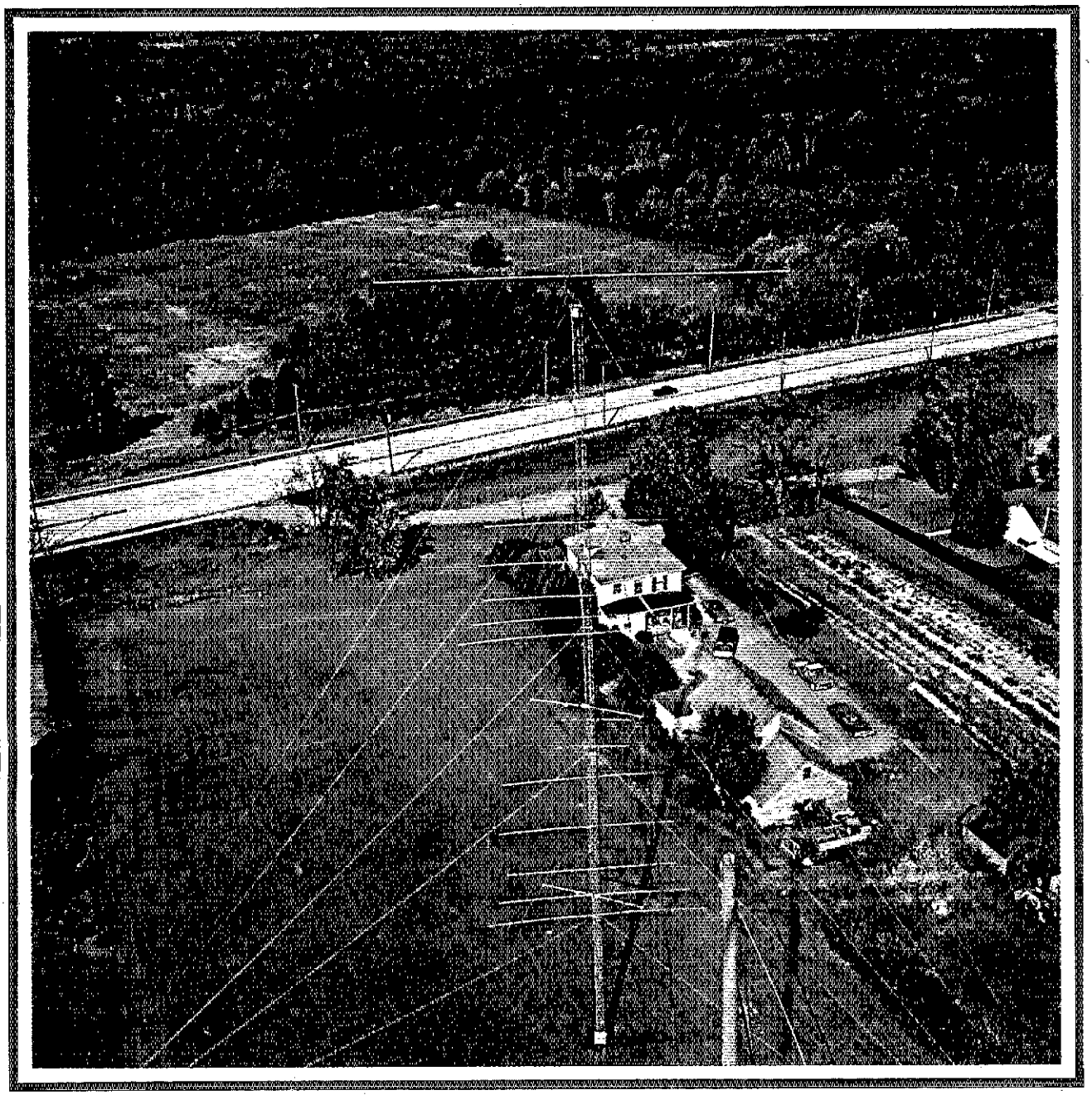
QST

devoted entirely to Amateur Radio

October 1977 $1.50



Did this station hit its target in the International DX Competition?

Page 81

the Tempo ONE is much more than just an inexpensive transceiver

The Tempo ONE is a highly reliable, excellent quality HF transceiver. It has proven itself in worldwide use by thousands of General and Advanced Class amateurs for more than six years. And now under the new FCC regulations the Tempo ONE has become the ideal rig for the Novice and Technician Class also. Study its specifications, talk to any of the thousands of owners, compare the Tempo ONE with other transceivers . . . and we know you can't beat the price. We're sure the Tempo ONE will prove itself to be the "value leader" for you also.

Frequency Range: 80 through 10 meters (28.5-29.0 10M. xtal supplied)
Modes of Operation: SSB upper and lower sideband, CW and AM.
Solid State VFO: Very stable Colpitts circuit
Receiver Offset Tuning (Clarifier): Provides ±5 khz.variation of receiver tuning when switched ON.
Frequency Stability: Less than 100 cycles after warm-up, and less than 100 cycles for plus or minus 10% line voltage change.
Input Power: 300 watts PEP, 240 watts CW.
AF Bandwidth: 300-2700 cps
Receiver Sensitivity: 1/2 μv input S/N 10dB
AGC: Fast attack slow decay for SSB and CW.
Selectivity 2.3 khz. (-6 dB), 4 khz. (-60 dB)
Image Rejection: More than 50 dB.
Audio Output: 1 watt at 10% distortion.
Audio Output Impedance: 8 ohms and 600 ohms
Tubes and Semiconductors: 16 tubes, 15 diodes, 7 transistors
Antenna Impedance: 50-75 ohms
Carrier Suppression: -40 dB or better
Sideband Suppression: -50 dB at 1000 CPS
Third Order Intermodulation Products: -30 dB (PEP)

TEMPO "ONE" TRANSCEIVER	**$399.00**
AC/ONE POWER SUPPLY	**$99.00**
CW FILTER KIT	**$46.00**
TEMPO VF/ONE External VFO	**$109.00**

AVAILABLE AT SELECT DEALERS THROUGHOUT THE U.S.

Henry Radio

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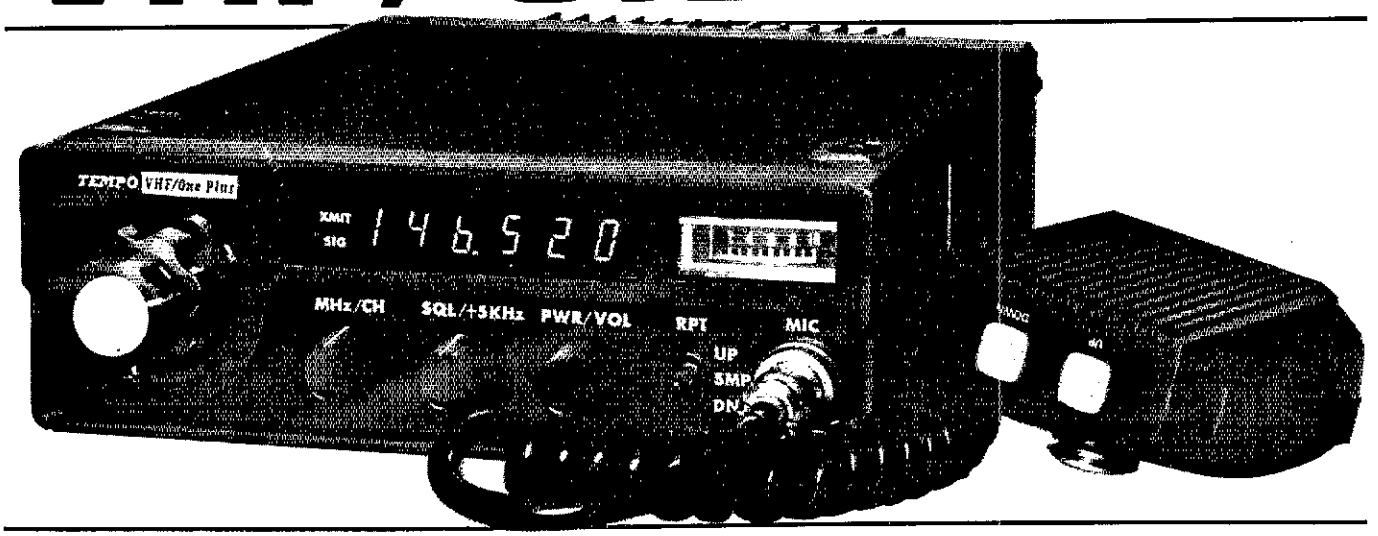
Butler, Missouri 64730 816/679-3127

TEMPO

VHF/ONE PLUS



MORE POWER / 25 OR 5* WATTS OUTPUT SELECTABLE

REMOTE TUNING / ON MICROPHONE

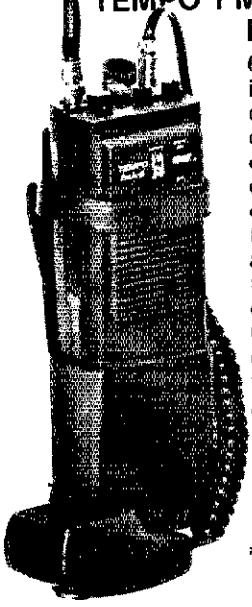
NEW LOWER PRICE / NOW ONLY $399.00

SIDEBAND OPERATION WITH SSB/ONE ADAPTER / MARS OPERATION CAPABILITY / 5 KHz NUMERICAL LED

The Tempo VHF / One Plus is a VHF / FM transceiver for dependable communication on the 2 meter amateur band • Full 2 meter coverage, 144 to 148 MHz for both transmit and receive • Full phase lock synthesized (PLL) • Automatic repeater split—selectable up or down • Two built-in programmable channels • All solid state • 800 selectable receive frequencies with simplex and +600 KHz transmit frequencies for each receive channel.

*Adjustable internally 3 to 15 watts

TEMPO FMH-2, FMH-5 & FMH-42 (UHF)



6 channel capability • selectable 1 or 2 - 1 or 5 Watts output • Solid-state • Battery level meter • Earphone jack • Built-in charging terminals and separate charging jack for Ni-cad batteries • Flex antenna • Carrying case standard • Excellent frequency stability allows use with booster amplifier for high power output over 100 Watts • 8 AA batteries or 10 AA Ni-cads.*

*Not furnished.

FCC Type accepted models available.

TEMPO VHF & UHF AMPLIFIERS

VHF (135 to 175 MHz)

Drive Power	Output	Model No.	Price
2W	130W	130A02	$199
10W	130W	130A10	$179
30W	130W	130A30	$189
2W	80W	80A02	$169
10W	80W	80A10	$149
30W	80W	80A30	$159

UHF (400 to 512 MHz)

Drive Power	Output	Model No.	Price
2W	70W	70D02	$270
10W	70W	70D10	$250
30W	70W	70D30	$210
2W	40W	40D02	$180
10W	40W	40D10	$145
2W	10W	10D02	$125

FCC Type accepted models available.

TEMPO POCKET RECEIVERS

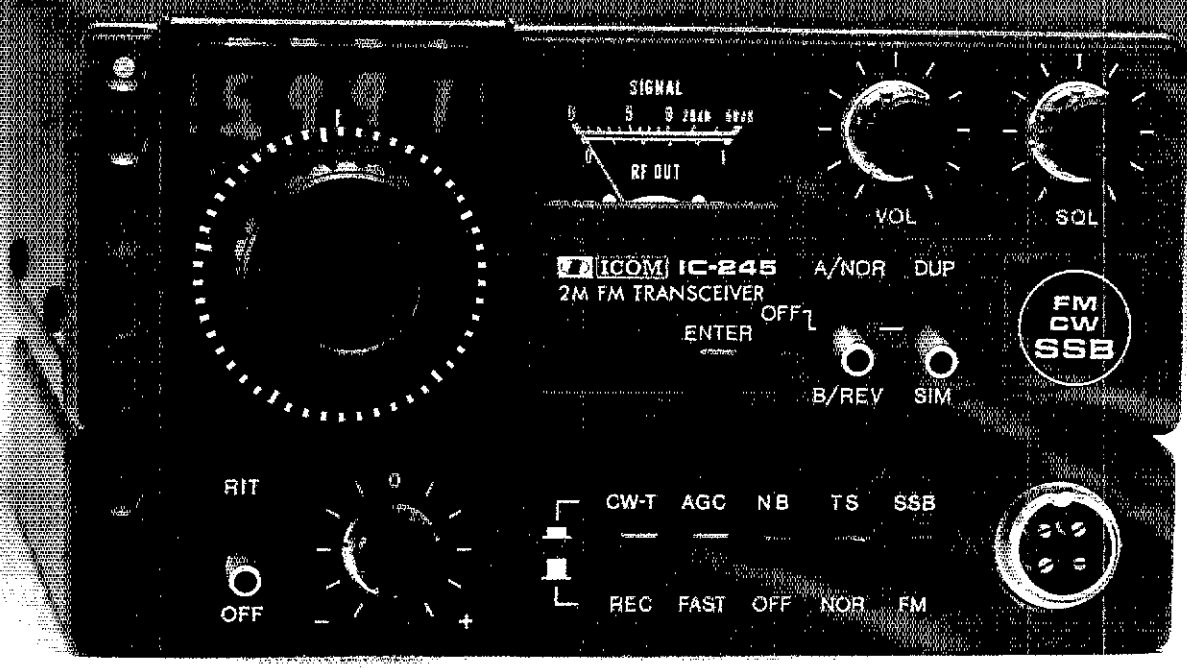
MS-2, 4 channel scanning receiver for VHF high band, smallest unit on the market. MR-2 same size as MS-2 but has manual selection of 12 channels. VHF high band. MR-3, miniature 2-channel VHF high band monitor or paging receiver. MR-3U, single channel on the 400 to 512 UHF band. All are low priced and dependable.

Sold at Tempo dealers throughout the U.S. and abroad. Please call or write for further information.

Prices subject to change without notice

11240 W. Olympic Blvd., Los Angeles, Calif. 90064 — 213/477-6701
931 N. Euclid, Anaheim, Calif. 92801 — 714/772-9200
Butler, Missouri 64730 — 816/679-3127

Henry Radio



That's all, Folks!

All you need for All Mode Mobile, that is.

All Mode Mobile is now yours in a superior ICOM radio that is a generation ahead of all others. The new, fully synthesized **IC-245/SSB** puts you into FM, SSB and CW operation with a very compact dash-mounted transceiver like none you've ever seen.

- **Single knob frequency selection:** The **IC-245/SSB** is the only fully synthesized mobile unit with convenient single knob frequency selection over the entire band. No more fussing with two or more knobs just to check what is going on around the band. One easy spin of the 50-position detent knob does it all. This very important user oriented feature is exclusively ICOM.
- **Variable offset:** Any offset from 10 KHz through 4 MHz in multiples of 10 KHz can be programed with the LSI Synthesizer.
- **Remote programing:** The **IC-245/SSB** LSI chip provides for the input of programing digits from a remote key pad which can be combined with Touch Tone* circuitry to provide simultaneous remote program and tone. Computer control from a PIA interface is also possible.
- **FM stability on SSB and CW:** The **IC-245/SSB** synthesis of 100 Hz steps makes mobile SSB as stable as FM. This extended range of operation is attracting many FM'ers who have been operating on the direct channels and have discovered SSB.

The **IC-245/SSB** is the very best and most versatile mobile radio made: that's all. For more information and your own hands-on demonstration see your ICOM dealer. When you mount your **IC-245/SSB** you'll have all you need for All Mode Mobile.

SPECIFICATIONS

GENERAL		*Spurious Radiation*	*60 dB or less below carrier*	*Squelch Threshold*	*5 dB or less (F3)*
Frequency Coverage	*144.00 to 148.00 MHz*	*Maximum Frequency Deviation*	*±5 kHz*	*Spurious Response*	*60 dB or better*
Modes	*FM (F3)*	*Microphone Impedance*	*600 ohms*	*SYNTHESIZER.*	
	**SSB (A3J), CW (A1)*	*RECEIVER.*		*Frequency Range*	*144 MHz to 148 MHz*
Supply Voltage	*DC 13.8V ±15%*	*Sensitivity*	**A3J, A1 0.3 microvolt input gives 10 dB S+N/N*	*Step Size*	*5 KHz for FM*
Size (mm)	*90H x 156W x 235D*		*F3 0.3 microvolt or less for 20 dB quieting*		**100 Hz or 5 KHz for SSB*
Weight (kg)	*2.7*		*S+N/N-D/N at 1 microvolt input, 30 dB*	*Stability*	*per C in the range of 10 to 60 C, ±0.0000145%*
TRANSMITTER					
TX Output	*F3 10W*				
	**A3J 10W (PEP), A1 10W*				
Carrier Suppression	*40 dB or better*				

* Valid with SSB only

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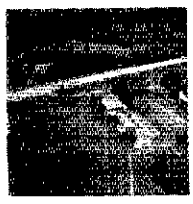
THE COVER



Using this 20-meter array, W2PV was able to work his share in the DX Competition. See full results, page 77.

Contents

Technical

Basic Radio

General

Organizational and Regulatory

Operating

Departments

Now there are two MLA amplifiers

DenTron announces the NEW! MLA-1200

The MLA-1200 linear amplifier was designed to give you a choice. We know that not all amateurs want to run 2000 watts PEP but we also feel the demand for a luxury styled amplifier. Hence the MLA-1200.

Basically it's built on success. The MLA-1200 incorporates the same sleek styling of the famous MLA-2500 but employs a single Eimac 8875 triode yielding 1200 watts PEP SSB and 1000 watts DC CW with as little as 70 watts of drive.

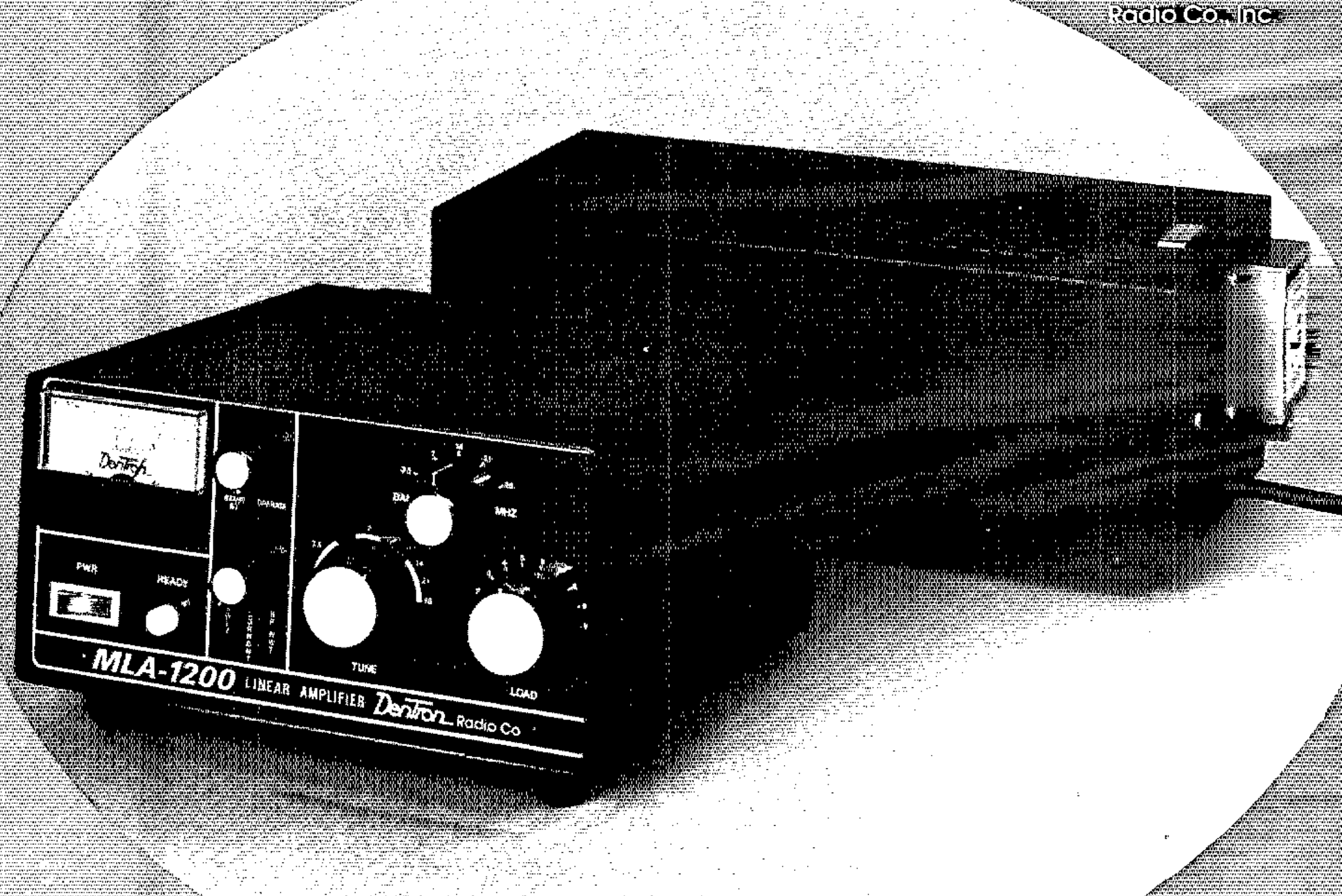
There are many features common to both MLA's, like forced air cooling, and a plug-in PC board containing ALC and metering circuitry. The MLA-1200 covers 10-80 and MARS frequencies. Be assured that all DenTron amplifiers far exceed the FCC harmonic emissions standards.

It's a different kind of luxury. The MLA-1200 is a compact dynamo only 10"W x 6½"H x 10"D and weighs only 10 pounds! Twin outboard power supplies are available for AC or DC mobile operation. Picture that on your home, boat or car!

MLA-1200 $399.50, AC-1200 $159.50, DC-1200 $199.50.

I'll bet you knew DenTron would give you a choice.

DenTron
Radio Co., Inc.



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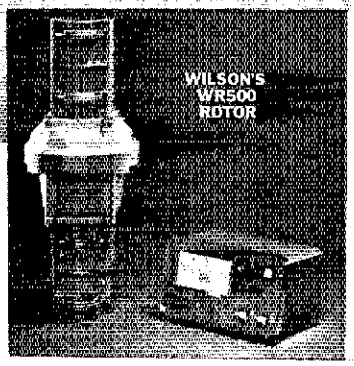
Twinsburg, Ohio 44
(216) 425-3173

Wilson's System one

TRIBANDER ANTENNA IS HERE...

System one
FOR 20, 15 and 10 METERS
Monoband performance with 4 elements on 20 meters on a 26' boom.

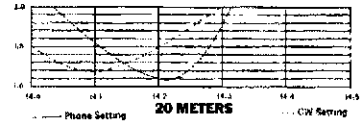
THE SY-1000 TRIBANDER ANTENNA IS SHOWN HERE WITH THE WR 500 ROTOR AND SST-64 CRANK-UP TOWER @ 50 FT. (Guy System not shown)

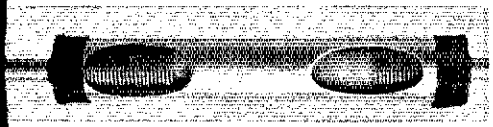


The new standard of performance for Tribanders is the Wilson System One!!! A DX'ers delight operating 20 meters on a full 26' boom with 4 elements, 4 operational elements on 20-15-10, plus separate reflector element on 10 meters for correct monoband spacing. Featured are the large diameter High-Q Traps, Beta matching system, heavy duty Taper Swaged Elements, rugged Boom to Element mounting . . . and value priced at $259.95. Additional features: • 10 dB Gain • 20-25 dB Front-to-Back Ratio • SWR less than 1.5 to 1 on all bands.

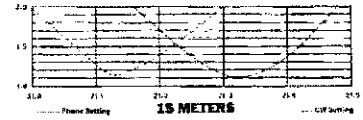
MODEL SY-1 SPECIFICATIONS:

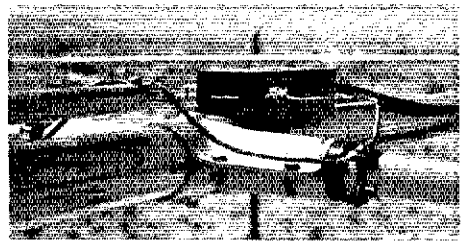
Matching Method:	Beta	F/B Ratio	20-25 dB	Mast Diameter	2" O.D.
Band MHz:	14-21-28	Boom Length	26' (2" O.D.)	Boom Diameter	2" O.D.
Maximum Power Input:	Legal Limit			Surface Area	7.3 sq. ft.
Gain	10 dB	No. of Elements	5	Windload Area	146 lbs.
VSWR (at Resonance)	1.5 to 1	Longest Element	26' 7"	Shipping Weight	50 lbs.
Impedance	50 ohms	Turning Radius	18' 6"		



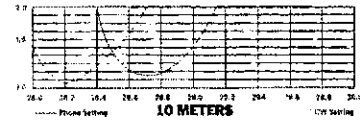


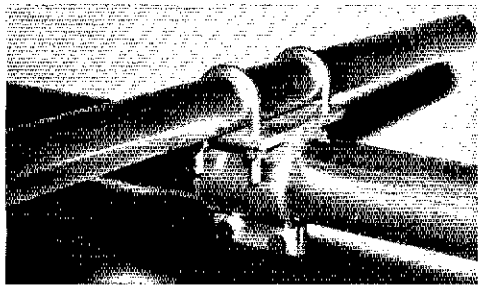
ADVANCED DESIGN LARGE DIAMETER HIGH-Q TRAPS FOR MINIMUM LOSS AND MAXIMUM POWER CAPACITY





INSULATED DRIVEN ELEMENT WITH PRECISION BETA MATCH AND HEAVY DUTY ELEMENT MOUNTS





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TR-8300

KENWOOD ANNOUNCES THE TR-8300. NOW YOU CAN TAKE ADVANTAGE OF THE LUXURIES OFFERED ON UHF. THE 70 CM (440 MHz) BAND OFFERS YOU NOISE-FREE, UNCROWDED OPERATION ON FM. THE TR-8300 PUTS YOU ON THE AIR WITH 10 WATTS RF OUTPUT POWER ON 23 CRYSTAL CONTROLLED CHANNELS (3 SUPPLIED) AT A LOW COST WHICH WILL SURPRISE YOU. THE TR-8300 HAS BEEN CAREFULLY DESIGNED BY KENWOOD ENGINEERS TO GIVE YOU EXCELLENT PERFORMANCE OVER A BROAD FREQUENCY RANGE. THE TR-8300 IS FACTORY ADJUSTED AS FOLLOWS: TRANSMITTER (445.0-450.0 MHz), RECEIVER (442.0-447.0 MHz). HOWEVER, THE TR-8300's RECEIVER AND TRANSMITTER SECTIONS CAN BE INDEPENDENTLY ADJUSTED TO COVER ANY 5 MHz SEGMENT BETWEEN 440.0 and 450.0 MHz.

Excellent Performance Characteristics

A host of new innovations developed as a result of intensive testing have been incorporated. These include a 5 section helical resonator and a two-pole crystal filter in the IF section of the receiver for improved intermodulation characteristics. In addition, receiver sensitivity, spurious response, and temperature characteristics have all been improved drastically.

Safety Protection Circuit

Special protection circuitry designed to protect the final stage transistors from the effects of severe SWR fluctuations that mobile equipment is subject to is provided. In addition, a power supply stabilization circuit is provided for the final stage to prevent any damage to the power transistors because of excessively high power supply voltages.

Protection Circuit for Reversed Polarity Connections

A protection circuit is provided to prevent any damage to the unit even if the polarity of the power supply connections is inadvertently reversed.

Call Channel Switch

The TR-8300 incorporates an additional feature called CALL CH. It allows control of a user desired function (CTCS, etc.) by using a single button on the front panel.

Broad Band Operation

The TR-8300 is designed for flexible coverage of the 70 CM band. The transmitter and receiver can be independently adjusted to cover any 5 MHz segment between 440.0 and 450.0 MHz.

2 Output Settings

Maximum transmitting power is a husky 10 watts from meticulously designed and assembled final stage. It may be set to provide either this 10 watt "Hi" output or a "Low" 1 watt output simply by means of a pushbutton switch.

Special Monitor Circuit

The TR-8300 includes a special monitor circuit which enables the user to listen to his own modulation and make frequency adjustments.

Coaxial Relay Employed for Antenna Switching

Motorola Power Transistor for Excellent Reliability

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

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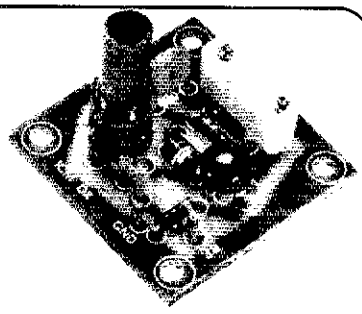
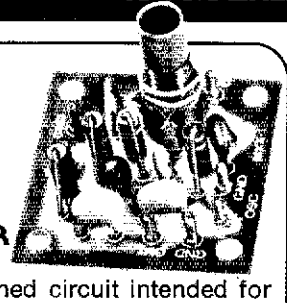
for the experimenter!

INTERNATIONAL CRYSTALS & KITS

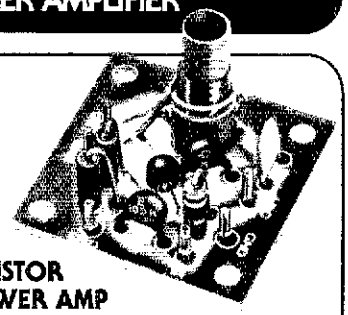
OSCILLATORS • RF MIXER • RF AMPLIFIER • POWER AMPLIFIER



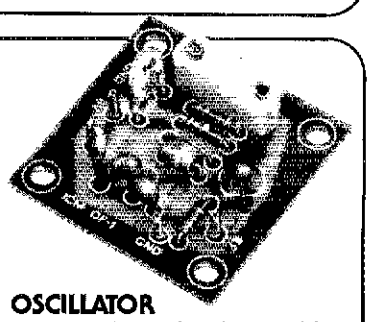
OX OSCILLATOR
Crystal controlled transistor type. 3 to 20 MHz, OX-Lo, Cat. No. 035100. 20 to 60 MHz, OX-Hi, Cat. No. 035101
Specify when ordering.
$3.95 ea.



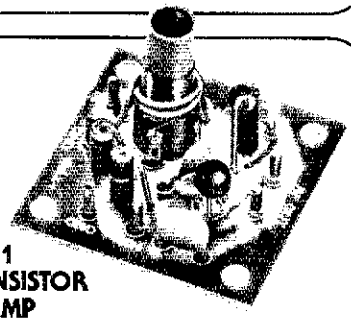
MXX-1
TRANSISTOR
RF MIXER
A single tuned circuit intended for signal conversion in the 30 to 170 MHz range. Harmonics of the OX or OF-1 oscillator are used for injection in the 60 to 179 MHz range. 3 to 20 MHz, Lo Kit, Cat. No. 035105. 20 to 170 MHz, Hi Kit, Cat. No. 035106
Specify when ordering.
$4.50 ea.



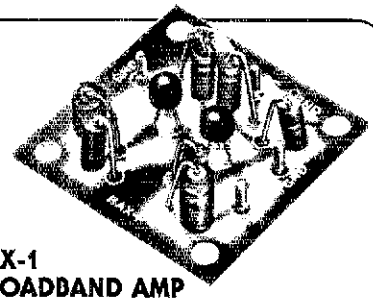
PAX-1
TRANSISTOR
RF POWER AMP
A single tuned output amplifier designed to follow the OX or OF-1 oscillator. Outputs up to 200 mw, depending on frequency and voltage. Amplifier can be amplitude modulated. 3 to 30 MHz, Cat. No. 035104
Specify when ordering.
$4.75 ea.



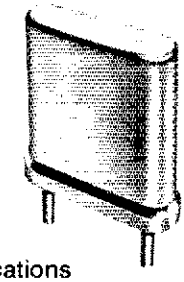
OF-1 OSCILLATOR
Resistor/capacitor circuit provides osc over a range of freq with the desired crystal. 2 to 22 MHz, OF-1 LO, Cat. No. 035108. 18 to 60 MHz, OF-1 HI, Cat. No. 035109
Specify when ordering.
$3.25 ea.



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.



DAX-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.

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ICM

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Oklahoma City, Oklahoma 73102

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1615 Scottsdale Ave., Columbus, OH 43220

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Vice Director: George A. Diehl, W2IHA
20 Wilson Ave., Chatham, NJ 07928

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THE AMERICAN RADIO RELAY LEAGUE, INC.

The American Radio Relay League, Inc., is a noncommercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its board.

"Of, by and for the amateur," it numbers within its ranks practically every worth-while amateur in the nation and has a history of glorious achievement as the standard-bearer in amateur affairs.

Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisite, although full voting membership is granted only to licensed amateurs.

All general correspondence should be addressed to the administrative headquarters at Newington, Connecticut 06111.

"It Seems to Us..."

WARC in a Magnetic Field

It is natural for people or groups of people to look at their problems in isolation. As amateur operators our thoughts often terminate with such considerations as SWRs or how many countries we have worked for DXCC. As members of the amateur fraternity, we tend to hold the ARRL responsible for our welfare on sizable chunks of the radio frequency spectrum. As Americans, we expect our government to protect us in international councils.

Such comfortable nostrums are not as valid as they once were. They need to be adjusted to the realities of a world significantly changed by a communications revolution in which amateur radio has made its modest contribution. In anticipating WARC, none of us can ignore outside forces which, like a magnetic field, will affect its deliberations.

1) *Political logrolling.* When the first postwar international radio conference was held in 1947, the United Nations numbered just over 50. Since then there has been a veritable explosion of new nations. At WARC in 1979, some 153 nations will be voting.

In 1947, our country had embarked with missionary zeal on what turned out to be a short-lived Pax Americana. At the United Nations, we rammed through such issues as the creation of Israel. For a score of years, by intensive "arm twisting," we mobilized the votes to prevent Communist China from being admitted. During the Korean war, we put through a "Uniting for Peace" resolution, designed to bypass Russia's vetoes in the Security Council. We relied on our ability to deliver a majority of the votes at the General Assembly.

Those days are past. Our chickens have come home to roost. A new majority, comprised primarily of the emergent nations, encouraged by the Communist countries, is ramming through resolutions. Issues are decided, not necessarily on their merits, but through a coalition of special interests. Frequently, the decisions are in defiance of positions which we Americans strongly hold.

The climate at the United Nations inevitably affects its auxiliary agencies. It is devoutly to be hoped that by 1979, all nations will better appreciate that the common interest should transcend special interests and that issues should be decided, not by logrolling, but on their merits. To this end, progress toward the resolution of tensions in the Middle East and in Africa could make a major contribution.

2) *Economic disparities.* Per-capita income in the United States is about $6,600 annually. But 2.5 billion of the world's four-billion people are subsisting for a whole year at incomes less than the price of a 2-meter transceiver. With only five percent of the population, the United States produces 24 percent of the gross planetary product and consumes one-third of the world's energy. Some 73 percent of the world's population shares in only 21 percent of the planet's production of goods and services. The Less Developed Countries are burdened with a $186 billion external debt. It will increase by $47 billion this year.

In absolute terms, this chasm between rich and poor nations is growing wider. Not surprisingly, tensions are rising. The LDCs have banded together to demand a New International Economic Order. Simplistic proposals for massive resource transfers are not the answer, but a more equitable international economic system must be found. It is interesting that even though plunged into deeper debt by the oil price hikes, Third World countries have muted their criticism of the OPEC countries. They are undoubtedly comforted by the belief that OPEC's actions are puncturing the smugness of the Developed Nations.

Under the circumstances, it is conceivable that many small and poor nations at WARC may construe American support for amateur radio as just another symbol of the determination of the Developed Countries to dominate them through some sort of economic hegemony. The problem, of course, is not only to divorce amateur radio from such international economic implications but to persuade our friends in the LDCs that amateur radio could make a technological contribution to their economic development.

3) *Finite resources.* In dramatic terms, people everywhere are learning that the natural resources of this planet are finite. During my recent visit to the Middle East, I was told that Saudi Arabia, without ever exploring for another drop of oil, can continue its daily production, half America's total consumption, until the year 2037. Yet, even in Saudi Arabia, the day will come when petroleum reserves will be exhausted.

It strikes me that we radio amateurs should keep in mind that the radio spectrum is also a finite resource. Should we not ask ourselves sensitive questions? Are we unleashing excessive kilowatts of rf or spurious radiations, creating unnecessary RFI problems and complaints to the FCC? Can we utilize efficiently, and in accordance with our high purposes, the frequency bands we are demanding, or are we seeking frequencies which will lie idle and unavailable to equally justified claimants? In any case, should we not, in the general cause of conservation, be doing more to assist in the development of alternatives which will assure a less extravagant utilization of the finite radio frequency spectrum? In short, should we not, in being true to our past, strive with increased dedication to improve the state of the art?

In pointing out that WARC in 1979 will be influenced by the magnetic field in which it occurs, we need not conclude that the cause of amateur radio will be overwhelmed. There are many positive forces.

WARC is essentially a technological conference. When scientists get together, political factors tend to play a less important role. Another positive factor is the splendid growth of the amateur radio community throughout the world. The Japanese, the Europeans, the Latin Americans, and the Soviet Union with its friends, all support active amateur operations. In these and other countries, the International Amateur Radio Union, under Noel Eaton's able direction, is intensively developing maximum support for the amateur cause.

While casting only one vote among 153, the United States still has great weight, even though it may not be as decisive as in earlier conferences. The ARRL is mounting a major endeavor, collaborating with the FCC and other governmental authorities, in planning for 1979. Every amateur who values his hours on the air should give the League and our government wholehearted support.

Such support means full cooperation in the campaign to gain worldwide support for the amateur cause at WARC. But it also means realizing that the climate in 1979 can be a determinant. Thus it behooves amateurs to interest themselves and encourage our government as it addresses the major international issues of our time. Our fate at WARC cannot but be improved by the reduction of tensions between nations, by insuring a better living for people everywhere, and by conserving this planet's precious resources, while at the same time developing new technologies to assure the continued progress of civilization. — *W3ACE*

League Lines...

This month's guest editorial is by Armin Meyer, W3ACE, former U.S. ambassador to Iran and Japan, and still very much involve in international affairs. These remarks were originally presente at the Northwestern Division Convention on July 30, and we are honored to be able to give them wider distribution this month in QST.

You asked for it -- now it's here! Rip-off and fire insurance fo your rigs, whether at home or in your car, sponsored by your League for its members only. There's info on page 58 of September QST; a brochure will be in the mail to members soon. One improvement: Since the September article, we've secured assurances that members in Canada, Alaska, Hawaii and Puerto Rico will have the same coverage at the same rates as members in the "lower 48" states.

Rig already been ripped off? Then register your stolen equipme in the ARRL's Stolen Equipment Registry. Updated monthly, thi compilation will be available free upon request to radio amateu and dealers as of November 1. Check the Registry before purchasing any used gear. This service is being instituted on a trial basis for one year. To register stolen equipment, ask for the stolen equipment registration card with a self-addressed, stamped envelope (s.a.s.e.).

U.S. Amateurs on or over the high seas, outside the jurisdiction of any country, have been freed of certain frequency restrictions imposed on them. Amateurs traveling within Region 2, North and South America, can now use any frequency authorized them under Section 97.61 of the rules. Amateurs traveling elsewhere can use the frequencies allocated to amateurs in the region; if in doubt, write ARRL hq. for details, enclosing a self addressed envelope.

Use of ASCII 8 unit teleprinter code on AMSAT-OSCAR 7 has just been extended by the FCC to March 15, 1978.

November SS rule change! A Contest Advisory Committee recommendation just adopted bans the use of the 146-148 MHz FM su band in this and subsequent November SS; see other rules this

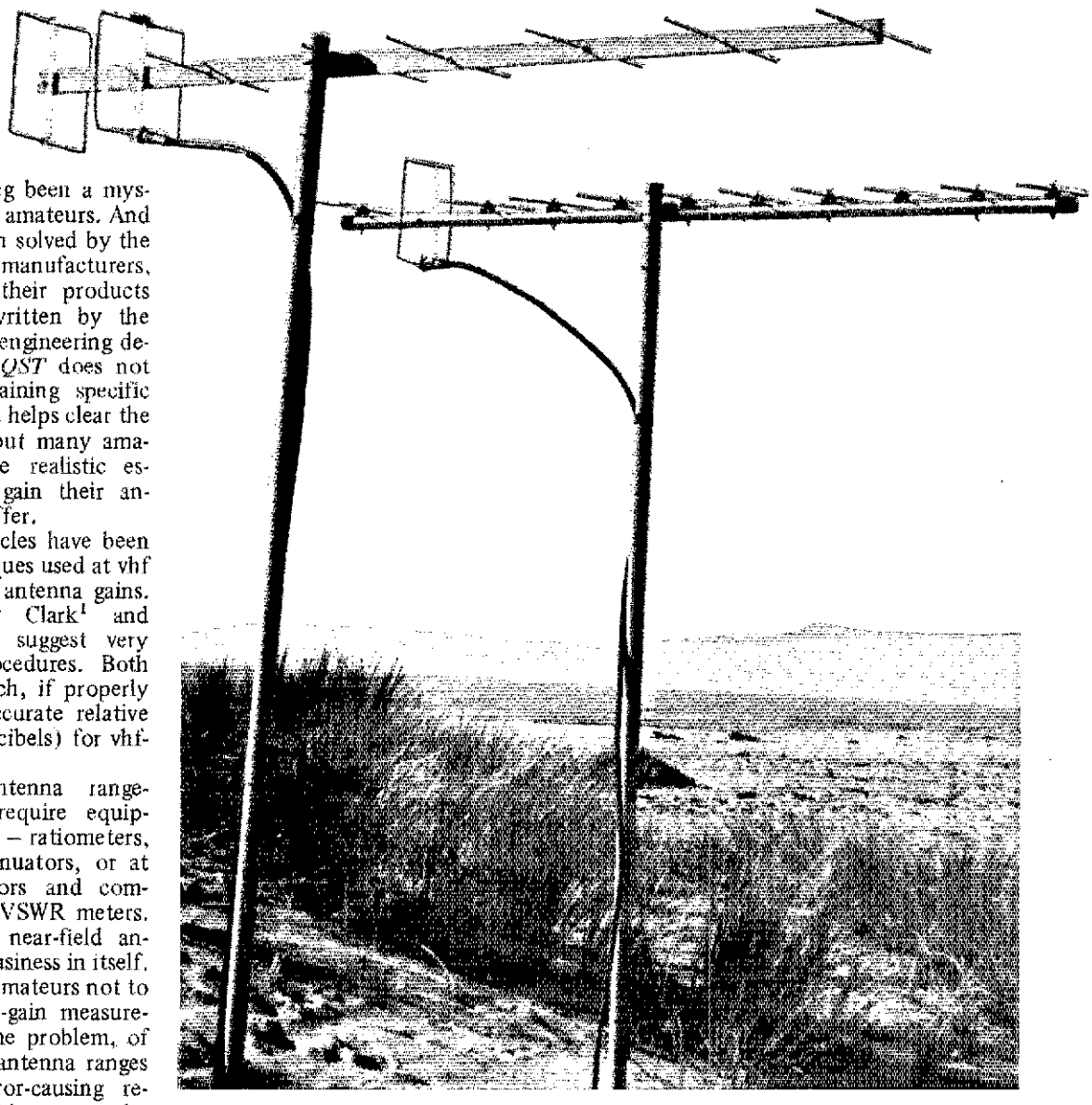
Amateurs in Hawaii can now use the 1800 to 1810-kHz segment of 160 meters from 4 P.M. to 8 A.M. local time, with no more than 100 watts input power. The new segment was made available to KH6s by a waiver of FCC rules, effective through July 1, 1978. The Commission has reserved the right to cancel the waiver, however, if the Coast Guard reports interference to the LORAN radionavigation system.

Know of any U.S. gals with visual problems? Whether licensed or not, they may be interested in the taped edition of YLRL publication, YL Harmonics. Further info from either Thelma J. Bolvin, WB4AUR, 2210 S.W. 27 Lane, Miami, FL 33133 or Raj S. Cauthers, K7NZO, 2310 Sleater Kinney Rd., S.E., Lacey, WA 98504.

Measuring Antenna Gain with Amateur Methods

Beat the cost of expensive test gear. Make your antenna measurements using this unique method! A VU meter, a handful of parts and this simple explanation are all you need.

By Wayne Overbeck,* Ph.D., K6YNB



For the antenna gain-measurement technique described here, two identical masts in a clear area (here a Southern California beach) are required. With the test and reference antennas at equal heights and fed with identical feed lines, the signal produced by the two antennas is compared by rapid and repeated switching. Here an 8-element quagi is tested against an 11-element Yagi that has been modified for quagi-type drive. The modified Yagi delivers 3 dB more gain than the conventional version, but 2 dB less than the quagi.

Antenna gain has long been a mysterious subject for many amateurs. And the mystery has not been solved by the commercial antenna manufacturers, whose gain claims for their products have sometimes been written by the advertising and not the engineering department. As a result, *QST* does not accept advertising containing specific antenna-gain claims. That helps clear the air of misinformation, but many amateurs still cannot make realistic estimates of how much gain their antennas actually have to offer.

Several excellent articles have been written about the techniques used at vhf conferences to measure antenna gains. Two such articles by Clark[1] and Knadle,[2] in particular, suggest very good antenna-range procedures. Both describe techniques which, if properly applied, will produce accurate relative antenna-gain data (in decibels) for vhf-uhf antennas.

However, these antenna range-measurement systems require equipment most amateurs lack – ratiometers, precisely calibrated attenuators, or at least specialized detectors and commercial grade audio or VSWR meters. Moreover, setting up a near-field antenna range is a tricky business in itself. One text[3] simply warns amateurs not to expect accurate antenna-gain measurements if they try it! The problem, of course, is that outdoor antenna ranges invite all sorts of error-causing reflections from various objects, not the least of them being the earth itself.

Ground reflections alone can com-

*Pepperdine University, Malibu, CA 90265

[1] Footnotes appear on page 14.

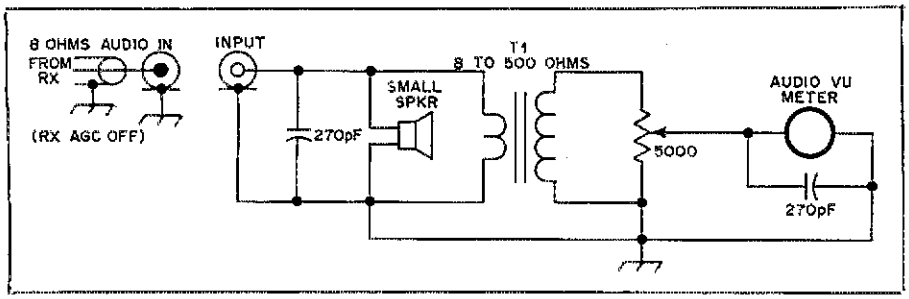


Fig. 1 — The audio VU-meter system for antenna gain measurements.

pletely invalidate the results on an otherwise good antenna range. At the 1973 West Coast VHF Conference, for instance, the author's 8-element quagi for 432 MHz[4] was measured at precisely the same gain as a well-built 15-element Yagi more than twice its size, despite the fact (established in other tests) that the bigger antenna had 2 to 3 dB more actual gain! The problem was that, even with the sophisticated measuring equipment in use, ground reflections were distorting the results. The best "gain" indication came with both antennas within a few inches of the earth, and the smaller quagi with its lower *Q* didn't mind the detuning effects of the earth's proximity as much as the bigger and higher *Q* array.

With results like that, wild claims are sometimes made for one vhf antenna or another. And the claims may be even wilder on the hf bands, where an amateur may well be told his signal is two or three S units louder than another ham's signal when the actual gain difference between the two antennas is insignificant. The ham who "won" the comparison by several S units, of course, is likely to go away thinking his antenna is 12 or 18 dB better than the other guy's, since S meters are supposed to show 6-dB signal difference per S point.

A Better Way

This article describes a more reliable and valid way to estimate antenna gain, and without expensive or hard-to-find test equipment. The technique requires only this equipment: a cooperative nearby ham with a transmitter capable of generating a few watts of steady carrier, a receiver whose agc can be turned off, an ordinary audio VU meter, and some antennas to measure.

The technique is nothing more than a more rigorous application of the test procedure radio amateurs have always used when they asked for "comparison" signal reports. It takes advantage of the fact that audio VU meters, unlike S meters, are calibrated directly and fairly accurately in decibels, with easy readout down to fractions of a dB. And with the agc turned off, most receivers will closely reproduce changes in the signal input at the antenna terminals with corresponding changes in audio output until they are badly overloaded.

This means that a nearby amateur's signal transmitted at a reasonably low power level can be used to compare the gain of various antennas by rapidly switching back and forth between them and averaging the results.

The only trick is to use a "test signal" that is coming from a point source — not a signal that is being reflected from surrounding objects. If your test antennas can "see" the signal source a few miles away and are well clear of nearby objects (and clear of the earth itself), valid results should be attainable if the procedures below are followed.

The author has spent many hours working with both local antenna ranges covering a few dozen wavelengths, and on-the-air signals from local stations. It is apparent that ground reflections and other such error sources are less serious problems when a steady, on-the-air carrier a few miles away — and not a local signal a few dozen wavelengths away is the signal source.

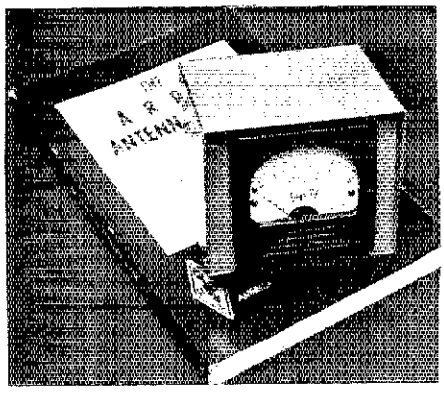


Fig. 2 — This small box houses all the test equipment required for antenna gain measurements using the technique described here. The front-panel audio VU meter is calibrated directly in decibels, with readout possible to about 0.2 dB in the most expanded part of the scale. Not visible are the meter level potentiometer (on rear), and small speaker which is mounted downward.

Test Procedures

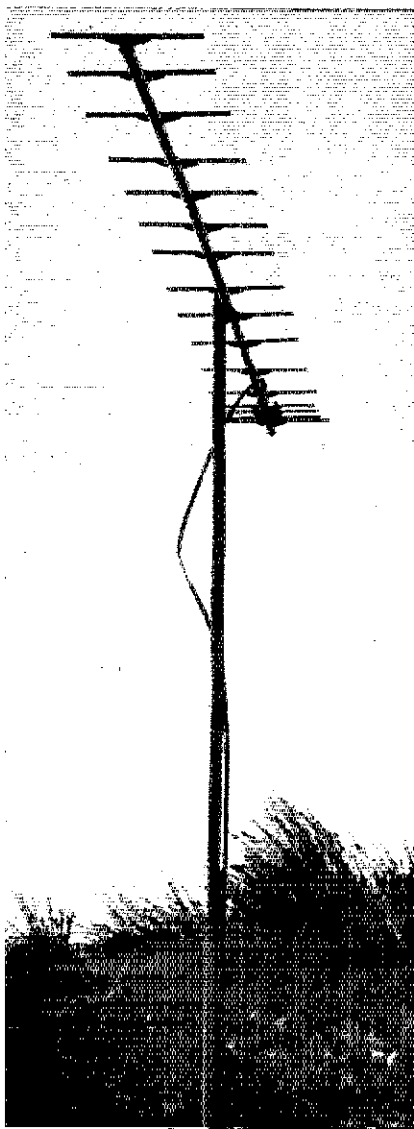
Here's how the procedure works at

vhf (at hf, it's a little more complicate because antennas are larger, as we'll s later):

1) Build an audio VU metering c cuit like the one shown in the pho and Fig. 1. All parts should be readi available anywhere that consumer ele tronics parts are sold. The speaker a meter-gain control are handy to ha when the receiver itself is located so distance away from the antenna te site, but they aren't absolutely essenti

2) Get a nearby amateur (perha one to five miles away) to generate steady carrier into an antenna of t same polarization as your test antenna A small beam pointed toward your te site is much better than a dipole groundplane antenna because it is le likely to invite reflection error. A bea pointed somewhere else is worst of a

3) Two of the antennas to be teste should be set up side by side, wi identical lengths of feed line going to coaxial relay or well-isolated switc The two supporting poles should high enough that the test antennas a at least two wavelengths above grou



(13 feet or more at 2 meters) and clear of nearby obstructions. To minimize interaction between the two antennas, the two masts should also be at least one to two wavelengths apart and standing side by side in relation to the signal source.

4) Make sure you can raise and lower your antennas and move them from side to side by at least a full wavelength or so (81 inches at 2 meters) without the indicated signal varying more than about 1 dB. If you can't do that, you probably have reflection problems that will have to be solved before you can make valid readings. If this is the case, try different sites until you do achieve nonspotty reception.

5) Check the receiver agc to be sure it is off; then rapidly switch between the two antennas and record the difference in decibels. Do it several times and calculate the average figure (the mean, for statisticians).

6) Next reverse the two antennas. Put antenna no. 1 on mast no. 2 and attach it to feed line no. 2. Move antenna no. 2 over to mast no. 1 and feed line no. 1. Do not eliminate this step and expect valid results.

Now run the test again. If there are more than very slight differences from the previous test, one antenna or the other is seeing some obstruction or reflection source. Your site isn't clear enough for good results; try a different one.

Since this test procedure requires only receiving, there is no reason not to perform it somewhere other than at home — anywhere that is clear of obstructions. Use a receiver or transceiver that runs on battery power, if necessary.

7) If you have followed steps one through six, you now have an accurate indication of the relative gain of your two antennas. Now you can make one of your antennas a "reference" antenna and compare any other antennas you or neighboring hams have against this reference.

So how do you determine how much gain your antennas have over a dipole? Some people would say, "Simple, make the reference antenna a dipole." But it may not be that easy, because dipoles are notorious for finding reflections that more directional antennas can't "see." At vhf conference gain-measurement seminars, dipoles have sometimes shown as much as 3 or 4 dB gain over a dipole!

The best reference antenna is probably a small beam of known (or approximately known) gain, assuming you don't have the National Bureau of Standards type of reference antenna that professionals use for this purpose. A three-element Yagi or a two-element quad built to handbook dimensions will usually deliver about 6 dB gain over a dipole at 2 meters, if the SWR is okay at the design frequency.

Thus, if you find that a particular eight-element antenna consistently produces 4.5 more dB on the VU meter than your little reference beam, you'll know you have an antenna with about 10.5 dB gain. You won't be exactly correct, but you'll be close to the right figure. Conversely, if your bigger beam doesn't show much gain over the small one, and there are no measurement errors of the sort just described, you'll know for sure that something is wrong with the big antenna.

Once you have established the integrity of your test site, you can even design your own antennas very accurately, using the audio VU-meter technique. To do that, set up your reference antenna and begin designing your new antenna by putting an empty boom on the other pole. Now start with two or three elements, get a decent SWR and try adding more elements.

As you add elements, you will be able to actually see where each new element "wants to be" on the boom, and you can see your new antenna gain over the reference antenna increase as you go along. Try all sorts of element lengths and spacings as you progress.

Antenna design professionals call this process "perturbation" and they do it with sophisticated mathematics, but you can design antennas that work just as well as theirs on your own antenna

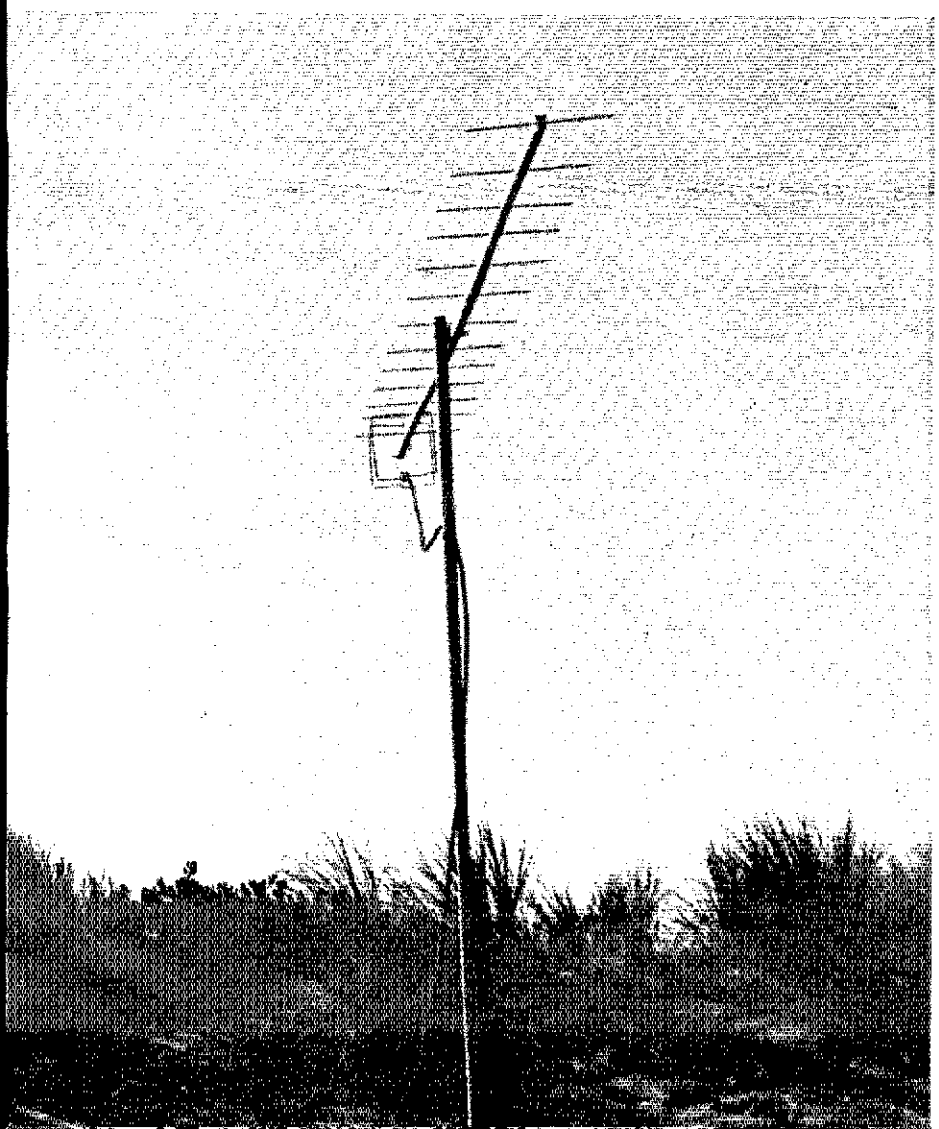


Fig. 3 — Here a 15-element long-boom quagi for 432 MHz is compared to a 16-element log-periodic Yagi, using the test procedure described in this article. The two antennas both deliver 15 dB gain over a dipole, decisively better than any other 432-MHz antenna tested here. The antennas to be tested are set up side by side and fed with identical lengths of coax. The antennas should be at least two wavelengths above ground and clear of nearby obstructions. To minimize interaction between the two antennas, the masts should also be at least one to two wavelengths apart, and standing side by side in relation to the signal source.

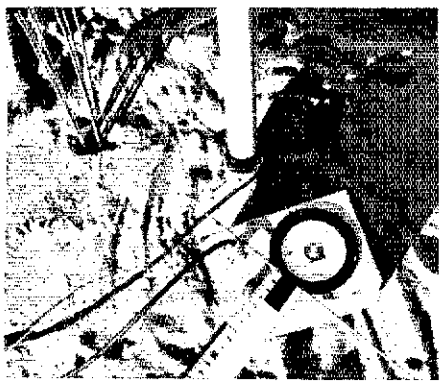


Fig. 4 — An earlier version of the metering system in Fig. 1, with assorted elements of various lengths and the yardstick used to make temporary placements on the boom.

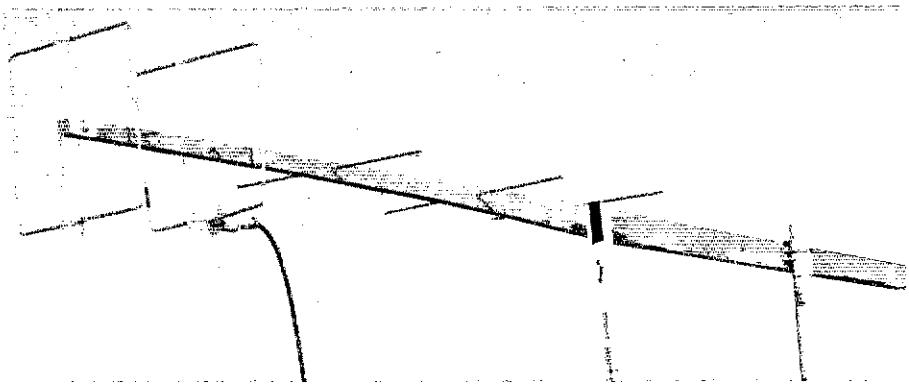


Fig. 5 — This photo shows the technique used to design a new vhf or uhf antenna experimentally. The boom is shown with the first few elements already in place, and each additional element is adjusted back and forth on the boom until a point of maximum indication on the VU meter is found.

range, once you master this technique. Then, if you do go to a vhf conference with your best home-designed antennas, you'll know about how much gain they have before you enter the gain contest. And you'll never come away from such an event with an antenna that has "minus 3 dB gain!" Moreoever, you'll know that your measurements, made without any of the sophisticated equipment you saw at the vhf conference, are about as accurate as anybody's. In fact, you may find your own measurements are more valid than the ones at the conference, especially if the antenna-gain figure jumps all over the place when you raise and lower it at the conference antenna range.

HF Antenna Measurements

So far, all of this has been devoted to vhf antenna-gain measurements. Many readers will say, "That's fine, but I want to measure the gain of my five-element 20-meter beam!" Of course, an audio VU meter and a receiver without agc are a much better way than the notoriously inaccurate S meter to compare two dissimilar hf antennas. The author has seen an S meter show three or four *S units* of signal difference between two antennas that are really only 3 or 4 dB apart in gain.

However, the only accurate way to calculate the gain of an antenna is to compare it to a reference antenna at the same height and then switch the two antennas to opposite masts to validate the data. That may be impractical at hf, but perhaps not as much so as it seems at first. Most amateurs motivated enough to install a five-element beam on a crankup tower can probably find a way to temporarily set up a smaller beam (not a dipole) on a 20-foot mast above a roof. Then the two antennas at identical heights can be compared on stable, line-of-sight signals.

The results of this test can be invalidated by obstructions or even by other antennas mounted on the same tower with the test antenna, but at least this will be more valid than a comparison against another ham's readings, when the two locations and rigs may be entirely different.

And if you can switch your test reference hf antennas to opposite masts, you can measure the actual gain of one over the other. One suggestion before you put that giant, long-boom array on the big tower: Put a little beam on the tower and an identical one on the rooftop mast and perform the audio VU-meter tests to see if the two antenna sites do seem to be identical. If they are comparable, then you can put the big antenna on the tower and find out how much gain it has, if any, over the small one on your roof when the two are at the same height.

This may seem cumbersome, and in fact it is! That's why most antenna designers do their research at vhf where antennas are so nice and small, and then scale their best designs up for the hf bands. But if you really want to know your big beam's actual gain, this is probably the easiest way to find out.

Conclusions

The antenna gain-measuring technique described in this article has repeatedly been proved to be reliable and valid. The author has used it to design new antennas that work well enough for all kinds of contest and DX work, including moonbounce. For a dedicated amateur, working DX on a home-designed antenna far surpasses the thrill of working the same DX with an antenna purchased at a store! But remember, whether you're working 20 meters or 23 centimeters, a signal source, a receiver with its agc disabled and an audio VU meter are the only pieces of equipment you need to measure antenna gain with this technique. QST

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[1] Clark, "Direct Methods for Measuring Antenna Gain," *Ham Radio* for July, 1969.
[2] Knadle, "UHF Antenna Ratiometry: An Outdoor Range Improvement Technique," a paper presented to IEEE Intercon session L, April, 1975.
[3] Brier and Orr, *VHF Handbook for Radio Amateurs*, Radio Publications, Inc., Wilton, CT, page 225.
[4] Overbeck, "The VHF Quagi," *QST*, for April, 1977.
[5] Knadle, "UHF Antenna Ratiometry," *QST* for February, 1976.

Strays

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Optimizing Vertical Antenna Performance

Do you have tower restrictions, a small yard or patio, almost no room for antennas? If so, here are some suggestions for making your signal bigger in spite of the handicaps.

By Yardley Beers,* WØJF

Antennas never cease to be a hot topic of conversation among amateurs; the interesting articles by John Stanley, K4ERO/HC1[1] and Roger Hostenbach, W5EGS,[2] on the optimum grounding of vertical antennas have led me to communicate my thoughts on the subject. In my present location I have obstacles (typical of many suburban dwellings) which place severe limitations upon where I can place ground wires. These obstacles are large boulders, areas of concrete, the house, vegetable and flower beds, and the neighbors' property lines. It has not been possible to lay out radials of uniform length or of uniform angular distribution. Nevertheless, I *have* had successful results with vertical antennas. Although I must make a number of statements which are based upon fragmentary evidence and are lacking in scientific rigor, I believe they are useful for suggesting how others might proceed to optimize their particular situations.

I have three very dissimilar vertical antennas. Much of my discussion will pertain to their individual ground systems, although strictly speaking they cannot be independent; a change of the grounding conductors of one vertical is bound to affect the others. For brevity I shall not discuss the methods of impedance matching of the antennas as this is a topic thoroughly covered elsewhere. I *shall* mention some problems of using dissimilar antennas in a phased array, although my results are preliminary.

The three antennas are (1) a shunt-fed crank-up tower having a three-element triband Yagi on top, the height being variable from 27 to 41 feet; (2) a 40-foot insulated base-loaded antenna consisting of a 30-foot pipe mast topped by a whip, located approximately 70 feet south of the tower and hereafter referred to as the "south antenna"; (3) about 20 feet east of the tower, a vertical antenna termed the "north antenna," which was described in an earlier *QST* article.[3] Fig. 1 shows the layout. The north antenna has been used with various heights up to 40 feet but in the present experiments it is used in its "summer" configuration with a height of 25 feet and with a 7/14-MHz trap located 10 feet from the base. For 3.5-MHz operation additional loading is supplied at the base.

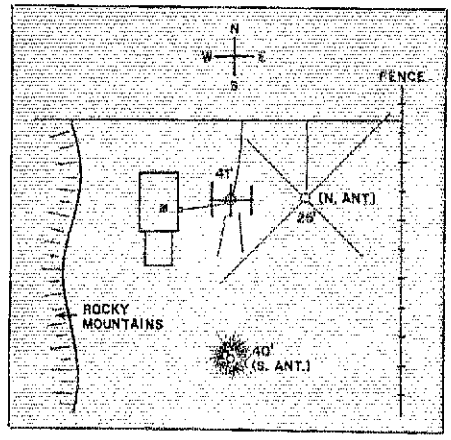

Fig. 1 — The WØJF backyard, with antenna farm.

The Grounding Systems

None of the three verticals have anything approaching an optimum ground system; while the south antenna has the best on paper, it is not necessarily the best in performance. When the south antenna was first placed into operation the grounding system consisted of about 200 feet of wire distributed among a few conductors which went out more or less radially. One was about 60 feet long, the others 30 feet or less. On 7 MHz the performance was generally inferior to that of a horizontal half-wave dipole 30 feet above ground. Later, the ground system was augmented to utilize about 1000 feet of wire, and the vertical then began outperforming the dipole.

While I foresaw Stanley's statement that possibly not all of this additional wire would be effective, I assumed that any wires I added at least would do no harm, and I tried to put wires in the entire immediate area of the antenna, subject to the constraints mentioned above. Several of the radials have bends to avoid obstacles. In a few cases a single wire goes out from the antenna to a junction some distance away, and then several wires fan outward from the junction. Three wires are connected at the far ends to a few square feet of chicken wire. Where the wires are in shrubbery they are above ground; otherwise they are an inch or two below. None of the additional wires were as long as 60 feet, and the lengths were generally determined by the obstacles they encountered. Haphazard as this system was, the improvement was spectacular.

While I was making this change in the south antenna's grounding, I carried out two simple experiments. First, when I was operating at 7 MHz, I added a 33-foot piece of wire, which in free space would be 1/4 λ long, but which when laid on the ground would be longer (in wavelengths). I connected it to the rest of the ground system through a thermocouple ammeter, and read the current while applying power. With this wire then cut in half and laid out as separate radials in opposite directions, I found that the total current

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[1] See references on page 17.

increased. Cutting these 1/8-λ pieces in half and distributing the resulting fragments as four radials in directions at 90 degrees to each other caused the total current to decrease. These observations lead me to conclude that for a given total amount of wire the most efficient layout would be radials having lengths of about 1/8 a free-space wavelength. This conclusion is consistent with Stanley's Table 1.[1]

In the other experiment, I also used a 33-foot piece of wire, but half of it was No. 34 and half No. 12 wire. With the thick end adjacent to the antenna, the current was higher than with the wire turned around so that the thin end was adjacent. The experiment showed that wire diameter is of some consequence, and it is more important to have heavy conductors close to the antenna.

The Tower and the North Antenna

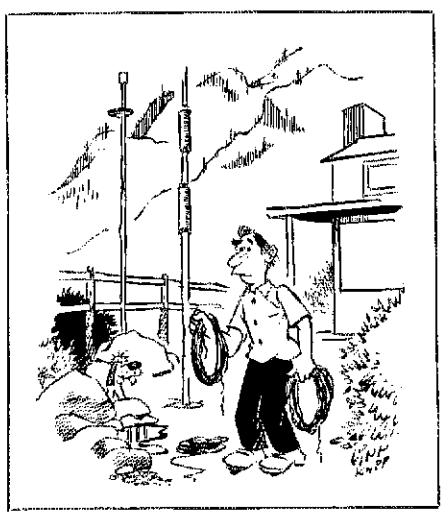
Grounding of the tower is very heterogeneous; first of all, of course, the bottom of the tower is buried in the ground some eight feet. There are two radials about 25 feet long going in a more or less southerly direction, then a short wire going to a water faucet on the wall of the house. Finally, and probably most important, there is a wire that goes northward about 20 feet and makes a junction with the middle of a 120-foot east/west wire. The eastern end of this wire is located at the common corner with the property of the neighbor to the northeast and at that point is bonded to his extensive chain link fence. About 25 feet west of this bond to the fence, there is a junction with a southward wire which is connected to the base of the north antenna. Otherwise, the grounding system of the north antenna, consisting of a few radial wires, is as described in the earlier *QST* article.

I carried out some observations by connecting a thermocouple ammeter and a selection of capacitors and inductors in series with various conductors connected to the base of the tower. On 3.5 MHz, with the wire that goes to the fence, I found a very strong resonance using a 300-pF capacitor. I found no such resonance with this wire on 7 MHz nor on 1.8 MHz, nor did I find any resonance with any of the other wires.

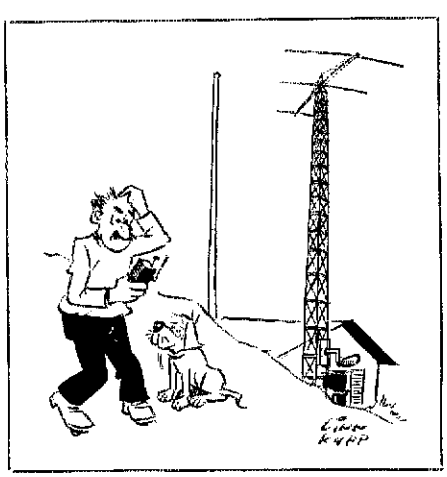
No attempt has been made to bond the upper and lower sections of the tower (where they telescope) together. No such bonding seems necessary, except in the rare case of an extremely strong wind, when there is some receiver noise resulting from poor conductivity between the sections. Cranking the tower up and down seems to have little effect upon the degree of impedance mismatch.

On 3.5 MHz, using a power of about 150 watts, I have had contacts all over the world using this shunt-fed tower, usually not cranked all the way up. The south antenna has also given fairly good account of itself, but with its thousand feet of radial wires its performance is still not quite as good as that of the tower with its meager "black magic" grounding.

On 7 MHz, the behavior of the tower is the reverse even though the impedance match is somewhat superior to that



How do you ground a vertical antenna when there is no ground?



Optimizing ground-wire currents is well worth the time and effort required.

on 3.5 MHz. The performance, despite the good match, is far inferior to the south antenna or even the north antenna. Offhand, one would expect the performance, such as it is, to be better with the tower cranked down to minimum height, when it would be close to 1/4 λ, but the few reports I have received on the air indicate better performance is obtained at maximum height. The overall performance of the tower on 7 MHz is a complete mystery to me.

I have used the tower on 1.8 MHz only rarely, but have worked as far as 1000 miles, even though there is a very bad impedance mismatch on the feed line. One of my future projects is to cure that, since the tower may be magic on the top band, too!

What If You Don't Have a Thermocouple Ammeter?

The preceding discussion has, I hope, suggested that individuals may be able to optimize their ground systems by measuring the currents in individual ground wires. In this regard I have been fortunate in having available a number of thermocouple ammeters, instruments not commonly available in ham shacks. However, I have found it easy to make a substitute which can serve to measure relative current and to detect resonances. Take a short length of Twin-Lead, speaker cord or similar cable, about a foot long. Connect one wire of the pair in series with the circuit to be studied (the ground wire). Connect the two ends of the other wire of the pair to a semiconductor diode and a sensitive dc meter in series (Fig. 2). For convenience and for reproducibility in results, coil the cable up and secure it to a terminal board.

Using Dissimilar Antennas in a Phased Array

I can use any two of my three verticals as a phased array by connecting the feed lines in parallel at the transmitter. In the shack I have a switchboard so that I can switch additional lengths of line in series with one antenna or the other. I do not attempt to change the impedance match at the bases of the individual antennas, but I generally retune the transmitter as the phasing is changed. Some of the effects observed must be attributed to variations in impedance mismatches rather than to basic changes in directivity. Nevertheless, some gain can usually be obtained by combining the verticals in one way or another.

In the use of two dissimilar antennas, two questions arise which may not apply when identical antennas are used. First, is there really an advantage in using the two of them in a phased array over using the better of the two alone? The relevance of this question may be seen by considering the extreme case where one is very much better than the other. In such a case the field strength of the poorer one is so much less that there is little difference whether it is in or out of phase with the field of the better one, and there can be little or no observable directional effect

when the two are used together. Furthermore, the power supplied to the better antenna is cut in half while the other half of the power is largely wasted.

This simple argument suggests that in most cases the two antennas should be nearly equal in the field strengths they produce if they are to be effective in a phased array. However, the actual situation is sufficiently complex that exceptions may be found. For one thing, the better antenna may have "blind" directions in its pattern because of obstructions, and the poorer one may help to fill those in. Also, the impedance effects which have been mentioned before are hard to predict. I can only suggest that one may find it worthwhile to try using two such antennas together, and may find unexpected advantages in some directions.

On 3.5 MHz my north antenna is generally much poorer than the tower. However, in some directions observers have consistently reported a small gain in using the two together over the tower alone. Incidentally, it should be mentioned that observations made on receiving are not reliable tests, partly because of impedance effects. Also, some of the noise received may be generated locally and its effect may mask the true pattern of the array. The only reliable evaluation is by transmitting to distant observers.

The second question concerning dissimilar antennas involves solving for an unknown quantity: the relative phase of the two antennas. The relative phase of the field of an antenna is *not* determined solely by the length of the transmission line connecting it to a transmitter. The impedance of the antenna usually contains a reactive component, and its presence gives rise to a phase shift. With two identical antennas these phase shifts are the same and do not affect the relative phase between the two antennas, which is determined only by the difference in feed-line lengths. With dissimilar antennas these phase shifts are generally not identical, and they may vary in different ways with shifts in frequency or with variations in the moisture content of the earth. Not unrelated was a discovery I made when changing the grounding of the south antenna from 200 feet of wire to 1000. There was a substantial change in the phasing when it was used in an array with the tower.

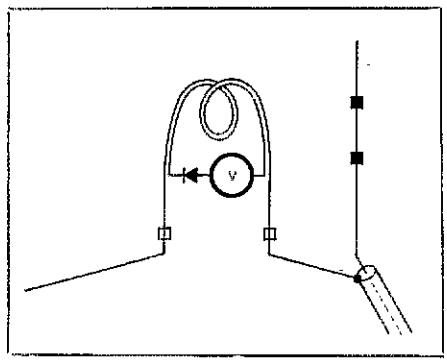


Fig. 2 — Suggested substitute for a thermocouple ammeter.

I have experimentally answered this phasing question by setting up a small probe antenna at a point equally distant from the two antennas and connecting it to a field-strength meter. I vary the line lengths until a minimum (usually quite sharp) is observed. Then I know the antennas are 180 degrees out of phase, and the array is a bidirectional end-fire one (W8JK). If I add or subtract 1/2 λ of line from one antenna, the antennas should be in phase and a maximum should be observed. My experimental observations are in agreement with such predictions. If a length of line equal in electrical wavelengths to the spacing between the antennas is then added or subtracted from the feed line of one of them, the combination approximates a unidirectional end-fire array. The favored direction is away from the element which has the longer equivalent feed line (larger phase shift from the transmitter).

To reiterate, my results with phasing dissimilar verticals are very preliminary, and there is little I can say about them except for the fact that at times very noticeable gains over using the better single antenna are observed.

Vertical Versus Horizontal Antennas

I have used some *horizontal* antennas and have observed the differences in performance between them and the vertical antennas at my particular location. I have not tried horizontal antennas on 7 and 3.5 MHz any higher than 30 feet above ground, however.

The first foothills of the Rocky Mountains rise up immediately to the west of my QTH, the nearest ones subtending a vertical angle of about 10 or 15 degrees. As expected, propagation to the west is usually difficult. To the east I have some power wires running north and south. The land slopes off to the north, and I have a line-of-sight view for 12 miles from the base of my antenna tower.

I find a tendency for horizontal antennas to be superior to the west, over the mountains, and for verticals to be superior to the east. Standard theory explains these findings as follows: Probably many of the signals coming over the mountains are scattered by the surface of the ground. Those familiar with advanced electromagnetic theory remember that according to the Fresnel equations, the reflection coefficient is greater when the wave is polarized with the electric vector parallel to the surface (i.e., horizontal). Therefore, this scattered radiation is probably horizontally polarized. On the other hand, the electric field from a vertical antenna is perpendicular to the direction of the power wires and is less disturbed by them than the field of a horizontal antenna.

In conclusion, I have presented very few firm results, but I hope to have suggested some procedures which will help those facing restrictions on grounding systems that they can use. I believe that with a little persistence and ingenuity they will be able to build effective antennas. It *is* possible to evaluate simple arrays yourself and to improve their performance according to your own communication requirements. QST

References

[1] Stanley, "Optimum Ground Systems for Vertical Antennas," *QST*, December, 1976.
[2] Hoestenback, "Improving Earth-Ground Characteristics," *QST*, December, 1976.
[3] Beers, "Short Antennas for the Lower Frequencies," *QST*, September, 1970.

Strays

I would like to get in touch with . . .

□ builders of the Radio Shack Digital Frequency Counter, project board number 277-111. Neil W. Zimmerman, KØYDO/WB7PRX, 1815 17th Ave. South, Great Falls, MT 59405.

□ any ham who was actively engaged in the search for Amelia Earhart during July, 1937. Dick Beckham, W7FVM, P. O. Box 1433, Pendleton, OR 97801.

□ radio engineers interested in the effects of electromagnetic radiation (vlf to microwave) on biological tissue. I would also like information on radio matrix scanning and imaging systems. D. A. Greenwood, G3HRG, 48 Mill Rd., Eastborne, East Sussex BN 21 2P9, England.

□ hams involved with college or university physical education or athletics to form a sports net or round-table sked. Chuck Schact, WB9ZED, University of Chicago, 5640 University Ave., Chicago, IL 60637.

The Zany Zener — Facts About This Special Diode

If you're mystified by this little guardian of electronic circuits, it's time to be enlightened! Here are some basic Zener facts for a quick review.

By Robbie Reid,* WB5VXL

Since the introduction of semiconductors over 20 years ago, hams have used increasingly large numbers of such devices in their equipment construction . . . bipolar transistors, FETs, integrated circuits, and the good old diode. Each semiconductor has evolved to the point of many variations designed individually for specific uses. Originally used to rectify, the diode has propagated into a good-sized family of diverse components. Most still rectify, but some additionally change in capacitance, emit light, or perform a number of other functions. One special member of the diode family is the Zener diode.

The Zener diode, like other semiconductor diodes, has what is called a reverse-breakdown voltage. At this point, called the knee, the diode conducts current. The value at which this happens in a common silicon diode is approximately 0.7 volt.

What distinguishes the Zener diode from other diodes is that it is designed to break down at a predetermined voltage. Depending on the rating of the particular diode, the value may be anywhere from a few volts to several hundred volts.

This breakdown voltage characteristic makes the Zener diode useful as a voltage regulator. The voltage marked on the Zener is the breakdown voltage, and the diode always has that voltage across it. The Zener diode in Fig. 1 has a 10-volt breakdown voltage and is therefore called a 10-volt Zener diode. The voltage between points X and Y can be almost anything more than or equal to 10 volts. The voltage at the output, between points A and B, is exactly 10 volts! This stays constant, even though the current drawn by the load may vary considerably.

Fig. 2 shows a graph of the reverse current through a 10-volt Zener diode. The point exactly at breakdown is the minimum current needed for good regulation. This point is at the knee, and when designing a Zener regulator, you can safely presume this value to be 5 mA.

*700 W. Franklin Rd., Norman, OK 73069

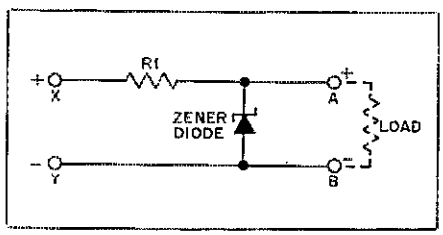


Fig. 1 — A basic Zener diode regulator circuit with the supply voltage at left, and regulated output to the load at right.

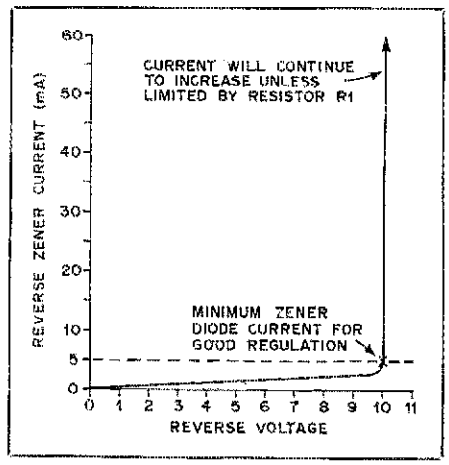


Fig. 2 — The graph shows that once the "knee" is passed, as current increases, the voltage across the diode remains constant (at 10 volts in this case). The limiting resistor must be used to keep the Zener current from increasing until diode destruction occurs.

A Good Thing Put to Use

Now that you know what a Zener diode is, how do you use it? First of all, you must remember always to use a current-limiting resistor such as R1 in Fig. 1. Without this resistor, the current through the diode will continue to climb until it destroys the diode. In the 6-volt Zener circuit shown in Fig. 3, a minimum drop of 9 volts will appear across R1. The minimum drop is found arithmetically by subtracting the 6 volts measured at the terminals of the regulator output from the minimum of 15 volts across the input terminals. Since the diode needs 5 mA for good regulation and the load on the supply output is 45 mA, we add these — obtaining 50 mA. Dividing 9 volts by 50 mA yields a resistance value of 180 ohms for R1.

$$R1 = \frac{(\text{Min. input } E) - (\text{Zener } E)}{(\text{Max. load } I) + 5\text{ mA}}$$

To determine the wattage rating necessary for the Zener diode, find the

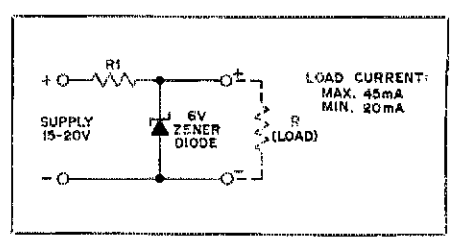


Fig. 3 — Similar to Fig. 1, but in this circuit a 6-volt Zener diode is used, and input voltage and load current demand are specified.

maximum current through the diode. The maximum wattage dissipated by R1 will be reached when the input voltage is at the highest value (20 volts) and the output current being drawn is at the lowest value (20 mA). The voltage across R1 is 20 volts minus 6 volts, or 14 volts. The power rating of the Zener diode is then determined by Ohm's Law.

$$\frac{14 \text{ volts}}{180 \text{ ohms}} = 77.8 \text{ mA}$$

$$77.8 \text{ mA} - 20 \text{ mA} = 57.8 \text{ mA}$$

$$6 \text{ V} \times 57.8 \text{ mA} = 0.347 \text{ watt}$$

Zener wattage is equal to Zener voltage times Zener current. We know the Zener voltage is 6 volts, so we must find the current. We first find the current through R1 (14 volts divided by 180 ohms) and then subtract the 20 mA of current that is always going to be drawn by the load. The balance will be going through our diode. Now the 57.8 mA that is going through the Zener is multiplied by the 6 volts across the Zener diode. The product is 0.347 watt, which rounded off gives us a need for at least a 1/2-watt rating on the diode. The general formula for determining the necessary Zener diode power rating is shown in the formula

Zener diode power rating =

$$\left[\frac{E_{min.} - E_{Zener}}{R1} - I_{min.}\right] E_{Zener}$$

Summing It Up

The two most important things to remember when using Zener diodes are *reverse biased*, and *dropping resistor*. Even though the Zener is a "special" diode, it can only perform as a Zener when reverse biased. Don't stick one in forward biased and expect it to regulate! And even reverse biased, the diode needs a current limiting resistor to keep things cool, and a cool diode lasts longer! QST

Build a UTO-1

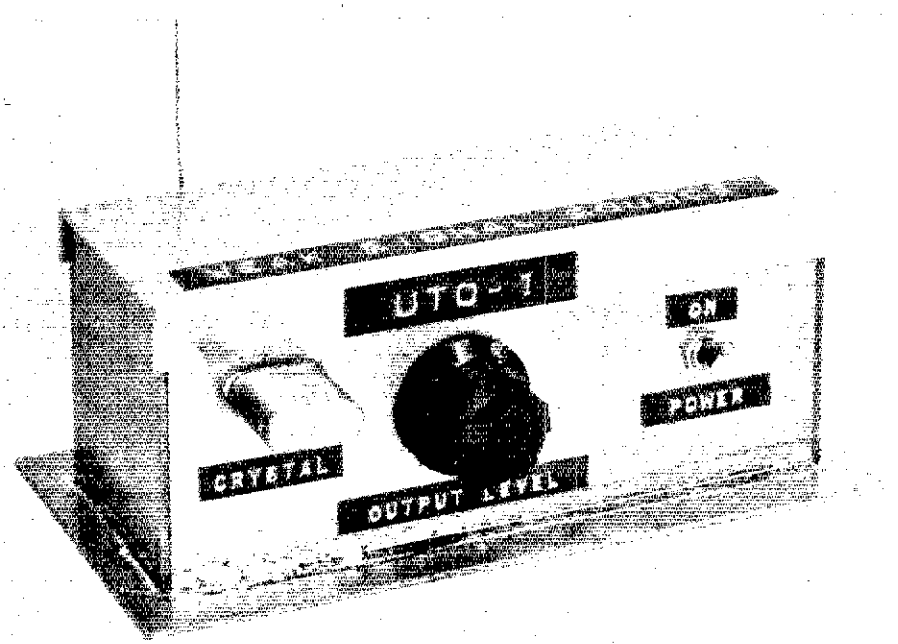
Is there a UTO — utility test oscillator — in your shack? Maybe it's time you had one for general-purpose testing. The circuit is simple, but the uses are many!

By Doug DeMaw,* W1FB

It takes so little time to build this minitransmitter that we can't even call it a weekend project. Matter of fact, from start to finish it took the author exactly 90 minutes to assemble the pc-board case and wire the circuit. So if you deplore drawn-out workshop endeavors, you should find the UTO-1 a refreshing change from those comprehensive projects that take days or weeks to complete.

No doubt some of you are wondering what's so great about a weak-signal type of test oscillator, what it can be used for, and how often will it come in handy. Well, consider the matter of antenna testing: It's handy to have a stable (no QSB) signal source some distance from the antenna or antennas under test. It sure beats relying on amateur signals in the band of interest, as the QRM, QSB and fast break-in can cause frustration while you are trying to observe measurement results by means of the station receiver.

If you don't have a signal generator in your shop, the UTO-1 can be located



The Universal Test Oscillator shown here was built from bits and pieces of materials and parts that were readily available at the time. The enclosure is of unetched circuit-board material and aluminum. The knob is used for adjustment of the output level.

*ARRL Senior Technical Editor

a distance from the receiving antenna to serve as a signal source for receiver alignment. Also, it can be probe-coupled to specific areas of the receiver for use as an alignment generator.

Still another application for the UTO-1 is as a marker generator. If you don't have a 100-kHz frequency standard in your receiver, the UTO-1 can be equipped with a band-edge marker crystal and used to keep tabs on the receiver dial calibration. For example, a 3750-kHz crystal could be used to spot the low end of the 80-meter Novice band. You might even become a super QRP person and key the 9-volt lead to the oscillator while trying to work the guy down the block from your house.

Finally, the weak-signal source could be used in combination with a station receiver as a code-practice oscillator. An insulated key jack can be placed in series with the positive lead from the battery to permit breaking the carrier during cw sending. Unlike most audio code oscillators, the UTO-1 would provide a cw note that sounded more like what one would hear in an actual QSO.

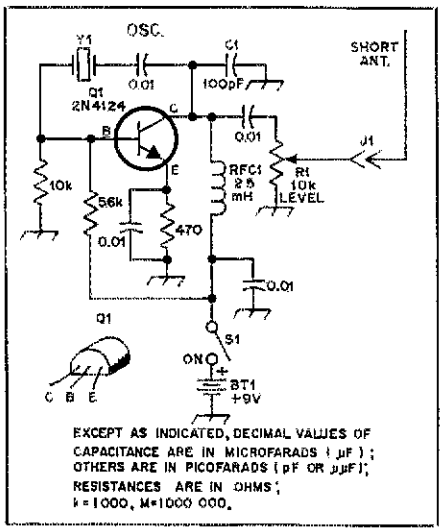


Fig. 1 — Schematic diagram of the weak-signal source. Capacitors are disk ceramic. Fixed-value resistors are 1/2-watt composition. Resistors of 1/4-watt rating are suitable also. BT1 is a 9-volt transistor-radio battery. R1 is a small carbon control with a linear taper. RFC1 is a 2.5-mH rf choke (Millen 34300-2500 or Radio Shack 270-1713). Any miniature slide or toggle switch (spst) will suffice for S1. A phono jack or plastic binding post can be used for J1. Y1 is a fundamental crystal of the user's choice (see text). Y1 socket is an International Crystal Co. AC-5.

The Junk-Box Approach

With things costing more than they're worth these days, it isn't likely that anyone is anxious to hand out a lot of money for a gadget like the UTO-1. For that very reason the writer chose to build the circuit from items that were on hand at the time, and phooey on the looks of the thing! Some scrap pc board was used to build the 5 X 2 X 2-inch (127 X 51 X 51-mm) cabinet. A 30-watt pencil type of soldering iron worked fine for joining the walls and bottom of the box. A piece of scrap aluminum was bent into a U shape to form a press-fit top cover. Although double-sided pc board was used for the main part of the enclosure, single-sided board could have been used. An aluminum Minibox or a food container would also make a suitable home for the UTO-1.

The most ordinary of component parts were chosen for the oscillator. In fact, the disk-ceramic capacitors were filched from a bc-band transistor radio which had already gone to its "great reward." Some old surplus computer boards contained the resistors which were needed for the circuit.

Circuit Road Map

A 2N4124 npn transistor is specified for Q1 of Fig. 1, but any 300-mW or greater small-signal npn type with an f_T of 200 MHz or higher will be fine. A 2N2222, Motorola HEP-series equivalent, or Radio Shack substitute will work okay in the oscillator. Many of the npn high-speed switching transistors found on old IBM computer cards will do the job in proper style.

The circuit is that of a Pierce oscillator. The crystal is in the feedback path between the base and collector of Q1. A 2.5-mH rf choke is used in place of a tuned collector circuit. This enables the oscillator to function over a wide frequency range — typically from 400 kHz up to 20 MHz, depending upon the crystal which is plugged into the socket. The crystals must be of the fundamental type. However, 3rd overtone crystals can be used, but they will oscillate only on their fundamental frequencies. For example, a 30-MHz 3rd-overtone crystal will oscillate on approximately 10 MHz. C1 of Fig. 1 is the feedback capacitor. The value chosen is for applications from 1 MHz and higher. It may be necessary to increase the value of C1 to roughly 330 pF for operation at the low end of the range — 400 kHz. Some experimenting may be required to find a value that assures rapid starting of the oscillator.

R1 was included to function as an output level control. When comparing antennas while you are using the UTO-1 as a signal source, it may be helpful to set R1 for S9 on the receiver S meter. This will make small changes in level more pronounced than when using a 20-

Fig. 2 — Schematic diagram of a low-power amplifier stage for use with the circuit of Fig. 1. R1 is the same control shown in Fig. 1. The resistors and capacitors are the same type specified in Fig. 1.

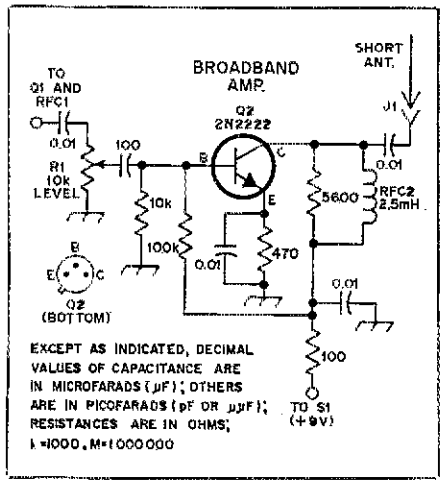
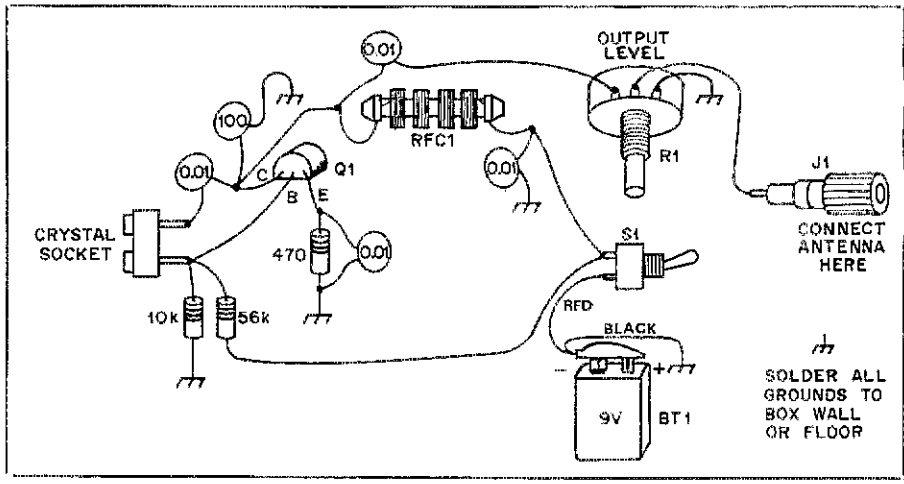


Fig. 3 — Pictorial wiring diagram of the circuit in Fig. 1. A multilug tie-point strip can be soldered to the floor of the box for securing the various components. BT1 may be clamped in position by means of a U-shaped metal bracket.



or 30-dB-over-9 reading. This is because many S-meter circuits compress the response as the reading becomes higher, thereby making small changes in signal hard to detect.

The antenna used with the oscillator can be any length that provides ample signal output. The writer uses a piece of No. 12 copper wire which is 20 inches long. The longer the wire, the greater the signal radiation.

If Greater Output Is Needed

If for some reason the builder wants more "whomp" from the UTO-1, he can add the amplifier shown in Fig. 2. Rather than the output of Q1 being routed to the spike antenna, it is applied to a small amplifier, Q2. It is not recommended that this circuit or that of Fig. 1 be hooked to a regular amateur antenna. The antenna could load the oscillator and prevent it from operating. Furthermore, there is no filtering in these circuits to prevent harmonics from appearing at the output. A large antenna could radiate the harmonics and cause TVI. Furthermore, if a crystal was being used for some frequency outside an amateur band, the signal could be radiated a long distance if a big antenna were used. The spike antenna will confine the radiation to the ham shack . . . right where it belongs!

The 5600-ohm resistor across RFC2 in Fig. 2 was necessary to prevent self-oscillation of the amplifier circuit. Because the spike antenna provides no real load for the amplifier, we have what is called an *open-loop condition*. The latter can lead to self-oscillation. The resistor provides ample collector loading, thereby assuring stability.

Oh yes, another good use for the UTO-1 is realized when one wants to check crystals for proper operation and frequency. If you have a box filled with surplus crystals, this unit can be used to grade them out. Just monitor the output on a general-coverage receiver. Or use a digital frequency meter to sample the oscillator output, if you're rich enough to have such an instrument, that is! QST

Feedback

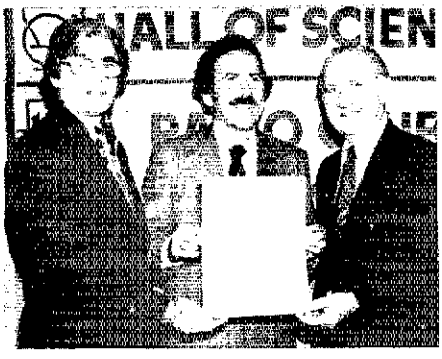
□ There's only one thing worse than an incorrect call sign – a switched photo. In the interviews with seven Hq. visitors concerning the FCC (*QST* for July), the photographs of Donald Duval, WA1WXS and George Bose, W2CJJ, were inadvertently switched. *QST* regrets the error.

□ Confusing, not so amusing . . . an error in Fig. 11 of Part 1 of Olsen's article, "Designing Solid-State RF Power Circuits," *QST* for August, 1977. Point A is misplaced from where it should appear by reason of the blue overprint following the 1.2 constant-conductance circle. The overprint should actually appear on the 1.0 constant-conductance circle. The significance of the broken lines is also lost; they should be extensions of the 0.4 inductive-reactance curve and the 2.0 inductive-susceptance curve, and were meant to indicate completely the coordinates of Point A.

We agree, blue on black is hard to read. It was initially planned that Fig. 11 would bear a red overprint. There was a last-minute color change related to the press run and the use of blue elsewhere in the front part of the magazine. Sorry about that, friends. – *K1TD*

□ A letter quoted in "Anderson Answered: Local Hams Do the Job" (*QST* for June) implied that U.S. citizenship is needed to hold an amateur license. WD4ACF reminds us that many national publications have erroneously reported the same information. "One does not have to be a citizen," she writes. "I know. Sincerely, Mrs. Janie P. Steer, Alien Registration No. A8735213, WD4ACF, WAEL 1485, *QST*-88." The last is her auto tag number!

Strays



museum housing an active amateur station. On the right is Jim Jaffe, WB2VOS, president of the Hall of Science Radio Club.

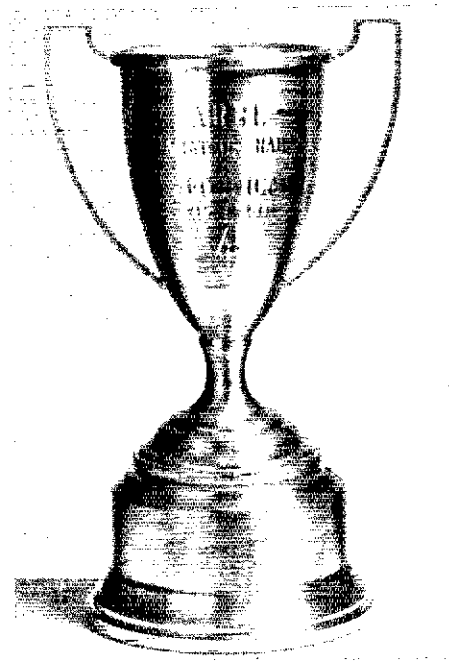
AMATEUR RADIO DAY IN QUEENS

□ Morton Povman, ARRL Public Relations Assistant and New York City Council member, holds a proclamation by Queens Borough President Donald R. Manes declaring January 29, 1977, Amateur Radio Day. At left is Wally West, director of the Hall of Science, a

ARRL TECHNICAL EXCELLENCE AWARD

□ The ARRL Board of Directors awarded the first Technical Excellence Award to Wes Hayward, W7ZOI, in 1976 for his outstanding *QST* article, "Defining and Measuring Receiver Dynamic Range" (*QST* for July, 1975). Hayward had previously won five ARRL cover plaque awards.

The pewter cup will be awarded annually to any amateur who in the Board's view has made an outstanding single-person technical contribution to amateur radio. The 1976 award has yet to be awarded. – *W1FB*



This 7-1/2-inch pewter cup is awarded each year to an amateur who has made an outstanding technical contribution to amateur radio. This attractive award awaits future winners.

Designing Solid-State RF Power Circuits

Part 3: Biasing of transistors, mechanical construction considerations and more. With this conclusion of the series the experimenter can set out in earnest to "roll his own."†

By Richard K. Olsen,* N6NR

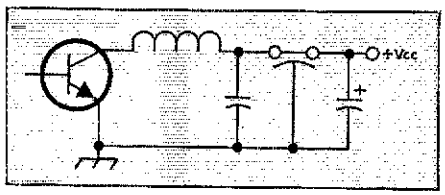


Fig. 22 — Collector supply decoupling.

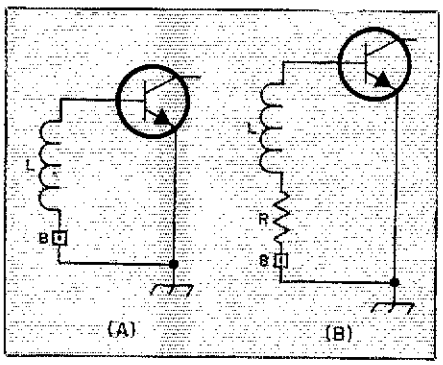


Fig. 23 — Two ways of biasing a transistor for Class C operation. B = ferrite bead.

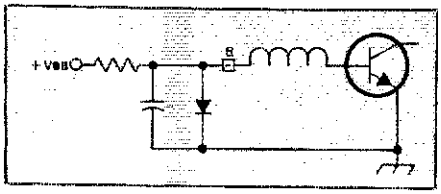


Fig. 24 — Method of biasing a transistor for Class AB operation.

In Parts 1 and 2 of this article, we have seen how to plot via the Smith Chart and ascertain the amount of transformation presented by inductors, capacitors and microstriplines. By a practical example we have designed an input and an output circuit for a solid-state amplifier for 450 MHz. The final step in generating our schematic approximation of the amplifier will be to come up with a method of biasing the transistor. There are many ways to accomplish this, but the primary objective is to apply a dc potential to the transistor without affecting the rf properties of the circuit. Essentially the bias circuits must have a low impedance for dc and a high impedance for rf.

A method of applying collector supply voltage (V_{CC}) is demonstrated in Fig. 22. Coming off the collector, the rf first sees a large inductive reactance. This amount of reactance must, at absolute minimum, be 10 times the value of the Z_{OL} of the transistor at the lowest operating frequency. At 420 MHz this would be an inductive reactance of about 35 ohms. This corresponds to an inductance of about 12.5 nH. We must also be careful so as not to cause the inductor to become self-resonant at or near the operating frequency. The higher we go in frequency, the more effect we see from interwinding capacitance. This capacitance coupled with the inductance of the choke can cause resonance in the V_{CC} circuit.

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†Parts 1 and 2 of this article appeared in *QST* for August and September, 1977.

The diameter of the wire must also be a large enough value so as not to drop an excessive amount of dc voltage during peak current conditions. In this circuit, we will use four turns of No. 18 AWG enameled wire, 1/4 inch ID. This is about 25 nH or 70 Ω.

The capacitors that follow are used to shunt the low-frequency components that return to the power supply. These low-frequency components can cause spurious oscillations and generate a great deal of adjacent-channel interference. We will use a 0.1-μF capacitor followed by a 620-pF feedthrough followed by a 1-μF tantalum.

The base of the transistor must also be held at some fixed value of dc potential. The terms, Class C, B, AB and A also apply to transistor amplifiers. Fig. 23 shows two ways of biasing the transistor at Class C. A much higher impedance to rf is desired with this choke. A ferrite bead is used to further impede any rf coupled through the choke via interwinding capacitance. Too low an impedance in this circuit can severely compromise the overall gain of the amplifier. As a rule of thumb, at 450 MHz I use a 10-turn coil made of No. 22 enameled wire wound on 1/8-inch form. A resistor can be added as in Fig. 23B to reduce the conduction angle if desired.

If the amplifier is to be used in ssb service, a small amount of positive voltage can be applied to the base to bias the transistor in a Class AB configuration. (See Fig. 24.) This voltage, about 0.6 to 0.7 volt, is developed across the diode which is biased into saturation. The series resistor merely

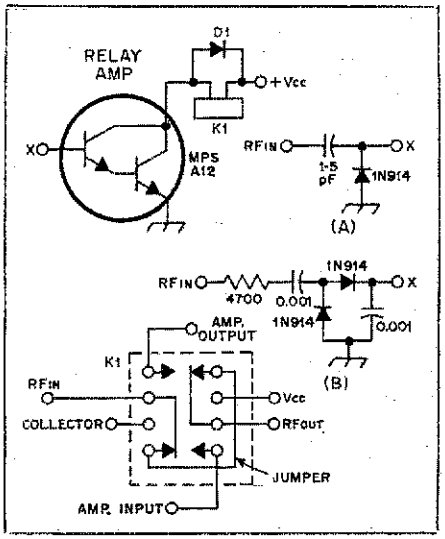


Fig. 25 — Antenna relay circuit with variations.

fixes a limit on that saturation current. Since this amplifier is to be used only on fm we may use Class C operation in our amplifier.

We also must consider what might happen if the output connector were to be accidently shorted. By using our present output configuration, it is pos sible to short out the collector supply. We must, therefore, put a capacitor in series with the output connector to isolate the V_{CC} circuit from the output. This capacitor must be less than an ohm in series X_C at the output frequency. A *pair of* 0.018-μF chip capacitors in parallel with each other will work well as they also have a minute amount of series inductance at f_o.

To use the amplifier with a transceiver we must provide a return path for the received signal around the amplifier. The insertion loss back through the amplifier would greatly reduce the effective sensitivity of the receiver. Fig. 25 shows an antenna relay circuit which employs a Darlington amplifier as a relay-driver amplifier and a "half-crystal-can" relay as an antenna switch. Fig. 25A shows the method I employ in driving the relay amplifier. The series capacitor is chosen to have an X_C great enough to prevent loading of the input signal and low enough to drive the Darlington. About 3 pF will work well at 450 MHz. Fig. 25B is a circuit used by Roy Hejhall, K7QWR, in some of his designs. Both circuits represent about 0.4 to 0.6 dB of insertion loss. Connections to the relay pins should be made with 50-Ω coax to prevent incurring more insertion loss in the circuit. The crystal can itself should also be well grounded.

Fig. 26, coupled with Fig. 25, comprises our schematic diagram of the MRF618 amplifier. Fig. 27 is the board layout I used in building the prototype amplifier. Both microstriplines are 2.5 inches long by 0.1 inch wide. The separation between groundplane and microstrip is about equal to twice the dielectric thickness of the board. Also, there is a small break in the output line to allow for the series dc isolation capacitor. The reason why the lines are made long is to allow for any possible error in design. Since we are using 50-Ω microstrip, the remaining line merely acts as a 50-Ω waveguide.

Once the board has been etched, a hole must be made in the center of it to allow for the transistor flange. The data sheet provides information as to the physical size of the package and also how much torque may be applied in mounting it to the heat sink. The next thing to do is to assure a good contact between the groundplanes on both sides of the circuit board. This may be done by wrapping the edges of the board and mounting hole with copper foil and soldering it or by using eyelets. Eyelets are put in place by drilling a small hole in the board and crimping the eyelet to the surface. A good solder connection must then be made. For this exercise we will use eyelets placed in all the points around the board where a ground contact will be needed.

We must now mount the board on the heat sink. Remember when choosing a heat sink to use one which will dissipate the heat generated by the transistor during normal operation. Thermal dissipation in terms of θjc (°C per watt) is included in the data sheet.

Fig. 26 shows two 20-pF Unelco capacitors in parallel at the collector and base rather than the single 40-pF capacitors used in the earlier examples. This is because the Unelco capacitors work well as supports for the transistor leads. Mount the capacitors on opposite sides of the line from each other and solder their center tabs together. Use a small copper strap to make connection with the microstrip.

Next we mount the transistor. Put a small amount of thermal compound on

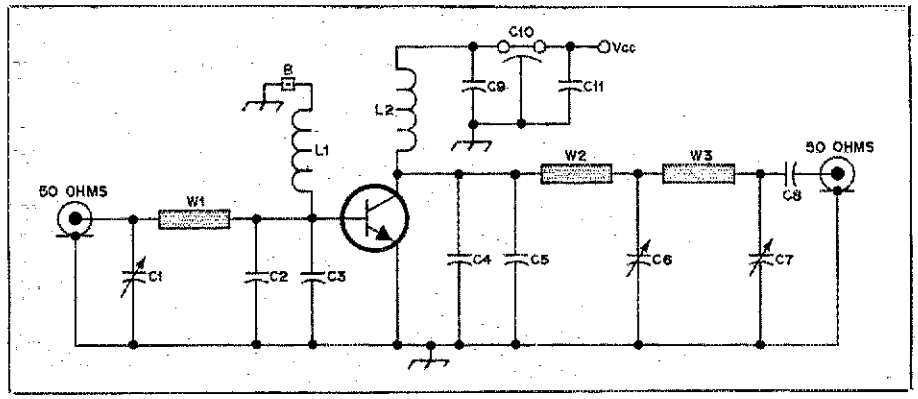


Fig. 26 — MRF618 amplifier.
B — Ferrite bead, Ferroxcube.
C1 — 1- to 20-pF variable.
C2-C5, incl. — 20 pF, Unelco.
C6 — 2- to 40-pF variable.
C7 — 1- to 10-pF variable.
C8 — 0.018-μF chip capacitor, Vitramon.
C9 — 0.1-μF capacitor, Erie Red Cap.
C10 — 680-pF feedthrough.
C11 — 1-μF, 35-V tantalum.
L1 — Approx. 0.12 μH; 10 turns No. 22 enam. wire closewound, 1/8-inch ID air core.
L2 — Approx. 0.089 μH; 4 turns No. 18 enam. wire closewound, 1/4-inch ID air core.
Q1 — Motorola MRF618 transistor.
W1 — Microstripline, 0.833 X 0.1 inch.
W2 — Microstripline, 0.4 X 0.1 inch.
W3 — Microstripline, 0.82 X 0.1 inch.

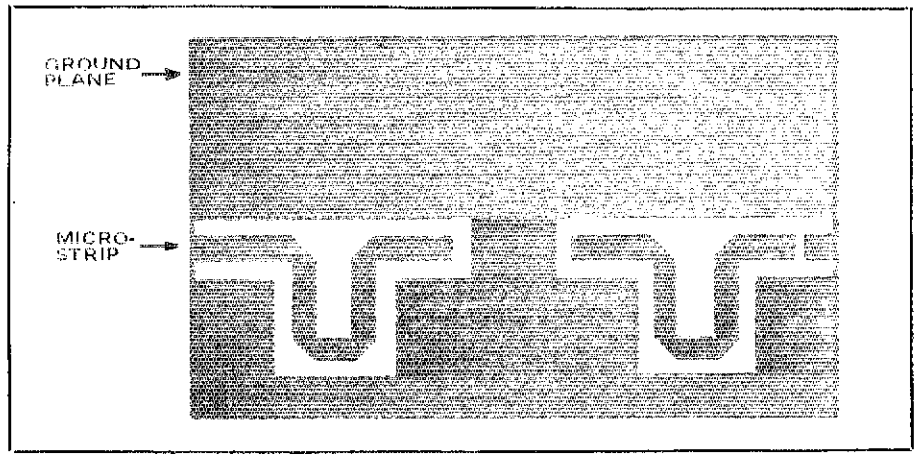


Fig. 27 — Circuit-board layout used for the prototype MRF618 amplifier.

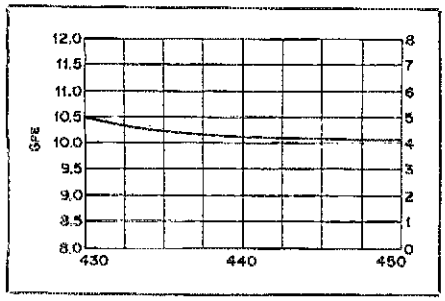


Fig. 28 — Graph of G_{pe} vs. frequency for the prototype MRF618 amplifier.

the transistor flange before screwing it down to the heat sink. *Always* mount the transistor on the heat sink before soldering it into the circuit! The mounting of the rest of the components is academic. Just remember when connecting the collector and base chokes to make the connection as close to the transistor as possible.

Testing and Evaluation

The next phase of our exercise is to evaluate the circuit we have created. After construction and a good visual once-over to assure that all is according to our schematic, we are ready to tune up and evaluate the amplifier.

The basic tools we will need are a spectrum analyzer, input and output power meters, a current meter, a power supply, a signal generator, and a good nonreactive 50-Ω load. Some of these components are difficult to obtain and often you will need to rely on your own versatility to provide a necessary substitute. The signal generator may be replaced, for example, by a transceiver. The output power may be adjusted by varying the supply voltage. You must be very careful, however, that the generator does not generate spurious emissions because of low V_{CC}. The spectrum analyzer is perhaps the most difficult to find a substitute for. Regardless, we will in this section speak in terms of ideal testing conditions so as to acquaint you with some of the testing that is employed in circuit evaluation.

Tune-up in this case is relatively simple. Apply a small amount of power to the input (approximately 1/2 the required drive level) and tune the input capacitor until a small rise in collector current (I_C) is observed. Then tune the two output variables for a peak reading of output power. Now tune the input capacitor for a minumum amount of reflected power while keeping an eye on the collector tuning. As the output power increases, the Z_{OL} of the device will also change slightly and will require minor adjustments during the tune-up procedure. Once you have tuned the circuit to the point where you feel the circuit is operating properly, you may now begin to evaluate the amplifier to see if it meets the original design criteria.

The first check is gain. Apply two watts to the input, checking to make sure the input VSWR has been minimized, and observe the output power. In this case with 2 W of drive at 13.5 volts, the output power is 17.6 watts. The gain may be calculated in the following formula

$$G_{pe}(dB) = 10 \log \frac{P_{out}}{P_{in}} \qquad \text{(Eq. 18)}$$

The gain therefore is 9.4 dB under those conditions. Next we will check amplifier efficiency. Power up the amplifier again to the previous conditions and observe I_C. I_C is 2.1 A. Efficiency may now be calculated in the formula

$$\text{Efficiency} = \frac{P_{out}}{V_{CC} \times I_C} \times 100 \qquad \text{(Eq. 19)}$$

Efficiency equals 62.1 percent. We can safely say that the amplifier is operating well beyond the requirement stated earlier. Now we will evaluate the amplifier under various dynamic conditions to determine its overall operating characteristics.

The first graph we will collect data for is gain vs. frequency. What we will do is establish an output power and V_{CC} specification and measure the input power at 430, 440 and 450 MHz. Test conditions are, therefore, V_{CC} = 13.6 volts with P_{out} = 15 watts. Our test results are shown in Table 2, and Fig. 28 is a graphical representation of the gain versus operating frequency. With this graph we may ascertain the gain that can be expected at any frequency in the required band.

Table 2

Test Results for Gain-Vs.-Frequency Measurements

f_o	P_{in}	G_{pe}
430 MHz	1.35 W	10.5 dB
440 MHz	1.45 W	10.15 dB
450 MHz	1.47 W	10.1 dB

Table 3

Test Results for Measurements of Power In Vs. Power Out

P_{in}	P_{out}
6.4 W	25 W
3.0 W	20 W
1.5 W	15 W
1.03 W	10 W
0.6 W	5 W

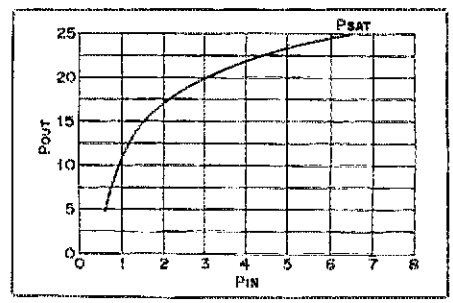


Fig. 29 — Graph of power in vs. power out at 450 MHz.

The next test is P_{out} vs. P_{in}. Since 450 MHz is our worst-case frequency, we will measure the amplifier there. To do this we will tune the amplifier at P_{sat} and record the input power at several output power levels. The data read as shown in Table 3. Fig. 29 is the graph of the data. By observing the plot of P_{out} vs. P_{in} and G_{pe} versus frequency we see that the amplifier easily meets the original design criteria.

The final check is for stability and it is done with the spectrum analyzer. First, power up the amplifier at 15 watts out and observe the spectrum. There are no spurious signals present on the scope display. Now vary V_{CC} from 5 to 15 volts and check for spurious. Now vary the output power from zero to P_{sat} and observe the display once again. If you are brave you may now power the amplifier into an open circuit and a short circuit to test for both spurious emissions and ruggedness. Once these tests have been made (and we hope with good results), the amplifier may be pressed into service.

Summary

This study examines the very basic elements of solid-state power amplifier design. Part 1 discusses the basic information that must be extracted from the data sheet in order to establish the necessary design criteria. Part 1 also demonstrates a fundamental approach to the Smith Chart and is carried further in Part 2 when working through the input and output transformation designs. Part 3 explains the basics of amplifier construction and layout. Also included in Part 3 is information on biasing the transistor for various classes of service and a means of switching rf around the amplifier to allow a return path for received signals. Part 3 further sets up a basic procedure for evaluating amplifier performance.

Much, much more can be said of solid-state amplifier design. At the end of Part 1 is a list of articles, application notes, and text books that will serve as an excellent source of additional information to assist you in amplifier design. QST

The Emergency Broadcast System

Are you aware of the EBS? All of us should be! With simple instructions WA7QPC tells us how to make an alerting unit. Must reading!

By Mike Piper,* WA7QPC

The cold-war era CONELRAD system may have gone the way of the fallout shelter, but its successor, the Emergency Broadcast System (EBS) is still with us. A few recent developments in the EBS should be of interest to amateurs concerned with emergency preparedness.

EBS was designed to be activated in a national emergency. The plan is being revised to allow local officials to use it when they need to warn residents in specific regions or communities.

In addition, the EBS attention signal (transmitted by broadcast stations to warn of an upcoming emergency message) has been changed. The old system consisted of two carrier interruptions followed by a 1000-Hz tone. On April 15, 1976, this method was replaced by a two-tone audio signal of 853 and 950 Hz, transmitted for 20 to 25 seconds. This signal can be used to activate an alarm receiver, making possible continuous monitoring for emergency broadcasts without hearing normal activities on the monitored frequency. For the amateur concerned with emergency communications, an EBS receiver is a logical addition to the shack.

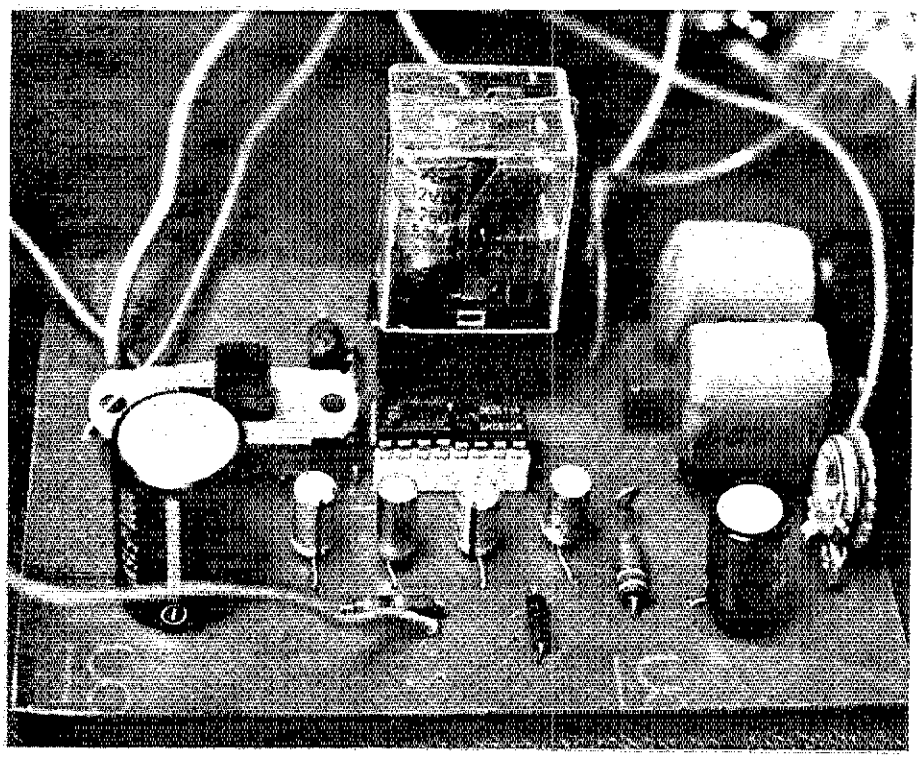
This article describes a simple decoder for the new EBS attention signal. While this circuit will not meet the requirements set by the FCC for the units used at broadcast stations, it will detect the EBS tones, and it won't be set off by interruptions of the broadcast stations carrier — a big nuisance with the old system.

The Circuit

The decoder is built on an 80 × 110 mm printed circuit board. The U1 and U2 are type 567 tone-decoder ICs. These are set to frequency by an external resistor and capacitor. Their outputs are of the open collector type which go to ground when the desired tone is applied to the input. Other external components vary the bandwidth and set the length of time a tone must be present before the output goes low. In this circuit, U1 or U2 can be set for either tone. For this presentation we will assume that U1 is set for 950 Hz and U2 is adjusted for 853 Hz.

Audio from a broadcast receiver is fed through R4, which provides the proper level at the IC inputs. The audio is coupled to both inputs through C8. The frequency of U1 is determined by R1 and C1. Components R2 and C2 set U2 to operate at the other frequency. The ground pin of U1 is permanently connected to the power-supply ground. When a 950-Hz tone is present on pin 3, pin 8 goes to ground. The ground pin of U2 is not connected to the power-supply ground, but to the output of U1. This means that U2 can only operate when 950 Hz is applied to the input of U1.

If an 853-Hz tone is present at the same time as the 950-Hz tone, the



The WA7QPC EBS decoder board. The multiturn frequency setting controls are mounted next to the large capacitors at the right. The trimmer at lower right sets the input level. The slide switch is shown in the operate position. TP2 can be a short length of wire soldered to the pin of S1 on top of the board. Use of the DIP socket is optional.

*205 W. 36th, Eugene, OR 97405

output of U2 will go low. However, C6 has been added to this decoder. The capacitor slows the response of U2 so that the tone must be present for about 10 seconds before the output goes low. This guards against false triggering should the broadcast station happen to transmit something containing both 950- and 853-Hz tones.

When the output of U2 goes low it energizes K1, which can be used to operate any desired alarm. It also acts to pull pin one of both chips low, through D1, D2, R5 and R6. This latches both chips so that K1 will remain energized after the tones have been removed.

The alarm is reset by applying V_{CC} to pin 1 of U2 through a momentary-contact switch, S2. Note that the output of U2 latches both chips.

Interrupting V_{CC} will cause the chips to latch. A normally closed push-button switch, S3, can be inserted in the V_{CC} line to permit testing the alarm.

S1 can be mounted on the circuit board. It is used to adjust and test the circuit. In the test position, it grounds U2 directly, rather than through U1. It also removes the delay capacitor, C6. In this position, an 853-Hz tone will cause K1 to pull in immediately.

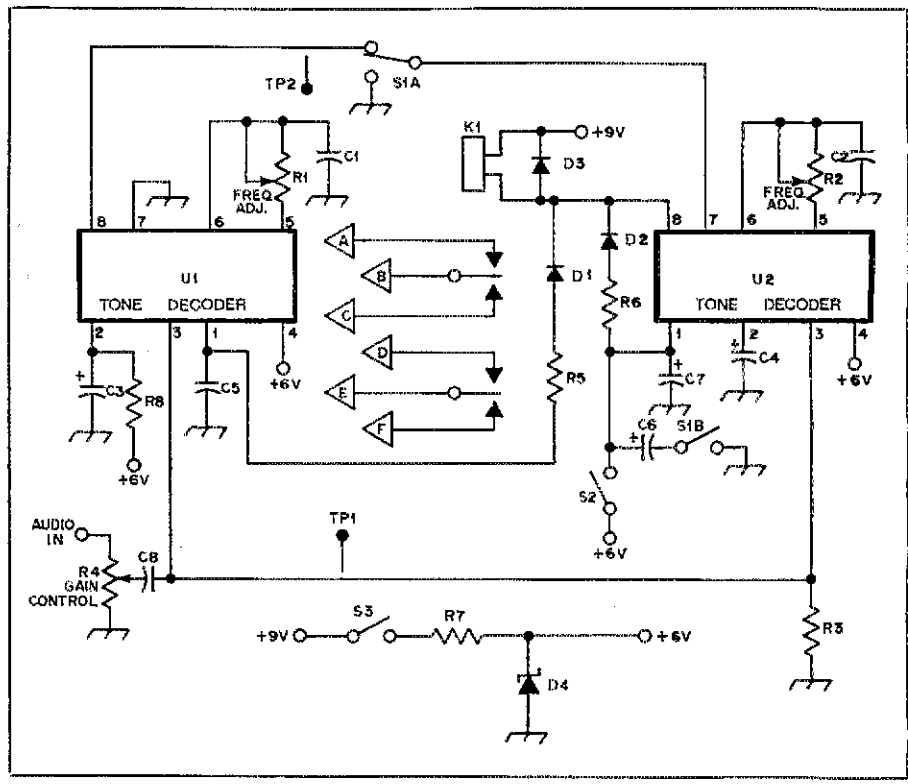


Fig. 1 — Circuit diagram of the EBS alert. Resistors are 1/2 watt; capacitors marked with polarity are electrolytic. Electrolytic voltages are all 12 V, or higher. Circuit designations not listed below are for test references.

C8 — 50 µF, 16 V. (Value, voltage rating and polarity may need to be changed depending on the voltage present where audio is taken from the receiver.)
C9 — 1 µF, 12 V. (Not needed if the dc supply is clear of transients.)
D1, D2 — 1N34A or similar.
D3 — 1N4002 or similar.
D4 — 6.2 V, 1/2-watt Zener.
K1 — 12-V dpdt relay (Archer type 275-206, or equiv.).
S1 — Dpdt slide switch, pc mounting (GC type 35-222 or similar).
S2 — Normally open, pushbutton.
S3 — Normally closed, pushbutton.
U1, U2 — NE567.

Construction

With the exception of multiturn controls, all components should be available from Radio Shack stores. If you use the board layout provided, miniature Trimpots could be substituted for the multiturn ones. You could also cut the longer of the two pads at each control and insert some fixed-value resistance in series with a lower value control. If you want to use a DIP socket, the two 567s fit in a single 16-pin socket.

The relay is designed for 12-volt operation, but will work with 9 V. This makes it easy to connect the EBS decoder to an inexpensive transistor receiver, and run them with a common power supply.

The schematic diagram gives two optional components. R8 will decrease the input frequency bandwidth of U1 and should only be used if your unit triggers on normal-program content. Use of R8 will make adjustment of R1 more critical. C9 may be needed if transients on the V_{CC} line are causing problems. I have not found either of these to be necessary.

Adjustment

The easiest way to adjust the decoder is to use a frequency counter. The 567 has an internal oscillator which has an output signal present on pin 5. Connect a frequency counter to pin 5 of U1. Use as much isolation as possible because the pin 5 output loading affects the frequency. Adjust R1 until the counter indicates the oscillator is operating at 950 Hz. Now connect the counter to pin 5 of U2, and put the test/operate switch in the test position (handle away from the IC). Adjust R2 for a frequency of 853 Hz. Return S1 to the operate position.

Another method involves use of an accurate source of the two tones. The device used at each broadcast station to generate the warning signal has provision for connecting the tones, one at a time or together, to an external device. If you can get permission to connect your decoder to the EBS generator at a broadcast station, adjust R4 for approximately 2 volts pk-pk at TP1. Connect an indicator at TP2 to show when it goes low. A VOM will work. It is also convenient to connect the cathode of an LED to TP2. The anode goes to the V_{CC} through a 330-ohm resistor. This LED will light up when U1 has been activated.

With a 950-Hz signal applied, adjust R1 until TP2 goes low. Continue turning until it goes high again. Now back up until the chip activates again. Set R1 halfway between these two points. Now put S1 in the test position. Apply 853 Hz and adjust R2 until the relay energizes. Turn the control a couple of turns more. Press the reset button. Back up until it energizes again. Set R2 halfway between the two pull-in points. Put S1 in the operate position. Press reset.

Now apply both tones together. In about 10 seconds K1 should energize. The FCC specifies that not less than 8 nor more than 16 seconds should be required for the alarm to activate. If your unit is outside these limits change the value of C6.

And If It Doesn't . . . ?

If neither chip will activate, the audio level is probably too low. If the output of U1 goes low intermittently when the tone is applied, the audio level is probably too high. (This effect can't be seen on U2 since it will latch as soon as it goes low.)

Connecting to a Receiver

When connecting the decoder to a receiver, remember that a constant audio level must be applied to the input. The polarity of C8 will depend on the voltage at the point where you tap off the receiver. Try to pick a point that will put a little more than a volt of normal program audio at TP1. This can be adjusted down if necessary with R4.

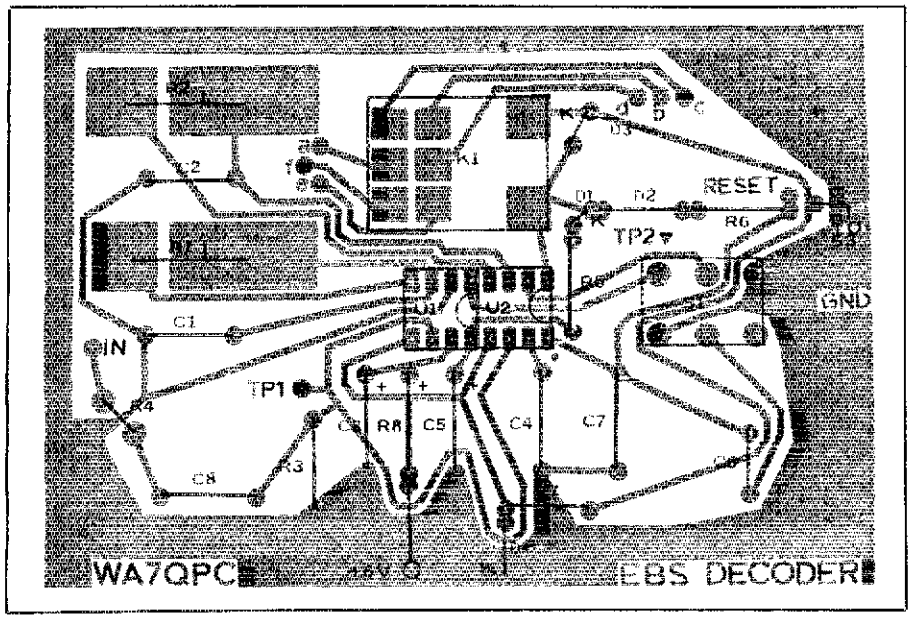


Fig. 2 — Template (full size) for EBS decoder.

I run mine at about 800 mV.

For my own installation, the speaker lead was removed and connected to K1 so that, when the relay is de-energized, audio goes to a terminating resistor and the decoder input. When K1 energizes, it connects the speaker lead back to the speaker instead of the resistor, ensuring that the EBS message will be heard. The remaining set of contacts on K1 can be used for a bell, lamp or possibly to start a recorder to take down the message. If you use this connection scheme, be sure to put the receiver volume control out of reach, or you could accidently put the audio level at the decoder input outside the allowable range.

EBS Tests

How do we know an EBS decoder is working? All broadcast stations (except the 10-watt fm stations at some schools) are required to test the EBS attention signal once a week. The test is run at random times between 8:30 A.M. and local sunset. If you use a small transistor receiver with the decoder, it is quite practical to leave it going at all times. If the monitor fails to go off for a couple of weeks, you will almost certainly notice the fact.

It is also convenient to leave an LED connected to TP2, as described earlier. This LED will flash from time to time, when the program contains 950-Hz energy. This shows that the receiver and U1 are working. If you put S1 in the test position with the receiver connected, K1 will energize after a random delay, as soon as U2 detects an 853-Hz component in the program. Neither of these tests will show that the tone decoders are on frequency, or that the audio level is correct. The weekly tests will show that.

Someone at a local broadcast station will be able to tell you which station in your area will initiate an EBS message. Normally, all the other stations in the area monitor that station and will repeat any message.

Hopefully, an EBS monitor will gather dust in your shack and maybe startle members of your family when it goes off during the weekly test. But if disaster threatens, it could provide the first step in establishing an emergency communications system — that of quickly notifying amateurs that an emergency situation exists! QST

Strays

PERSONAL-COMPUTING SHOW IN CHICAGO

Tuning across the hf bands or listening in on the local repeater, the "in" topic of conversation these days seems to be microprocessors and minicomputers. A whole new hobby is evolving around this new technology, technology that makes it possible to build a functioning computer for the cost of a new transceiver.

Because of the impact of computers on amateur radio, it's only natural that many hams are getting involved in the fascinating workings of computers. It's estimated that one-third of computer hobbyists are hams (or about to become licensed). It's not really surprising, since computers have had such a large impact on our hobby. Computer journals have published amateur-related articles describing memory keyers based on computer technology, automatic beam locators, Morse code-generating keyboards and even automatic SWR-sensing antenna tuners.

How does the beginner get acquainted with the minicomputer and microprocessor? The best way is to attend a computer show. With many hams also computer hobbyists, you'll find lots of people and exhibits to attract your interest.

There are many local and regional shows, and a couple of really big national exhibitions. If you can make the trip, try to attend one of these national get-togethers. It's well worth the effort.

One national that is likely to rate among the best of the breed is the upcoming '77 Midwest Personal Computing Show to be held in Chicago on October 27, 28 and 29. It will feature a wide variety of books and supplies for the beginner and exhibits by more than 100 organizations, including the ARRL. The valuable information contained in the free handout material alone is worth the trip. Highlighting the show will be a number of seminars and demonstrations, among them a computer school with hands-on demonstrations, and talks on personal-computing hardware and software, computerized games, home use of personal computers, and computer art and music.

You'll find the show at the Chicago-O'Hare Holiday Inn on the Kennedy Expressway, just five minutes from the airport. The exhibit halls will be open from 4 P.M. to 10 P.M., Thursday and Friday, October 27 and 28, and from 10 A.M. to 5 P.M. on Saturday, October 29. You can get more information about this show from *Personal Computing*, 401 Louisiana SE, Suite G, Albuquerque, NM 87108.

More than 3,000 hobbyists, many of them hams, attended the Personal Computer Show this past March in Los Angeles. 10,000 are expected at the Chicago show October 27-29

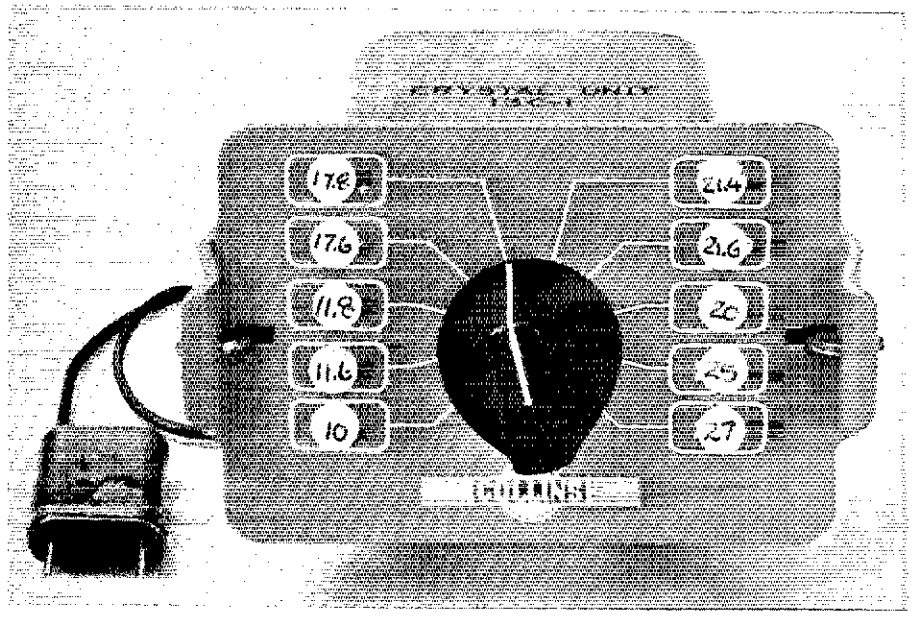
An Extended Frequency Range for the Collins 75S-1

Treat that 75S-1 to a new way of life! Let the greener pastures of a wider frequency coverage for this fine receiver be yours. No internal modifications of the set are necessary and only a handful of parts are required. The deal is good!

By Vernon L. Gibbs,* W4JTL

You own a Collins 75S-1. That prestigious receiver gives you the feeling of being in the Cadillac class. Performance is solid testimony that it deserves the rank. Yet, a limitation connected with the 75S-1 instills a slight sense of claustrophobia. There just doesn't seem to be enough "elbow room" with a receiver restricted to the amateur bands and the 14.9- to 15.0-MHz segment. How to satisfy that restless feeling for greater freedom? You realize that your 75S-1 should have the extended frequency range offered by the 75S-3C. Possible?

Yes, several articles have been written about extending the coverage of the 75S-1. Each is informative but has a different approach. As I reached the moment of decision on resolving the way to achieve broader coverage similar to that of the C model, two considerations shaped my final plan. First, the cost had to be kept low. I knew that obtaining original parts from a Collins distributor would more than exhaust the budget. The second requirement was that no physical changes to the receiver would be made. Without compromise, both requirements were met.



A front view of an old KWM-1 crystal-switching unit is shown after being modified for use with the 75S-1 receiver.

An External Crystal-Switching Circuit

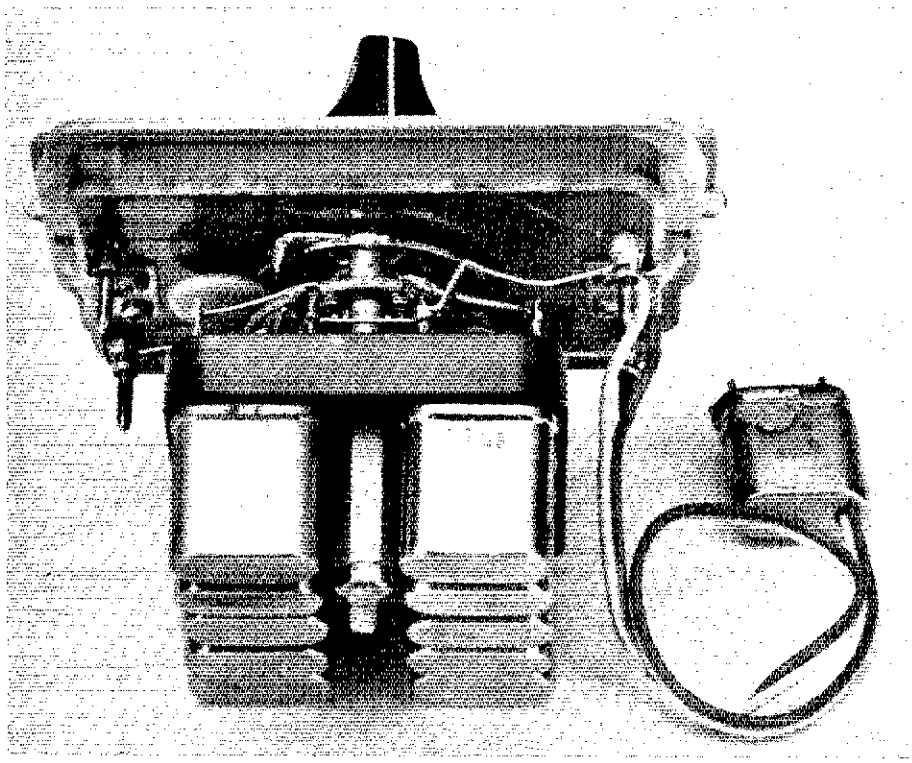
My basic plan was to provide an external crystal-switching circuit that could be plugged into the 75S-1 crystal board. Additional crystals, of course, were required to furnish the wider frequency range. Table 1 indicates the coverage and crystal frequencies used in

Table 1
Crystal Frequencies

Switch Position	*Xtal Frequency (MHz)*	*Frequency Coverage (MHz)*	
1	8.155	5.0-5.2	
2	13.155	10.0-10.2	
3	9.0775	15.0-15.2	
4	11.5775	20.0-20.2	
5	14.0775	25.0-25.2	
6	12.555	9.4-9.6	(31-meter SWBC)
7	12.755	9.6-9.8	"
8	14.755	11.6-11.8	(25-meter SWBC)
9	14.955	11.8-12.0	
10	7.9775	12.9-13.0	

This table shows the crystals used and the frequency-range extension provided by the external crystal switching assembly.

*Rte. 1, Mt. Sterling, KY 40353



This rear view of the KWM-1 crystal switcher illustrates how crystals could be mounted in a comparable unit made from a utility box. Note the plug made from a defective crystal.

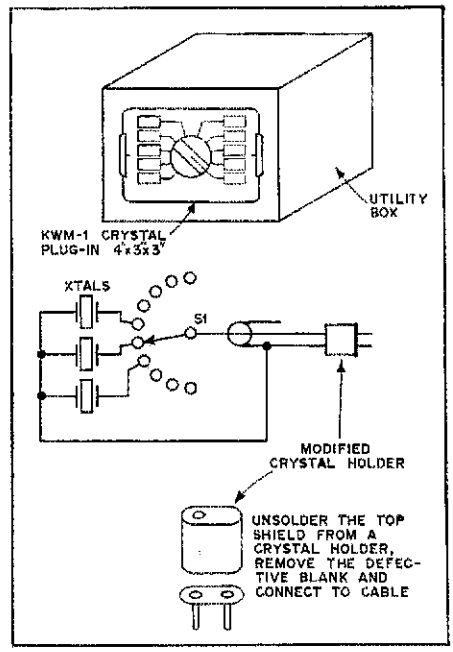


Fig. 1 — Circuit for switching external crystals to provide wider frequency coverage for the Collins 75S-1 receiver.

extending the range. All that is essentially required are the extra crystals, a rotary switch, some cable, a defective crystal, and a small cabinet to enclose the new crystal assembly. The defective crystal unit is to be disassembled and converted into a plug as can be seen in the photographs. I was fortunate to have an old KWM-1 crystal plug-in that solved most of the parts problems. This unit holds 10 crystals, which are more than ample to obtain the extended coverage. Amateurs without access to this particular plug-in device can construct a comparable unit in a utility box. A crystal-mounting board may be avoided simply by soldering the crystals to the rotary switch.

Anyone planning to extend the coverage of the 75S-1 should keep in mind that the leads from the plug-in unit to the crystal board in the 75S-1 must be as short as possible. I used only 12 inches of cable — just enough to allow the new crystal assembly to be placed atop my receiver.

Once the new crystal-switching device is completed, the cable may be plugged into one of the high-band positions of the 75S-1 crystal board. I use the 28C position. Full enjoyment of extended frequency coverage should now be at one's fingertips.

With proper choice of crystals, the 75S-1 can be adapted to covering the range of 3.4-30.0 MHz with the exception of a part of the range from 5.0-6.6 MHz. I have also found that for some amateur bands the preselector can be tuned to the fundamental frequency rather than twice the frequency with no difficulty being observed in receiving additional bands. For example, with the band switch set at 21.0 MHz and the preselector adjusted to a dial setting of five, the coverage is then 15.032-15.232 MHz. In the 75S-1, all of the crystals which are higher than 14.955-MHz injection frequency operate on the second harmonic. Therefore, one may tune in the fundamental frequency by retuning the preselector.

The relatively few components needed for the crystal assembly may be obtained from most parts supply houses. Sources for crystals may be found in the advertisements in *QST*.

Club Notes

Looking for programs for your club meetings? (Isn't everyone?) You've heard all about the new W1AW antennas; now take a tour of them. Club and Training Department has a new slide/tape collection which not only shows the aerials, but also gives you a look at the rigs, past and present, inside the W1AW building. History is combined with up-to-date views to make an enjoyable evening for your club members.

Another new show now available concerns WARC. (And if you don't know what that stands for, you haven't been reading the club mailings we've been sending.) This slide/tape set traces the growth of international telecommunications regulation from 1865 up until now, including the very first regulatory agency, the Austro-German Telegraph Union. The importance of WARC to amateur radio, what the League is doing, and how your club can help are part of this presentation.

Affiliated clubs get first consideration on orders. Ask for order form CT-20 and for better booking service, please give several dates your club can use the set. All tapes are cassettes; all slides are 35 millimeter.

Other ideas from our affiliates: salesperson from area solar-products company, radio astronomer from area planetarium, meteorologist, insurance agent speaking on policies for ham gear/towers, state Forestry Department speaker with movie on "Red Flag Alert" (*de Palomar ARC — CA*). — *WA1STO*

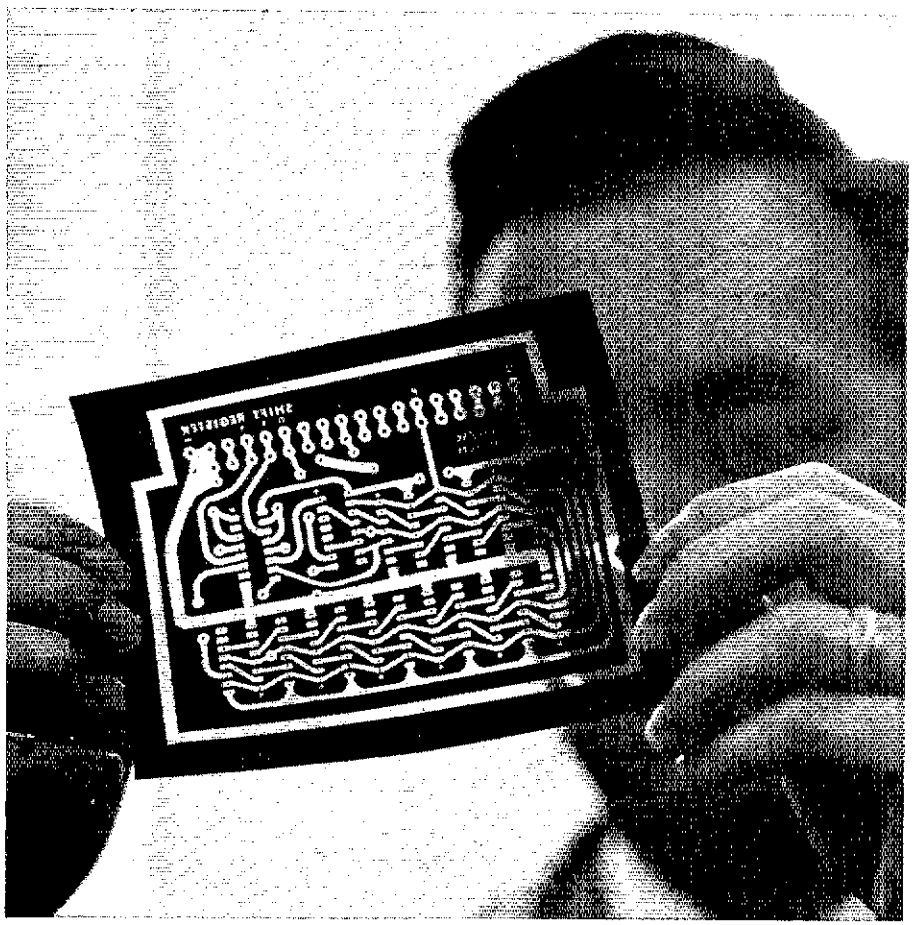
Printed Circuit Boards — An Easier Way

If you've wondered how some people can make nice-looking etched circuit boards, this article will be a revelation. Even beginners can come up with professional-looking boards.

By Robert Cavin,* WBØOSX

How did you wire your first ham radio project? Old-timers may recall driving finishing nails into a pine board and then wiring point-to-point with components and bell wire. This method was called "bread board." Now that the good old days have all but faded from memory, we're faced with the more difficult task of printed circuit board fabrication for our construction projects. Nails and bell wire have given way to copper-clad boards, photo-sensitive coatings and etching solutions. Anyone who has made a board from scratch will admit it can be a messy job.

*8903 Ironwood Ave. S., Cottage Grove, MN 55016



The graphic-arts film negative ready for exposure to Image 'N Transfer material.

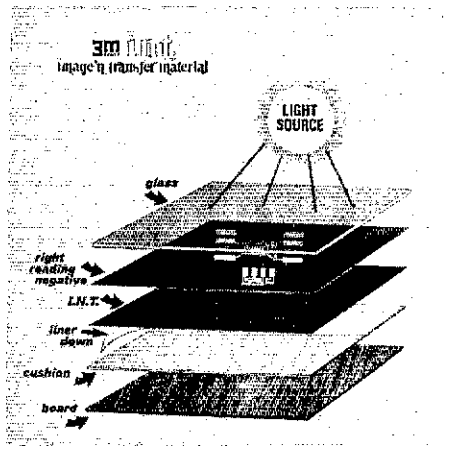
I recently experimented with a new approach which is made possible through the development of a new product called Image 'N Transfer or I.N.T. film.[1] This new technique eliminates much of the hassle and makes it possible to produce professional-looking boards.

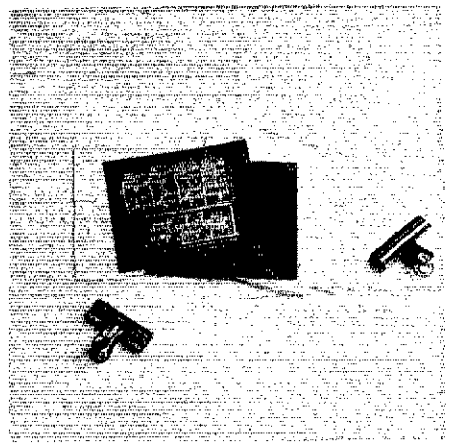
Attendees at the 1976 ARRL convention in Denver saw the I.N.T. process demonstrated by Bob Shriner, WAØUZO. Bob used the sun as an exposure source. The result was a good-looking circuit board made with a minimum of effort.

The I.N.T. material consists of a polyester film which has been coated with an ultraviolet sensitive coating. This material may be exposed with a no. 2 photoflood or as WAØUZO did, with direct sunlight. The film is developed with a special solution, and the resulting positive is a reversal of the image exposed on the I.N.T. sheets. These sheets may be handled in subdued indoor light without danger of exposure. A clear peel-off liner covers the back of each sheet to protect the emulsion until development.

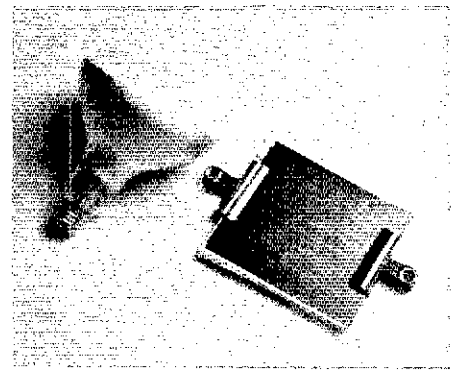
I.N.T. is ideal for circuit-board construction because once the film is exposed and developed, the image can be rubbed off or transferred to the circuit-board material by burnishing. This is similar to the manner in which rub-on letters are transferred to a poster or sheet of paper. When an I.N.T. image is

[1] Manufactured by 3M Company, P. O. Box 33600, St. Paul, MN 55133.





The image on the negative is transferred to the Image 'N Transfer (I.N.T.) where it appears in positive form. This transfer is accomplished by making a contact printing frame using glass, the negative, a sheet of I.N.T. and a sheet of thin sponge or tissue for a cushion.



The contact frame should be clamped tightly. Since the I.N.T. is sensitive to ultraviolet light, exposure can be made to direct sunlight, or to a lamp such as a number 2 photoflood. It may be a good idea to experiment with a test strip to find the right exposure time for your light source.

transferred to a plain copper-clad board, it forms a resist that easily withstands the ferric-chloride etchant.

The Sequence

Here's how I experimented with I.N.T. The May 1976 issue of *QST* featured a construction article on learning to work with ICs by Jerry Hall, K1PLP and Charles Watts, WA6GVC. The article included a suggested circuit-board layout for a frequency counter, printed to scale for use by interested hams. I removed the page, took it to a local offset printer, and had him shoot a same-size lithograph-quality negative. Since I was willing to pay cash and eliminate paperwork the cost was $2.50. A check of other suppliers in the St. Paul/Minneapolis area indicates a range of cost from $2 to $5 for a good-quality negative. You may have to shop around for a supplier who will bother with noncommercial work, but the cost generally isn't steep.

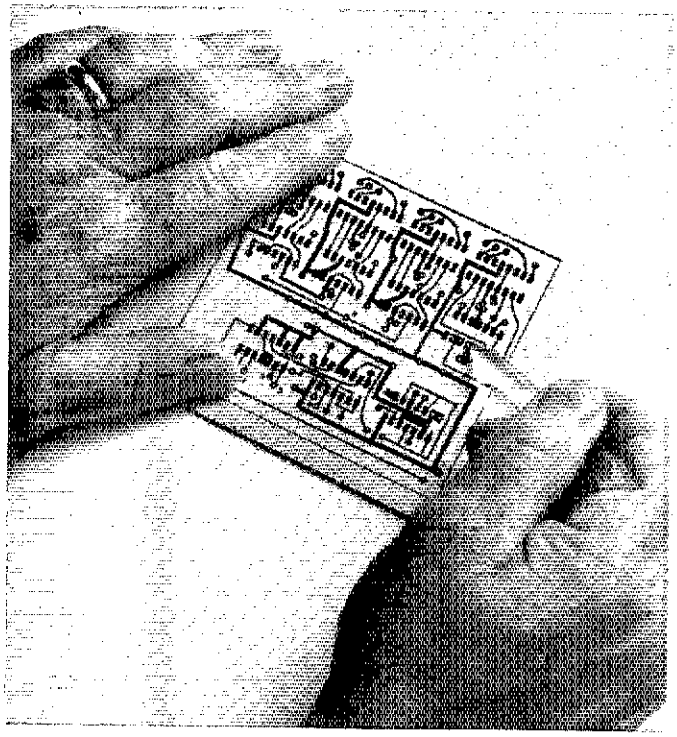
The next step was to make an exposure frame. I used a piece of glass for the base, placed some thick industrial-grade cleaning tissue over it for cushioning (a thin sponge would work as well), and laid the I.N.T. material over it (liner side down). The litho negative went down next, and then a second piece of glass was used to press everything together. Two paper clips hold the assembly together.

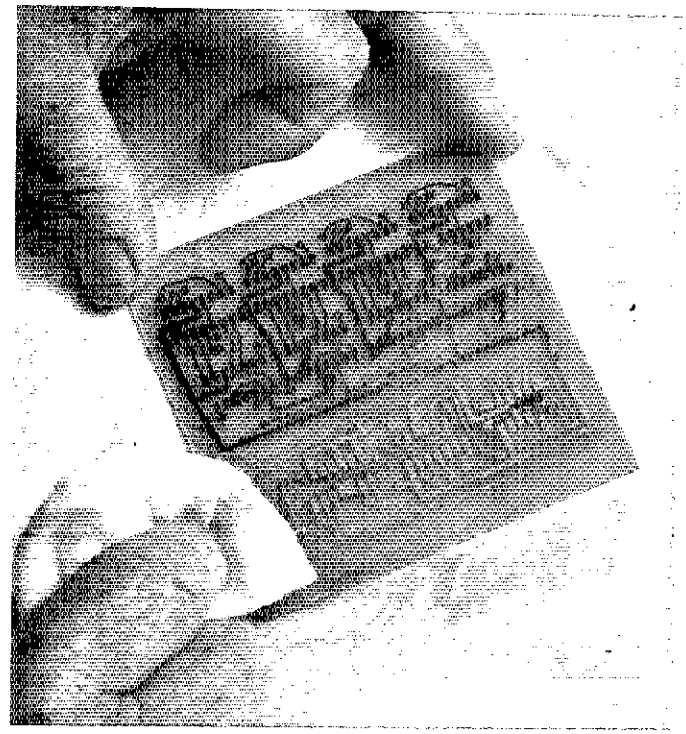
I exposed the film, using a no. 2 photoflood lamp and an exposure time of about a minute and a half. You might want to experiment with narrow test strips of I.N.T. to arrive at the optimum exposure time for your light source. Timing is approximate and not critical. The main precaution is to avoid overexposure since it tends to harden the image and make it difficult to transfer.

After exposing, I disassembled the frame, removed the I.N.T. and peeled

The I.N.T. image is developed on a piece of glass using the 3M brand I.N.T. processing solution and a cotton wipe. A newspaper or tray may be used to collect excess developer. Developed positives should be kept out of strong light to avoid further hardening of the image.

off the protective film from the emulsion side. Following the manufacturer's directions, I poured approximately a tablespoon of developing solution on the center of the I.N.T. and spread it evenly with another piece of industrial wiping tissue. The water-based developer is nontoxic and the amount used is not important. After 15 or 20 seconds of wiping in a circular motion, the black emulsion was removed from areas not hardened by the light, and I had an image of the frequency-counter circuit board. A rinse in the sink removed the chemical residue. To speed the drying process, I used a soft rubber squeegee to remove the excess water from the base side of the I.N.T. Since I.N.T. is polyester and is nonhygroscopic (unlike conventional photo-





The I.N.T. image is then transferred to the copper-clad board by burnishing with a blunt tool. The pattern serves as an etch resist. Careful inspection is important to make sure that no areas are missed and the pattern is firmly adhered in all areas. Once the I.N.T. pattern is in place, the board is etched using standard circuit board techniques. Then the I.N.T. pattern is removed with isopropyl alcohol, and the board is ready for drilling.

graphic film), it doesn't absorb water and dries quickly (allow five minutes before transferring). At this point the circuit image was ready for transfer to the board.

Before starting, I cleaned the copper surface thoroughly with isopropyl alcohol to remove any contaminants that could interfere with the transfer step. If you have used rub-on letters, you no doubt know how important it is to burnish hard enough for good transfer, and yet not so hard as to stretch the backing paper and split the letters. The I.N.T. backing is somewhat more stable dimensionally than transfer-letter sheets, so the stretching problem is minimal. Still the burnishing process requires some care to ensure a good job, especially on a complex circuit pattern with many lines. Registration can be best handled by taping one I.N.T. edge and burnishing away from the tape side — thus preventing most movement of the material.

After transfer of the pattern to the board, I made a careful inspection under bright light to make sure that all the details were in place. A permanent-ink marking pen may be used to make any corrections since the ink is also a good etch resist. The manufacturer suggests that the green liner sheet which comes with each piece of I.N.T. be used for a second burnish to make sure that all of the pattern is tightly affixed to the board.

Once the circuit image was in place the board was ready for etching. Here I proceeded just the same as with any circuit-board process and made sure that the etchant temperature was correct and that the tray was properly agitated. If tongs are used to lift or inspect the board during this step, be sure not to grip over the I.N.T. pattern, as it can be scratched, causing the etchant to remove that portion of the circuit pattern.

As the photo shows, the finished board is sharp in detail and neat looking. The I.N.T. transfer material is removed after etching by using the same type of alcohol used to clean the board before burnishing.

So What Else Is New?

As you may have guessed, 3M's Image 'N Transfer material wasn't developed for ham radio circuit-board makers alone. It is a part of 3M's Industrial Graphics product line which includes Color-Key materials and other items for artists and printers. It just happens to be a good resist material.

You can also use the I.N.T. process to make customized rub-on panel decals or chassis labels to dress up your construction projects. Anything that can be converted to negative form can be put on I.N.T. and transferred to a hard surface. When I.N.T. is used for labeling, the finished product should be sprayed with a protective lacquer to make sure that it isn't scratched off or smeared by solvents (experiment with lacquers on scrap I.N.T. to determine best compatibility).

There is another means available to amateurs interested in making their own circuit boards without using a litho negative; 3M's Color-Key material, which is processed in a manner similar to I.N.T., may be exposed to a transparent or translucent copy of a board layout to form a negative. The negative is then used to image the I.N.T. for conversion to positive rub-on form.

Note that a transparent or translucent master circuit-board layout is required, since the light must pass through the material to expose the Color-Key. When using this technique, you may want to prepare your original layout on vellum or on an absorbent paper which can then be treated with vegetable oil to make it translucent. Or, you can purchase transparentizer solutions in aerosol form from art and design stores.

Where Do I Buy I.N.T.?

Radio clubs or other groups interested in a large quantity can save money by purchasing I.N.T. in commercial lots (ten 8-1/2 × 11-inch sheets minimum order) from graphic-art, engineering and printing products dealers. The packages are approximately $30 and developer is $3.45 per quart.

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The Gentlemen's Band — 160 Meters

Getting your act together on 160 meters can be challenging if it's your first trip to "top band." Here are some helpful pointers for you newcomers to "160."

By Doug DeMaw,* W1FB

That guy you just met — the one with the haggard look, dark rings under his eyes, and a two-day stubble of beard on his face — just might be a 160-meter enthusiast! If so, he was probably on the air most of the night . . . sifting through the QRN in search of a new country to add to his slow-growing list of "confirmed ones." If he's a little bit grumpy it's probably a result of his lack of sleep, but he's really a good guy: He'd have to be, for he's a man of patience and courtesy. That's part of the reason why 160 meters is known fondly as the "gentlemen's band" by those who speak softly into their microphones, or caress their keyer paddles tenderly as they transmit the Morse between 1.8 and 2.0 MHz.

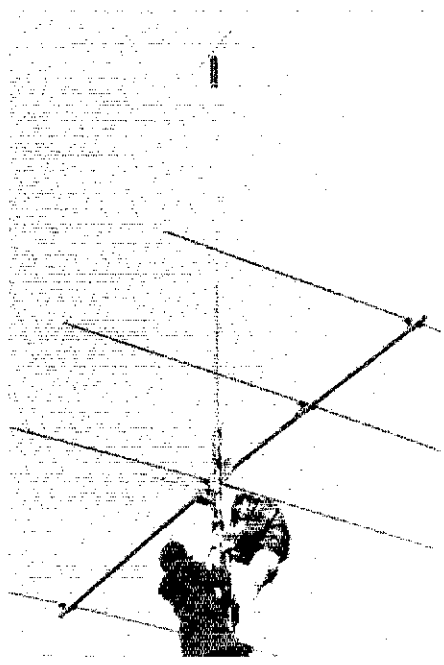
Let's suppose that you just bought or built your first rig that includes the 160-meter band. Beyond a doubt you're wondering what goes on in that part of the amateur spectrum, how to erect a suitable antenna, what kind of DX can be expected, and what the operating procedures are. Rightly so, for 160 is a contrast to the high-frequency amateur bands in its characteristics. The 80-meter band is the most similar in nature, but 160 and 80 are different in most respects.

If you're going to have fun and success with that new piece of apparatus you are anxious to try on "top band," you may as well erase from your mind any images you have about propagation and operating procedures for the bands from 80 through 10 meters. It's time to start from scratch, and some of the tips given in this article should help you avoid the kind of disappointments that many have encountered when assaulting the medium-frequency spectrum for the first time.

*ARRL Senior Technical Editor

Propagation

For the most part, 160 meters is a night owl's band. That is, during the daylight hours absorption is extremely high on 1.8 MHz, and especially during the summer months. For this reason the signal path is limited mainly to ground-wave distances. The absolute distance one can work will depend on the antennas used by the communicating stations, the power levels involved, and band conditions at the time of the QSO. The "daytimer" with a typical 100- to 200-watt rig should be able to communicate effectively over a 100-mile radius or beyond, regardless of the polarity of his antenna — horizontal or vertical. There are times, however, when contacts are made over a distance of 1000 miles during daylight hours. Again, it will depend on the time of the year and the band conditions.



A tower and hf-band beam can be used as a vertical antenna by shunt feeding the tower. In this picture a top-loading coil and 25 feet of aluminum tubing are being added to increase the tower height from 50 to 75 feet. The top section resonates the vertical to one quarter wavelength.

Another serious complication is seen in areas — metropolitan for the most part — where a-m broadcast stations pollute the 160-meter band with second-harmonic energy from their transmitters. In some regions the 160-meter band can become a jamble of music and voice energy as wads of second harmonics blend together between 1.8 and 2.0 MHz. Unfortunately, the suppression of harmonics at some of these stations which operate between 900 and 1000 kHz leaves more than a great deal to be desired. It isn't unusual in the least to see spurious signals from the a-m stations peaking as high as 20 dB over 9 on a ham receiver, even though that station may be many miles away from the amateur receiving antenna. The 50-kW stations lay down a tremendous barrage of spurious energy, and even though they are in conformity with FCC regulations their harmonics are pretty hefty. Unfortunately, there is nothing a ham can do to relieve the QRM from bc-station harmonics [except

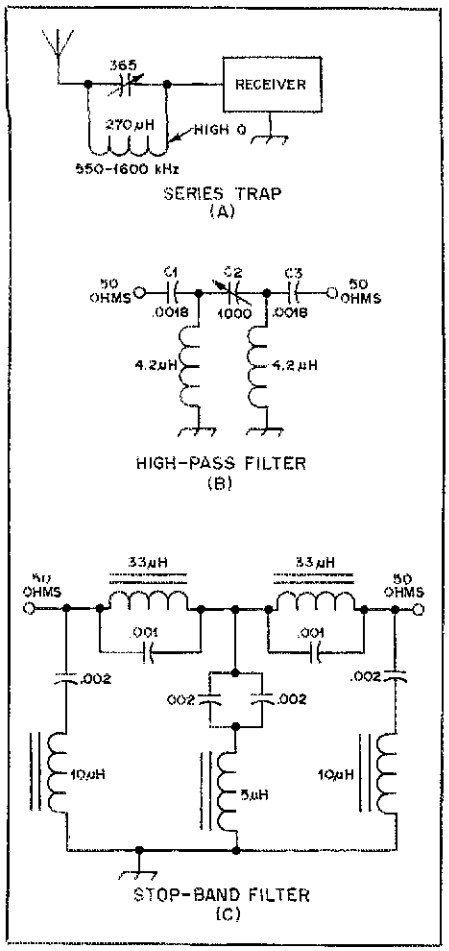


Fig. 1 — The simple parallel wave trap shown at A can be installed in series with the antenna feeder near the receiver. With the values shown it will tune the a-m broadcast band. A high-pass 50-ohm filter is illustrated at B. A band-reject (stop band) 50-ohm filter is depicted at C. It will remove bc-band signals from 550 to 1600 kHz.

build a receiving loop antenna which can be turned to null out the interfering signal energy].[1] In some parts of the country the offensive commercial stations shut down at sunset and remain quiet until sunrise. The writer has the good fortune of living in such an area!

Harmonic energy from bc stations should not be confused with receiver-front-end overloading. If the amateur receiver lacks sufficient dynamic range to withstand the high levels of rf energy from the bc station's fundamental frequency (550 to 1600 kHz), the entire 160-meter band will be a mish-mash of howls and yowls, day and night. The easiest remedy in such an event is to place a filter between the antenna and the ham receiver. If only one bc station is involved, a simple wave trap can be used (tuned to the frequency of the offending station). Fig. 1A shows a circuit which should be suitable. When many bc stations are involved, it is better to install a high-pass or stop-band filter. The high-pass filter is shown in Fig. 1B. It rolls off (starts attenuating) at 1.8 MHz, thereby rejecting energy below 1.8 MHz while passing the desired energy above that frequency. A stop-band filter rejects all of the broadcast-band energy by a substantial amount. It can be thought of as the opposite of a band-pass filter — creating a notch from 550 to 1600 kHz in the input signal line. Fig. 1C shows the circuit of such a filter.

Obviously, the most professional approach to eliminating receiver overloading is to use a receiver that has been designed properly. This calls for a strong mixer and rf stage (if the latter is used), plus good tuned-circuit selectivity in the receiver input section. A homemade receiver of high dynamic range was described in *QST*.[2] It was built especially for use on 160 meters, but through the addition of high-quality "down converters" it can be used from 160 through 10 meters. The converters were described in the same issue of *QST* that contained the receiver circuit.

Some 160-meter operators use crystal-controlled "up converters" into existing station receivers. The converter can be designed to handle high in-band and out-of-band energy levels, and its output can be fed to the station receiver at a level low enough to prevent the main receiver from overloading. Such a converter does not really handle large out-of-band signals, but rather *rejects* them, and that's the real name of the game. A typical circuit for up-converting to 28 to 28.2 MHz is shown in Fig. 2.

Getting back to propagation conditions, the band starts to bristle with amateur signals at or near sunset, particularly on weekends. As the darkness increases the signals become louder, and the span between stations increases. In this respect we can observe a great similarity between 160 and 80 meters.

As the path lengthens there will be a marked increase in atmospheric noise (QRN). This is because storm fronts from a distance away can be heard, even though their electrical noise is not heard locally in the daytime. At times, even though the skies are clear at the receiving locale, QRN will peak well above the S-9 level. Generally speaking, 160 is more noisy than 80 meters.

There is a phenomenon known to 160-meter DXers — *sunset skip* and *sunrise skip*. There seems to be a short-term DX-signal peak just as the sun slips away or rises over the horizon at one's QTH. The DX path is in the direction of where darkness has already fallen, or in some instances along the terminator to the north and south. A lot of USA-European contacts are made at that time, when propagation is otherwise unsuitable. Similarly, the best time work KH6 land from many parts of th USA is when the sun is coming up in th USA or just before. This writer h noticed distinct short-lived signal peal from KH6IJ and KH6CHC just as da light was showing in Connecticut.

The more typical skip is noted fro full darkness to just before sunris European and South American statio can be worked during that period whe the band permits. As a rule, th Europeans are strongest on the Ea Coast from 0300 to 0800 UTC. The are times, however, when prominer stations like PAØHIP, OK1AT GD4BEG, G3LIQ and others are loude in the early evening here, say, 01(UTC. The unpredictable nature of 16 meters helps to make it the fascinatir band it is. One needs to be at har when and if the band opens if he wan to work effectively for his DXCC. Th can lead to the rings under the eyes ar the haggard look mentioned earlie But, DXCC doesn't come easy on 16(Only a small handful of operators ha acquired that precious award. W1BI the "old man" of 160 has done it, and few others have followed. Success DXCC on 160 is complicated not onl by noisy band conditions and unpredic able propagation, but is cursed furthe by the small number of countries that ar active on the band. The governments c many countries prohibit their amateu from using "top band." To illustrate th snail's pace at which some of us mov toward DXCC, the writer has garnere only 50 confirmed countries in thre winter seasons of DX chasing. All bu three countries heard have been worke so it's a matter of playing the "waitin game" until more islands are visited b DXpeditioners, or until some inactiv countries come to life on the band.

A Fine Mobile Band

Daytime propagation makes 16 meters an excellent mobile band fo local work. It is not unusual to wor mobile to mobile on ssb over a 50-mil path, and the range between mobile and fixed stations is even greater. Ma made structures and land-mass obstacle have minor effect on the signals — contrast to what one experiences on 1(6 and 2 meters! The greatest enemy t the mobile operator on 160 meters power-line noise as he travels down th highway. In some areas the 15,750-kH radiation from TV set horizontal-swee circuits will interfere with reception but if the mobileer is in motion th problem will usually be a temporar one.

Mobile operation at night can be lot of fun, as it is not unusual t communicate with fixed stations 100 miles away or farther. The primar handicap is the extremely short an

[1] References appear on page 38.

inefficient mobile antenna required for 160-meter work. An 8-foot loaded whip on 160 is equivalent to a 6-inch loaded whip on 10 meters!

Antenna Dilemma

Antennas for fixed-station work – that's where the men and the boys part company on 160 meters! It's time to clear the memory and reprogram it for top-band operation. Just any chunk of wire that can be made to take rf power is not sufficient on 160. Sure, a guy can work across town or farther by tying together the feeders on his 80- or 40-meter dipole and using a Transmatch to make the transmitter happy with what it sees, but the results when it comes to "getting out" will probably be dismal at best. Of course, it depends on how high up the hf-band dipole is, how vertical the feeder system is, and what the earth-ground quality is. A high dipole with a nearly vertical feeder can be an excellent antenna on 160 if it functions as a top-loaded vertical T, especially if the system is worked against a buried or on-ground radial system. To define the term "high," let's say that the flat portion or apex of the inverted-V antenna being used is 80 feet or more above ground. Fig. 3A illustrates the principle.

Close-up view of a top-loading coil for use on a tower. W1VD and K1JX of the Hq. staff are making final adjustments prior to installation. The coil was furnished by WAØRFF.

Among many 160-meter operators there is a well-founded statement which goes, "a properly tuned short vertical is always better for DX work than is a full-size horizontal antenna which is close to ground." Basic antenna theory

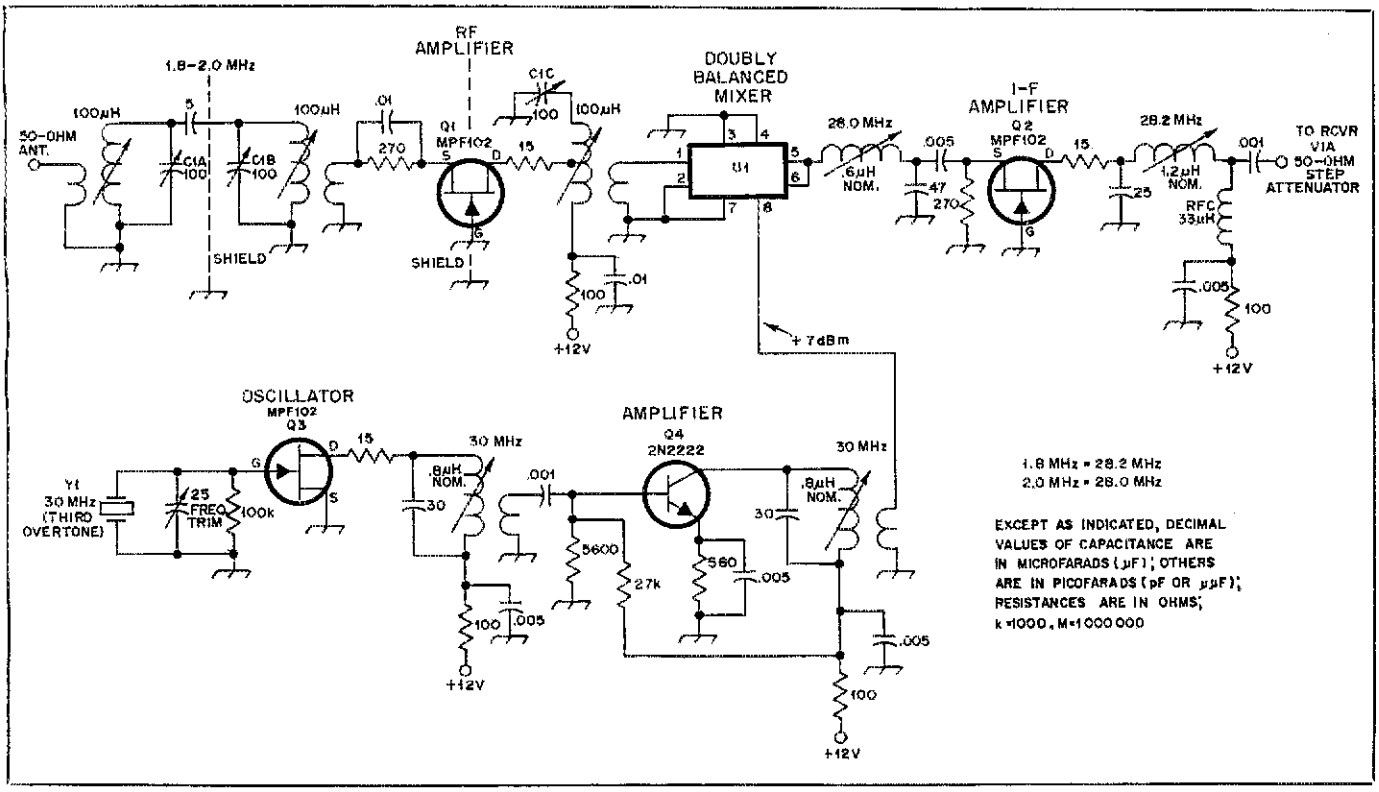


Fig. 2 – Schematic diagram of a suggested high-performance 160-meter converter. A 50-ohm step attenuator should be used at the converter output to keep the converter from overloading the front end of the receiver with which it is used. The i-f amplifier, Q2, may not be necessary if the station receiver is a modern one with good sensitivity. In such a case the 50-ohm output of U1 can be routed directly to the receiver input jack. A double-tuned input filter helps keep bc-band energy out of the converter. C1 is a three-section variable which tracks the three tuned circuits. U1 is a diode-ring mixer module (SRA-1, Mini-Circuits Labs, or equivalent).

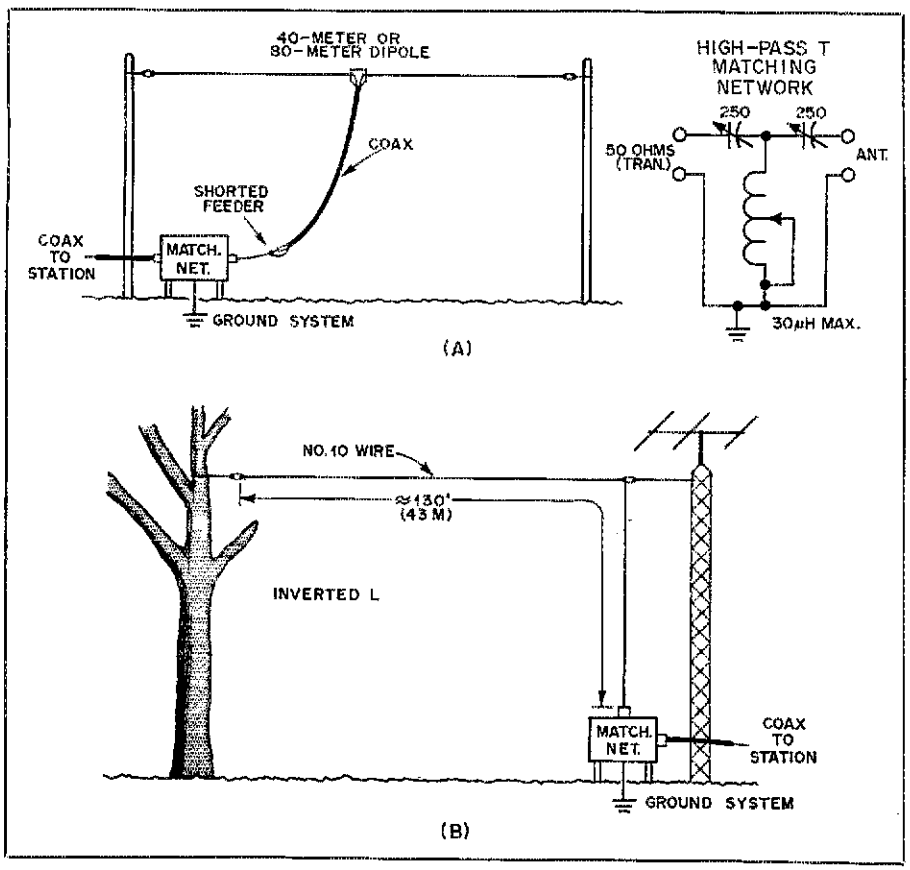


Fig. 3 — A 40- or 80-meter dipole can be used as a top-loaded vertical as shown at A. The high-pass type of T network illustrated at A can be used to match any of the antennas described in this article. It can be mounted in a weatherproof enclosure at the base of the antenna. An inverted-L antenna is seen at B. Its proximity to the tower will have minor effect on the performance.

tells us that a half-wave horizontal dipole, for example, doesn't do its characteristic "thing" unless it is a half wavelength or more above ground. On 160 we're talking about an antenna height of roughly 250 feet or greater! This rule applies also to inverted-V antennas — the great temptation of many who first tool up for 160-meter work. Dipoles, end-fed half-wavelength wires and inverted Vs have been known to do a good job consistently on DX work when installed 80 or 100 feet above ground, but the real benefits from that type of antenna come when they're *really* high in the air. It should be said, however, that dipoles and Vs that are relatively close to ground, say 40 to 80 feet, will do a fine job out to perhaps 600 miles. They are good high-angle radiators, and that's what is needed for short-haul communications. In most instances they will greatly outperform a low-angle radiator (vertical) throughout that coverage area.

Where does the foregoing leave us? Well, there are a number of practical ways to realize a good DX antenna on 160. Boothe gave numerous examples of these antennas in his *QST* article.[3] Cunningham and DeMaw wrote papers on the general subject, also.[4] Some good information is given in *The ARRL Antenna Book*. But for those who do not have access to those references let's talk about verticals, short and tall.

One of the most popular vertical types of antenna is the "inverted L." This is a poor ham's Marconi in many instances. It consists of a quarter wavelength of wire which may be series or shunt fed and worked against a ground system. The object is to make as much as possible of the fed end to rise upward, vertically. This is not to imply that the amateur must resort to the Hindu rope trick. Rather, the vertical portion of the wire is supported by a tower, tall tree or building and fed at the end near ground (Fig. 3B). The remainder of the wire is run off horizontally, or sloped back to ground at whatever angle necessary to secure it. The horizontal or sloping portion of the antenna does little radiating. Instead it acts as a capacitance hat for the vertical section. The greater the length of the vertical member of the antenna, the better the results. Of course, an effe tive ground-radial system helps to mak this antenna a "go-getter" on 160.

Tower Verticals

The fundamentals for a good D antenna may already exist on th property of the 160-meter man. If yo have a tower and hf-band beam avai able, you've got a top-band DX antenn just waiting to be activated! Regardles of the tower height (30 feet or more fo this discussion) it can be made into a effective 160-meter radiator. We' assume that it's grounded and set i concrete. We may even have guy wire attached to it, and if so that can be a advantage.

A tower can be shunt fed and use as a narrow-band nonresonant radiato (assuming it is shorter than a quarte wavelength on 160). Fig. 4A shows hov this can be done. Better still, the towe can be made resonant by adding a extender wire (capacitance hat) or top loading coil and capacitance hat (Fig 4B and C). The resonant tower can b fed with a gamma section, as shown The hf-band beam will simply add t the system as additional top loading The feed line and rotator cables for th hf-band beam need not be decouple from the tower by any means othe than dressing the cables along the towe leg to ground, then bringing them awa from the tower to the shack at groun level. If a top-loading section with a co type of resonator is employed, specia care must be given to the structure o the coil and the dielectric material upo which it is wound. Large-diameter wir should be used (No. 10 or 12 enamele copper wire) to reduce resistance losses The coil-form material should be of th low-loss variety and must not be subjec to damage from rf voltage and heating PVC tubing and nylon materials ar unsuitable for rf work and should b avoided. At power levels above 50 o 100 watts, these materials may melt i an antenna system. An acceptable coi form would be one made from solic cloth-phenolic rod (2- or 3-inch diam eter), ceramic or Teflon. The last two would present some problems if a sub stantial amount of tubing or rod con ductor were used above the loading coil as the durability of the assembly migh be substandard. The most ideal reso nator would be an air-wound one o large diameter.

The bandwidth of a top-loaded system with a resonator coil will be quite narrow between the 2:1 SWR points. A 50-foot tower which had a 20-foot tubing extension with resonator coil and small capacitance hat exhibited a bandwidth on only 8 kHz at the low end of 160 meters. For operation in different parts of the band it was necessary to readjust the matching net

work at the base of the tower.

If guy wires are present they can remain common to the tower and will serve as capacitance hats. They can be isolated from ground at the lower ends by means of strain insulators. In fact, some 160-meter operators have been known to use one of the guy wires as a feed system for the tower, with a suitable matching network to accomplish the excitation (Fig. 4D).

If you're a person of means and courage, you can shoot for the ideal kind of vertical antenna — along the lines of the system used at K1PBW, who is perhaps the most effective DXer on the East Coast. Ernie had a 130-foot vertical which was insulated from ground and worked against thousands of feet of radial wire. The antenna was series fed. Late word indicates that he now uses phased verticals!

Needless to say, the greater the antenna height the better the DX results. The writer uses a shunt-fed Rohn 25 tower which is 50 feet tall. A 4-element, wide-spaced 10-meter beam is aloft on the tower, and a 90-foot horizontal extender wire is hooked to the top of the tower to establish resonance at 1810 kHz. A 25-foot aluminum-tubing mast is mounted above the 10-meter beam to provide an overall antenna height of 75 feet. The advantage in using a resonant tower is mainly one of acquiring greater bandwidth. The tower alone, used as a nonresonant monopole, yielded a 10-kHz bandwidth between the 2:1 SWR points. The bandwidth increased to 50 kHz when the extender wire was added, and that is helpful in contests, as it becomes necessary to QSY frequently.

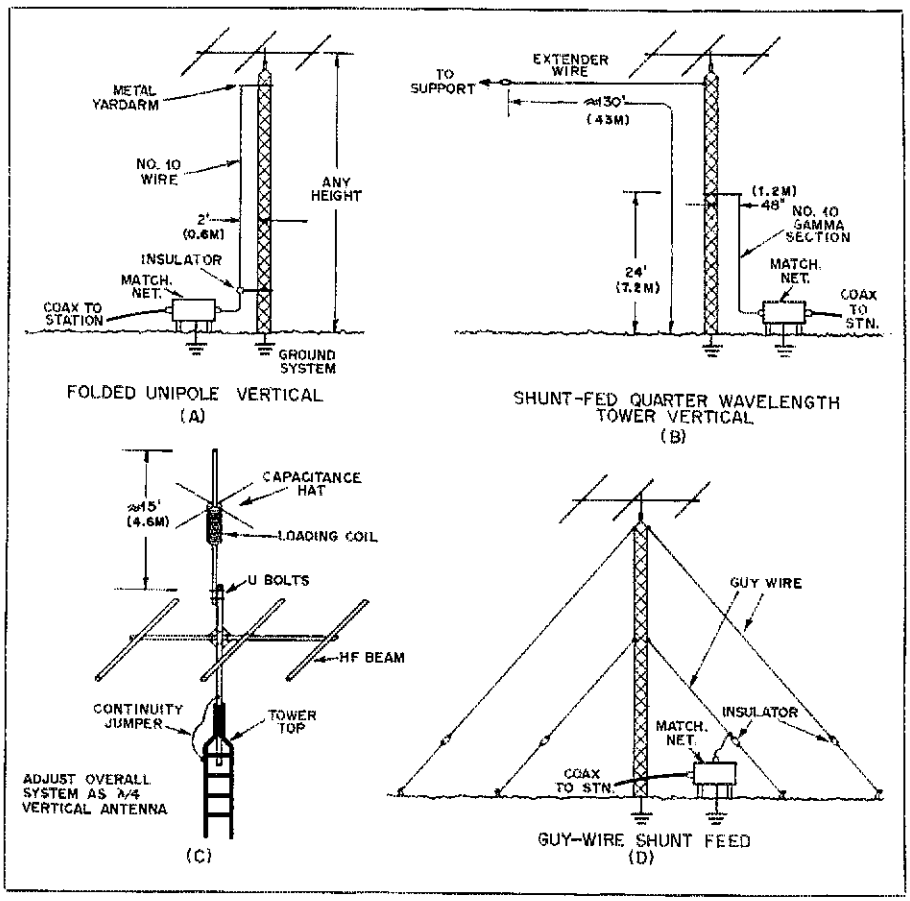


Fig. 4 — A nonresonant folded-unipole vertical is seen at A. If it is less than a quarter wavelength electrically (nonresonant) the bandwidth will be narrower than the system at B exhibits. At C are the details for resonating the tower to one quarter wavelength by means of a top-loading coil and capacitance hat. A method for using one of the tower guy wires as a feed system is shown at D.

Other DX Antennas

Among the varieties of DX antennas used by 160 operators are full-wavelength loops (perpendicular to ground), bob-tail arrays, tilted Delta Loops and sloping half-wavelength dipoles. Each has its virtues, but the larger the antenna the greater the amount of property needed to accommodate it — a truism, to say the least. The sloping dipole is probably the least difficult to realize, provided the operator has the required very-high supporting structure for the uppermost end of it. Sloping half-wavelength dipoles are known as "slopers" among hf-band people, and they function principally as vertical dipoles. This removes the need for excessive heights above ground. Furthermore, the angle of radiation is low — a necessity for DX work. Half-wavelength antennas (or multiples thereof) are fairly independent of a special ground system, and that makes them appealing. If slopers are supported by a metal structure they should be hung on the side of the support facing the desired DX direction, as maximum radiation will occur in that direction. That is, a sloper erected on the northeast side of a support will have its maximum lobe in that direction. This is true even if the support is nonconductive, but the effect is more pronounced when metal or earth is behind the antenna.

One of the common misnomers heard on 160 meters is "long wire." A long piece of wire, relatively speaking, is not a classic long wire. The latter must be a wavelength long or more to qualify for that description. The greater the number of wavelengths, the higher the antenna gain in the direction it is pointed, provided it is terminated in a resistance. Long wires, V beams and rhombics are governed by the same rules as dipoles when it comes to height above ground. If they're less than a half wavelength above ground, regardless of their overall size, they won't "chop it" for DX work in the manner one might expect.

The Matter of Reception

How many times have we heard the statement, "If you can't hear 'em, you can't work 'em." Well, this really means something on 160 meters because the man-made and atmospheric noise levels are usually quite formidable. A paradox exists in the matter of DX antennas: A vertical is ideal for DXing on 160 meters, but it's the most subject of the popular antennas to noise pickup. Most of the successful 160 DX operators use a separate antenna for receiving. Those who have the acreage to permit Beverage antennas to be installed will fare the best of all. A pioneer named H. H. Beverage developed the antenna in question back in the early 1920s. It was intended for lf and mf applications and proved to be a system that rejected atmospheric noise while favoring the desired signal. What it amounts to is a wire antenna of several wavelengths which is installed a few feet above ground and pointed toward the part of the world from which the received signal will come. The far end of the wire is terminated in a pure resistance which matches that of the receiver input. Ideally, the terminating resistance is connected to a system of buried radial wires, but some amateurs have reported good results when connecting the terminating resistor to a long rod driven into

the earth. A Beverage antenna responds to the incoming wave from the direction it is pointed. Energy arriving from the opposite end of the wire (QRN and signals) travels along the wire and is dissipated in the termination. It may be necessary to use a preamplifier between the antenna and the receiver to compensate for signal loss with the antenna.[5] This will depend on the sensitivity of the receiver used. Some 160 DX operators have several Beverage antennas for receiving, each being oriented toward a part of the world where there is amateur activity. These antennas are effective also for low-noise reception on 80 meters. One has to be a "land baron" to accommodate large receiving antennas of this type, but they are extremely useful in DX work.[6]

A compromise to the Beverage antenna is a small receiving loop.[7] Because of its inefficiency, it is necessary to employ a preamplifier which will provide 25 to 30 dB of gain. If a sense antenna is used with the loop, a cardioid response pattern will result. The latter can be directed toward the area of interest, and signals and QRN will be rejected off the back side of the loop.

A random length of wire (with preamplifier) can be run in almost any compass direction a few feet above ground to provide a low-noise receiving antenna. The far end of the wire can be grounded to make it function like a loop — the earth serving as the missing leg of the loop. When this is done the maximum response will be at right angles to the plane of the loop, provided the loop is large in terms of wavelength. It is useful to have an antenna switch at the receiver to permit use of the low-noise antenna and the vertical, as sometimes the vertical may be the better antenna.

Ground Systems

It is a well-established fact that the more extensive the ground system, the better the results with a quarter-wavelength vertical antenna. However, not all 160-meter operators have the property to permit an ideal ground-radial system. Many are forced to make do with what is available, and good results are obtained frequently. Those who have the room for a proper ground system will have a hundred radials or more, each being in excess of a quarter wavelength in size. They can be buried a few inches below the earth's surface, they can be placed on the ground, or they can be a mixture of in-ground and on-ground wires. But for those who can't manage a spectacular ground system, a few wires will be better than none. Furthermore, the wires need not extend uniformly in the various compass directions. Put them where you can, even if some must be wrapped around the house and garage. If they have to be less than a quarter wavelength long, use them anyway. The wire can be insulated or bare, and the performance will be the same.

In a desperate situation the operator should bond together all things that will serve in the ground system – metal fences, power company grounds and the water-pipe system of the house. Each ground that is added will make some difference in the performance of the antenna.

Some Operating Hints

Split-frequency operation is the rule rather than the exception in DX work on 160 meters. Most DX stations transmit in the DX Window (1825 to 1830 kHz), but listen in the lower 5 kHz of 160 for replies (1800 to 1805 kHz). A courteous U.S. operator will remain outside the DX Window at all times. When working Hawaii one must listen near 2000 kHz for the KH6s, but he will transmit near 1800 kHz when replying. To enjoy maximum versatility in operating it is wise to employ two receivers. One is kept tuned to the DX station's frequency, and the other is tuned to the operator's transmit frequency. This will enable the operator to keep tabs on what's happening on his frequency, especially in a pileup. Knowing when to call the DX station (timing) will be bolstered by monitoring your own frequency.

There is a syndrome that seems to have developed some years back, in which cw DX chasers call "CQ DX" for interminable periods of time at speeds of 5 wpm or less. An ordinary operator could have two or three short QSOs while one of these fellows was calling a single CQ. There's no need to monopolize the small band in that fashion, as most DX stations can copy high-speed cw as well as we U.S. hams can. Admittedly, slow-speed cw is easier to copy during adverse band conditions, but if the need arises to slow down it can be done after the contact is established.

Some DX stations listen on their own transmit frequencies and operate outside the DX Window, especially if they are equipped with transceivers. They may appear in the lower 10 kHz of 160, or elsewhere. Over-zealous DXers can ruin communications for everyone by calling the station again and again without allowing a period of quiet for the calling stations to find out who was heard and answered. A DX hog can spoil things for everyone, and in the process deny himself a needed contact. The moral of the story is use short calls and allow reasonable periods for listening to the frequency between calling periods.

It has been said that there are some operators among us who are "power mongers." In areas where the maximum legal power limits at night are 100 watt
it has been reported that there are thos
using in excess of 1 kW. Violators refe
to their amplifiers jokingly as "activ
antenna couplers." This writer has bee
told of specific operators who hav
parallel 4-1000As, three 813s or a singl
4-1000A in the PA. Perhaps that's th
way to become a big frog in a littl
pond, but it's definitely not in keepin
with the real amateur spirit. If we're t
keep 160 meters deserving of the title
"gentlemen's band," operating legall
and politely seems like the only thing t
do.

Those wishing to keep abreast o
events on top band can obtain W1BB
excellent newsletter for a small fe
Worldwide and local DX news is cor
tained in the publication. Prime time fo
DXing is from October to May of eac
year, even though some long-haul DX
work is done in the summer months
Perhaps it's time that you jumped int
the game and tried your hand on one o
the most fascinating bands we have
160 meters. If we should meet someda
at a hamfest, and one or both of us loo
rumpled and haggard, chances will b
that we've been up all night chasing DX
on top band! QST

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[2] DeMaw, "His Eminence, the Receiver," *QST* for June and July, 1976.
[3] Boothe, "The Minooka Special," *QST* fo December, 1974.
[4] Cunningham, "Shunt Feeding Towers fo Operating the Lower Amateur Frequen cies," also, DeMaw, "Another Method fo Shunt Feeding Your Tower," *QST* fo October, 1975.
[5] See DeMaw, "Build This 'Quickie' Preamp," *QST* for April, 1977.
[6] See also Boothe, "Weak-Signal Reception o 160 — Some Antenna Notes," *QST* fo June, 1977.
[7] Nose, "160-Meter Receiving Loop," *QST* fo April, 1975.

Strays

SS CLUB COMPETITION AWARDS

Engraved Sweepstakes Club Plaques sponsored by the Northern Californi Contest Club and the Potomac Valley Radio Club, will go to the club with th highest percentage increase in score ove 1977-1976-1975, the club with th highest percentage increase in score i 1977 vs. 1976, and to the club with th highest average score per club entry Minimum of 20 entries plus a minimun aggregate of 200k points for the three year or one-year awards during the year used to compute the percentage. *WIYL*

Morse Code to ASCII Translator Using a Microcomputer

Everybody talks about receiving hand-sent Morse code by machine, but not many people do anything about it. In truth, it's no big problem for a microcomputer.

By Drago Novak* and Anton P. Zeleznikar,* YU3EM

With the advent of microprocessors it has become a possibility to feed Morse code into the computer and have the code translated into readable text, either as a printout or on a video display. For several years we have explored the possibility of developing such a Morse code reader using a computing device as a base. In the last few years, the availability of low-priced microprocessors has made it possible and attractive to come up with a simple code-reader program.

The program for Morse code reading was devised for an F8 Survival Kit (Mostek) using an ASR33 teleprinter. This kit has an effective monitor system in 1000 X 8-bit ROM (read only memory) using 1000 X 8-bit RAM (random access memory) for application programs and is available for under $150. Additional performance of the F8 computer is a programmable timer and an external interrupt input line to which the Morse code interrupt signal is conducted.

By proper programming it is possible to process "simultaneously" several real-time signals, e.g., Morse code and TTY output for full-duplex communication between the F8 and its environment. This should be mentioned because there exists the possibility to handle in the same way the TTY code speed conversion, e.g., writing the Baudot code with an ASCII teleprinter and vice versa. This problem was also solved with the F8 system.

The Criteria of Character Evaluation

The characters in Morse code are composed of different numbers of elements. The basic elements of a character are the dot and the dash. The basic problem in character evaluation represents the element and interval recognition. The decision into which category the certain element belongs depends on prescribed criteria. Let us consider the criteria on which the computer program is based. If we denote by E_n and E_{n+1} the nth and (n+1)th element of a character and d (E) signifies the length of the element, then the following holds

If $\frac{2}{3}\, d(E_n) < d(E_{n+1}) < 2d(E_n)$
then $E_{n+1} = E_n$

If $\frac{2}{3}\, d(E_n) \geqslant d(E_{n+1})$
then E_n = dash, E_{n+1} = dot

If $2d(E_n) \leqslant d(E_{n+1})$
then E_n = dot, E_{n+1} = dash

The above criteria say that an element equals the preceding one if it is not shorter than 66 percent and not longer than 200 percent of the preceding element; otherwise, it does not equal the preceding one and is in the first case (≤66 percent) a dot and in second (≥200 percent) a dash.

The intervals are evaluated and classified by the following criteria: If $d(P_0)$ is the length of the interval between two successive elements, then it holds

If $2d(P_0) < d(P_n) < 4d(P_0)$
then P_n is the interval between two characters (P_n is nth interval in a character)

If $4d(P_0) < d(P_n)$
then P_n is the interval between two words

If $d(P_n) = L$ then the message is finished

So, the interval equals the interval between two characters if it is between 200 percent and 400 percent of the interval between two elements of a character. If the interval is longer we consider it as an interval between two words; and if it reaches the certain length L, we consider the message finished.

The Algorithm of Character Recognition

Let us assume there are counters for measuring the lengths of single elements, that there is a register (IB) which collects the elements of a character, the counter (IC) that counts the number of the received character elements and that some registers into which we will store the reference values of element and interval lengths are available.

When the first element of a character is received, we store its length for the further evaluation and set IB = 1. Additional elements of a character are evaluated by using the criteria described. If the element equals the first one, then we catenate 1 to the contents of IB; otherwise, we catenate 0.

For instance, if the character B (– ···) were received we would have in IB the value B'00001000' (B means binary) and in IC the value 4; when receiving the character F (·· – ·) the content of IB equals B'00001101' and the content IC equals 4.

By means of characters composed of mixed elements, we can state whether the first element was a dot or a dash. If

*IJS, Jamova c. 39, 61000 Ljubljana, Yugoslavia

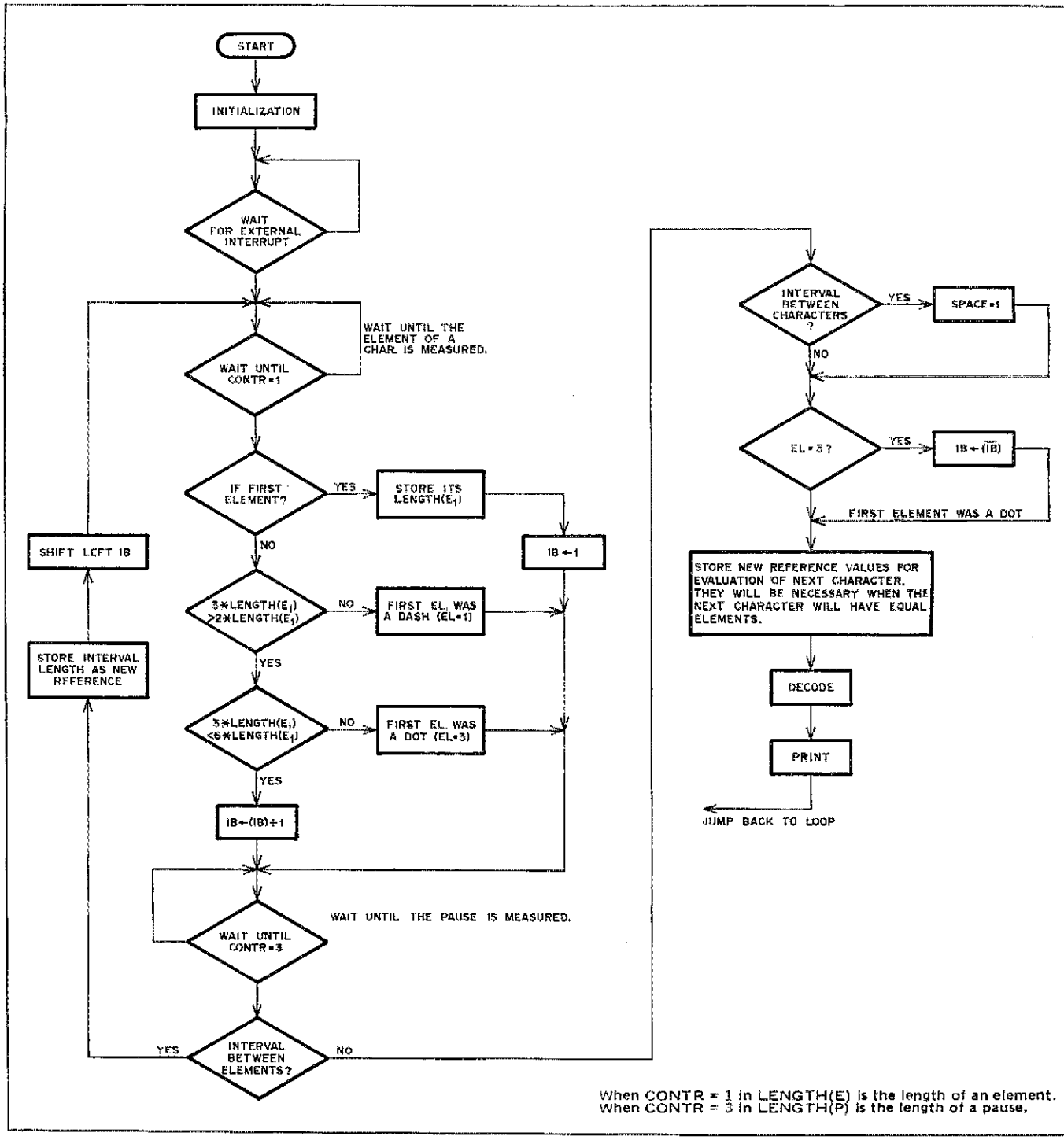


Fig. 1 — Flow diagram of the algorithms for character evaluation.

the first element was a dash then the value in IB is already valid. But if the first element was a dot, then IB must be complemented to get the right value (dash = 1, dot = 0). As we see there are no difficulties in the recognition of characters with mixed elements (A, B, C, D, F, 1, 2, 3, etc.).

In recognizing of the characters composed of equal elements (E, T, I, 5, etc.) we take the length of the first element of a character with mixed elements, received last, as the reference in evaluation. The basic limitation for the correct activity of the algorithm is that the first character must include mixed elements.

The aim of interval evaluation is to tell us at which moment the element collecting must be finished, the interval between words (space) must be generated, and the recognition reception ends.

Program Description

The program is composed of three segments: the Morse code recognize the decoder of Morse code into ASCI and the output in line form (60 chara ters a line).[1] Input and output are use in the full duplex mode. While receivin a new Morse character, the precedin one is typed out in ASCII.

Roughly, the course of the progra

[1] [Editor's Note: Because of space limitation we are making the actual F8 progra available separately. The program is ava able in photocopy for $4, postpaid fro ARRL headquarters.]

is the following: after initialization, the program waits for external interrupt. The first Morse element of the first character releases the interrupt and the control is transferred to external interrupt service routine. This one sets the timer to the appropriate value. Next, the program will be periodically interrupted by the time. and the timer interrupt service routine (TISR) will be executed. TISR measures the element and pause lengths and puts out the ASCII characters serially. Simultaneously, the main program evaluates and classifies the elements and pauses. When it recognizes the interval between two characters, it decodes the received character to ASCII. Then the program initiates the output and the control is returned to the beginning.

As the second and the third part of the program are not directly concerned with the problem of Morse code reading, we will concentrate our attention on the essential, i.e., the first part of the program. This part is the implementation of the previously described algorithm. Its flow chart is shown in Fig. 1. The measuring of elements is performed with timer interrupts. TISR is composed of two parts. The first part decides if either an element or a pause is at the imput. It adequately increments the counter that measures the length of an element or a pause. TISR informs the main program about the conclusion of the measurement, assigning a certain value to the control variable (CONTR). The second part of the TISR puts out ASCII characters bit by bit to the teleprinter. Its function is to form the start and stop bits and to output single information bits in accordance with the teleprinter speed. The flow chart of TISR is presented in Fig. 1. The frequency of timer interrupts (frequency with which the TISR is called) is chosen according to the teleprinter speed. In our case it equals 1136 μs (8 X 1.136 = 9.09 μs) for a bit or 110 baud.

The communication between the main program and TISR is based on common memory locations. The simple mechanism of waiting loops provides effective control of this communication. In the main program, traps are set in the form of waiting loops. As soon as TISR assigns to the control variable (CONTR) a certain value (the measurement of an element or a pause is finished), the main program continues. According to the described algorithm the program collects single elements and forms a Morse character. It also counts the number of character elements. With this information it can then decode the Morse character to ASCII.

This program is written for Mostek's F8 microcomputer and it occupies 750 bytes of memory. The measuring and comparing of elements and pauses are performed with double precision (16 bits). Also, the program covers the whole range of normal Morse transmission speeds (5 to 60 wpm). By evaluating the elements and pauses separately a good recognition reliability is achieved. This measuring method was arrived at after experimenting in evaluating the elements and pauses with the same reference value. The program is insensitive to the code transmission speed being received. So it is practically insensitive to continuous changes in transmission speed. The program is provided with some diagnostic messages. If the received character has more than six elements an asterisk is printed. If the received elements do not compose any of the Morse characters the character @ (ASCII hex 40) is printed.

Conclusion

This Morse code to ASCII translator has the advantage of using a computer program which can be modified (maintained) in several ways. By few modifications this program will write the Morse text in Baudot code with different speeds (e.g., 45.45 to 100 baud). In this way the same hardware (priced under $150) can be used for several jobs, e.g., also for translation of ASCII to Baudot code and vice versa.

The main problem in the described translator represents the accumulation of characters in the buffer since the transmission speed is at best, equal to the receiving speed or lower. So by translating long text the buffer becomes full and failures appear. This is the consequence of the fact that the character transmission (bit by bit) is also performed by the program. This effect can be overcome by enlarging the buffer in RAM and can be eliminated using separate hardware for parallel-to-serial conversion of output (TTY) characters.

References

Petit, "The Morse-A-Verter," *QST*, January, 1971.

"Petit Logic Systems MT-5 Morse to Teletype Code Translator," Recent Equipment, *QST*, August, 1973.

Schnell, "Automatisches Morsetelegrafie – Dekodier – und Anzeigegeraet," *CQ DL*, Vol. 46, pp. 578-583, October, 1975.

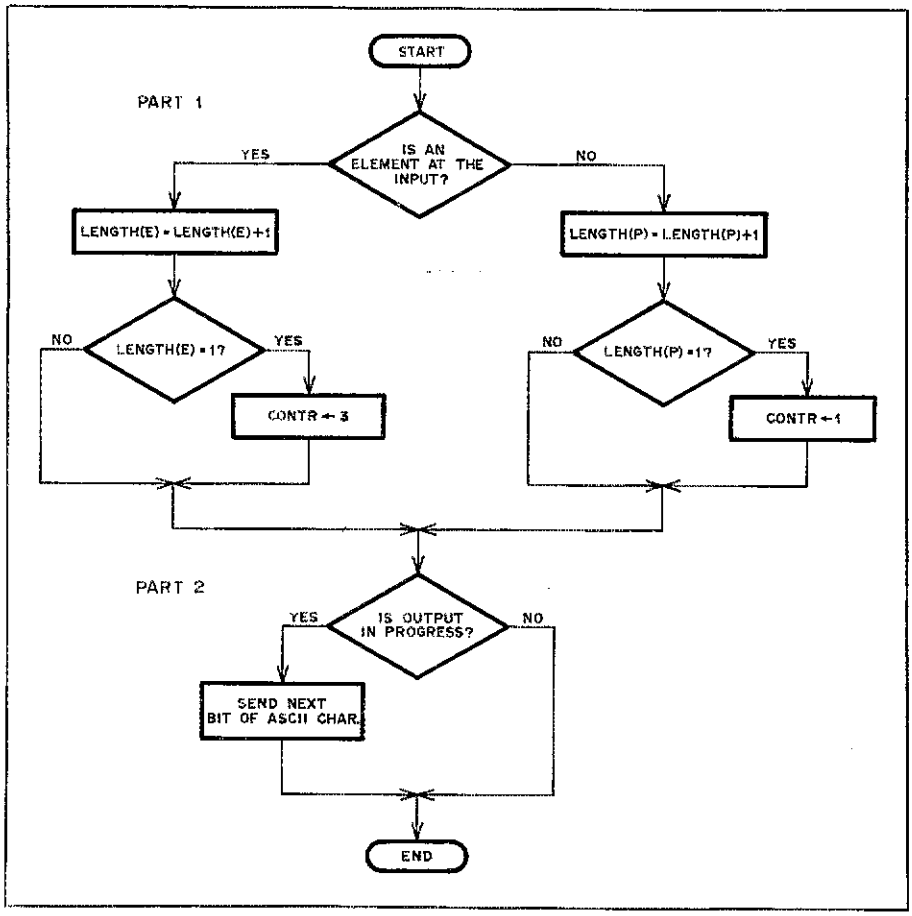


Fig. 2 – Flow diagram of the timer interrupt service routine (TISR). When CONTR = 1 in, LENGTH(E) is the length of an element; when CONTR = 3 in, LENGTH(P) is the length of a pause.

Product Review

Yaesu FT-301D 160-Through 10-M Transceiver

Let's get acquainted with the FT-301D! It's a handsome piece of merchandise – smaller than other hf-band "imports," black in color and with that new "military" look which seems to be coming from the Orient these days. It covers 160 through 10 meters and provides approximately 100 watts of key-down output with its all-solid-state format. Available operating modes are ssb (upper and lower sideband), cw, a-m and fsk. A six-character digital frequency display resides symmetrically at the upper center of the panel. There is no analog readout facility to complement the red LED display. One complete revolution of the main tuning knob provides 16 kHz of frequency change.

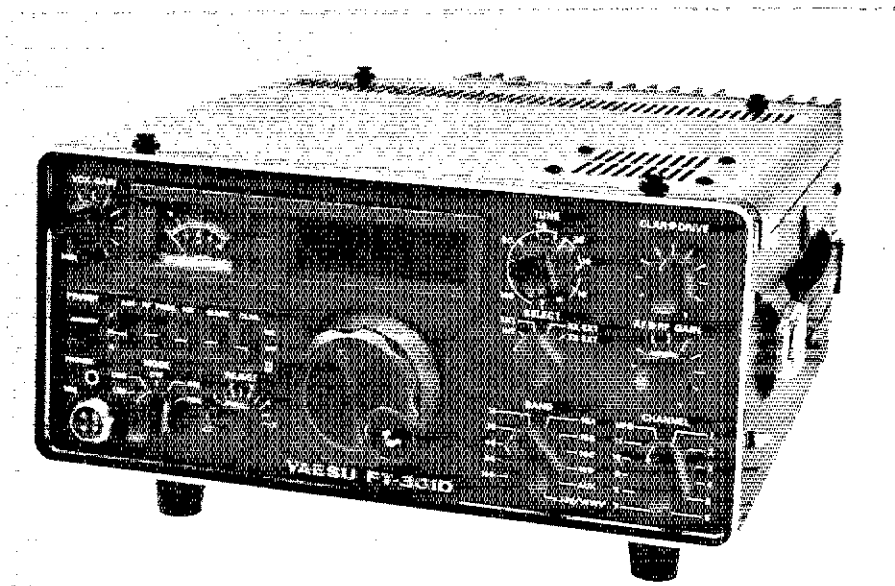
Among the other features of interest to the prospective buyer are the following: The ac power supply (FP-301 or FP-301D) is separate from the main transceiver. This results in a much more compact mobile package than is found with the FT-101E series. The weight is approximately 10 pounds less than the '101E. There is an adjustable VOX. Full QSK has not been provided for, but break-in delay is available for cw operation.

In the filtering department we find the customary ssb-bandwidth i-f lattice filter (2.4 kHz at −6 dB and 4.0 kHz at −60 dB). Optional filters are available for a-m (6 kHz at 6 dB) and cw/fsk (600 Hz at −6 dB and 1.2 kHz at −60 dB). A rejection filter is adjustable from the front panel. It utilizes a crystal in series with a tuning capacitor to function as a series high-*Q* notch filter at the i-f. The crystal can be "rubbered" over the entire i-f passband. Although the reviewer did not measure the notch depth, it appeared to be 30 dB or greater in magnitude. An *RC* active filter (3 kHz) is used in the audio circuit as a further aid to QRM and noise reduction.

A built-in noise blanker is part of the system offered with the composite FT-301D. As is true with all blankers, ordinary ambient noise and atmospheric QRN are not reduced significantly by the circuit. However, the '301D blanker is the most effective one tested by this writer when it is used for the intended purpose – removing pulse types of noise. Automotive spark-plug hash simply vanished during mobile checks on 10 meters. On 160 meters the night-time LORAN signal level reaches 30 dB over S9 at W1FB. The noise blanker chopped the LORAN to S3 without degrading the sensitivity of the receiver! The same tests were performed with the FT-101E blanker, and the LORAN pulses were cut to only S8 from 30 dB over S9. No evidence of receiver degradation (cross-modulation) was observed with the blanker actuated, even with W1AW operating two blocks away.

An rf speech processor is built into the FT-301. It can be made operative by installing the optional crystal filter which is required to complete the circuit.

The age can be set for fast, medium or slow by means of a front-panel switch. A 100-kHz calibrator is built into the transceiver. If the operator desires to use an external VFO with the unit, he can purchase the FV-301 for that purpose. For mobile operation the transceiver is connected directly to the 13.5-volt dc line in the automobile. A stable RIT circuit is also a feature of the '301D.



A handsome piece of merchandise, smaller than other hf-band "imports," and black in color with that new "military" look – the FT-301D.

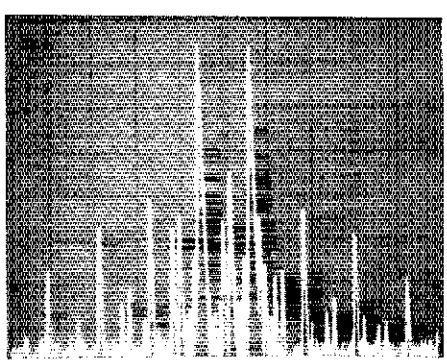


Fig. 1 – Two-tone test for IMD products. The third order products are down approximately 40 dB from full output. Individual signals are down 6 dB from the PEP output.

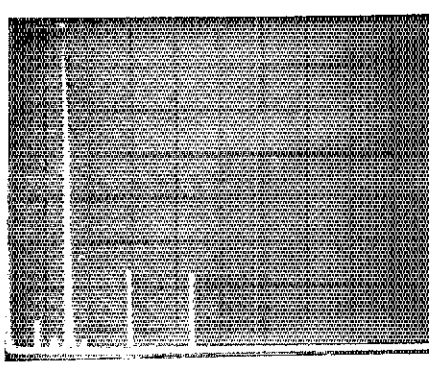


Fig. 2 – Spectral analysis of the 40-meter output, or worse case condition. The second harmonic is attenuated 55 dB and the third harmonic (farthest to right) is down approximately 57 dB. The FT301D exceeds FCC standards for spurious emissions.

Performance Traits

The writer used one of the first FT-301Ds available in the USA for a 1976 DXpedition to Barbados (8P6EU/8P6FJ). It performed flawlessly, even in the boiling tropical sun during the peak of the day. Operation was carried out on ssb and cw from 160 through 10 meters. All of the signal reports received were "top quality." Despite the wide variations between day and night temperature frequency stability was excellent. Lab measurements of the drift were made later, and no more than 100 Hz of change was noted for any one-hour period. The digital display was entirely readable in all but the brightest of sunlight. From a subjective point of view, the '301D receiver has a much smoother sound than that of the FT-101B and E models checked by the writer. That is, the noise seems lower in level, and the frequency response of the audio is more suited to communications work.

The present model of the FT-301D has a few circuit changes in the receiver front end and we're happy to report that the 11-meter band (CB) has been deleted from the box that

is current available! Bravo for Yaesu!

ARRL laboratory tests were conducted to determine the dynamic-range characteristics of the receiver. The test methods used were those reported by Hayward in his *QST* article for July, 1975: noise floor = −133 dBm; blocking occurs at 100 dB above the noise floor; IMD is 75 dB above the noise floor.

Transmitter spectral purity meets or exceeds the FCC-required −40 dB. No evidence of in-band spurs was noted from 160 through 10 meters. The latter is usually found in solid-state amplifiers which have low-frequency instability.

The transmitter PA is SWR protected. That is, as the SWR increases, the drive to the PA is reduced. This protects the amplifier transistors from damage. During the 1976 DXpedition some operator errors caused the transmitter to look into dead shorts and at least one open condition with full drive applied. No damage to the equipment resulted. A problem was averted during that operation by removing the cover from the ac-operated power supply. The line frequency on Barbados is 50 Hz, and the power transformer in the ac supply became extremely hot in a short period of time. In fact, the paint on the cabinet (above the transformer) began to blister and smoke from the heat. The cabinet has only a few small vent holes, so removal of the cover seemed appropriate. The problem was cured through that "modification," and the transformer operated just warm to the touch thereafter. Here in the USA during operation from 117-volt, 60-Hz mains there is no evidence of excessive heating in the power supply.

Final Comments

An interesting experiment was conducted with the FT-301D for the sake of operating the transceiver at lower power. Normal peak current drain during transmit (full power) is on the order of 20 amperes. For low-power use it seemed possible that the PA "brick" could be removed from the rear of the transceiver to permit routing the 10-watt driver through the PA output filters to the antenna jack (the PA filters are internal and switchable). The brick was removed quickly after releasing two spring-loaded holding screws and pulling the module from its socket. BNC connectors (two) on the rear of the '301D are used as input and output terminals for the PA assembly. A BNC jumper cable was used to join the two connectors, thereby routing the driver output through the harmonic filters. Operation was excellent, and maximum current drain was only 4 amperes. Part of that drain resulted from the frequency counter and digital display. A steady carrier output of 7 watts was obtained. The only shortcoming noted was that the meter was no longer operative during the transmit period. An external SWR indicator served as the power-output meter while peaking the drive control. Not only did the current drain of the rig drop markedly, but the size and weight of the transceiver was greatly reduced!

The FP-301D power supply comes equipped with a 24-hour digital clock. It also contains an internal speaker which is somewhat larger and better sounding than the tiny one built into the transceiver. An IC can be ordered with the operator's call programmed in it. The IC is installed in the power supply so that an internal keying circuit can be actuated from the panel to send the station identification over the air as desired.

All of the circuit-board modules are plug-in units. This makes servicing relatively simple. The color scheme of the transceiver and FP-301D is low-glare black with gold trim. The writer considers the FT-301D a quality product which should offer reliable service to the purchaser. — *W1FB*

The Yaesu FT-301D

Dimensions (HWD) and weight: 125 × 280 × 370 mm, 9 kg.
Power requirements: 13.5 volts dc (negative ground) at 21 A for the transmitter. For the receiver, 13.5 volts at 1.1 A.
Receiver audio power: 3 watts at 10 percent total harmonic distortion.
Price class: $935 (transceiver), $125 (power supply FP-301D).
U.S. distributor: Yaesu Electronics Corp., 15954 Downey Ave., Paramount, CA 90723.

MIDLAND 13-509 220-MHz TRANSCEIVER

The Midland Model 13-509 is a 1-1/4-meter fm transceiver. Power output is dual range, 1 or 10 watts selectable, with provision for 12 repeater or simplex channels. The unit is designed primarily for mobile use with a 12-volt, negative-ground supply. With all the activity on 2 meters today, many hams are considering "220" as a good band for vhf operation, repeater or simplex. The 13-509 is Midland's entry into this band.

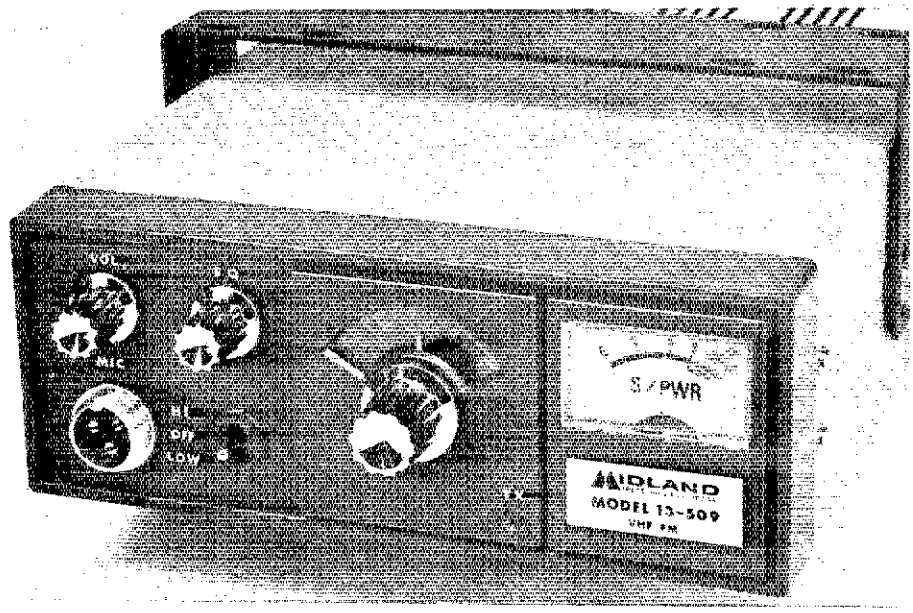
The Receiver

Midland utilizes dual-conversion design with MOSFET devices in a straightforward circuit, the aim being to obtain high signal sensitivity and to reduce cross-modulation products. Audio output is about 2 watts. The frequency is controlled by a 53-MHz, 3rd-overtone crystal, multiplied four times.

The Transmitter

The oscillator starts with an 18-MHz, fundamental-type crystal. The signal is multiplied by 12 up to the operating frequency through a tripler, buffer-doubler and another doubler. Phase modulation is employed for the audio. Once crystals were obtained, this reviewer had no difficulty in netting the three channels used, via the frequency counter in the ARRL lab. Midland supplies the 13-509 with simplex crystals for 223.5 MHz. They are already installed and netted.

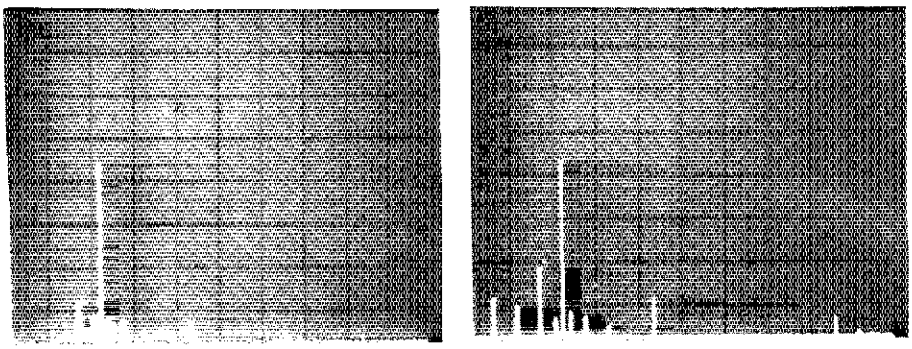
In the accompanying spectral analysis of the 13-509, readings were taken at both the low (1-watt) and high (10-watt) power levels. The horizontal scale is 100 MHz per division and the vertical scale is 10 dB. The carrier is notch filtered, and is approximately 36 dB down from full scale. In order to comply with the latest FCC ruling, transmitting gear operating from 30 through 235 MHz must have all spurious signals attenuated at least 40 dB for a carrier of 10 watts or less. When reading this analysis, note that the carrier in relation to the spurious, is actually at full scale, but has been suppressed intentionally to prevent overload of the analyzer front end. In our test, the second harmonic was down about 68 dB and, under high power, improved to 72 dB, so the 13-509 meets the current FCC spurious requirements easily.



The Midland 220-MHz transceiver has provisions for 12 crystal-controlled repeater or simplex channels.

For operating mobile or in the shack, the 13-509 has some interesting features. One switch combines the on/off and low/high-power functions. The S-unit/relative-rf meter is unusually large for a rig this size and is very easy to read, unlike many of the edgewise-reading meters whose movements can be hard to follow. A four-pin socket located on the back panel allows the use of a discriminator meter or a tone encoder for autopatch access. Midland has also incorporated an ingenious bridge in the transceiver output to monitor constantly for high VSWR; this circuit automatically disables the driver and PA stages should an abnormally high VSWR occur – a good precaution in case a short occurs in the coaxial feed line or if the antenna becomes accidentally disconnected, for instance.

The receiver seems to have adequate sensitivity and is free from intermodulation problems; signal reports of excellent audio have, so far, been reported. The two watts of audio that the receiver supplies are far more than this writer expected – it really fills car or shack with good-quality sound from a very small speaker. The case is finished in tan and brown, and overall construction of this vh transceiver seems to be excellent. The 13-509 is distributed in the U.S. by Midland International Corp., P. O. Box 1903, Kansas City MO 64141. – *WA1EEA*



Spectral output of the Midland 13-509 220-MHz transmitter. At the left is shown 1-watt operation, and 10-watt operation at the right. See text for explanation of the display.

Midland 13-509
220-MHz Transceiver

Dimensions: (HWD) 2-1/4 × 6-3/8 × 8-7/8 inches.
Weight: 4-1/2 pounds.
Operating voltage: 13.8-V dc, negative ground, nominal.
Rf power output: 1 or 10 watts, selectable.
Receiver sensitivity: 0.5 microvolt for 20 dB of quieting.*
Squelch threshold: less than 0.3 microvolt.
Price class: $250.
*Manufacturer's ratings, not verified in the ARRL lab.

MULTICORE ALU-SOL, SOLDERING ALUMINUM

I watched with fascination as the man demonstrated his company's technique for soldering aluminum during ELECTRO-77 in NYC. Apart from the myriad commmercial exhibits at the IEEE trade show, the Multicore booth seemed to stand on its own as the crowd pushed closer and closer to the demonstration table. A company representative was soldering pieces of aluminum together with absolute ease, and there were looks of awe and delight on the faces of those who watched. "Fantastic," I heard someone mutter, and in my mind I was saying, "Unbelievable." I recalled the many times I had attempted to obtain a good bond between pieces of aluminum while using ordinary solder and some special flux material. The main problem was getting the metal hot as quickly as possible, then applying the solder before the surface to be soldered began oxidizing. It practically required a magician's skill to accomplish that feat as oxidation, however invisible to the human eye, formed almost immediately. This caused a poor bond between the solder and pieces of metal being joined. The longevity of the bond was usually short – weeks, or months at best.

The man in the Multicore booth was working with a hot plate (kitchen type) and a roll of Multicore Alu-Sol 45D. He was placing one-inch squares of aluminum on the hot plate so that they would reach the required temperature of 350°C as quickly as possible, thereby minimizing oxidation on the surface of the metal. The aluminum solder was then allowed to flow over the heated metal. It ran as smoothly as water, leaving a relatively uniform surface. No external flux was applied; the required flux was contained in the Alu-Sol! Some of us onlookers were amazed further when we saw the man wash the residue away with ordinary tap water. That's right, no special chemicals are needed to clean the finished work! The fellow doing the demonstrating advised us that the residue should be washed off the work as soon as possible because the residue is slightly corrosive. Also, it will absorb moisture from the atmosphere.

Some Characteristics

Alu-Sol 45D contains 18 percent tin, 1.9 percent silver and 80.1 percent lead. The melting range is 178 to 270°C (Fahrenheit 352 to 518). Its electrical conductivity is 8.7 percent of copper. The flux content is 2.8 percent by weight.

The fumes produced by any soldering flux should be avoided. Multicore Co. states that none of its fluxes are likely to be harmful to humans if the exposure is occasional and short in duration. It is recommended that any type of soldering which involves flux material be done in a well-ventilated area. After using Alu-Sol, the operator should wash his or her hands immediately. The solder and flux should not be allowed to touch food items, and the material should be stored out of the reach of infants. These rules apply, of course, to any toxic or dangerous materials used in electronics work. The watchword in cases like this should always be "safety."

Soldering

The thermal conductivity of aluminum is only about half that of copper. Therefore, it is important that the joint, as well as the aluminum surrounding the joint, be well heated before the solder is applied.

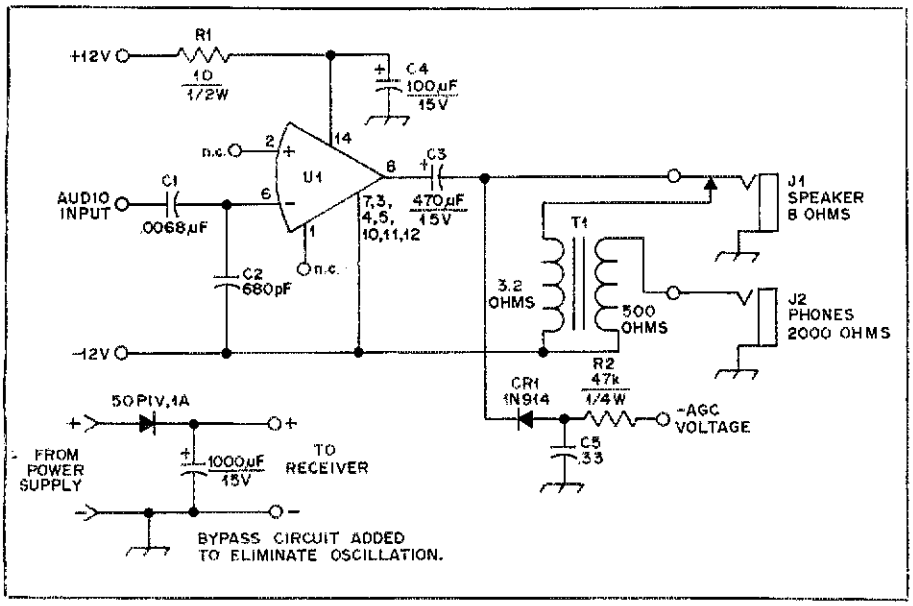
Although a heavy-duty soldering iron can be used with Alu-Sol 45D, a butane o propane torch is more suitable for fast heatin of large pieces of work. The material shoul be heated quickly by directing the torc flame toward both pieces of aluminum alloy, alternately, until the surface tempera tures are between 350 and 450°C. Nex apply the aluminum solder, but avoid direc ing the torch flame onto the solder joint. I other words, the solder should be melted b the surface of the metal being soldered – no by the torch flame.

It is worth mentioning that Alu-Sol i compatible with normal standard solders. I contains no bismuth, zinc, cadmium or alum num. It will solder practically all metals including stainless steel!

Perhaps you're wondering now just wh aluminum solder would be of value to radi amateurs? Well, how about that vhf or uh beam antenna you've been wanting to build Wouldn't it be nice to solder the elements t the boom ? You betcha! Or how about tha homemade chassis or utility box that could b fashioned from scraps of aluminum? Alum num solder will be useful when soldering brackets to an aluminum chassis. Alu-So should be quite handy when building anten nas from alunimum clothesline wire, especia ly when it comes to making an electrica connection for the feed line.

According to Multicore, this great new solder is available from any distributor who handles the regular Multicore product line Don't forget to clean the surfaces you're planning to solder. They should be smooth and free of grease, chemicals or dirt before the work begins – the basic rule for any type of soldering. Additional literature is available from Multicore, Westbury, NY 11590. – *W1FB.*

Hints and Kinks



A circuit for improving the audio of the *QST* course receiver.

MORE AUDIO FOR *QST* COURSE RECEIVER

One aspect of the 80-meter "course" transistorized receiver featured in the April through September 1974 issues of *QST* (DeMaw and McCoy, "Learning to Work with Semiconductors") that I felt could be improved was the limited gain of the audio amplifier. It was impossible to drive the speaker with the amount of audio provided.

A review of the IC power amplifiers now available for operation at 12 volts led me to consider the LM-380 which is a 12-transistor 2-watt IC amplifier (Poly Pak no. 92CU2000 or Radio Shack 276-1725) for this application, even though I have not seen such use described in *QST* or other amateur journals. Its input characteristic is well-suited for communications circuits.

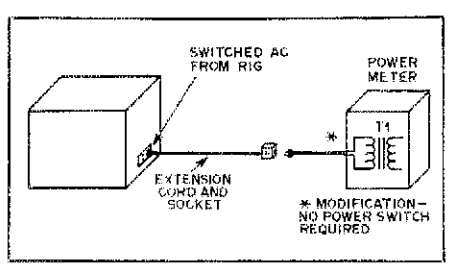
Results with this little amplifier have been highly satisfactory, with excellent headphone volume and sufficient speaker output for a small room. Difficulties were encountered initially with oscillation at frequencies above the audio range. The problem was cured by connecting a 1000-µF, 15-V, electrolytic capacitor from the reciever side of the protective diode in the power supply to ground.

One item of information missing from the specification sheets for the LM-380 was the signal level required to drive the amplifier to full output. However, gain was found to be excessive when the amplifier was connected to the full secondary winding of the product detector at coupling transformer of the receiver. Consequently, the center tap of the transformer winding was used to feed the volume control and the amplifier. Because of the excellent-quality audio output, the low cost and relatively small size, this af power amplifier is recommended for use in other transistorized receiver projects. – *Herbert L. Ley, Jr., ex-W3VYN*

SWITCHING ARRANGEMENT FOR THE PEP WATTMETER

In "Hints and Kinks" for July, 1977, I made reference to the easy switching arrangement I use for applying power to the PEP Wattmeter a la Heath. The power cord, as shown in Fig. 3, is connected to the transmitter power switch. The plug and receptacle line-cord coupling is convenient for removing the wattmeter, if necessary.

I'd like to stress again the need for good shielding to prevent erratic operation. A back cover is a must for the meter. Removal of paint *is* essential at points of contact between the cover and the meter enclosure, as well as between the two chassis as mentioned in the July article. – *Jay Kobelin, WA2FIJ*

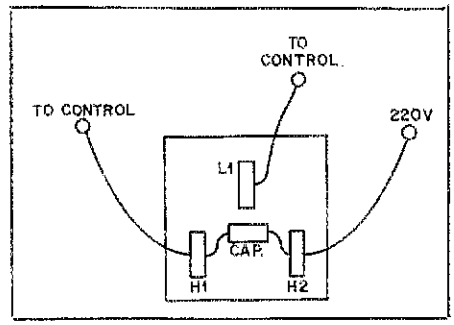


The PEP Wattmeter a la Heath may be switched on or off from the transmitter power switch by using this convenient arrangement.

S9 NOISE – WELL-BAKED

At last! After two years of frustration it was finally solved . . . S9-plus noise throughout the spectrum when our electric stove was operated in the BAKE position. The cure for the problem was provided by the service manager of the Gibson Stove Company in Providence, RI. He informed me that most stoves have a thermostat relay just inside the rear of the stove and to the left of the 220-V entrance. Apparently, this relay has a reputation for causing havoc – not only with ham gear, but also with TV sets and stereo equipment.* A capacitor (0.05 to 0.1 µF, 600 V) placed across the terminals as shown in the drawing will suppress the noise. While the code letters on the terminals for the control may differ from stove to stove, the capacitor is placed across the bottom terminals as indicated. CAUTION: Be sure to disconnect the 220-V line at the source before installing the capacitor. – *Tom Galante, WA1PWZ*

*[Editor's Note: The thermostat for the domestic hot water supply in some furnaces can also be a source of strong interference, even from a neighbor's home.]



Electrical noise, generated by an electric-range oven thermostat relay, may be suppressed with a bypass capacitor connected across these relay terminals.

COUNTER PROBE

Many frequency counters do not have adequate sensitivity for measurement of receiver crystal-oscillator output frequencies. For this reason, I purchased a preamplifier probe, advertised by Page Electronics (*QST* for Dec., 1976, page 148). This device provides an ideal solution for the problem of insufficient sensitivity. Alternatively, one could build a wideband preamplifier.

Often, however, an amateur might have access to an Ameco or similar preamplifier which will serve the purpose admirably by adding a piece of RG-58/U coaxial cable, terminated in a one- or two-turn loop for the pickup probe. The preamplifier output is coupled to the counter via a short piece of coax.

To use this system, place the pickup loop

near the receiver crystal and tune the preamp carefully across the approximate crystal frequency. The counter will flip between several frequencies until one tunes to the actual output frequency. The counter will then lock in and the frequency can be read.

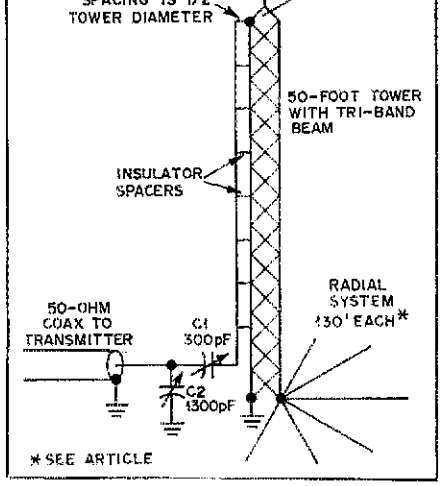
Using this scheme, I have easily measured the 9-MHz frequency of a Drake TR-4 carrier oscillator, all the TR-4 receiver mixer crystals, including the ones for the 43-MHz overtone mode, and the receiver crystals in a 12-channel 2-meter rig with excellent results. – *Roy Albright, W5EYB/N5RA*

160-METER VERTICAL ANTENNA

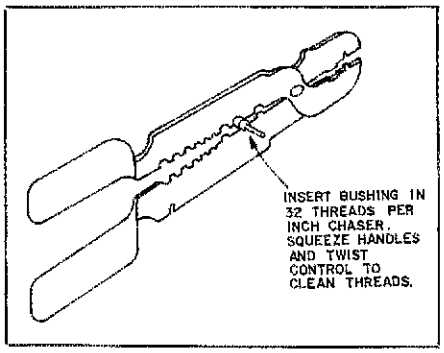
Horace Greeley is said to have advised one to go west. I did and am now on Johnston Island.* My advice for those who want to work 160-meter DX is, "Go vertical!" Let me say that I formerly used a full-size dipole, 90 feet high, which ran nearly the length of a football field. DX results were fair. But thanks to KH6ABF, I changed to the vertical antenna illustrated here. Since then my signal-strength reports from DX stations are generally three to four S units better than with the dipole. Running my TX-4C barefoot, my first contact was 6,000 miles away.

Most of the features of the vertical are shown in the drawing. The tower is top loaded by the tri-band Yagi antenna. A good ground is a must. I believe that the radials should be 130 feet long, and the more radials the better. No. 12 copper wire was used for the shunt-fed system, which extends the length of the tower. It is supported and spaced from the tower by means of plastic pipe. The two capacitors, C1 and C2, are mounted in a plastic box affixed to the tower. Tuning is just a matter of adjusting the two capacitors for minimum SWR, which in my case was 1.2 to 1. – *Capt. Marvin Feldman, KJ6DL*

*[Editor's Note: Capt. Feldman has moved to Hawaii since these data were contributed for use in *QST*.]



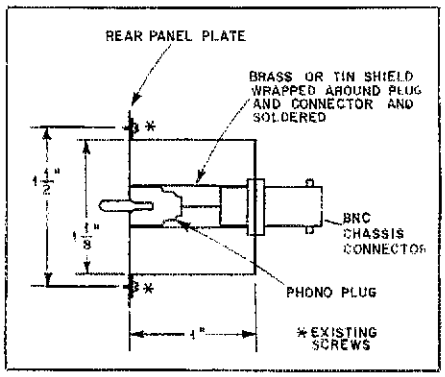
Shunt-fed vertical antenna for 160-meter band.



Method of repairing threads on shaft bushings.

REPAIRING THREADS ON SHAFT BUSHINGS

Some wire strippers and terminal mashers, such as the T & B Sta-Kon tool, WT1OOM, have thread chasers to use for cleaning screw threads. All one has to do is to clamp the screw between the jaws of the die, then turn the screw with a screwdriver. For repairing threads on the bushings of variable capacitors, volume controls, jacks, toggle switches and pilot lights, one can use the 32-threads-per-inch chaser. Place the bushing in the no. 32 opening, squeeze the handle of the tool, and twist the device until the thread is cleared. – *The Rev. Benjamin Clark, K4ZN*



BNC connector for HW-2036.

TWO CHANGES FOR THE HW-2036

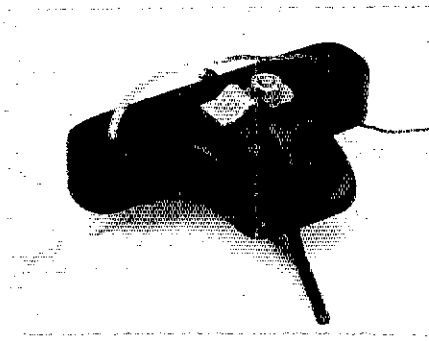
After constructing both the Heathkit HW-202 and the HW-2036, I have found that these otherwise well-designed sets have the same problem. Removing and re-installing the antenna connectors when changing from fixed to mobile operation and vice versa results in serious wear of the connectors after a year or so. Without defacing or permanently modifying the equipment, I solved the problem as follows.

To accommodate a BNC connector and a phono plug, I made a U-bracket and attached it to the rear panel by means of the existing mounting screws. The bracket, shown in the drawing, may be constructed from brass or aluminum stock. It should be large enough to hold both the antenna connector and the auxiliary-speaker jack, should the builder so desire.

Because the HW-2036 does not lend itself to the installation of a microphone jack without drilling the panel, I needed to provide another means for an audio-input circuit for use with RTTY. A short length of mic cable was fitted with an in-line mic jack and a mating plug was installed on the cable from the rig. This worked well and also made it easy to change microphones. – *Dick Bensinger, K8ILQ*

A RUGGED HOMEBREW DIPOLE INSULATOR

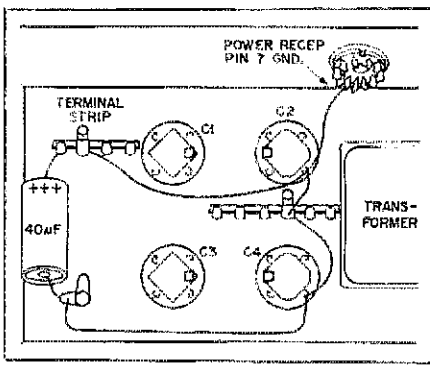
Plastic plumbing pipe material has been used by many amateurs to make antenna insulators. But the one shown in the photograph is more rugged and "a bit different." It is made from the remains of a bathroom seat! – *Bill Doolittle, K1EPX*



This rugged dipole insulator can take plenty of strain.

LOW LOW-VOLTAGE OUTPUT FROM THE HP-23 POWER SUPPLY

Owners of the Heath HP-23 power supply who find an instability of voltage or low low-voltage output, should check the ground connections, especially the one for C4. Even corrosion on the positive terminal of C4 may result in below normal voltage. On my HP-23 I found that all ground points had paint under the terminals, an invitation to bad connections. My solutions were to remove the paint under the ground soldering lugs and to run ground buses as shown in the drawing. – *Bill Wood, WB6FXJ*



A ground bus connected in this manner will avoid a drop in low voltage that could result from poor ground connections.

Update Your OSCARLOCATOR — And Your Amateur Radio Library

Here's a simple way to improve your OSCARLOCATOR. And a new book to let you in on all the excitement of the amateur satellites.

By Jon E. Ahlquist,* WAØWYX

If you're one of the 20,000 amateurs who have found OSCAR quickly and easily with your own OSCARLOCATOR, you may have noticed that something was missing. You guessed it — beam headings for directional antennas.

Here's an easy way to adapt your OSCARLOCATOR to give approximate azimuth and elevation information at a glance.

Just Trace It

Using a permanent, nonwater-base, felt-tipped marker (available at all stationery stores), trace Fig. 1 on your QTH/Rangefinder (the small circle that shows the satellite's range) or a separate sheet of mylar, available at art supply stores. The elliptical shape will yield more accurate results for North American latitudes on the polar projection map.

Place the center of the overlay on your QTH. The straight line, now labeled "0" (zero), should be aligned so that the arrows point north. This indicates 0 degrees azimuth.

The lines radiating from the center give azimuth bearings at 30-degree intervals, while the concentric circles give elevation bearings of 0, 30 and 60 degrees. With the relatively wide beamwidth of typical OSCAR antennas (about 60 degrees for a 10-dB gain antenna), estimates between the marks should be adequate; you should have to reposition your antennas only every two minutes or so.

*Dept. of Meteorology, University of Wisconsin, Madison, WI 53706

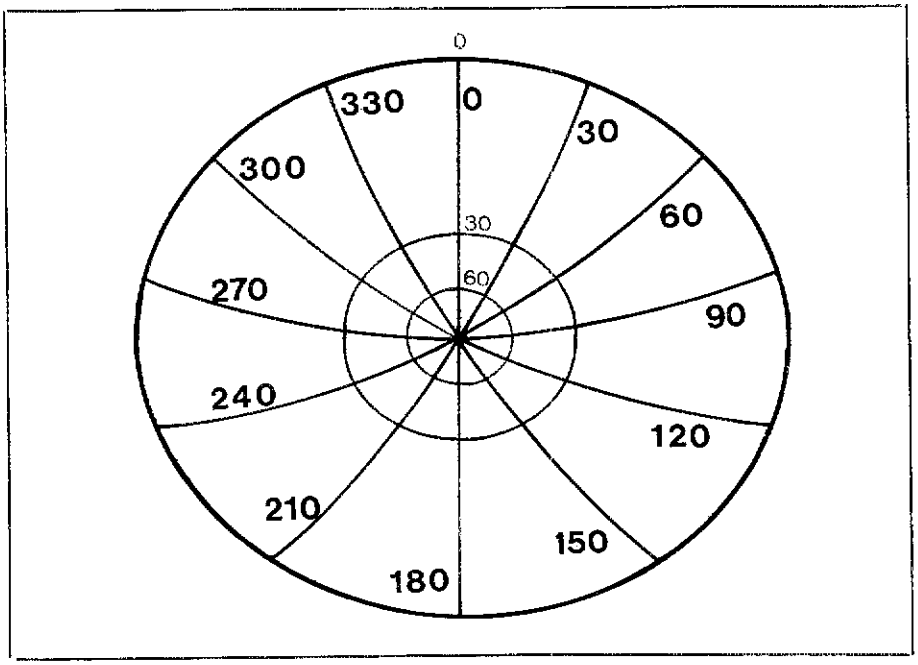


Fig. 1 — Using this QTH/Rangefinder will provide accurate AOS, LOS and beam headings for all OSCAR passes in the Northern Hemisphere. Just trace it onto a piece of mylar with a felt-tipped pen. To determine DX possibilities, center the original (circular) Rangefinder on the area you are interested in working (London, for example). If OSCAR will be within range, the orbital track will fall in the area where the two Rangefinders overlap.

Using your updated and improved OSCARLOCATOR is simple. The "Orbit Finder" overlay still gives the number of minutes after equator crossing (EQX) that the satellite will be within range.

If, for example, the path of a given orbit crosses the 30-degree elevation oval at an azimuth of 180 degrees on the modified overlay, then at that instant the satellite will be 30 degrees above your horizon and directly south of your QTH. With the new overlay, you can jot down the az-el data at two-minute intervals well in advance of an upcoming pass. This will let you devote every precious minute between AOS (when you first hear it) to LOS (when you lose it) to operating.

Sound easy? You bet it is! QST

ARRL Satellite Book Available Now

Whether you're just starting to listen to OSCAR 7 on the upper part of 10 meters or you've already got your satellite WAS, you'll want to get a copy of the ARRL's brand-new satellite booklet — *Getting to Know OSCAR — from the Ground Up.*

Aside from reprints of the widely praised series of *QST* articles on the amateur satellites, the book has a preview of future OSCARs and a history of past ones. All you need to know to get into OSCAR is here, from tuning in the spacecraft to chasing operating awards.

Included in every copy is an attractive four-color OSCARLOCATOR map and a coupon which can be redeemed for a free acetate sheet that incorporates the beam heading data described in the accompanying article.

How can you get your own copy? Simply send $3 to the ARRL, or look for it at your amateur radio supply store.

20th Jamboree-on-the-Air, 1977

This fun weekend is strictly "no contest." But there's lots of DX and even more excitement to be had when scouts meet hams over the airwaves.

By Morris Jones,* N6DE

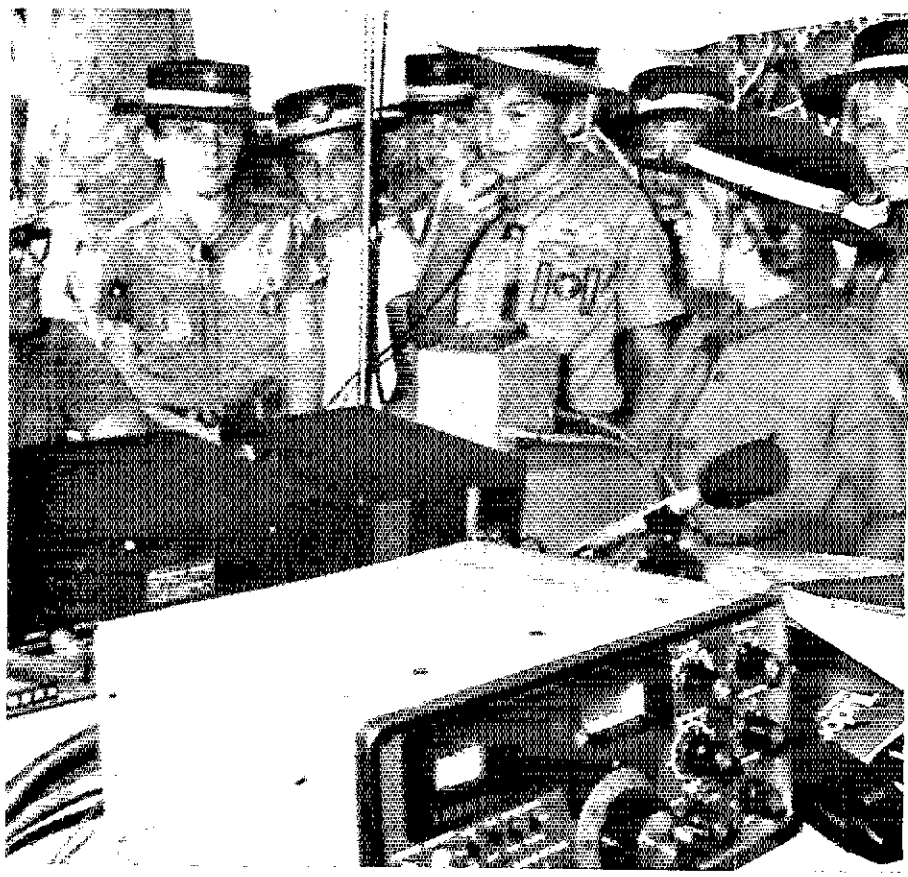
Since worldwide communications and friendship are a major goal of both scouting and ham radio, it's amazing that somebody didn't think of bringing them together a long time ago. It's been 20 years since an English scout and ham, Les Mitchell, came up with the idea that the scouts and amateurs who meet at the annual World Jamboree should get together on the air. The first Jamboree-on-the-Air (JOTA) exceeded everybody's expectations, and it has grown to the point that an estimated 2.5-million scouts and guides took part in last year's event.

This year, JOTA will be held October 15 and 16, local time. It will be 48 hours of fun for everyone who participates. Stations will be on the air the day before and after, so there's no need to be strict with operating times. Frequencies are shown in Table 1; QSOs are encouraged on 2 and 6 meters, as well as OSCAR (the World Scout Bureau hopes to use its new OSCAR station donated by Communications Satellite Corporation). RTTY, SSTV and CB, if available, will also be used for JOTA contacts.

Stations calling "CQ Jamboree" should move off the calling frequencies once contact is established. Look for K2BSA on the air for the entire period; F0AA will be on representing the World Bureau. Send activity reports to W2GND, National Office, Boy Scouts of America, North Brunswick, NJ 08902. Special certificates will be awarded to all participating individuals.

A highlight of the 20th JOTA will be a message to scouts from President Carter to be transmitted by W1AW both days during the regular bulletin schedule (see "Operating News").

*Membership Services Asst., ARRL



VK4OV (left) supervises a group of enthusiastic scouts from Mount Isa, Queensland, Australia, during the 1975 Jamboree-on-the-Air. This photo appeared on the cover of *Amateur Journal*, the journal of the Wireless Institute of Australia.

Conditions this year should be super, and scouts everywhere are looking forward to some meaty contacts. Even last year with less than optimum conditions, activity was very high.

In Australia, Governor-General and Chief Scout, Sir John Kerr, gave VK1BP use of the grounds of the Government House in Canberra and performed the official JOTA opening ceremony.

On the Cook Islands, the Nikao Scout Troops camped at Aroa received a personal message from New Zealand Governor-General Sir Dennis Blundell. ZK1BS and ZK1BA made many contacts with scout troops in Oceania.

When poor conditions curtailed ragchewing in Denmark, RTTY, SSTV, fox hunting and code practice took over.

The Finnish scout magazine reported, "There's a lot of squeaking and crackling going on; the equipment looks extremely complicated. One could almost say that there is a feeling of a great sports event in the air."

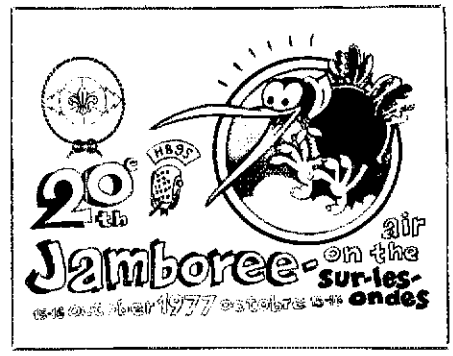
In Hong Kong, scouts had a long ragchew with a JOTA station in Java, and the scouts exchanged songs over the air. (No music on the air in the U.S., please!)

Norway had tremendous activity, despite poor conditions. SSTV contacts were made with Denmark and Switzerland and a portable station was set up in the snow. Nearly 14,000 scouts at the National Jamboree participated in amateur radio, fox hunts, and kit building.

Table 1

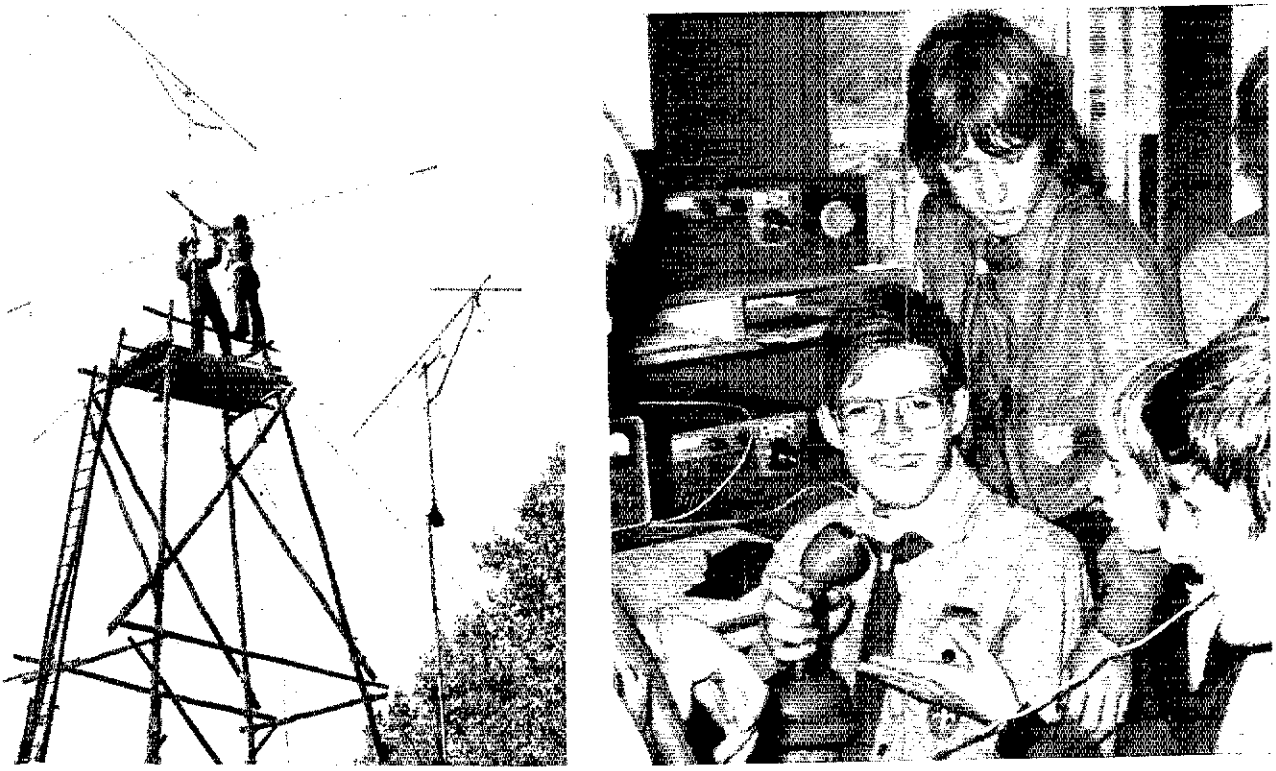
JOTA Calling Frequencies (kHz) October 15-16, 1977

CW	*Phone*
	3,740
3,740	3,940
7,090	7,240
7,140	14,290
14,070	21,360
21,140	28,990
28,190	



TV coverage in Portugal included 15 minutes of news time on JOTA. Boy Scouts of America operated three stations from U.S. air bases in the Azores.

Jamboree-on-the-Air provides a tailor-made opportunity for ham radio publicity. Why not invite the local Scout troop over to your station for the weekend? Contact the local Boy Scouts of America Council listed in your phone book and offer your services. Don't forget to invite the local media as well!



Scouting's annual Jamboree-on-the-Air is fun as well as educational. These participants at PAØTOI/A discover the joys of tower climbing (left), while scouts at DLØWW, Lampertheim, West Germany, seem to be having a great time (right). Both photos were taken during last year's JOTA. *(Photos courtesy of Boy Scouts World Bureau)*

Strays

CANADIAN JAMBOREE

□ "Chimo," the Eskimo term for "friends all," was the theme of this year's Canadian Boy Scout Jamboree on Prince Edward Island. Its amateur station, VE1CJC, helped bring this theme to life.

Over 7,000 scouts and scouters visited the station, making more than 1,200 contacts and sending 30 messages to families and friends across the continent. Foxhunts, kit-building, cw familiarization, traffic handling and guest operating were some of the highlights.

The great success of VE1CJC was in part attributable to the enthusiastic support of the Boy Scouts of Canada, the Summerside ARC, Ottawa ARC and the CRRL/ARRL. Special thanks should go to VE1CJC staffers VE1DI, VE3DV, VE3AUM, VE1AOY, VE1AQB, VE1AWV, VE1ABU, CJ1EJ, VE1BKP, VE1BKN and to VE1AIC and crew who set up a comprehensive 2-meter emergency communications network throughout the area. "Chimo" is an apt description of all who participated. – *WB1EYI and VE1SH*

BOY SCOUT QSL AVAILABLE

□ If you contacted K2BSA/3, the 1977 National Scout Jamboree at Moraine State Park in Pennsylvania, and would like an attractive QSL card, send your QSL with time, date and frequency along with an s.a.s.e. to K2BSA, National Headquarters, Boy Scouts of America, North Brunswick, NJ 08902.

Amateurs Respond to FCC WARC Inquiry

The FCC asked for public comment on its WARC proposals, and got it: from hundreds of hams and, of course, from the ARRL.

By David Sumner,* K1ZZ

Early in the summer (*QST* for July, 1977, page 56), we reported a request of the Federal Communications Commission for public comment on a series of important proposals which affect the very existence of amateur radio. In developing its position for the 1979 World Administrative Radio Conference (WARC) of the International Telecommunication Union, the U.S. government has invited public participation at several points along the way. The ARRL has represented amateur radio in the preparatory process since the very earliest stages, and was joined a couple of years ago by a group of very knowledgeable and dedicated amateurs who, at the invitation of the Commission, formed the FCC Advisory Committee for Amateur Radio (ACAR). The ACAR has held a series of meetings in the Washington area, all open to the public. There has been close cooperation between the League and the ACAR, and amateur radio's cause has been promoted effectively by both.

The Commission's request for public comment referred to above was known officially as the Fifth Notice of Inquiry in Docket 20271. Needless to say, both the League and the ACAR devoted considerable energy to preparing extensive, carefully researched responses. As we reported in July, this was an excellent opportunity for individual amateurs and local clubs to add their voices to those of the League and the ACAR. In addition to the *QST* article, we made a special mailing to all League-affiliated clubs and provided extensive WIAW bulletin coverage. A resounding response to the Fifth NOI, we said, could help influence the position the U.S. delegation will carry to Geneva in two years.

How Well Did We Do?

The deadline for comments in response to the Fifth NOI was August 1, which was extended at the last minute to August 15. How did we do? Did individuals and clubs rise to the challenge? Well, while we don't have exact figures at this time, it is clear that hundreds did. Unfortunately, this means that thousands did *not*. Out of an amateur population of 321,153 and an affiliated-club list numbering more than 1700, we know that a substantial number would like to see amateur radio continue to exist beyond 1979. "It's the League's job to represent us in WARC preparations," you say. True enough. But the League is more than a handful of volunteer officials and paid staffers. Most of the real work of the League is done by volunteers, by people who feel their obligation to amateur radio extends beyond 12 bucks a year. An important responsibility of the professional staff is to motivate the membership to be active and involved, and to provide support and guidance as required. We had hoped to stimulate a somewhat greater level of participation. When and if another major opportunity for public WARC participation comes along, we of the staff will try to fulfill this responsibility more effectively.

Now for the bright side. Most of the comments filed by amateurs were brief but *good*. Many supported the establishing of new amateur bands in the high-frequency range, especially at 10 MHz, and the proposed expansion of the 14-MHz band. There were numerous comments in support of an amateur band at 160-190 kHz, some of which went into considerable detail as to how amateurs could effectively use this spectrum in the public interest. The need for additional amateur satellite allocations between 438 MHz and 24 GHz was mentioned by several. Amateur com-

* Assistant General Manager, ARRL

What About the Fourth Notice?

We have given major *QST* coverage to the Commission's Third and Fifth Notices of Inquiry in Docket 20271. What happened to the Fourth?

The Fourth NOI was released two weeks before the Fifth, and dealt primarily with technical matters not affecting the Amateur Service. However, there was one item of particular interest to us: a proposal to tighten considerably the standards applied to spurious emissions from transmitters. The present standards were first applied to the Amateur Service in the U. S. earlier this year, when the Commission adopted a First Report and Order in Docket 20777 (May *QST*, page 63; June *QST*, page 76; August *QST*, page 67). Therefore, the proposal to tighten these standards was of great concern.

The League called this aspect of the Fourth Notice to the attention of the membership of the Amateur Radio Manufacturer's Association, so suitable responses representing the manufacturing viewpoint could be prepared. Some manufacturers who are not members of ARMA also filed comments. For its part, the League submitted extensive opposing arguments. The Commission has not justified its proposed revisions, we said; the economic costs involved far outweigh the benefits. Even if tightening of the specifications were desirable for other services, it would be unnecessary for the Amateur Service, since interference problems can be better handled on a case-by-case basis by technically qualified amateur operators. The greater need is for *receiver* standards to be applied to broadcast receivers and audio devices which are not even intended to intercept radio transmissions. Experimentation at the higher frequencies would be drastically curtailed. Finally, the proposed time frame for implementation of new standards was hopelessly unrealistic.

Will our opposing arguments convince the Commission that it is on the wrong track? We hope so. More than that, though, the Fourth Notice pointed up the need to read every word of every FCC document relating to WARC. In other words, it justified our vigilance!

ments took a long-term view of the need for spectrum in most cases, especially at uhf and the microwaves.

Long-Term Perspective Needed

A few of the comments were disappointing in one respect: They took a short-term view of amateur needs at hf, and subordinated the need for additional spectrum to the slight modifications of existing equipment which would be needed. This was particularly true with respect to the segments 13.95-14.00 and 20.95-21.00 MHz, which are among those the Commission proposes for expansion of the Amateur Service.

Certainly, bands should not be shifted unnecessarily. The League did not support an earlier Commission proposal to relocate the 15-meter band to 20.700-21.200 MHz, and was able, with the cooperation of the nonamateur Maritime Mobile interests, to prevail upon the FCC to drop the proposed change.

However, the last thing we want to do is to leave the impression that additional spectrum is so unimportant to amateurs that we are unwilling to buy and install a new heterodyne crystal in order to utilize it! The fact that the lower edges of most of the amateur bands are multiples of 1 MHz is of no particular significance, other than historical; with the sole exception of the Standard Frequency Service, the Amateur Service is the *only* service listed in the International Table of Frequency Allocations where the operating frequencies are in this sort of an exact relationship. It might be nice to continue this tradition, but the need for additional spectrum is far too pressing to permit this to stand in the way of expanded amateur allocations. Twenty years from now, when the results of the 1979 WARC are still in effect, the impact on present-day amateur equipment will seem rather unimportant.

The ARRL Filing

In response to the Commission's Fifth Notice of Inquiry in Docket 20271, the League prepared and filed a 44-page document. The basic philosophy of the filing was endorsed by the Board of Directors at its July meeting. Here is a summary of the arguments presented therein. Reference to the July article, and to the ones in February (page 62) and April (page 64) of this year, will help put the comments in context.

Growth of the Amateur Radio Service

Based on the present annual growth rate of radio amateurs in the U.S., about 20 percent, and on the continued success of its training program, the League now estimates that there will be 440,000 licensed amateurs in the U.S. by the end of 1978, and 500,000 by the opening of the WARC in September, 1979. Worldwide, the same trend is evident. It is likely that the worldwide amateur population will exceed one million by the middle of 1978, two million by 1982, and six million by the end of the century. The growth may be even greater if technical and operating proficiency requirements are reduced in some of the major countries.

Growth in amateur radio can improve its public-interest performance, which is already at a high level. However, sufficient spectrum must be made available to assimilate the hundreds of thousands of additional stations.

Spectrum Between 10 and 4000 kHz

In its Third Notice of Inquiry, the Commission proposed 160-190 kHz for amateurs. There was objection based on possible interference to power line carrier systems used by electric utilities. No technical evidence was offered in support of this view. Subsequent investigation has shown the objection to be unfounded and premature. The Commission now proposes to establish a broadcasting band at 115-190 kHz. The propagation characteristics of the band make it wholly unsuited for local broadcasting such as envisioned by the Commission; no case for regional broadcasting has been made; and there appears to be no demand from potential listeners. Amateurs, on the other hand, could make good use of the band for reliable regional communications and for training and experimentation. (Note: Filings by many individual amateurs made excellent arguments in support of the 160- to 190-kHz amateur allocation.)

The League strongly supports the Commission's proposal for a worldwide exclusive amateur band at 1800-1900 kHz, and a shared band at 1900-2000 kHz. The stated needs of broadcasting and radiolocation in this part of the spectrum do not have a sound technical basis. History shows that amateurs can share successfully with certain other services, without harmful interference to the other parties.

The 3500- to 4000-kHz band continues to support the bulk of regional amateur public service communication. No new services can be introduced in the band without substantial disruption of the emergency communications capability of the Amateur Service.

Spectrum Between 4 and 27.5 MHz

The League has some reservations about the Commission's plan to make 6950-7250 kHz exclusively amateur and 7250-7500 kHz exclusively broadcasting, worldwide. Out-of-band operation by broadcasters is so widespread that there is little reason to believe they would respect the exclusivity of the amateur allocation. Furthermore, it may not be possible to obtain the necessary spectrum from the Fixed Service. Canadian objections to the plan may be anticipated, because of time station CHU on 7335 kHz; the League's suggestion is to make 7500 kHz a Standard Frequency and relocate CHU there. This would be consistent with the use of the frequency in other parts of the world.

With the exception of maintaining existing allocations of heavily used bands, the addition of a new band at 10 MHz commands the greatest priority for the Amateur Service. To use sound spectrum management practices, i.e. appropriate frequency for the path to be covered, minimum power, etc., a service must have access to bands of frequencies throughout the spectrum. Today, vast gaps exist between the amateur allocations at 7 and 14 MHz, and again at 14 and 21 MHz. On long-distance paths under normal conditions, communication is possible only for short periods on one or two frequency bands. The Commission proposes to establish new broadcasting allocations at 5, 7 and 13 MHz for this very reason; however, the need of the Amateur Service is much more compelling because of the low-power nature of the service and the wide gaps which exist between present bands.

The League believes there is sufficient justification for exclusive amateur allocations of 300 kHz at both 10.1 and 18.3 MHz. The League recognizes the need for an orderly and gradual transition between use of these bands by the Fixed Service and by amateurs. The comments filed by the general public in this proceeding clearly show that there is widespread support, and no domestic opposition, to these new amateur allocations.

The proposed 29 percent expansion at 14 MHz will help reduce overcrowding in this heavily used band. The 14-MHz band is relied upon for intercontinental communication and will continue to be so used even if new allocations at 10 and 18 MHz are forthcoming. Radio amateurs are already voluntarily employing spectrum conservation measures such as single-sideband, directional antennas, etc.; the use of the narrowest emission available, cw, is also widespread. In spite of these measures, the 14-MHz band is extremely congested whenever the frequency is capable of supporting propagation. The expanded allocation will permit amateurs to continue their unique contribution to international goodwill through direct, person-to-person communication.

The Commission's action in restoring the 21-MHz band to its present position,

and in proposing a 50-kHz expansion, is most appreciated. There appears to be no justification for an expansion of the adjacent broadcasting allocation.

If the proposed allocation at 25.76 MHz were to be adopted internationally, there would be no lack of amateur activity in the band. However, other countries are adopting positions in support of an amateur band at 24 MHz. The U.S. position is more likely to be accepted internationally if it agrees wherever possible with the positions adopted by others. To this end, the League requests that consideration be given to shifting the proposed amateur allocation to 24 MHz, and renews the request for a 500-kHz exclusive band here.

Spectrum Between 27.5 and 1215 MHz

No changes in the 28-, 50- and 144-MHz bands are proposed by the Commission. The bands are heavily used for public service communications, propagation research, and (in the case of 28 and 144 MHz) amateur satellite work. In the U.S. alone, registration of two-meter repeaters for listing in the ARRL *1977-78 Repeater Directory* increased 45 percent in one year, from 1,450 to 2,103. In most metropolitan areas, no frequencies are available for new repeaters in this band.

The two-meter repeater has given amateur radio a powerful new tool for public service use. As these Comments are being prepared, hundreds of volunteer amateur operators are assisting with communications in conjunction with the catastrophic fires now sweeping portions of California. Amateur-constructed repeater stations, installed at no cost to the taxpayer, have been able to provide communications into areas which are unreachable by other means. Less dramatic instances of public service by amateurs occur every day. As the nationwide network of amateur repeater stations develops still further, the value of the Amateur Service to the general public will increase. Amateur investment in equipment for the 144- to 148-MHz band is in excess of $100 million. This tremendous investment, the cost of which cannot be passed on to the public, must be protected.

The Commission should abandon once and for all the outmoded idea of CB at 220 MHz. Amateurs are turning to 220 MHz in ever-increasing numbers; repeater registrations were up 141 percent last year, and metropolitan areas such as Los Angeles and New York already have run out of available channels. Recent events at 27 MHz have demonstrated the folly of establishing a CB allocation in close proximity to an amateur band. Outside the United States, there is no support whatsoever for a 220-MHz CB band. In some parts of the world, the spectrum in question is used for television broadcasting; in others, for aeronautical radionavigation and other vital services. If 220-MHz CB gear found its way into the international stream of commerce, as it inevitably would if the U.S. adopted such an allocation domestically, the results would be catastrophic.

The Commission's proposals for 420-450 MHz are strongly supported by the League. The band houses such a variety of amateur operating interests that introduction of new services in the band would be most undesirable.

While the League supports the introduction of a new, high-quality CB service at 900 MHz, inclusion of the Amateur Service in the international Table of Frequency Allocations at 902-928 MHz is supported. Flexibility to provide for future domestic needs is the goal in this international proceeding.

Spectrum Between 1215 MHz and 10.7 GHz

The Commission has proposed to withdraw 1215-1240 MHz from the Amateur Service because of possible incompatibility with a Radionavigation Satellite system planned for this band. The League recognizes the importance of high reliability in any such safety-of-life service. However, an explanation is needed as to why the satellite system can coexist with radiolocation (radar) operations in this band, but not with amateur operations. It appears that some sharing arrangement should be possible, and the Commission is urged to give this further study.

At the present time, the Amateur Satellite Service has no access to spectrum between 438 MHz and 24 GHz. If satellite technology is to play a part in the future of amateur radio, and if amateurs are to make their unique contributions to space communications, access to this spectrum must be provided. The League strongly urges continued support of usable allocations to the Amateur Satellite Service in the 2300-, 3300- and 5650-MHz bands, and reconsideration of the question at 10.475 GHz. The League opposes sharing with the Broadcasting-Satellite Service at 2300 or 3400 MHz.

Spectrum Above 10.7 GHz

The League endorses the proposal for an exclusive amateur and amateur-satellite allocation at 49.8-50.0 GHz and strongly supports the other proposals for amateur occupancy above 10.7 GHz.

Article 41 Revision

While some minor clarification of the language might be desirable, Article 41 (which establishes certain guidelines for amateur licensing and operation; see chapter 9 of the *License Manual*) of the Radio Regulations is basically sound. Attempts at revision might create more problems than they would solve; arriving at regulations which say the same thing in several languages is no easy task, and there is no guarantee that the intent of minor changes would be preserved in an editorial committee.

The League firmly opposes deletion of the Morse code requirement for operation below 144 MHz. Modern techniques used in teaching the code have eliminated it as a roadblock for any serious student, and it remains an important part of amateur radio. Removing the code requirement would increase the number of amateurs in the high-frequency bands far beyond the capacity of the bands.

If it were practical to modify Article 41 slightly, the League would support clarification of the responsibilities and privileges of amateurs in emergency situations; specific provision for handicapped persons to demonstrate Morse code ability in ways other than receiving by ear and sending by hand; and clarification of the so-called "banned country" procedures. However, the League has no specific wording to offer at this time, and would analyze any proposed wording very carefully.

Sharing

The Amateur Service has an excellent record of cooperative sharing with other services. Unfortunately, the Amateur Service has frequently been the victim of irresponsible operation by other services. For sharing arrangements to work, there must be a mutual and cooperative relationship between the services involved. Without common respect for the requirements of all services, effective use of the spectrum is not possible. The past record of a service is the best indicator of how well it will cooperate with others in the future. The record of the Amateur Service speaks for itself.

What's Next?

The revised deadline for comments was August 15; for comments in reply to those filed by others, September 2. It is hoped that another Notice of Inquiry can be issued in November. This will probably represent the preliminary U.S. position. At this point, nothing is cast in concrete; adjustments will continue to be made. However, the concrete is beginning to harden, and drastic changes become more unlikely as time goes on.

Will amateurs have another chance to comment? We hope so, in response to the next Notice of Inquiry. If so, we hope *you* will take advantage of a significant privilege: participation by an individual citizen in the development of his nation's long-term telecommunications policy. QST

QSLs

Part 1: How to make them, send them and store them.

Confirming Two-Way QSO of_____ Mode_____

At_____ UTC XMTR_____ RCVR_____

Report_____ Freq._____ ANT_____

You've passed your test, and waiting for the day's mail has become just about your most enthusiastic occupation. When that license comes, you say, I'll really be in business.

Finally, something comes. It doesn't look like it's from the FCC, but it's sure related to amateur radio. Opening up the envelope, you discover what all new hams – and many old ones – find in their mailboxes sooner or later: a QSL card solicitation.

There are usually five or six designs enclosed, from straight key to tower to American flag. While pondering how commercial organizations know you're a new amateur before you do, you notice that some promise such customized extras as a listing of organizations you belong to, awards won and so on.

There's nothing wrong with them, of course (except that you'd rather have your Novice license than a bunch of sample QSL cards!), but you may just want to show off your ingenuity by rolling your own.

You needn't be an artist to make a truly customized QSL card. Anyone can design a simple yet attractive card that will make your QSL stand out in the crowd. Most hams have outside interests, and it isn't difficult to come up with designs relating to them. Nautical themes, satellites and stamps come to mind as designs that tell your contacts about your avocations or career.

Cards conveying the unique personality of their senders are one of the most effective ways of getting one in return. That becomes important if you're after WAS or WAC (Worked All States or Continents) or other awards.

Geographical variations are always eye-catchers. One grey-on-black card that came to the ARRL QSL Service from SV-land depicted an attractive drawing which its sender says is the "Greek goddess of (DX) hunters, Artemus, and a companion." Another featured a pair of dice, an exotic dancer and four aces – you're not surprised to see Las Vegas as the QTH. Postcards of your city or town can be used by scraping off part of the glossy portion and substituting your address label. Image-conscious Atlantic City, NJ, recently had a large quantity of QSLs printed on cards showing its skyline – each operator in the city had his or her own QSLs at no cost!

Photos of the operator (or operators) add a nice touch, as do sketches of licensed family members, with a square available to identify the person who actually made the contact.

The ultimate in simplicity, of course, is a rubber stamp, on a 3 X 5 file card.[1] It won't win any beauty prizes, but it sure is an inexpensive way to get your QSLs off and running.

The ARRL QSL Service

Whether you are an avid DXer or only occasionally try to snare a rare country, you'll want to know the best way to exchange QSL cards with foreign stations. For one thing, they're required for most awards, Five-Band DXCC being the juiciest one.

It doesn't take long to figure out that sending each station a QSL and enclosing an International Reply Coupon (IRC) for his postage and a self-addressed envelope can be a mighty expensive proposition.

Let's face it – with the number of W, K and N stations, foreign operators often value your particular QSL card somewhat less than you value theirs.

As a membership service, the ARRL Overseas QSL Service will send your cards to foreign stations in most of the countries of the world (see Table 1, page 51, *QST* for October, 1976). All you need do is enclose a current *QST* label, one dollar (check or money order) and your cards, presorted by prefix.

If you're a family member (same family as a member receiving *QST*), just enclose your cards in the same package. An extra dollar is required for each member whose cards are enclosed. Sightless members who do not receive *QST* need only enclose a note to that effect along with the dollar. As with regular members, cards must be sorted alphabetically by prefix.

Finally, associate members may use the ARRL QSL Service to send SWL reports to overseas *amateur* stations. Cards will not be sent to individual QSL managers.

Once a week, cards are mailed from League hq. The only limitation on users of this service is that no more than 12 batches of cards are sent to the ARRL each year.

More than 6,000 members have used this membership service since it began a year ago. Why not do the same?

Now that you've taken care of sending your cards, how can you get them back? Next month's *QST* will feature an article giving the most useful hints on how to ensure a high return of QSLs from foreign stations. – *WA1ZUY*

[1] After April 15, 1978, postcards must be at least 3-1/2 X 5 to qualify for the postcard rate.

ANSWERS TO YOUR QUESTIONS ABOUT QSL CARDS

Q. Do I have to use them?

A. You won't find any mention of QSL cards in the rules and regulations governing the Amateur Radio Service. A great majority of operators use them anyway, however. Some do it out of courtesy, others because they want cards from the stations they've contacted. If in doubt, invest a few dollars in a batch of cards and make a habit of using them.

Q. What should they look like?

A. That's for you to decide. There are no hard and fast rules about shape and size, although the 5-1/2 X 3-1/2 card is standard. The smallest card that can be sent for nine cents is one that measures 3 X 4-1/4 inches. It can be no larger than 4-1/4 X 6 inches, however. After April 15, 1978, the minimum acceptable size will be 3-1/2 X 5.

Many commercial printing firms specialize in QSLs. Their addresses can be found in the Ham-Ads section of any *QST*. Many operators prefer to stamp their individuality on their cards by making their own (see related stories).

Q. What should go on them?

A. If a card is to be used to confirm a QSO for an award (many of them do), it must contain the following information: the fact that it confirms a two-way contact, the other station's call, signal report, frequency band used, mode, date and time (in UTC, Coordinated Universal Time). The station owner's name, address and call should also appear.

Q. How do I send cards to foreign countries?

A. If you're an ARRL member, by all means take advantage of the ARRL Membership Overseas QSL Service (see related story). It's a simple (and inexpensive) way to get your cards to the stations you've worked around the world.

Q. How do I get cards back from the stations I work?

A. That's a question many operators have been been asking for years. Sometimes you just can't. But even though you can't expect to get a 100-percent return, you will get cards from a good percentage of overseas contacts if you tell them you'd like them to "QSL via buro," or bureau. Each U.S. and Canadian call district has a separate bureau that handles incoming cards from around the world. Yours is listed in every other month's *QST*. Tips on ensuring a high return on DX QSLs will be covered in Part 2 in next month's *QST*.

Q. What's a QSL Manager?

A. Simply a person who has agreed to manage QSLs for a DX station or stations. If a DX operator asks you to QSL via his manager, he'll provide the call sign.

Q. What do I do with the cards I receive?

A. Again, that's entirely up to you. Lots of DXers put their most prized cards on the wall, where everyone is sure to see them. You'll soon run out of wallspace if you're on the air fairly regularly. How about a DXCC album? Or a Five-Band WAS album, with five cards to a page? Then of course, there's the shoebox. After this is overloaded, try putting them in a file cabinet (used ones are reasonably priced at used furniture stores). Separate them with file separators by continent, country and call sign.

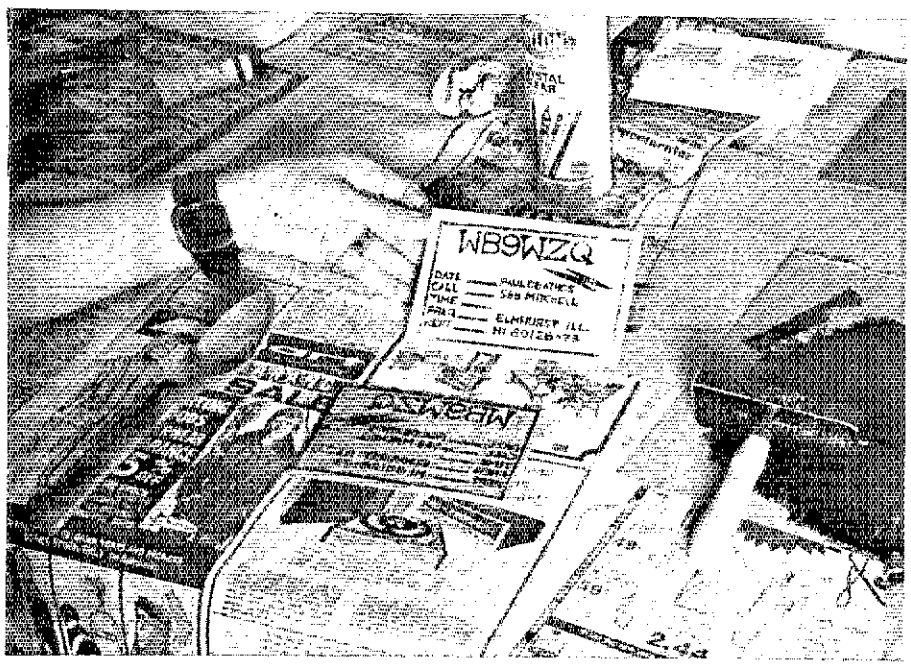
Q. What's an IRC?

A. A coupon (International Reply Coupon to be exact) which the bearer can exchange for first-class overseas postage in his or her country. It is a must when QSLing directly and asking for a card in return. Your DX contact won't have any use for your postage – only IRCs. They are available at all post offices for 42 cents.

How to Roll Your Own

A quick and easy way to generate some original QSLs is by linoleum-block printing. What'll you need? A small piece of linoleum, tools to carve it to your specifications, some ink, solvent, tracing paper, a roller, a spoon, cardboard, some fixative – and a creative mind. All but the latter are available, reasonably, at all art stores. You'll get good results by designing a linoleum block that will fit on a standard postcard, using one side for the design and one for the address.

If you've been convinced to take the plunge into homemade QSLs, here are two tried and proven ways of going about it – with linoleum and with a copier.



Coming up with original QSL designs is easy when using the linoleum block method. Materials you'll need are available at all art stores.

Start by sketching a preliminary design on an area of a sheet of paper the same size as the postcard. Next, use a charcoal pencil to draw the actual design on a piece of tracing paper. Try to avoid making small, thin letters; they'll be hard to cut around later.

Next, flip it onto the linoleum and retrace your design onto it. You should have a good representation of your design – reversed, of course. Next, fill in the letters and lines with the charcoal pencil and spray the design with fixative.

Cut out the area that won't be printed – everything except a border, if you want one, and the letters and lines

MAKE YOURS A GRABBER

Do you ever spend a quiet hour thumbing through the QSLs; not necessarily the raries but random QSLs from all over?

Do they grab you — or do you see them as slips of cardboard whose QSO info is simply a means to your particular end: DX, awards and so on? A verification, by virtue of its designation, contains the basic data to establish beyond doubt a two-way QSO. In this respect, all cards are the same. But there the common denominator usually ends, or should if possible.

Not every ham makes a thing of the QSL card. Some verify a QSO only as an obligation. They may choose the cheapest and most impersonal way to do it. Others simply buy stock cards of little or no individuality. This may be deliberate or due to lack of imagination or communicative talent in the literary sense.

It must be remembered there are two parts to each QSL — the technical and the personal. There are those few electronic purists who have have no interest in the latter. To them, only the gear matters. However, the bulk of hams view QSLing as a vital part of amateur radio and most endeavor to stamp their individuality on their cards. They succeed or fail in a variety of ways.

Any person who daily reads correspondence from strangers soon picks the writer's character traits by what is said or left unsaid. The same applies to QSL cards. Those of artistic temperament may try color to produce something eye-catching. Others exhibit their creative instinct by including a sketch, a drawing or even a mug-shot photo. Those who see hamdom through the eye of a comic go for something likely to raise a laugh and so on.

Some come up with a nice design but lay it on a card little thicker than newsprint. This is hard to understand. Are they trying to save on bulk postage and printing costs? Anyway, such a card is prematurely doomed to the wastebasket because it suffers with every handling and is soon a tattered rag. At the other end of the same scale is the card so thick and rigid, it simply breaks or cracks. A few extra dollars spent on superior quality stock is but one of the soundest investments in amateur radio.

You'll also strike that odd piece of wallpaper on which the owner seems frightened should anyone read his call. After turning it over two or three times, you discover it in 10-point typeset, or less.

Then there's the type whose measure of success lies in the physical size — the megalomaniac. His card has to be twice as gaudy and big. If it's posted via the bureau it has to be folded in half, won't fit in the filing or on the wall and throws all the others out of symmetry. You are tempted to write back, politely requesting a frame to match.

Telling Individuality

There are those ultramodest and introverted characters who see any listed achievement as a form of bragging. Meanwhile, others include every certificate and award ever earned, right down to the last detail. A balance needs to be struck here. If you want to let the other fellow know what you're about, list your achievements — but briefly.

Even more stimulating than the rare card is one that comes through to your vibes, big and strong. You may not even be sure what, but the sender has told you something of himself — and there's instant empathy. This is the QSL that stays in memory.

Shacks are coming in from the cold. Rigs are now less likely to be found in an outhouse or garage. Gone is the maze of wires surrounding them. They are now acceptable, indoors; many even have aesthetic appeal.

Likewise, QSLs seem to be slowly disappearing off walls, from bootboxes and into filing cabinets. Again, aesthetics may have something to do with it but there are other sound reasons. Many QSLs are irreplaceable. Used as wallpaper, they tend to fade, deteriorate and in some cases become insect marked. Also, only one side can be read. Even so, their removal could be a retrograde step for the ham image. A shack wall with no QSLs up, is like a travel agency sans posters, or a pub with no beer; the very essence is missing.

This writer, after filing all cards away, is now planning to restore some to a section of the shack, purely as visual impact value for the lay visitor.

If your stock of present QSLs is dwindling, don't wait until you're right out and then hastily order more. A little thought now toward producing a more personal, intimate, attractive card is time well spent. Accentuate every positive aspect you can and list any other interest and hobby you wish to share. If you come up with something that prompts the recipient to write and say "I see by your QSL you . . . ." you've got through. Like an intimate letter, a QSL, in similar vein, is the best investment in human relations. There's no better way of making friends — eyeballs excepted. — *Alan Shawsmith, VK4SS*

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you want to show. Use an X-acto knife for the straight edges and a gouger for the other parts. It must be at least one-eighth inch deep.

You're almost ready to print. Roll out some ink on the cardboard, and pick up an even coat onto the roller. Using firm but not-too-firm pressure, coat the piece of linoleum block evenly and thoroughly. Lay your block, carved side up, on a piece of newspaper and press the card on it, straight down. Holding it firmly, rub the back part of the spoon over the card. Wait five seconds and pull the card straight up. There you have it — your original QSL card.

A couple of hints: Use an oil-base ink, such as Speedball. To make a two-color card, you'll need two blocks and two colors of ink. Carve your call on one block and other information on the second. If you make the cards 100 at a time and save the linoleum block, you'll have an indefinite supply — all you'll need is more ink and you can sit down and make another batch when the first runs out. — *Paul De Athos, WB9WZQ*

With a Copier

Have access to a copy machine? Here's another way to roll your own — with the help of an offset print shop. You'll also need such common household items as scissors, rubber cement, lightweight cardboard and some old newspapers, magazines and brochures.

Use Your Imagination

Card themes are limited only by your imagination. Advertisements and graphics in publications are a rich source of material for making QSL cards. Your hobbies or other interests as well as the station equipment can be displayed pictorially. These can be found in the suppliers' catalogs. You may wish to highlight your home area or make a card in a humorous vein with cartoon characters.

If you happen to have a little talent in drawing (or have a cooperative friend who does), you can have a lot of fun designing your card without using cutouts.

Lettering for your call should be no problem. Many sizes and typefaces are available from the publications that you just used for graphics. Also, dry-transfer press-on lettering may be used. It comes in assorted sizes and styles from plain block to Old English. Stationery stores usually carry them in mini-editions at reasonable prices. Preprinted return address labels are handy to use for your name and address.

After deciding on the theme, making the master is simple. Cut a piece of paper or thin cardboard to the card size you desire — usually 3-1/2 × 5-1/2 inches for a "standard" size card. Arrange the cutouts and lettering until you arrive at the desired effect. Next, tack them in place with rubber cement, paying careful attention to the edges to avoid shadows. Any excess will easily rub off. Now you have the master and several options at this point. Most copy machines produce business-size sheets — 8-1/2 × 11 inches, so one sheet can accommodate more than one design. You could make additional masters from the original design and fill up the master sheet that way, or you could make different originals for different situations.

If each design is to be 3-1/2 × 5-1/2 inches, either three or four can be put on one sheet. With three of the designs having their long side parallel to the sheet's short side, all stacked together, a 3- × 11-inch strip is left over. This can be subdivided three ways for a report form on the back of each card. By including the report form with the front design and turning each one's long side parallel with the sheet's long side, four can be placed together.

After the copies are made, it is a simple matter to affix them to cardboard backing with rubber cement or paste. If necessary, trim the edges. You've created your own QSL cards! — *Willard A. Brownlee, W2HMX*

Coming Conventions

October 7-9
Midwest Division, Wichita, KS
October 7-9
Southwestern Division, Santa Maria, CA
October 8-9*
West Gulf Division, Austin, TX
October 15-16
Pacific Division, San Mateo, CA
November 19-20
South Florida Section, Clearwater, FL

*Date Change

PACIFIC DIVISION CONVENTION

October 15-16, 1977, San Mateo, California

The Greater Bay Area Hamfest and Pacific Division ARRL Convention will be held October 15th and 16th at the Royal Coach Motor Hotel in San Mateo, only 20 minutes from San Francisco, with the theme of "Keep Amateur Radio Strong." Registration begins Saturday at 8 A.M. Technical sessions will begin at 9 A.M. The exhibit hall will be open from 9 to 5:30 with many of the nationally known manufacturers and dealers showing their latest products.

In keeping with the theme, Armond Noble, W6AJY; Lenore Jensen, W6NAZ and other prominent hams will report on issues and propose specific directions that the Pacific Division should steer in the coming year to strengthen the position of amateur radio. Participants from ARRL hq. will be Ellen White, W1YL, deputy ommunications manager; Lew McCoy, W1ICP, assistant technical editor; Harry J. Dannals, W2HD, president; Robert M. Booth, Jr., W3PS, general counsel; Jean "Doc" Gmelin, W6ZRJ, Pacific Division director and W. W. Eitel, WA7LRU, vice director.

The technical sessions will feature many outstanding professionals in the industry. Special presentations will be made on microprocessors, digital electronics, antennas (hf and vhf), RFI/TVI, vhf clinic, satellite communications, ATV/SSTV and the N6V Mars landing pictures. A separate demonstration room will feature specialized communications equipment for open continuous discussion with the equipment designers.

Saturday evening there will be two general-interest programs for family entertainment. "Behind the Scenes at the Olympics" will be presented by ABC, followed by a slide presentation by Iris & Lloyd Colvin, W6QL and W6KG, entitled "Worldwide Amateur Radio." Also featured will be swap tables, ARES/NTS, MARS, DX and contest operating techniques and ARRL forum.

Package for all programs and banquet on Sunday is $14 prior to October 7th or $16 at the door. Send checks to the Greater Bay Area Hamfest, P. O. Box 751, San Mateo, CA 94401.

SOUTH FLORIDA SECTION CONVENTION

November 19-20, 1977, Clearwater, Florida

The Sheraton Sand Key Hotel at Clearwater Beach is once again the site of the Florida Gulf Coast Convention on the Gulf of Mexico. Complete family entertainment is the order of the day, with nearby attractions, hotel facilities on the beach, and a wide range of activities and demonstrations for the ladies. Again, the most comprehensive technical sessions in the Southeast will be scheduled throughout both days. National exhibitors, flea market, and special forums by ARRL, QCWA, AWA, SMIRK, 10-10 Club, MARS, etc., with FCC Chief Engineer Ray Spence, chairing the FCC forums are also featured.

FCC exams will be given on Saturday at the hotel. Reservations are required via FCC, Zak St., Tampa, FL 33602, with a completed form 610.

A gala banquet on Saturday evening with IARU President Noel Eaton, VE3CJ, highlights the convention.

Ticket info: $3 single, $5 family, plus 2 bonus tickets for advance registration. $9 banquet. Contact FGCARC Convention, P. O. Box 157, Clearwater, FL 33517. QST

Hamfest Calendar

Indiana: The Radio and Electronics Swap n' Shop, sponsored by the Marshall County Amateur Radio Club is Sunday, October 30, at the Plymouth National Guard Armory located at 1220 West Madison St. from 8 A.M. to 5 P.M. Free tables, no charge for setup. Tickets are $2. Food and drink. Talk-in on 07/67 and 146.52 MHz. Write to Wayne Zehner, WA9INN, Rte. 3, Box 526, Plymouth, IN 46563.

Maryland: The Foundation for Amateur Radio's annual hamfest is at Gaithersburg on Sunday, October 23. Large flea market, food service, exhibits, ladies events and supervised children's program. Main events are indoors; rain or shine. Picnic grounds and free parking available; participation fee is $2; flea market sales spaces are $5 each on first-come basis; commercial exhibitors $10 each with preregistration required prior to October 20. Nearby motel rooms are available. For info write or call Hugh Turnbull, W3ABC, 6903 Rhode Island Ave., College Park, MD 20740, 301-927-1797

Massachusetts: The Sharon Amateur Radio Association's annual auction is Sunday, October 23, at 2 P.M. Free refreshments. Club takes 15-percent selling commission. Location is Sharon Community Center, Massapoag Ave., Sharon. Talk-in on 04/64 and 146.52 MHz. Doors open at noon. For further info write or call SARA, 15 Gorwin Dr., Sharon, MA 02067, 617-784-3886.

Michigan: The Repeater Association of Downriver Amateur Radio (R.A.D.A.R.) Hamfest is October 16, at Kennedy High School, located in Taylor (Northline Rd. east of Telegraph, U.S. 24). Talk-in is on 52/52, 34/94, 93/33. Admission $2; YLs free; reserved tables $1; 9 A.M.-3 P.M. For further info write R.A.D.A.R., Inc., P. O. Box 1023, Southgate, MI 48195.

Mississippi: Gulf Coast Ham/Swap Fest is Sunday, October 23, 9 A.M.-5 P.M. It's at the International Plaza located near the west end of the Biloxi-Ocean Springs Bridge on Hwy. 90, in Biloxi. Tickets $1 donation, tables $2. Talk-in on 13/73 and 146.52 MHz. For info, advance tickets and table reservations contact Irvin Kelly, K5YIN, 116 Wiltshire Blvd., Biloxi, MS 39531, 601-374-3340.

New York: Hamfest and Giant Swap n' Shop, Sunday, October 16, at the Islip Speedway, Islip. Sponsored by LIMARC, the Long Island Mobile Amateur Radio Club. 9:30 A.M.-4 P.M., general admission $1.50 (wives, children and sweethearts free), exhibitors and swappers $2.50 per car space. Featuring: amateur radio, CB, computers, ATV, satellites, ARRL info, theory contest, LIMARC tune-up clinic, and awards. Located on Rte. 111, Islip Ave., one block south of Exit 43 of the Southern State Parkway. Trucks, campers and trailers use Long Island Expressway Exit 56, Rte. 111, south to the Speedway. For info write or call Hank Wener, WB2ALW, days 212-355-0606, nights 516-484-4322.

Ohio: The Marion Amateur Radio Club's annual Heart of Ohio Ham Fiesta is Sunday, October 23, at the National Guard Armory from 8 A.M. to 5 P.M. Free parking. Admission $1 advance, $2 at gate. Tables must be reserved, $3 each. Refreshments available. Write to Earl Adey, WB8EDO, 2697 Curren Dr., Marion, OH 43302.

Pennsylvania: The Mid-Atlantic States VHF Conference is October 1 and Hamarama is October 2. This two-day event, sponsored by the Mt. Airy VHF Radio Club, the Pack Rats, is informative and fun-filled. The Saturday session is from 9 A.M.-5 P.M. at the Treadway Inn on Easton Rd. (Rte. 611) Willow Grove. An all-day program moderated by well-known vhfers is of much interest. Hamarama, the following day with its flea market and other hamfest activities, should top off the weekend in fine style. Contact Ron Whitsel, WA3AXV, at 215-355-5730 for info.

Tennessee: The Music City hamfest is on October 15, 16 at Opryland USA in Nashville. Banquet is Saturday evening; flea market will open each day at 10 A.M. A reduction in Opryland tickets has been arranged for participants. For motels and campgrounds -- make reservations early. For further info contact George Dowd, W4CYL, 2829 Blue Brick Drive, Nashville, TN 37214, phone 615-889-9067. QST

Happenings

Conducted By Perry F. Williams,* W1UED

Another RFI Bill

Congressional attention toward the problem of radio frequency interception by home-entertainment devices seems to be intensifying this year. Last month in this space, we reminded readers about the Goldwater Bill S-864; reported on the Benjamin Bill, HB-8079, with a text identical to S-864; and, on the "League Lines" page, briefly mentioned the new Vanik Bill, HR-8496. Here is the text:

A bill to amend section 302 of the Communications Act of 1934 to authorize the Federal Communications Commission to prescribe regulations establishing minimum standards with respect to certain electronic equipment that is susceptible to radio frequency energy interference.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That (a) section 302 of the Communications Act of 1934 (82 Stat. 290; 47 U.S.C. 302a) is amended as follows:

1) Subsection (a) of such section is amended –

A) by inserting "(1)" immediately after "governing" in the first sentence;

B) by striking out the period at the end of the first sentence and inserting in lieu thereof ", and (2) establishing minimum standards for the reduction of interference from radio frequency energy to audio and visual electronic equipment."; and

C) by striking out "shipment, or use of such devices" in the second sentence and inserting in lieu thereof "or shipment of such devices and electronic equipment or the use of such devices."

2) Subsection (b) of such section is amended by striking out "ship, or use devices" and inserting in lieu thereof "or ship devices and electronic equipment or use devices."

3) Subsection (c) of such section is amended –

A) by inserting "or electronic equipment" immediately after "devices" wherever such term appears in the first sentence;

B) by inserting "and electronic equipment" immediately after "Devices" in the second sentence; and

C) by striking out "the common objective of reducing interference to radio reception," in the second sentence and inserting in lieu thereof "the objectives of reducing interference to radio reception and to electronic equipment,".

(b) The heading for section 302 of such Act is amended to read as follows:

"Interference with Radio Communications and Electronic Equipment"

SEC. 2. Any minimum standard established by the Federal Communications Commission under section 302(a) (2) of the Communications Act of 1934, as added by the first section of this Act, shall not apply to any audio or visual electronic equipment manufactured before the date of the enactment of this Act.

Rep. Vanik's Remarks

Not only did Congressman Vanik introduce a good bill, but he explained clearly the radio-frequency interception problem in layman's terms, in remarks printed in the *Congressional Record* July 22, 1977. Extracts of these remarks appear here; the full text is being added to ARRL's RFI Kit.

Legislation to Reduce Radio Frequency Interference

Mr Vanik. Mr. Speaker, today I am introducing important consumer legislation that will eliminate up to 90 percent of the interference problems that radio and television users experience. This bill is an improved version of a bill I introduced in the 94th Congress (H.R. 7052). . . .

"Radio frequency interference is generated by a wide variety of electronic devices, including microwave ovens, automatic garage openers, and medical and hospital equipment. The most frequent complaints come from people who live near amateur and citizen band radio operators. The great growth of CB radios, in particular, has contributed to the increase in complaints that the FCC has been receiving. The FCC expects to receive 200,000 RFI complaints in the next fiscal year. This is five times the number received by the FCC in fiscal year 1974. . . .

"Even if the FCC had the manpower to deal individually with these complaints, it does not have the jurisdiction to correct 80 to 90 percent of the problems. In most cases, the broadcasting unit, such as the CB radio, is operating within its assigned frequency, in accordance with FCC regulations. It is the receiving unit, the television or radio being interfered with, that is at fault in most incidences of RFI.

"It would seem only natural that a new television set or other electronic device should work properly. In fact, however, televisions and radios have not been made well enough in the past to block out unwanted signals from other broadcasting sources. The receiving unit indiscriminately picks up radio signals that are in the atmosphere in addition to the desired signal. As a result, the TV or radio tries to broadcast more than one signal at a time, causing interference to the desired program. As electronic equipment has begun to use less shielding and more solid-state circuitry, the equipment has become increasingly susceptible to picking up and broadcasting unwanted signals. . . .

"The legislation I am introducing today would permit a wide variety of solutions to the RFI problem. Briefly, this bill would authorize the FCC to establish reasonable standards for the rejection of RFI in televisions, radios, and other audio and visual electronic equipment. Unlike my legislation in the last Congress, this bill would permit the manufacturers to develop their own solutions to reject interference from unwanted radio frequency energy. This minimum rejection standard would meet industry's objection that the FCC should not be dictating how equipment is manufactured. The electronics industry would be free to develop its own technical solutions to blocking out RFI.

"The electronics industry has been very reluctant to try to correct the RFI problem itself. In a survey that I conducted last year of the major manufacturers of televisions, some manufacturers stated that they have incorporated a device that only minimally rejects RFI in the design of their sets. Those whose equipment already rejects RFI would not be affected by my legislation. Others, however, said that they only respond to individual customer complaints. However, due to the confusion over what causes the RFI problem, the average customer is more likely to blame his broadcasting neighbor than to write the manufacturers of his set. Other nations appear more responsive to the RFI problem. Grundig, a major television manufacturer in Germany, has already manufactured an interference-free television set that is cost-competitive. Given the increasing RFI problem in this country, there is little reason for further delay by U.S. manufacturers. The FCC has the technical expertise to set the rejection standards, and the manufacturers have the ability to meet them. The consumer simply is not capable of evaluating and correcting the problem on a technical level. . . .

"In view of the growing and serious problem of radio frequency interference, I hope that this legislation can be seriously considered by the Congress. As this Nation grows more and more dependent on electronic media as primary means of communication, it is imperative that we work to insure that these media operate free from mechanical and electronic interference."

FEDERAL PREEMPTION

Increasingly, local governments, frustrated by the seeming lack of attention to the growing RFI problem (see the lead story, above, for another facet of this) have taken steps toward regulation of the problem on their own. Many of these actions, if they are allowed to stand, would infringe on regulation of radio by FCC. A recent bulletin from the FCC is helpful in clarifying the situation. Extracts follow. The text will be available from ARRL hq., and has been made part of the Legal Kit which is available to members who encounter local legal problems with their antennas or operations.

. . . As early as 1912, Congress recognized that communications by means of radio energy was inherently interstate in nature, was a form of commerce, and was uniquely adaptable to uniform regulation by the federal government. The Radio Act of 1927, increased the federal government's authority to regulate this area, and with the passage of the Communications Act of 1934, the trend towards comprehensive federal regulation of interstate and foreign communication by wire and radio was substantially completed.

*Manager, Membership Services, ARRL

The Communications Act of 1934, provided for the establishment of the Federal Communications Commission to execute and enforce the provisions of the Act. The goals sought to be attained by adoption of the Act are clearly stated in Section 1:

For the purpose of regulating interstate and foreign commerce in communication by wire and radio so as to make available, so far as possible, to all people of the United States a rapid, efficient, nationwide, and worldwide wire and radio communication service . . . and for the purpose of securing a more effective execution of this policy by centralizing authority hereto granted by law to several agencies and by granting additional authority with respect to interstate and foreign commerce in wire and radio communication . . . 47 U.S.C. §151.

Additionally, Section 301 of the Act claims complete jurisdiction over radio energy for the federal government. Section 301 states:

It is the purpose of this Act, among other things, to maintain the control of the United States over all the channels of interstate and foreign radio transmission; and to provide for the use of such channels . . . under licenses granted by Federal authority . . . No person shall use or operate any apparatus for the transmission of energy or communications or signals by radio . . . except under and in accordance with this Act and with a license in that behalf granted under provisions of this Act, 47 U.S.C. §301.

Furthermore, Congress granted the Commission the authority to establish a pervasive system of regulation in the various radio services. Section 303 of the Act gives such numerous powers to the Commission as to leave no doubt as to the extent of this regulatory scheme. These and other sections of the Communications Act indicate the clear intention of Congress that radio be regulated by the federal government.

Under the Supremacy Clause of the United States Constitution, state and local statutes may be preempted: (1) when a local law conflicts with a law enacted by Congress, or (2) when Congress has adopted pervasive legislation in a particular field with the intent that regulation in the area will be conducted exclusively by the federal government. Additionally, local ordinances which unreasonably burden interstate commerce may be invalidated under the authority granted to the federal government by the Commerce Clause of the United States Constitution.

The problem of federal-state conflicts in radio communication is not a new one. In 1929, the Federal Radio Commission issued a report entitled "State and Municipal Regulation of Radio Communication." In the forward to that early publication, the General Counsel of the Federal Radio Commission made the following observation:

Transmission of intelligence by radio is interstate commerce, and public interest requires Congressional action to administer and conserve the ether for the maximum benefit of the people of the United States. The Radio Act of 1927, as amended, represents the latest Federal statement of the subject. Meanwhile, in recognition of local interests, state legislatures and lesser bodies have framed laws imposing a measure of control on radio transmission and reception, and on the use of apparatus causing interference. Some of these measures are legitimate and useful, falling well within the scope of the police power. Some are clearly unconstitutional, since they interfere with Federal regulation. . . .

Generally, it may be said that in matters involving purely local concerns, courts have found that reasonable local statutes may stand absent a clear conflict with the Act. For instance, local zoning ordinances limiting antenna heights, regulations on professional advertising practices, and the right of local courts to adjudicate property rights involving licensees facilities have all been upheld. On the other hand, where local law conflicts with the Commission's regulatory scheme for radio services, the federal law will prevail. For example, state laws involving the censorship of material carried on broadcast stations and those requiring Commission licensees to refrain from activities required by the Communications Act have been struck down. . . .

CODE-SENDING TEST ELIMINATED

The sending test in international Morse code has been eliminated from those amateur license examinations which are administered by FCC, effective August 18, 1977.

In its public notice, the Commission said, in part:

"It is a generally accepted fact that persons who communicate by Morse code build their sending ability at a faster rate than they are able to receive. This is confirmed by the FCC's own experience through the years that virtually everyone who passes the code receiving test is able to pass the sending test. For instance, during May 1977, 3201 applicants passed the FCC receiving test. Only 25 of those (less than one percent) were unable to pass the sending test. Thus, the Commission believes that the applicant who has demonstrated his ability to receive code possesses the ability to send code and little is gained by requiring a separate sending test.

"There has been a five-fold increase in amateur examinations during the past three years and this new examination procedure is intended to help meet these new workload demands on the field examination staff."

The sending test continues to be part of the requirement for Novice examinations administered by volunteers.

DISPUTED LICENSE RENEWED

In the Broadcast Services, whenever an application is made for renewal, a public notice is issued by FCC. Any parties who think the station has been doing an inadequate job may file a "Petition to Deny," and present reasons why the license should not be renewed.

There is no such formal process connected with amateur radio. Nevertheless, a recent Commission news release reports that FCC received several letters over the past year or two petitioning the Commission to hold a hearing and deny the application of Richard G. Boston, K6AU, for renewal of his amateur station and Extra Class operator licenses. Many of the petitioners cite the case of the late Myron Henry Premus, W2OY, wherein a hearing was held on an application for renewal. The Commission's rules do provide for informal consideration of any matter not governed by formal procedures: the FCC accepted the complaints against Boston under that provision, as "informal requests."

The amateurs filing the complaints against K6AU were officers, members or participants of an amateur radio net, the West Coast Amateur Radio Service (WCARS, or "WestCARS"). WestCARS operates "all day, every day" on 7255 kHz, functioning as a meeting place where an amateur in the Western states knows he can raise someone when the need arises.

The complaints alleged that Boston had frequently and deliberately interfered with the operation of the net, in contravention of Section 97.125 of the rules and, in so doing has used language violative of Section 97.119. The allegations were based on asserted familiarity with Boston's voice, the characteristics of his radio signal and the interferer's use of the call sign K6AU.

In the Premus case, FCC conducted its own investigation following a similar complaint. In the present case, the Commission has also conducted an investigation (which included df equipment) to determine the circumstances which gave rise to the complaints and whether there exists sufficient evidence to warrant a hearing. The Commission was able to confirm the complaints during the W2OY investigation but was not able to do so in the present case. In light of this, and in light of the misleading use of tape recordings and false call signs which it uncovered, the Commission could not find that there was sufficient evidence of misconduct to warrant a hearing on the application. Thus, the licenses of Richard G. Boston, K6AU, were renewed for full five-year terms.

WARNING ON INTERFERENCE

Though the Commission did not find "fire" in its examination of the WestCARS complaints, it did find "smoke" enough to issue a strong warning that malicious interference would not be tolerated by FCC. The text follows:

The FCC warned today it would crack down on willful or malicious interference in the operation of Amateur Radio Service "monitoring service" networks.

Monitoring service nets function as a meeting place or calling channel for amateur radio contacts. Because they operate day in and day out, they provide ready sources of aid in the event of emergencies.

The FCC's Safety and Special Radio Services Legal, Advisory and Enforcement Division said that while these nets would appear to provide a beneficial, voluntary service, their operations had not been fully accepted by the amateur community.

Opposition to the nets stems chiefly from the fact that they use a particular frequency for extended periods, the Division said, adding that this antagonizes many amateurs who feel the nets have unjustly appropriated frequencies and have sought to exercise proprietary control over them.

The Division reported that in some regions of the country, especially on the West Coast, the differing sentiments on this issue had led to feuds in the amateur community.

The principal tactic, it said, has been willful or malicious interference, including unidentified heckling, catcalls and comments as well as a variety of mechanical and electronic noises. Other forms of interference include operation on or too near a frequency already in use, and pretended inability to hear a conversation in progress.

The Division pointed out that willful or malicious interference was prohibited by Sec-

tion 97.125 of the Commission's Rules, and warned that continued violations would be met with vigorous action to identify the violators, revoke their radio licenses and suspend their operating privileges.

The amateur rules neither authorize nor prohibit monitoring service nets, the Division said. But if such nets are to continue to function, it added, an understanding must be reached among all amateurs similar to those reached in other cases where structured spectrum management was desirable.

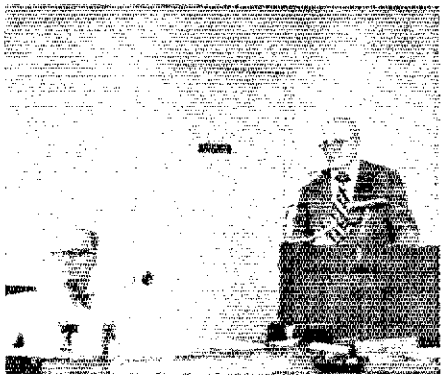
To that end, the Division urged amateurs to consider the benefits the monitoring service nets provided. At the same time, it recommended the nets avoid abuses in their operations that might tend to antagonize their fellow amateurs.

If such an understanding cannot be reached, the Division declared, the Commission must consider imposing additional regulations to bring about order.

FCC MEDIA WORKSHOP

An innovative Media Workshop was convened by FCC's Personal Radio Division for the amateur radio magazines and other interested parties on July 12, 1977. About 50 people attended – magazine representatives, amateurs who work for manufacturers of ham radio equipment, and FCC staff being the most numerous. ARRL and *QST* were represented by First Vice President Clark; General Counsel Booth and Demi Pulas, WB4BTF, of his staff; Atlantic Director McConaghy and Assistant General Manager Sumner.

FCC Chief Engineer Ray Spence, W4QAW, discussed type approval and related subjects, Dockets 21116 and 21117.



John Johnston, W3BE, chaired the Personal Radio Division Media Workshop at FCC in July.

PRD Chief John Johnston, W3BE, chairman of the meeting, first charted the course of the session as an information exchange, with participants there to discuss or inform, not to advise or recommend; no one would be under obligation as a result of the meeting.

Of the 31 "temporary" personnel at Gettysburg whose jobs were thought in danger earlier ("A Domestic Crisis Looms," July *QST*) 23 had been made permanent, and seven replacements were being recruited for those who had left.

There was a wide-ranging discussion involving FCC Chief Engineer Ray Spence, W4QAW, concerning Dockets 21116 and 21117, the banning of external amplifiers and type-acceptance rules for amateur equipment. Peter Drake, of R. L. Drake, countered with a strong case for point-of-sale control as having the better chance for solving a problem which involves marketing rather than engineering. The Class E CB proposal was also discussed, focusing heavily on 900-MHz frequencies.

Greg Jones of FCC outlined the rulemaking process (See "Regulations Revisited," March 1977 *QST*) and called for more response by ordinary amateurs to petitions for rulemaking and Notices of Proposed Rulemaking. The media's difficulty with 30-day limits was noted, and the recommendation was made to the Commission that 90 days be provided for comment wherever possible, since most amateurs receive information on FCC matters from monthly magazines.

Joe Johnson of FCC discussed interconnection of radios with telephones. Mention was made of abuses of amateur phone patching, especially concerning the use of autopatches on vhf for business purposes. Common sense was offered as the best guide, but the fraternity was warned that if irresponsible amateurs keep pushing the limits, we all could lose much of our rights to use patches. Enforcement of amateur rules also came up for discussion and it was reported that about 1800 citations were issued last year, 1700 related to use of unauthorized subband privileges. Only 1578 complaints and 32 station inspections involved amateurs, as compared with 49,722 complaints and 3500 station inspections in the citizens band. The Field Engineering Bureau, in discussing enforcement, pointed out that they only have about 480 staffers, the same number as in 1948! Another interesting statistic: Field-supervised amateur exams, which averaged 20,000 per year for the first seven years of the decade, are expected to hit 75,000 in 1977!

All concerned agreed the meeting was a grand idea; there will probably be some more like it, perhaps on a quarterly basis.

BEHIND THE DIAMOND

It has been said that people who originate from America's heartland, the Midwest, are among the friendliest and most outgoing of all Americans. Certainly it is true with this month's subject.

Rosalie Cain came to Newington in 1973 from the little town of Greensburg, IN, where she grew up on her father's farm. (Her dad still farms it, by the way.) After attending local schools, Rosalie went on to higher education at Hanover College in Hanover, IN, for three years before graduating from Indiana University with a B.S. in Education in 1971. She then taught third and fourth graders for two years in the Indianapolis school system.

Her career with the ARRL began in the Communications Department as a DXCC assistant checking QSL cards. That was quickly followed by jobs in public service, club affairs and training aids. In March, 1976, she was promoted to Associate Manager of the newly formed Club and Training Department. Rosalie also organized all the Novice training material and became editor-in-chief of Radio Club News which is distributed on a quarterly basis to all ARRL-affiliated clubs.

"My major interest is clubs," she says; "Chod looks out for the training aspect of the operation." Rosalie has stated her goal for this year is 2000 affiliated clubs by December (there are 1800 or so now affiliated). Chod Harris, her compatriot in C & T, describes Rosalie as "the real force behind Club and Training. She keeps everything going." Chod also spoke of her popularity with all types of clubs at speaking engagements. It is a known fact that the only way the Radio Club News gets excerpts from club bulletins is for Rosalie to thoroughly read 250 club bulletins per month – no wonder they love her!

No "Behind the Diamond" is complete without a word or two about the subject's amateur activities. Rosalie was licensed as WN9FJT in her last year of college. She now holds WA1STO and an Advanced class ticket. Her favorite mode? "Cw, of course," she said. There is a difference, though. Rosalie has a passion for getting people off the usual "shop-talk" type of QSOs and into discussions on a variety of topics – e.g., current events, gardening, boating and others. She enjoys DXing on 20 meters and ragchewing on 80. When she is not trying to induce people to talk about something besides antennas, DX and the present state of ham radio, Rosalie makes gardening, hiking, camping, boating and the outdoors her other hobbies.

Even though as a resident of Bristol, CT, Rosalie is slowly being influenced by some of our Nutmegisms, she still retains her ties with Indiana. When visiting her home recently, she helped her father on his farm by plowing fields and sorting hogs. Her sense of humor also holds true with the Midwest. Rosalie described how the county courthouse in Greensburg has a 15-foot tree growing out of its roof. When visitors to Greensburg ask how tree growing there could receive any water, local residents usually say the water springs from the clock, which is also located on the roof.

One thing is for sure – Rosalie is not the kind of person who would ever get wound up over a corny joke like that. – *WA1TZK* QST

Rosalie Cain, WA1STO.

Correspondence

The publishers of QST assume no responsibility for statements made herein by correspondents.

TO LOBBY OR NOT TO BE

□ Your lead article in July 1977 *QST* asks members, "Should the League lobby on behalf of amateur radio?" That article seems to seek opinions from members, so here is mine. YES! The League is the largest single representative of amateur radio and the only one in position to speak for the individual ham before congress and the FCC. — *Aaron Lewis Overton, WØRFF, Lawrence, KS*

□ The idea of suspending the Novice licenses is a very bad one in my opinion, if only for the reason that there are so few activities that one can use to interest youngsters in a person-to-person relationship that is at one and the same time both constructive and rewarding. A lot of good things happen when people gather around a radio set; generation gaps disappear, problems are solved, and insights not only on a technical, but also on a personal level are gained.

How about one dollar a year for each license? It would pay some salaries and enable some work to be done. In fact I'm almost inclined to send a donation for the cause, but more than likely it would only be returned under the present law and just create that much more work for an already overburdened staff. — *Reverend Gerald Leibenguth, O.S.B., WB1AIR, Hingham, MA*

□ If it would take lobbying from the League to get the situation turned around, let's do it and do it right. I personally worked too hard getting my ticket and station equipment to let it be spoiled because of a lack of regulation from FCC. — *Jaap Kroes, WBØAQW, Pella, IA*

□ As an unlicensed individual, who is very close to obtaining my Novice ticket, I am upset about the FCC's current money problem. Abolish Novice licensing? To me, that is as if I hiked 100 miles only to see my destination moved another 100 miles away!

In order to help solve the present FCC money crunch, I feel that all license fees should be reinstated. The sum is small to the individual, but the accumulative total at FCC headquarters should be enough to, at least, reduce the "crisis" to a dilemma; and dilemmas are much easier to deal with. — *Roger R. Roberts, Racine, WI*

□ Please fight to keep the Novice class. I just graduated from Novice to General (6/15/77) and without the Novice experience I would not be in ham radio. Let us go back to exams in blocks and even issue call signs per exam sent to volunteer examiners. — *Jack K. Diamond, WB6UZI, Arleta, CA*

□ I feel ARRL should lobby and strongly. It would seem good sense, if FCC is in financial trouble, to set up an annual fee system to cover needed administrative and policing personnel. If a CBer or ham can afford $100 to $1000 for equipment he can afford to contribute directly to the costs of needed services, if only to guarantee continued enjoyment of his hobby. — *H. Stevens, Coventry, RI*

□ ARRL should save our money, keep out of hock and submit to FCC a streamlined licensing program, that would benefit the economy and amateur radio, as an enjoyable hobby. I don't think we can afford an effective lobby. — *Paul Williams, W6WEQ, Santa Cruz, CA*

FATHER KNOWS BEST?

□ I am a strong private enterprise (vs. Government) advocate because *in general* the competitive motive of private enterprise will whip the "father knows best" approach every time.

I feel quite strongly that while privately owned enterprises serve the Amateur Fraternity well in most departments, the ARRL has a unique and important role to play in organizing and distributing training material. This is not to say that ARRL has a monopoly – I defend the right of private publishers to compete; more power to them – the Amateur Fraternity will then have an opportunity to make a choice. It is possible that some of the producers of training material may resent the part ARRL is playing in providing and distributing Novice courses (and expanding its activities into higher grades). I support ARRL 100 percent. — *Philo D. Smith, W7WCT, Spokane, WA*

A FEW MONTHS OLD

□ A few months ago I went to the hospital for a hernia operation. For something to read I bought a few *old QST*s along. Dug them out of a closet. So here I am propped up in bed reading one of them, and the night nurse came in to the room to take my temperature, and said, "Oh, a *QST*. My husband is a ham; just got his license a few months ago. I don't remember this issue; must be the new one I haven't seen yet." I told her it was not a current one, but that it was a few months old. I handed it to her and she read March 1924 – she nearly flipped. "Wait till I tell my husband, but I don't think he will believe me." I handed her five or so of the 1924 *QST*s for her to bring home. I told her she could keep them.

Two days later *he* phoned me, thanking me. — *Joe Haskell, Jr., W1JGJ, Melrose, MA*

SPEEDY COMMUNICATIONS

□ A late change in travel camping plans showed up as some touring in Canada. We were to leave on July 3rd. I phoned ARRL on June 29th, and got the Canadian permit form – along with other pertinent information on June 30. I sent the permit request with an apologetic letter via Special Delivery to Toronto on July 1st, with a request – *if* they could process – to send same to a pick-up address in West Lafayette, Indiana. The permit, postmarked July 6th, arrived on the 8th! Now, that's real fine service from both sides of the border, and you may be sure I have sent a "thank you" note to the telecommunications people in Toronto! — *Douglas W. Benedict, WA1MJT, Thomaston, CT*

NO VACANCY?

□ The statement "This frequency is occupied" is stupid to say the least. On 20 meters, what frequency is NOT occupied, especially on weekends when all are used constantly for such useless purposes as evident in the many contests and likewise useless "nets." Some contests and nets are good, but the majority serve no real purpose. — *M. W. Mitchell, WØIQZ, Denver, CO*

LAUGH BACK

□ TROSTER! TROSTER! TROSTER! TROSTER! I can't believe it! *QST*, my favorite rag, has finally got another humorous Jack Troster story, and a good one too! Why, it's almost like finding a secret stash of Phil "Gil" Gildersleeve cartoons! — *Dave Heil, WB4KTR, Fort Thomas, KY*

THANK YOU TD

□ Enclosed is my $12 *renewal* for ARRL membership. I really was impressed by *QST* and the ARRL. Your Technical Information Service crew really helped me. I would really like to see more beginners projects. — *Peter John Keane, WD8EKX, Glendale, OH*

□ Thank you very much for "A Simple Approach to Complex Circuits." This is the best article on this subject I've seen anywhere and will go far to remove some of the mystery for us who are not electrical or electronic engineers. — *Roy E. Lyon, WA4WZJ, Knoxville, TN*

QUICK UPGRADING

□ I would like to thank the League for publishing easy-to-understand material. I knew nothing about amateur radio until November, 1976, when I first started learning the code and studying your books. In March, I passed the Novice. In April, I passed the Technician, and in May, I passed the General. With the quick upgrading of my license and help of your books, I just received my call a couple of weeks ago. I am proud to be a member of your League. Although I am only 14 years old, I'm sure with the help of your books, I'll make it to the Extra in the near future. — *Randy Himelfarb, WB2OEI, Howard Beach, NY*

HARDLY EVER READS IT

□ I've been reading *QST* for about six months. My teacher at school gets it monthly, but he hardly ever gets to read it. As soon as he gets his copy, I take it home and read it. I have never bought a subscription to a magazine, but now I have found one worth the money. *Ron L. Matney, Rockville, MD*

International News

Conducted By Bruce A. Johnson,* WA6IDN/WA1ZQP

The Plunge Forward

What happens when seven officers of the International Amateur Radio Union gather in Maidenhead, England, to consider the status of the Amateur Radio Service around the world, and its preparations for the crucial World Administrative Radio Conference facing us in 1979? One can certainly count on some clear decisions emerging from such a meeting, and we'd like to tell you about some of them.

This particular meeting of the International Working Group was held from 24 to 26 June. Several items were on the agenda: to conduct a country-by-country study of national positions toward both WARC-79 and the Amateur Service; to conduct a similar survey of all bands presently allocated to amateurs and future frequency needs; a discussion of the makeup of the IARU delegation to WARC and how delegates should be briefed; a review of the "Geneva documents" (specially written documents aimed at helping national amateur radio societies in dealing with their national governments and developing amateur radio in their own countries); a consideration of the needs of various IARU member-societies around the world; an important review of Article 41 of the International Regulations; a study of the Amateur Satellite Service and its future role; a discussion of upcoming world meetings and IARU officer travel; and a consideration of the problems confronting the IARU Monitoring Service (the Intruder Watch program).

Office space adjacent to the site of the WARC was arranged. This is vital to the IARU WARC effort, for this space serves as a headquarters for the Union throughout the Conference and allows the staff to handle routine and special office work.

Just prior to the Maidenhead meeting, it was learned that the Administrative Council of the International Telecommunication Union (ITU) had decided to add Article 41 to the agenda of WARC. That is, the regulation which defines and outlines the basic structure of the Amateur Radio Service can now be reviewed and modified by the WARC. It is the position of the IARU (decided in England) that member-societies urge their national governments to retain Article 41 in its present form and that this retention is in the best immediate interest of the Amateur Radio Service and developing Third World countries. To this end, a special position paper was drafted and circulated to all member-societies, outlining the arguments and showing why we must do all we can to retain Article 41 in its present form.

Since it has become apparent to those working on the WARC front that the future of amateur radio lies largely in the Amateur Satellite and microwave bands, it was decided that an amendment along these lines should be prepared to accompany the Geneva documents mentioned earlier. "Use it or lose it!" could well be the watchword of amateurs everywhere as we come down to the wire on WARC preparations. There is perhaps no resource more limited than the radio frequency spectrum, and the rapidly increasing interest among spectrum users means that the amateur frequencies are very enticing. We must, as a service, prove that we are indeed using all the bands allocated to us now and that our steady growth mandates even more spectrum at WARC-79.

Over the next 18 months, IARU headquarters and the three regional organizations will attend meetings and conferences around the world which are felt to be important to the future of the Amateur Service. These occasions will present opportunities for personal contacts with officers of national societies in all three regions. In addition, important contacts can be made with nonamateur officials in a position to assist the service at WARC-79.

*International Services Assistant, ARRL

Peter Williams, VK3IZ (left), was the first secretary of the IARU Region 3 Association (consisting of member-societies from Australia and New Zealand, the Pacific and central and eastern Asia). He is shown here receiving a plaque of appreciation from Region 3 Director Michael Owen, VK3KI at the recent convention of IARU member-society Wireless Institute of Australia. *(VK3ZCK photo)*

FRIEDRICHSHAFEN: A HOUSEHOLD WORD TO EUROPEAN AMATEURS

Every July, amateurs in Europe set their sights on a charming Bavarian town in the Federal Republic of Germany. Where else can one find *10,000* amateurs and amateur enthusiasts gathered together at one time? Known as "Internationales Bodensectreffen," the fest offers an unparalleled exhibit of commercially manufactured amateur gear and accessories, as well as numerous activities enjoyed at hamfests throughout the world.

But one of the most important features of this year's Friedrichshafen gathering was the focus on WARC-79 and the Amateur Radio Service. Interest ran high among the many amateurs attending the "IARU Speaks" seminar. DJ3KR spoke of the ongoing efforts in Europe and Africa (Region 1) to prepare for WARC. They answered questions from the audience, and went to great efforts to inform the attendees of the *unified* worldwide effort on behalf of the globe's million radio amateurs.

This unity of effort was underscored by remarks of IARU President Noel Eaton, VE3CJ, who pointed out that well-intentioned efforts to support amateur radio in developing countries must be coordinated through the IARU. Only by working together can we retain our position of respect and professionalism.

WHAT CAN YOU DO TO HELP?

Plenty. Talk about WARC on the air. We must make every possible effort to raise the awareness of amateurs in seeing WARC for the challenge it is. Think . . . before you run that patch (see August, 1977, *QST* page 71). Join the Official Observer and Intruder Watch programs (details available from ARRL hq). Get active in microwave (Remember: we use it, or we lose it!). Teach a class. (A service which isn't growing is certainly ripe to lose its frequencies. Growth = life.) You see, the real backbone of the WARC effort isn't in Newington, CT – it's in the field. It's YOU! QST

YL News and Views

Conducted By Louise Moreau,* W3WRE

1889–1977 YL Tradition Maintained

Eighty-eight years ago a communications tradition was originated by six women telegraphers during the Johnstown Flood of 1889. In 1977, Johnstown YLs W3TVU, WB3FAA, WB3FCC, WB3FBI, WB3FBM and WB3CCU maintained the tradition of carrying on the communications link with assistance from N4YL, WB3EFQ and W3CUL on much of the long-haul outlets.

Nancy Coleman, WB3CCU, writes "Several area amateurs had formed a skeletal emergency net when I checked in on Wednesday morning. I was sent to the Meadowvale school to act as emergency liaison for Mayor Pfuhl because all commercial circuits were out. Bedford Street was like the raging white water of the Colorado River so I took off on foot scrambling over fences and backyards to the school.

"From then on I was periodically relaying requests from the Mayor to fire and police, requests for help from Hornerstown (where I was located), sending appeals for ambulances, and calling for fuel oil for fire equipment. Also I had relays of calls for assistance from the fire department to the gas company to shut off gas at a construction company fire.

"One of the very vital jobs was relaying the names and addresses of refugees who had come to the school, and the saddest was advising authorities each time more dead had been found."

Nancy tells us that hers was just a small contribution the first day of the disaster augmented by work of the many others who came in to assist from all parts of the state. She added that, "Here in a mud-soaked building the full reason for Field Day and the SET was changed from the fun of a contest to grim reality."

Two of the gals with those distinctive calls: W1YL, Ellen White, Deputy Communication Manager ARRL (right) and W4YL, Timmie McCraw. Both gals hold Extra Class licenses.

ANNUAL TRILLIUM WEEKEND

The annual Trillium Weekend sponsored by the Ontario Trilliums for all amateur radio operators will be held November 5-6, 1977, UTC.

TOT members will operate both phone and cw on 80, 40 and 20 meters. The contest custodian is Eva Colleck, VE3EVA, 155 Midland Avenue, Scarborough, Ontario, Canada M1N 3Z8.

Full contest rules may be found in "Operating Events."

*YL Editor, *QST*. Please send all news notes to W3WRE's home address: 305 N. Llanwellyn Ave., Glenolden, PA 19036.

MINOW Net members at their annual picnic: (l-r) Marion, WA7TLL; June, WA7FRM; Pat, WA7GMX; Mary, W7QGP; Joan, WA7BDD; Margaret, WA7RBR; Bernice, WA7TPU; Tiny, WA7LOQ; Freida, K7PVG; Marty, W7KGU; Ruth, WA7RVA; Bea, W7HHH; Beth, W7NJS. *(Photo courtesy WA7RBR)*

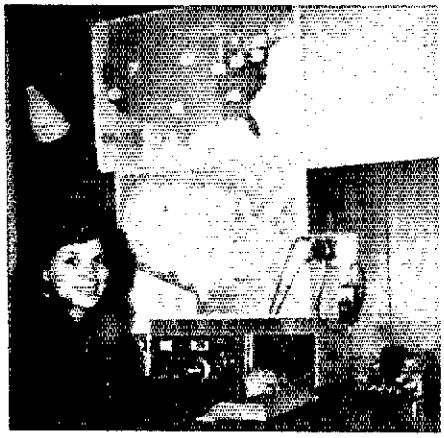
1977 YLRL ANNIVERSARY PARTY

The first of the 1977 major YLRL-sponsore contests the YLAP has been scheduled fo October 12 and 13, 1977, UTC for the cw section, while the phone portion will b November 3 and 4, 1977, UTC. The contest i for YL operators only.

Remember there is a special award for th highest scoring Novice participant.

All logs should be sent to the Contes Custodian Carol Bourne, WA9NEJ, 362 Haw thorne, Glen Ellyn, IL 60137.

Look for full details in *QST*'s "Operatin Events" column.



Jan Moore, WD4CMG, who passed Novice in February of this year, is hunting states for her WAS while studying with the OM to upgrade her license.

BRYLA AWARD CHANGES

The call and address of the custodian of the Brazilian YL Award have been changed. All requests should be addressed to Therezinha Cardoso, PT2TF, P. O. Box 07/0004, 70.000 Brasilia, DF Brazil.

The BRYLA Net meets each Wednesday at 1900 UTC on 14.250 MHz. These members of the nationwide YL-on-the-air club in Brazil are anxious to meet women from this country and stand by each week for North American participants.

The certificate is awarded for proof of contact with 12 YL stations from three different continents plus eight YL stations from Brazil.

1977 ONTARIO TRILLIUM OFFICERS

The 1977/78 officers of the Ontario Trillium are President VE3CLT, Thelma Woodhous Vice President VE3EVA, Eva Colleck; Tre surer Doris Cody, VE3BBO; Publicity Chai man VE3AIZ, Mary Huston; Social Chairma VE3COH, Mary Hedges.

These women will head the TOT throug June 1978.

YLRL CERTIFICATES

In answer to many queries the YLRL certif cate requests must be accompanied by a itemized list of all contacts with the QS cards. A list is also required for all reques for endorsement stickers for these certificate

FM Repeater News

Conducted by Lew McCoy,* W1ICP/WR1ABH

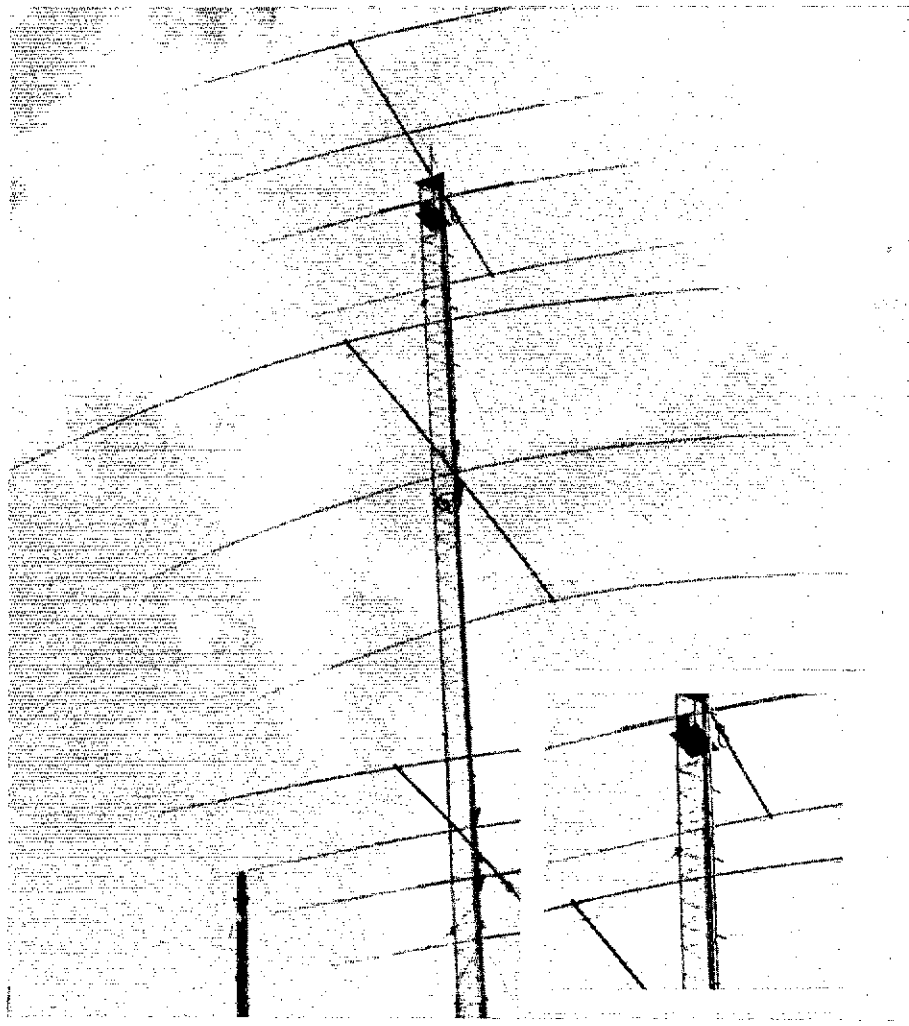
Code Practice and Repeaters

We have just installed a 6-dB, omnidirectional Decibel Products antenna at the top of the new 120-foot mast at W1AW. W1AW now increases its range considerably on 2 meters, 147.555 MHz to be exact (a coordinated frequency). The important point here is that W1AW is widely listened to in this area on 2 meters – and the bulletins and code practice are used by many local newcomers.

Did you ever consider what a wonderful device a repeater would be for providing code practice for local work? Many radio clubs have amateur radio classes and running code practice so that students can study on a day-to-day basis can be a problem. If time can be set aside so that the local repeater could transmit code practice, think how much simpler it would be for the club.

Of course the hundred-dollar question is, "Where is a prospective amateur going to get a receiver that will tune in the repeater without spending a young fortune?" No real problem. The weather receivers that are single-channel jobs can be used and they are very reasonable. It is simple to tune them down from the 160-MHz range to 2 meters. In fact, back in 1971, May *QST* we had an article on several low-cost methods of listening to repeaters, including using weather receivers.

It is a simple matter to transmit the code via the repeater – as simple as turning on a tape recorder and setting a mic near the speaker. (But don't forget the time-out timer on the repeater!) There is one more advantage to such a setup. The would-be amateurs will have a chance to actually listen to on-the-air activities – and assuming your repeater observes good operating practices – where better to teach newcomers good habits.



Located just below the top 20-meter beam (at 120 feet) is the new Decibel Products stacked four-bay array. The bulletin and code-practice frequency is 147.555 MHz. (The inset photo at the bottom shows the four-bay array.)

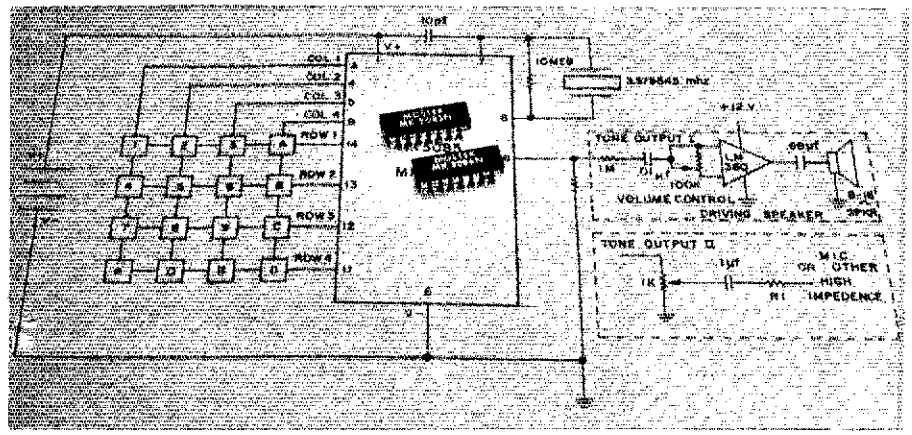
JAMMERS – AND OTHER SICK PEOPLE

The August Newsletter *Squelch Tale* carried the following thoughts by the Brooklyn group: "Jammers want to be noticed. The King's County Repeater Assoc. policy is to never acknowledge a jammer on the air. Never talk to or about a jammer. Let him talk to himself. Most of these unfortunate individuals will leave under these conditions. Those who don't can be hunted down and prosecuted. This rule is set down by the trustee of WR2ACV and approved by the executive board. The repeater will not be turned off on a jammer unless these rules are broken."

This is good advice from a club that operates a repeater in a crowded, heavy-QRM type of environment – and they make it work. Experience has proven that sick jammers want to be noticed. If you don't play their game then they will leave, because without attention they die. Next time one shows up on your repeater – ignore 'em.

MOSTEK MK5086

Mostek Corp. recently announced the MK5086-N1 tone-generator chip which can be used to build an inexpensive Touch-Tone dialer. Amateurs who like to roll their own can get additional information plus circuit tips by writing to Mostek Corp., 1215 West Crosby Road, Box 169, Carrollton, TX 75006, Attention Joe Jarrett, K5FOG.



These are the two low-priced ICs, the MK5085 and 5086. The only difference between the two parts is their method of keyboard entry.

*VRAC Liaison, ARRL hq.

Washington Mailbox

Conducted By Harold M. Steinman,* K1FHI

CODE TESTS

Q. International Morse code seems to be such an outmoded form of communication. Why do we still have to take a code test to obtain an amateur radio license?

A. The usefulness of telegraphy can be hotly debated back and forth. For every person who says it's seen its day there is another person who swears by it for its ability to get through the QRM and transmit messages accurately. It certainly is an *efficient* use of the frequency spectrum for it occupies less bandwidth than other modes. Also, using telegraphy (cw), one can get on the air with less expensive equipment because the circuitry needed to modulate the signal is not required.

The above notwithstanding, there is another overriding reason that a telegraphy test is required to obtain an amateur radio license: The international regulations require it! Section 3 of Article 41 of the regulations of the International Telecommunication Union (ITU) states: "Any person operating the apparatus of an amateur station shall have proved that he is able to send correctly by hand and to receive correctly be ear, texts in Morse code signals." So, you see, the FCC has little choice but to require a telegraphy examination for amateur radio licenses.

Q. But didn't the FCC some time back propose a "no-code" entry level license? I believe it was called the Communicator. Doesn't that contradict the international regulation requiring a telegraphy test?

A. Well, the last answer was oversimplified a bit. Section 3 of Article 41 of the ITU rules reads further: "Administrations concerned may, however, waive this requirement in the case of stations making use exclusively of frequencies above 144 MHz." So, for amateur licenses that authorize privileges below 144 MHz (and all present classes of U.S. licenses do), a telegraphy test is required. The Communicator proposal called for only limited privileges *above* 144 MHz, hence is legal under international regulations.

Q. So the international regulations require a telegraphy test for amateur privileges under 144 MHz. But who determines how the test is conducted; that is, who determines the code speed requirements for the different license classes, etc.?

A. The international rules only require that a telegraphy test *must* be given for an amateur radio license granting privileges under 144 MHz. How that test is conducted, its format, and the speed requirements are completely up to the country granting the license. In the case of the U.S., it is the FCC that administers the licensing program. In Canada, the DOC (Department of Communications) grants amateur radio licenses.

Q. OK, I understand that the FCC must administer code tests because the international regulations require it, and the FCC must abide by the international rules. Can you tell me why the international rules require a code test for amateur privileges under 144 MHz?

A. On an international scale the telegraphy requirement is easier to understand. The code is an *international* language. The ITU wants to assure that should the need arise, amateur stations of different countries can communicate with one another. The code, along with Q signals, is an international language – a common bond among amateurs throughout the world. The fact that amateurs throughout the world can communicate with each other in times of disaster is one justification for the existence of the Amateur Radio Service.

COMMUNICATOR

Q. You mentioned above the proposal for a code-free Communicator license with privileges above 144 MHz only. The FCC first proposed such a concept over two years ago, but I've heard nothing since. What ever happened to the proposal for a code-free entry level license?

A. The Communicator license proposal (Docket 20282) came before the FCC for consideration this past July. Had it been approved at that time, it could have been implemented in the summer of 1979, having telephony only privileges on 220-225 MHz and 420-450 MHz (with 435-438 MHz reserved for satellite communication). The problems discussed were availability of the resources required to administer such a license, the sharing of these bands with the government radiolocation service and possible interference with TV channels 11-13 in some areas. Because these issues could not be satisfactorily resolved, further consideration of the Communicator license was postponed, but not dropped entirely. However, because of the necessity to prepare budgets well in advance, it appears that implementation of such a program could occur at the earliest in 1980, *if* the concept *does* receive final approval at a later date. That is where the matter stands now.

MAIL EXAMINATIONS FOR APPLICANTS UNABLE TO TRAVEL

Q. The Novice examination is the only test that is routinely given by mail. How does someone who is unable to travel go about taking the test for a higher class license?

A. Those unable to travel because of protracted physical disability may take the examination at a location other than an FCC examination point when it is shown by a physician's statement that the applicant cannot appear at a regular Commission examination point due to that disability. Application should be made to the FCC Engineer-in-Charge in the district in which the applicant resides. (97.27)

Note that the physician's statement must indicate *two* things: (1) that the applicant is *unable* to travel, and (2) the disability is *protracted* (i.e., long term). The fact that travel for the applicant may be *inconvenient* is insufficient ground to warrant a higher class examination being given at the applicant's home. Also, short-term illness does not warrant such an exemption.

Q. Who chooses the examiner in such cases?

A. The FCC will choose the examiner. The applicant makes application *only* to the FCC Engineer-in-Charge.

IDENTIFICATION REQUIREMENTS

Q. What are the requirements concerning identifying my station and the station I'm in QSO with when I'm on the air?

A. You should give your station's call sign at the beginning and end of a transmission or series of transmissions, and at least every 10 minutes during a single transmission or series of transmissions. In addition, at the end of a QSO you must give the call sign of at least one station you've been communicating with plus your own call sign. (97.87a)

In the case of a net or a round table, you may use some sort of group identifier to indicate the group you're talking with; either the net name, net control station, or other readily recognizable group identifier.

[Editor's Note: In the "Happenings" column this month you will read that the FCC has deleted the requirement that applicants taking FCC supervised examinations must take a separate examination to demonstrate their ability to send international Morse code. At first glance this seems to contradict the international requirement that for a license granting operating privileges below 144 MHz the applicant must demonstrate ability to "send correctly by hand and to receive correctly by ear . . ." The catch, however, is that the administration granting the amateur license has complete freedom to determine to its satisfaction whether or not these requirements are met. The FCC cites the statistic that in May of 1977 out of 3,201 applicants who passed the FCC receiving test, only 2 failed the sending test. Thus, the FCC believes that an applicant who has demonstrated ability to receive code also possesses the ability to send code, and that a separate code sending test serves little purpose.]

*Asst. Manager, Membership Services Dept.

How's DX?

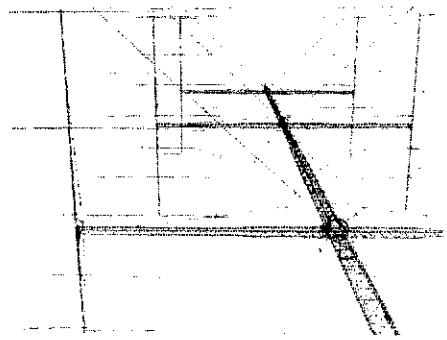
Conducted By Rod Newkirk,* W9BRD

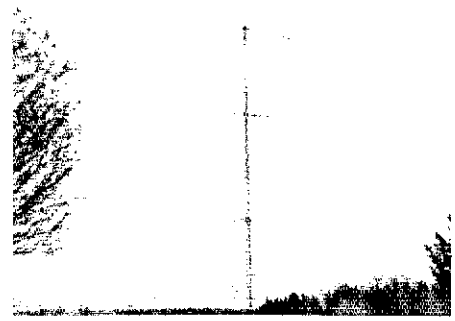
And a Goodly Crowd Was There

We spent some balmy summer evenings speculating about imminent DX wonders of OSCAR. 'Tis time we got back to terra firma, sunspots and 28 MHz, our frequent October theme. One year ago, in fact, we noted that old 10 never really dies, it just QSBs somewhat, reporting phenomenal summertime 28-MHz openings near the bottom of the sunspot cycle. Now after another such sensational season we're wondering if we haven't been putting the DX cart before the propagational horse all these years. Maybe happenings on old 10 actually lead and portend changes in solar climate, not the other way around.

"Reports for 10 meters are forging far ahead of those for 40 and 80," observed WA6AUD in a June issue of his West Coast *DX Bulletin*. QSOs with all continents were indicated on voice and code. Geoff Watts' *DX News-Sheet* listed steady 28-MHz action through the hot months, not only easy north-south skip. G4BHE picked up 58 fast countries on 10. In VERON's weekly *DXpress* PAØTO acknowledged the trend to recommend, "Keep a close eye on the band, especially for nonamateur trespassers. Many countries now are easier to work on 10 than on 20." Western Washington DX Club's July *Totem Tabloid* (K7VPF & Co.) confirms developments: "Summer conditions continue to provide thrills. JAs still are found on 15 and 10 late at night."

A4 A9 C31 C6 D2 DL DM EA EA6-8-9 EI EL F FC FG FM G GD GI GJ GM GW HB9-ø HH HI HP HV I IS IT JA JW KG4 KH KP KV KZ LA LU LX MJ OA OD OE OH OHØ ON OX OY OZ P29 PJ PY PZ SP ST TF TG TR TU UA2-9 UB UD UF UH UI UJ UL UP UQ VK VP2-5-9 VU XE YN YO YV ZD7-8 ZE ZF ZK1 ZL ZP ZS3-6 4U 4X 9J 9L 5A 5B 5T 5W 5X 5Z 6W 6Y 7X 8P 9G 9H 9J 9L 9Q and 9X are among countries reported workable on 28 MHz in early summer, more than enough for 5BDXCC purposes. It's promising, indeed – almost enough to suggest we've been watching for solar developments through the wrong end of our sunscopes.





OH8OS offers your QTH of the Month including what well may be the most elaborate 20-meter antenna system in amateur radio. Simon says the 36-element rotary array on that 210-foot stick has 24 dB gain over a dipole. W9KOK journeyed all the way to Oulu for a close look at this monster. *(W9KOK and W2ONV photos)*

FROM *QST*'S DX MAILBAG

HEREABOUTS: Although I missed much of that fabulous June 10th-11th 28-MHz opening I did contact 20 countries including 4Z4UH and four UB5s. (W3RJ) . . . W8s DNC VW, N8AA, VE1CD and I will caper in the Caymans on the 19th-29th of next month, 1.8-28 MHz, call(s) unknown at this writing. This will be primarily a radiotelegraphic DXcursion and Novice bands will not be ignored. (K8MFO) . . . Left W3GJY and

*c/o ARRL, 225 Main St., Newington, CT 06111

HC5EE throws plenty of rf our way in pursuit of five-band WAS and DXCC certification on voice and code. OSCAR work is in prospect. Rick expects to continue medical studies in Ecuador for the next several years. XYL Maria is also active from Cuenca as HC1MM/5 when not QRL with two lively junior ops.

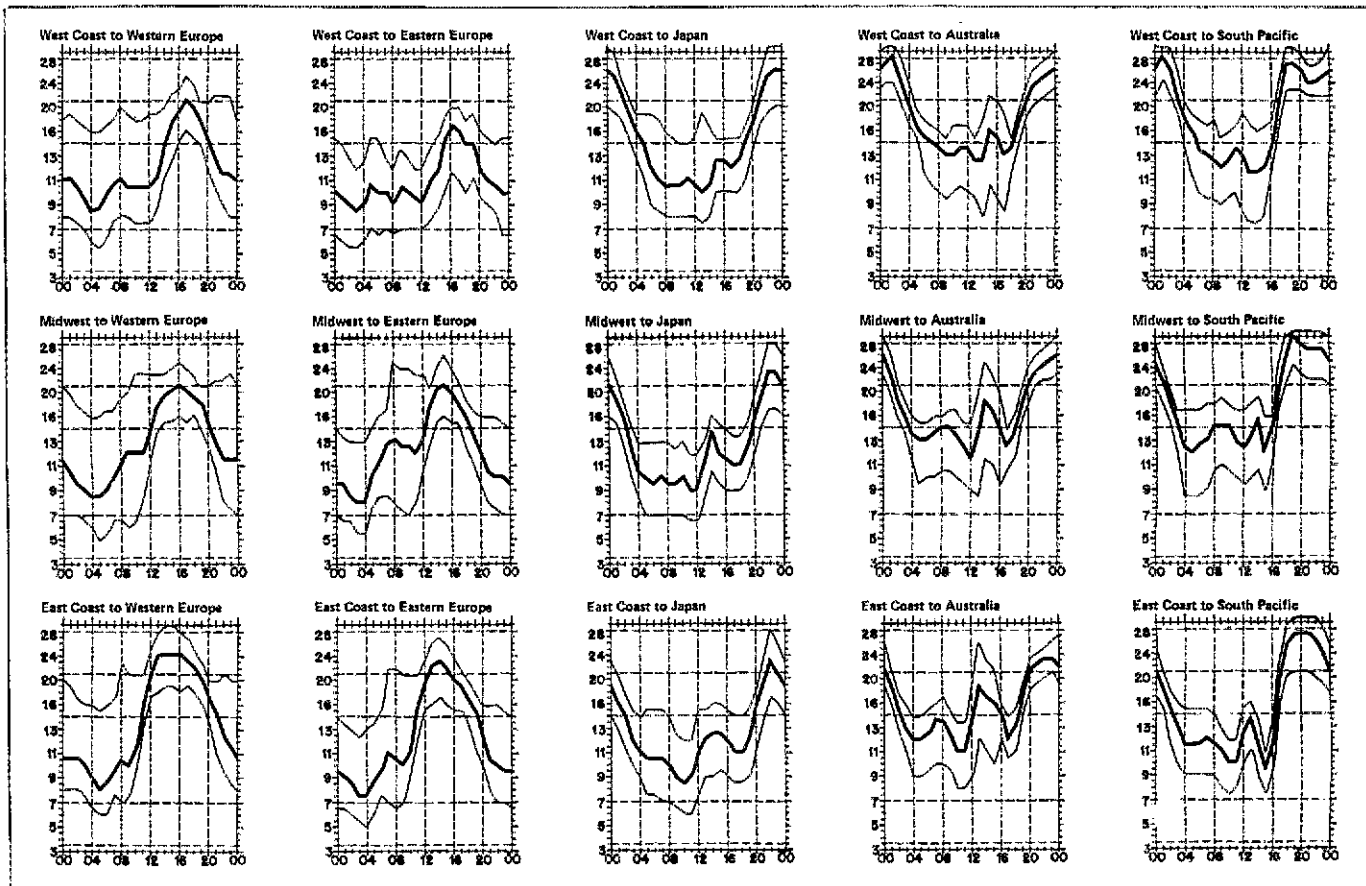
338 confirmed a year ago this month. (W7LLC) . . . Nice diploma from RCV for participation in last year's Venezuela DX Test. (W1OPJ) . . . At 223 countries confirmed I find the DX climb getting steeper every day, especially with S7 local QRN. (PY6CN) . . . My Argonaut 509, modified and certified for strictly one-watt input, has an ssb country total of 139/112 worked/confirmed as of June. Some 600 DX stations have been QSOed since last October. (W8ILC) . . . LU8DQ came back to my 1.7 watts and inverted V on 7005 kHz, a real DX thrill. (W6NPN) . . . The barefoot gang shouldn't let all the kWs on 14 MHz discourage them. My hundred watts and vertical catch plenty of DX. I see nothing wrong with so-called "list" operation, a technique that promotes many more contacts between Statesiders and outnumbered DX. (WA4QHV) . . . Eighty and 40 were my big DX bands in early summer. (K3UA) . . . WA4YZC and I will sign ZF2AP on Grand Cayman late this month into November with the accent on 15 and 20. (W4YKH) . . . Now moving to Maryland after finally making DXCC as WA4GAJ. Pacific propagation peaked in June for goodies like FK8CP, FO8DV, KJ6BZ, KP6BD, VK9ZM, VRs 3AK 4DH, 3D2s DM and ER, all new ones here. (N4GJ) . . . Beginning early in May I observed the best openings to eastern Europe and the Middle East in 15 years of hamming. (W7LLM) . . . Kept KV4IF active on 160 through 2 meters from June into September. (K1DLM) . . . Our Virginia Century Club enjoyed summer meetings at the QTHs of W9QQ/4, W4OM, WA4s HHG and YBV. (WA4ZYU) . . . VP1MPW, now back in eight-land, worked every band from 160 to OSCAR during 10 months in Belize. A KL7 on 28 MHz would have clinched Mark's 5BWAS. His gear was left in the able hands of VP1SM. (W5QPX/YN1QPX) . . . Departed WA8FIO for a new Michigan QTH and got a fresh call to go with it. (N8ZZ) . . . I'll return to cw action this month with an ear out for U.S. Novices. Incidentally, Guatemala's Novices can work only 40-meter ssb. (TG9ML) . . . KX6DC, UH8HBI and other delicacies have been surprising me on 20 around 2000 UTC. (WA2ZQB) . . . I'm still averaging about 75 contacts daily, G3XTT being this year's 15,000th QSO. (KV4AA) . . . Took me years to clinch my own tricky DXCC, a double-letter-suffix job. Goes CE8AA-CR6YY-DL1FF-FB8XX, etc. Is this an original? (N2AC) . . . "The Case for Identity," your July commentary, makes me wonder anew why any amateur would voluntarily abandon a call sign he has held for many years. (W7CWN) . . . I'm working toward my Extra but you can bet I'll cling to the radio identity I've held since 1969. (WB9CAC) . . . It took patient WØLNC 25 years to coax me into amateur radio. Now DX, here I come! (WDØALE) . . . K1DRN/C6 raised all States and 56 countries on his July jaunt to Freeport. Vern also has three St. Pierre sessions behind him. Easter's CEØAE has his 1827-kHz rig finally debugged. Fr. Dave listens near 1805 around 0500 UTC. *(WCDXB)*

EUROPE: I have a full-size 80-meter quad fired up outside Paris which has accumulated about 150 ssb countries on the band. This month I'll watch for Statesiders on 75, Friday and Saturday nights. Other big weapons on 3.6-3.8 MHz are the rhombic of UK9AAN and the delta loop of UI8LAG. From New York in about a year on 75, I have 172/165 countries worked/confirmed but DX is easier in France. (WA2LTQ/FØCGP) . . . Readying for this month's contest action, I'm rigging large loops, phased arrays, groundplanes, longwires, Beverages and various multiband beams for 160 through 10 meters at a hand-picked Liechtenstein location. (DJ2EH/HBØ) . . . Russia's '75 CQM DX Test, a radiotelegraph affair, entertained Yank single-op entrants in

this scoring order: K3EST, W8VSK, WA1NKK, KH6CKJ, Ws ØBMM 3GN/8 1OPJ 3EAN, WB2VFT, Ws 6DGH and 8RV, with VE5RA representing Canada. Continental leaders were JH1GTQ, K3EST, OA4AJT, OK2SIR and VK5NO, no Africans applying. Other single-op winners by country included: DI6AU, DM2CMF, EA5BS, F5YG, G3TXF, GW3INW, HAØDU/9, HP1AC, IIFGT, JT1AO, LA2Q, LU6EF, LZ2HA, OH5TS, OZ5ME, PAØVB, SMØCCE, SP7CTY, W6GBY/6Y, YO5BQ and YU1NGO. Russia's regional leaders were UAs 4PWW 4SM 4WAD 6JWW 6KAH 6PBQ 6WF 9JH 9WS 9XS ØYAE, UC2RG, UD6BO, UF6DZ, UH8BO, UI8ACI, UJ8JAS, UL7EAH, UM8FM, UO5PK, UP2CY, UQ2PQ, UR2QI, UT5GZ and UW3HV. UI8ACI turned in the fattest, single-operator score worldwide. (CRC) . . . For contact with all 14 of those U60 commemorative stations, active through the 7th-8th of next month, the U.S.S.R. Central Radio Club will issue special wallpaper. (N6HR) . . . Low-frequency DX specialist PAØGMW lays off heavy hamming for the next few years while pursuing his EE master's degree. Paul's imposing rural 75/80-meter antenna farm will give way to a modest city skyhook. Myself, I'm now active mostly from club station W9YH. (PA9AWG/K9VV) . . . In your July picture caption G6CJ holds a type "R" tube that was used for transmitting, not receiving, during pioneer contact with Australia. (WØJF) . . . Please mark your DX calendars for the annual Spanish International Contest on the first (voice) and second (code) weekends in December. (URE) . . . 9H1FF keeps me QRL as QSL manager for his many sideband QSOs on 15 and 20 meters. (K9DID) . . . I7s DLV DPO and I enjoyed a DXcursion to the Cheradi Isles in late July as IJ7EX/IJØONU. (I7VCA) . . . Yugoslav DX Club, P. O. Box 82, Ptuj 62250, offers a certification attainable by W/K/VEs for working four of 40 designated YU stations. Another similar sheepskin for YU QSO prowess is available through YU2AKL. (YUDXC) . . . British QSOs on June 4-12, 1977, may qualify you for the English Silver Jubilee Award, details available here for s.a.e. plus IRCs. (G8KLO) . . . EIØA of IRTS bagged 2300 DXpeditionary QSOs from the Arans. UW3HY relocates to Franz Josef Land to bolster UK1PAA's cw program. SVØWZ, due for Maryland return, leaves his Crete TH3 with SV1IV. (*WCDXB*) . . . Facilities loaned by PAØs LVB and WRS helped PAØTO maintain *DXpress* mailings in the aftermath of VERON's big office fire. (VERON) . . . YL DX? G4EZI, Diana, suggests CE1KZ, CTs 1YP 2YA, TG9HZ, VE3HYU/SU, VP8NY, 6Y5YL and 9K2BE, all on 20 ssb. (*DXNS*)

VE2AQS/TG9 amassed 24,000 QSOs from Guatemala City before QSYing to Peru for more multiband DX work and an OSCAR fling.

OCEANIA: So much fine DX rolling through on Guam I can't decide where to point my new TH6. Fifteen's been coming alive to the U.S. East Coast and 10 has good openings to South America on the midnight path. Let's have more 28-MHz activity! I'm looking forward to 40- and 80-meter DX doings this fall and winter. (KG6JIH/K6QHC) . . . DU6RH digs for Alabama, Maine and Nevada to complete WAS. Ricardo likes cw on the low ends of 20 or 40 around 1300 UTC. (W7HPI) . . . Speaking of DUs, I sure miss the big sig of old DU7SV whose QSLs were so prominent on DXers' walls some years ago. VK1DL puts a rather rare prefix on 40 cw these days. (W8IQ) . . . W6YO/mm aboard *Yankee Trader*, who regaled Novices as W6YO/VR6 on 15 cw, intends more rare stops before heading homeward. (G. Hunt) . . . Arrived Wake in mid-July and the island's administration quickly blessed my proposed DX efforts. After stringing a 14-MHz tape dipole to a nearby palm tree I found myself the sole active KW6. Though only 20 feet high the antenna had a view of blue Pacific and, operating intermittently for about a week, I collected 1370 QSOs with 25 countries. Some 650 contacts were with the USA, another 570 with Japan. Cw QSOs outweighed ssb. No Africans were worked, very few East Coast W/Ks. More power and a better skywire would have helped in marginal conditions. There is plenty of interest in ARRL's CW-DXCC, especially among JAs, as I was the first land-based Wake cw station available since 1974. American and Japanese operators displayed a high level of savvy, skill and courtesy. Lids, jammers and tuner-uppers were an insignificant minority. With my departure KW6 activity returned to zero but there's a chance for Wake MARS activation in the not-too-distant future. If a ham takes on the post it should be a very lively and interesting DX tour. For WA6KWQ/KW6 QSLs use only my home QTH as it appears in



When are the bands open? These charts predict this month's average propagation conditions for high-frequency circuits between the U.S. and various overseas points. One chart for East Coast to West Coast is also included. On 10 percent of the days of the month, the highest frequency propagated will be at least as high as the uppermost curve (highest possible frequency, or hpf). On 50 percent of the days of the month, it will be at least as high as the middle curve (maximum usable frequency, or muf). On 90 percent of the days of the month, it will be at least as high

the latest *callbook*. (WA6KWQ) . . . Delightful visit with OT VK5WR in Adelaide. A later stop in Perth brought a pleasant meeting with another old QSO buddy, VK6RU. Jim and XYL Joan were also wonderfully hospitable. (W9DH) . . . VR3AH closed down in favor of return to Kwajalein after unrarifying Christmas Atoll with thousands of multiband QSOs. Doug probably will retain his old KX6LA call. The depth of VR3AH interest among 160-meter DX fanatics was awesome to behold! (K2BT) . . . More Oceaniagrams via *WCDXB*: VK4FJ's springtime Lord Howe splash weighed in at 2300 contacts. . . . P29JS warms up a new TS-820 at Konedobu. . . . VK9JD likes Sunday 3.8-MHz DX and should be heard from Norfolk for the next few years. . . . FK8BK expects to resume FR7BM adventures this month. . . . VR1AF has a new 7- and 3.5-MHz antenna matcher on Ocean Isle. . . . ZK1DR intends voice and code frivolity at Rarotonga into 1980, a new quad due. Alan formerly signed ZLs 4FX 2BX and 5AC. Neighbor ZK1BA knocks off for New Zealand. . . . W6s UOU and WNE kicked off a global spin with mid-August Ponape operation. This month may find them audible in the Mediterranean vicinity after other Asian and African ssb activations on 10, 15 and 20.

ASIA: Unrest in the Middle East prevents Syria from implementing the more liberal radio regulations prepared several years ago. YK1AA remains the only Syrian licensee active since club station YK1KAS closed down. The country's Technical Institute of Radio, an International Amateur Radio Union affiliate, looks forward confidently to better days for YKs. (WA1ZQP) . . . KA6 friends and I may try further DXpeditionary doings after summer Marcus success. (HL9VA) . . . W5UJF and K8CSG, going strong from HZ1AB since January, should keep Saudi Arabia coming through for several years. (K8PYD) . . . JA7s RHJ UIH, JH7s CSU and IDA operated JA7ZSQ/JD1 on Chichi-Jima in the Ogasawaras in August, a DXcursional project of Morioka DX Club. (T. Sasaki) . . . A9XCC, usually on 14,217 kHz after 2300 UTC, may terminate in February. Nearby A4XFV likes 14,203 at 2230, A4XFW tries 14,230-kHz slow-scan at 2130-2400, and A4XGX haunts 14,224 from 0200-0300 or so. (LIDXA) . . . More Asian items courtesy *WCDXB*: S21AB works mostly JAs from Dacca, 20 ssb. . . . The 10-meter beacon lineup includes A9XC on 28,207.5 at 2100-1400 UTC, EA2OJZ 28,247.5, N4RD 28,207.5, VP9BA 28,165 and 5B4CY 28,200 kHz. . . . Old Laos hand ex-XW8FN is now WB3IDA, ex-XW8AL signs FØDAJ, ex-XW8HT (CP1JV) will try DX luck as an HI8, and ex-XW8BS is W7KRP. . . . OE2WSL/YK should be raisable on 15 and 20 sideband until QRT next month. . . . JTØOAQ closed his Outer Mongolia logs for return to UC2LBI after 5500 QSOs with 123 countries, mostly on 40 and 80. . . . Time to credit sources for much monthly "How's" data, recording recent input from Arkansas DX Association (WA5YMW), Canadian DX Association *Long Skip* (VE1AL/VE3), Columbus Amateur Radio Association *CARAscope* (W8ZCQ), *DX News-Sheet* (G. Watts, Norwich, England), Long Island DX Association *Bulletin* (W2IYX), Newark News Radio Club *Bulletin* (M. Witkowski, Rte. 6, Box 255, Stevens Point, Wisconsin, 54481), Northern California DX Club *DXer* (K6SSJ), North Florida DX Association *News* (WA4UFW), VERON's *DXpress* (PAØTO), West Coast *DX Bulletin* (WA6AUD) and Western Washington DX Club *Totem Tabloid* (K7VPF). Y'all come again!

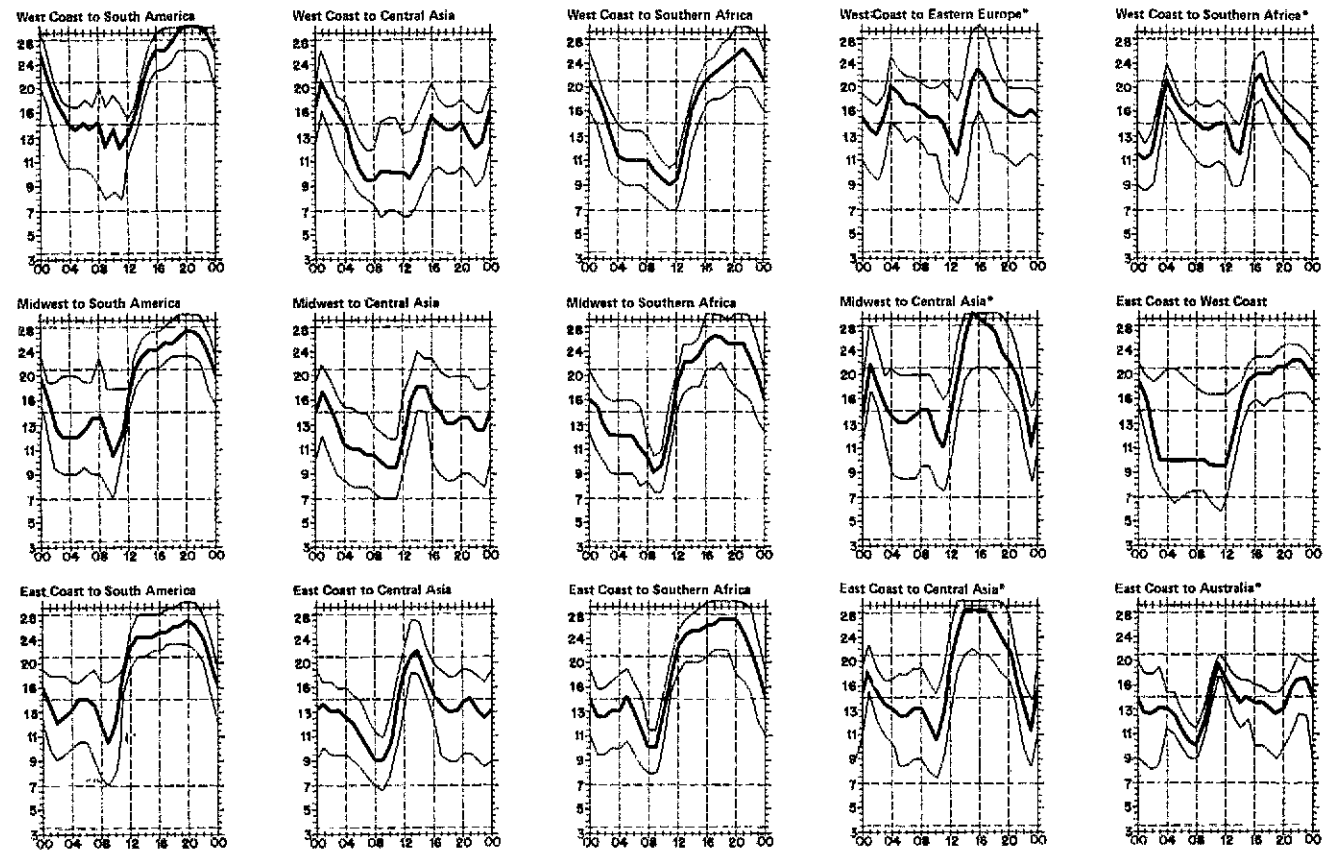
VS6GG catches frequent 14-MHz openings between chores as Hong Kong Transmitting Society secretary. This picture comes via John's busy QSL manager, WB4FJO.

SIXTH CALL AREA QSL BUREAU

The Sixth Call Area QSL Bureau is unique in its organization. Under the auspices of the Los Angeles Area Council of Amateur Radio Clubs and the General managership of W6LPJ, the workload of the bureau is divided between 13 radio clubs in the Los Angeles area.

The 26 letters of the alphabet are divided among 24 submanagers in the 13 clubs. Each of the submanagers is responsible for the sorting and distribution of cards for calls whose suffix starts with their particular assigned letter or letters of the alphabet. While "many hands make light labor," inasmuch as some 400,000 cards for an estimated 4000 people were handled by the Sixth Call Area QSL Bureau in 1976, just how "light" the labor is might be questioned.

Taking a break from their task at the bureau's annual meeting are W6DDB, W6LPJ



as the lowest curve (optimum traffic frequency, or fot). See January 1977 *QST*, page 58, and September 1977 *QST*, page 35, for a complete explanation. The horizontal axis shows Universal Coordinated Time (UTC); the vertical axis, frequency in MHz. Asterisk indicates long-path circuits. Data are provided by the Institute for Telecommunication Sciences, Boulder, CO. These predictions for October, 1977, assume a sunspot number of 44, which corresponds to a 2800-MHz solar flux of 97.

and YF, K6XO, W6QVK, W6IR, W6EL, WA6TLA and son, WA6JZL, W6WIS, K6ELX, W6BA, WA6DZR, WB6BFK, WA6ARP, K6LXH, WB6UJA and WB6ROH. Other bureau workers not shown in the photo are WB6CEI, K6VA, W6HUR, K6KII, K6JG, W6NHX, WA6OWM, K6YGN and WB6NSJ.

The 13 radio clubs involved are Assoc. Amateurs of Long Beach, Downey ARC, Hughes ARC, JPL ARC, Lockheed ARC, Marina ARC, Monterey Park ARC, San Fernando Valley ARC, Santa Clarita ARC, So. CA DX Club, TELCO ARC, TRW Systems ARC and United RC.

Are you doing your part to help these people help you? Do you have envelopes on file at your QSL bureau? If not, why not?

Sorting 400,000 cards is surely no small task. But it's not just all work for the Sixth Call Area QSL Bureau volunteers, shown here at their annual meeting.

THE ARRL DX QSL BUREAU SYSTEM

The ARRL DX QSL bureau system distributes cards free of charge from DX stations to amateurs within the League membership area (see page 8). Every active DXer should keep several 5 X 7-inch envelopes on file with the bureau of his home district. Place your call sign in large block letters in the upper left corner, and attach a single first-class stamp, unless you normally receive more cards. Unclaimed cards are discarded after one year. For more details on the bureau system, write ARRL hq.

□ First Call Area: all calls* — Hampden County Radio Association, Box 216, Forest Park Station, Springfield, MA 01108.

□ Second Call Area: all calls* — North Jersey DX Assn., P. O. Box 8160, Haledon, NJ 07508.

□ Third Call Area: all calls* — Jesse Bieberman, W3KT, RD 1, Box 66, Valley Hill Rd., Malvern, PA 19355.

□ Fourth Call Area: K4, N4, W4 — National Capitol DX Assn., Box DX, Boyce, VA 22620.

□ Fourth Call Area: WA4, WB4, WD4, WN4 — Sterling Park Amateur Radio Club, P. O. Box 599, Sterling Park, VA 22170.

□ Fifth Call Area: all calls* — ARRL W5 QSL Bureau, Box 1690, Sherman, TX 75090.

□ Sixth Call Area: all calls* — ARRL Sixth (6th) District DX QSL Bureau, 2814 Empire Avenue, Burbank, CA 91504.

□ Seventh Call Area: all calls — Willamette Valley DX Club, Inc., P. O. Box 555, Portland, OR 97207.

□ Eighth Call Area: all calls — Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, OH 43215.

□ Ninth Call Area: all calls — Northern Illinois DX Assn., Box 519, Elmhurst, IL 60126.

□ Zero Call Area: all calls — WØ QSL Bureau, Ak-Sar-Ben Radio Club, P. O. Box 291, Omaha, NE 68101.

□ Puerto Rico: all calls* — Radio Club de Puerto Rico, P. O. Box 1061, San Juan, PR 00902.

□ U.S. Virgin Islands: all calls — Graciano Berlardo, KV4CF, P. O. Box 572, Christiansted, St. Croix, VI 00820.

□ Panama Canal Zone: all calls* — KZ5 QSL Bureau, KZ5OD, Box 407, Balboa, CZ.

□ Hawaiian Islands: all calls* — John H. Oka, KH6DQ, P. O. Box 101, Aiea, Oahu, HI 96701.

□ Alaska: all calls — Alaska QSL Bureau, Star Route, Box 2401, Wasilla, AK 99687.

□ SWL — Leroy Waite, 39 Hannum St., Ballston Spa, NY 12020.

□ QSL Cards for Canada (VE and VO) may be sent to: ARRL Central QSL Bureau, P. O. Box 663, Halifax, NS, Canada, B3J 2T3. Or, QSL cards may be sent to the individual bureaus.

□ VE1* — L. J. Fader, VE1FQ, P. O. Box 663, Halifax, NS B3J 2T3.

□ VE2 — A. G. Daemen, VE2IJ, 2960 Douglas Avenue, Montreal, Quebec H3R 2E3.

□ VE3 — The Ontario Trilliums, P. O. Box 157, Downsview, Ont., Canada M3M 3A3.

□ VE4 — W. A. Stunden, VE4BJ, 578 Oxford St., Winnipeg, Man., Canada, R3M 3J9.

□ VE5* — A. Lloyd Jones, VE5JI, 2328 Grant Road, Regina, Sask., S4S 5E3.

□ VE6* — G. D. Holeton, VE6AGV, 4003 1st St., N.W. Calgary, Alta., T2K 0X2.

□ VE7* — Howard Martin, VE7AFY, No. 45-9960 Wilson Road, Ruskin, BC V0M 1R0.

□ VE8* — Al Sturko, VE8NS, P. O. Box 72, Fort Smith, NWT X0E 0P0.

□ VO1, VO2 — William Coffen, VO1KM, P. O. Box 6, St. John's, Nfld., A1C 5H5.

*These bureaus sell envelopes or postage credits. Send an s.a.s.e. to the bureau for further information.

QSL bureaus for other areas can be found in the December, 1975, issue of *QST*, page 64.

DX Century Club Awards

The ARRL DXCC is awarded to amateurs who submit written confirmation for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 20-country increments through 240, 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from July 1 through July 31, 1977. An s.a.s.e. will bring you the full rules for participation in the DXCC, the DXCC list and application forms.

New Members

Mixed

CX4CR/226	K4IX/109	WA4EFH/105	W9ZXN/102	WB6EMR/101
YU1OER/178	WBØTDZ/109	WB9SEJ/105	WØGZI/102	JR3ODV/100
K1SA/154	DM3WMJ/108	YU3WS/105	JE1BQE/101	K2TJ/100
WA4GKR/129	W7FOF/108	DF2SL/104	VE3AAN/101	WA3PTY/100
IØMMI/122	WB7AJR/107	K7SPL/104	VE7DEN/101	WA4JIY/100
WB9GGD/122	AAØKXJ/106	DK8KC/103	W8KZM/101	WAØKXJ/100
DA2BD/119	W4QO/106	JA1MNO/103	WA1NLD/101	WB2AMU/100
DL2OV/118	JA5PUL/105	VE3HHS/103	WA2EJZ/101	

Radiotelephone

CX2CS/182	DK5XO/130	VE2QO/105	K8CYJ/102	VE1VE/SU/101
ZP5LX/164	ZP5EF/127	WB8PCN/105	K9RSF/102	WB5UKI/101
WA4JT/160	VE4AA/109	EI9CB/103	WA6NRQ/102	DA2BD/100
I8KNT/151	JA5PUL/105	K7SPL/102	K7CCP/101	HI8EDS/100
F6BFI/141				

CW

OH2BAD/145	VE3CVZ/115	JA3AQM/106	K1SA/103	W9AG/101
W3GID/130	K2AAC/108	JA1BWA/105	W7OK/102	W8KI/100
JA6UYF/125	W6RGQ/108	WØCAW/104	W1ZW/101	WB4ACV/100
CX4LO/120	OK3EA/107			

5BDXCC

DJ2AA	JA6BZI	K3EH		

Endorsements

Mixed

OE1ER/358	W1JFL/316	K9CT/279	W8LU/230	KP4BDL/160
W2QHH/355	WA5REU/316	SM5AQB/276	N4HH/222	WB4WFT/160
W8JBI/354	SM6EOC/311	W3GL/273	YU3TXT/222	K4SV/159
DL1BO/345	W3KA/311	W7ZHZ/272	WA4JTI/220	K2RN/144
K3II/345	W6GC/311	VE3CVZ/270	WB9CGL/220	WB9DWG/142
W2GC/345	K9JF/310	WA4DCP/264	WA6DNM/219	WA7DYH/141
WØGKL/345	DJ3GG/309	K4VT/260	K6DR/202	JA6UYF/140
DL7HU/342	K6OJO/306	K5KLA/260	N6SV/202	WA4WCG/140
KP4RK/340	N8AA/305	WB2VFT/260	CX4CO/201	WB4FQT/140
W9TKD/340	OK3EA/302	DL1LZ/252	KG6SW/201	W1YNE/139
W2GKZ/336	W5UC/302	W4CZU/251	WB2LOF/200	YU3UAR/133
W8RT/336	K6DT/300	K6DG/250	YU2CAL/188	WB4ACV/128
K2LE/331	N3ED/297	W3XX/250	K6ZMB/182	WB2IDU/126
W4KFC/330	W6UY/297	VE3DU/249	WØBWJ/182	W4ONA/123
SMØKV/328	W6VBI/296	YU3EU/244	N4HU/181	K8MLO/122
W7DY/328	JA1WVK/290	W8GOC/241	WB6TUH/181	K4BIY/120
JA1MCU/325	K8RA/290	WB9BGJ/241	W9UDK/181	N7DX/120
K5LIL/325	WA5WFY/290	W2TA/240	I3EGD/164	W3CRG/120
W9HZ/325	VE3IR/288	XE1FR/239	K1BUR/163	WB7DPM/120
K4RID/321	K6JB/287	DL2AA/W1/238	WB7DKV/163	
WA6DUG/320	K5YMY/285	WB5HVY/238	VE3HLC/163	
JA1DFQ/317	WA9VIZ/281	W8ZNO/232	JR1TNE/161	
W6MUM/317	WA4EYR/280	JA3CHO/231	K7SFN/160	

Radiotelephone

TI2HP/354	I1UW/301	W3GL/256	WB5HVY/222	WA6HAV/160
WØGKL/344	W2OVC/291	I7RNH/253	DL2AA/W1/218	K1CPJ/152
DL7HU/338	JA1DFQ/289	K6DT/253	YU3TXT/215	LU8BF/151
EA2HX/333	W8JXM/289	N3ED/253	W8LU/207	WAØTAM/150
I5WT/330	K5FM/283	WA4CXZ/251	I8ACB/200	W7GOV/141
W2GKZ/330	W6UY/280	K6DG/250	N6SV/200	WB4ASV/141
K2JMY/326	K5YMY/276	W1KSN/250	K8GWM/199	W9CYL/140
PY2DYI/322	KZ5JM/266	CT2BB/244	KG6SW/199	VE1DI/139
W9TKD/321	CX9CO/266	W6EHA/240	WØBWJ/182	WB9DWG/138
W9HZ/319	SM5AQB/263	WØAUB/240	I1GAS/164	K2BWQ/132
G5AFA/315	W5UC/261	WB9BGJ/240	K1BUR/163	WB2IDU/125
W6XP/309	OE1PC/260	OK3EA/234	KØIET/161	W8TXM/120
G3ZBA/307	W9MQK/258	W8ZNO/224	W8NPF/160	WB2HJW/120
K6OJO/305	K9JF/256	PY6CN/222	WØSIP/7/160	W2YTO/118

CW

W3KT/231	K6DT/170	WA6DNM/160	DL1LZ/140	W6UY/127
DL8AN/201	WØBW/161	K2IJ/142	K2FL/138	W3GL/121
W7LR/175	W2NC/160	WA4LDM/141	K9QXY/131	

50 Years Ago

October, 1927

□ The U.S. will support present amateur bands (3500-4000, 7000-8000 and 14,000-16,000 kc.) at the forthcoming international radio conference, but preliminary proposals from other countries are nowhere near as favorable.

□ Amplifier power output when driven by an oscillator doesn't satisfy a number of amateurs, and currently there is a trend to letting the amplifier oscillate on its own, making sure it is "locked in" to the crystal. 1AXA shows the latest example.

□ 178 reports were received from U.S. and Canadian participants in the international DX test. Much of the effective work was done on 20 meters, dispelling earlier doubts about that band. A map of worldwide activity shows only a few countries, mostly in Africa, with no amateurs.

□ Alex Nyman of Cornell Dubilier shows us in detail what makes condensers function, how internal current flow varies with the shape and construction, and how high-voltage types differ from high-current designs.

□ An Experimenters' Section report does much the same for r.f. chokes, in particular illustrating the extensive change of impedance when the frequency is varied.

□ Former Department Editor Mason has completed an extensive expedition in northern Alaska with the Wilkins group; most communication was commercial, but using hamdesigned gear and techniques, and Howard often wished a bunch of hams were on the other ends of QSOs.

□ 1ZS describes another way to calibrate a wavemeter from b.c. station harmonics.

25 Years Ago

October, 1952

□ Interest is high in pi-network output circuits for reduction of TVI, but few components are available for high-power amplifier use. W1DF shows us a Hq. test unit in which he modified and adapted available parts for the half-kw. range.

□ W6QYT's tunable audio amplifier, or "Selectoject," has generated considerable interest among selectivity-minded hams, and Prof. Villard presents a new and improved version with simpler receiver interconnections.

□ The League has filed comment with FCC vehemently opposing the concept of restricted subbands for calling and answering purposes only.

□ The Sweepstakes dates are imminent, and Asst. Secretary W1IKE reports the results of a survey among previous top-scorers, divulging their secrets of success.

□ Our advanced communications receivers these days have a lot of output, and if the background noise between stations is bothersome you can build the outboard squelch system described by Cornell Lab's Ronald Ives.

□ Asst. Secretary W1LVQ was long bothered by lack of c.w. reception capability in commercial mobile converters, and so built his own b.f.o. attachment.

□ Ending years of East Coast domination of the top spot, W5ENE placed highest in the 18th ARRL DX contest.

□ If single-sideband theory and terminology still confuse you, W6UYG's explanation of basics should help considerably.

□ Hams are providing communication for the women's transcontinental air races. — *W1RW*

Strays

I would like to get in touch with . . .

□ amateurs who are members of Sister Cities groups who would like to get together on the air and discuss the program and possible contacts with hams in our sister cities. Robert C. Morgan, W6UMV, 7448 Sausalito Ave., Canoga Park, CA 91307.

□ any DX station who would like a stateside QSL manager. Also any station in Alaska who would like to set up a cw sked to help me with WAS. Alan D. Kamman, WA1VWF, 454 Ward St., Newton Ctr., MA 02159.

□ amateurs who are kidney dialysis or transplant patients. Wm. L. Harris, K9FOV, 414 Bomberding, Lafayette, IN 47905.

□ Hudson River Valley Novices and Techs to set up an 80- or 15-meter HV Novice and Tech net starting in September on Sunday or Tuesday evenings at 2030 local time. Stu Ballinger, WA2BSS, 57 S. Clinton St., Poughkeepsie, NY 12601.

□ anyone who can help me locate a working heliograph instrument to be used in re-enacting old-time communication feats. Lewis Coe, W9CNY, P. O. Box 316, Crown Point, IN 46307.

□ amateurs who are 18 years or younger to form a 20-meter phone net for young OMs. George Thompson, WA4YOX, 8121 Lillian Hwy. Lot 52, Pensacola, FL 32506.

□ bankers who are amateurs. Les Lussier, WA1JBH, Northampton Institution for Savings, 109 Main St., Northampton, MA 01060.

□ hams who are boating enthusiasts, with interest in forming a 20-meter net to exchange ideas on circumnavigating, hamming on board, etc. Capt. Al Yetman, VE3HTV, Box 271, Stn. A, Scarborough, ON M1K 5B9, Canada.

Silent Keys

It is with deep regret that we record the passing of these amateurs.

W1ASF, Reed B. Eddy, Sr., Middletown, CT
K1KQJ, Karl W. Miles, Wilton, NH
W1MTL, Lt. Col. Charles E. Remick, Ellsworth, ME
W1NT, Henry G. Lambert, West Yarmouth, MA
WA1OUP, Edward W. Strong, Boxford, MA
W1QEI, Ernest E. Crocker, Fairfield, ME
W1TK, John E. Wilkinson, Westport Point, MA
W1UXI, Harry E. Dean, Bernardston, MA
W1ZEL, James Petalas, Littleton, MA
W2FZ, Frank Frimmerman, Bronx, NY
W2GVT, Solomon Kupferman, Flushing, NY
WA2SNT, Louise Smith, Forest Hills, NY
K2YFL, John T. Warek, Yonkers, NY
*WB2ZOZ, John V. Fieldly, New Windsor, NY
K3ABC, Lyle K. Williams, Wysox, PA
W3NRZ, Leo J. Voltz, Sarver, PA
W3SDE, Albert L. Godshall, Lansdale, PA
*K3VYO, Charles Renner, Pittsburgh, PA
W3ZDW, Joseph P. Merloni, Coraopolis, PA
W4BEK, William F. Lange, Charleston, TN
K4DLC, William P. Hamilton, Lake Placid, FL
K4EAL, Clayton M. Cook, Englewood, FL
W4FRH, Robert W. Franklin, Greensboro, NC
WB4HHW, Millard L. Rucks, Okeechobee, FL
W4JDV, Charles H. Welch, Winter Park, FL
W4JVP, Marion B. "Hank" Tribley, Greenville, NC
K4KKI, Kenneth F. Miller, Port Richey, FL
K4LFT, Michael J. English, Port Charlotte, FL
W4LON, Frank D. Luddington, Dunedin, FL
W4MGV, William T. McMahan, Morrow, GA
W4MWR, D. Ernest Farmer, Lexington, KY
W4NLS, William J. Bainbridge, New Smyrna Beach, FL
W4OZ, Dewitt C. Bailey, Tampa, FL
W4PM, William Noble Smith, Hollywood, FL
WA4QPS, Marion Gail Sanders, Melbourne, FL
W4SID, Russell F. Ellis, Fairfax, VA
W4TJ, Edward A. Koch, Boynton Beach, FL
W4WXR, Otto G. Menn, West Palm Beach, FL
WA5JNC, James T. Lawyer, Deming, NM
W5JSW, Cleon E. Raymond, Shreveport, LA
WA5LPQ, James N. Stephens, Jackson, MS
WB5MKJ, Edith S. Henricks, Monroe, LA
WA5VKE, Raymond B. Griffin, Aubrey, TX
W5TKN, Glenn C. Free, Moline, IL
K5OYG, Alfred W. "Whit" Mustion, Tulsa, OK
W6ARK, Clyde M. Gregory, Santa Rosa, CA
K6AVP, Elmer J. Peck, Santa Clara, CA
Ex-6CNC, Harry J. Lyman, LaJolla, CA
K6EYC, Robert G. Finley, San Anselmo, CA
WA6HNZ, James R. McGrath, Sylmar, CA
WA6KUS, Merle S. Gould, Van Nuys, CA
W6LR, Noble G. "Pappy Dow" Dowdell, Santa Ana, CA
W6PTS, Howard W. Hansen, Corte Madera, CA
W6SU, Arch E. Ekdale, Rancho Palos Verdes, CA
W6VMY, Frank J. Pacier, Saratoga, CA
W6YAV, Norman C. Kruke, Ukiah, CA
W7ALY, Bernard B. Albertson, Boise, ID
*W7BQ, William R. Watson, Ellensburg, WA
K7DCY, Richard U. Brown, Kimberly, ID
WA7FDU, Milfred V. "Mif" Ball, The Dalles, OR
W7JO, Burr A. McMahon, Reno, NV
K7KIM, Joseph S. Ayers, Salem, OR
W7MGN, Harland G. Hoit, Graham, WA
WA7TQA, Harold Stuart, Goodyear, AZ
K7VUL, Harvey G. Solberg, Everett, WA
K8BOB, Albert G. Bessel, Middletown, OH
W8FYZ, Ensio Suhonen, Marquette, MI
K8JAY, Raymond A. Lorant, Sr., Columbus, OH
W8JD, Albert E. Gerth, Cincinnati, OH
W8JX, Raymond J. Anderson, Midland, MI
W8KJZ, Robert L. Vaughan, Akron, OH
Ex-9AAW, William Schweitzer, Kenilworth, IL
W9ABP, E. Wayne Palmer, Ft. Wayne, IN
W9CZZ, Merlin W. Richardson, Edgerton, WI
W9FX, Wilson S. Smith, Rockford, IL
W9IER, Osman Y. Starner, Effingham, IL
W9LU, John L. Milster, Collinsville, IL
W9MSX, James J. McNulty, Hillsboro, IL
WA9PGG, LeRoy C. Marach, Chicago, IL
WØAJT, Elmer J. Kregel, Garnaville, IA
WBØAYN, Robert Wierimaa, Orr, MN
WØHNG, Bert T. Weidner, Coffeyville, KS
WØJXL, Charles H. Ihrig, Bloomington, MN
KØKEO, Joe H. Roberts, Sr., Omaha, NE
WØLUX, Paul M. Brom, Winona, MN
WBØNBB, Lyle L. Lenth, Elgin, IA
KØQOQ, George S. Lovering, St. Paul, MN
WØSWM, Earl E. Leonard, Colorado Springs, CO
ZE1TX, Marcos Lazard Lederman, Mexico City, Mexico
VE1AIF, Edgar R. Hartling, Dartmouth, NS
VE1AUX, John D. Legatto, Sydney Mines, NS
VK3AXU, C. A. Cullinan, Colac, Australia
VE4AU, Leslie A. Sedore, Brandon, MB
VE4OB, John Kuhny, Flin Flon, MB
VE4SH, Ben Tylko, Winnepeg, MB
VE4TM E. H. "Ken" Hentschel, Cranberry Portage, MB
OHØNI, Sigurd Mansnerus, Marehamn, Finland
ZL3JC, A. B. Thornton, Christchurch, New Zealand
ON4LJ, Jan Libot, West Vlaanderen, Belgium
ON4OT, Urbain Ost, Antwerpen, Belgium
ON4RB, Antoine Vander, *Antwerpen, Belgium*
*Life Member

The World Above 50 MHz

Conducted By
William A. Tynan,* W3XO

More on Polarization

Over the past few months we have been running guest editorials devoted to the optimum polarization for 2-meter use. Specifically addressed has been the question of whether or not the "weak signal" contingent, essentially those using ssb and cw, should adopt vertical polarization which is standard for the more local type of operation associated with fm. This month we present a view by Paul Bock, K4MSG, proposing a compromise approach which may offer advantages to both modes.

There can be no doubt in the mind of the average vhf enthusiast that acceptance of a common mode of polarization would greatly benefit the hobby. Long-time ssb and cw operators cling to horizontal; newcomers would have everyone switch to vertical. This author feels that the answer is a combination of the two, commonly called circular. Before examining this mode, however, let's look at some reasons *not* to use the other two.

Horizontal polarization has been the "bread and butter" of vhf since the '30s. [E. P. Tilton in last month's editorial points out a varying history of vhf polarization. – Ed.] What vhfer has not marveled in awe at an 80-element collinear or four stacked long Yagis sitting atop a 100-foot stick? Yet, there are disadvantages. No path, except a relatively short line-of-sight path, is free of obstructions. Obstructions cause reflections, and reflections cause polarization shift of the wave. The end result is that the received wave is probably not the same polarization as that transmitted, nor can it even be predicted what the actual polarization will be at any instant in time. If the wave arrives shifted 90 degrees, the loss can be as much as 20 dB. Since the amount of shift is a variable with time, it is obvious that such polarization shifting accounts for much of the fading encountered on long direct paths.[1]

Vertical polarization suffers from the same syndrome as horizontal. In addition, vertically polarized waves suffer greater path attenuation than horizontal waves, particularly from trees (which are usually vertical) and other obstructions, and the degree of attenuation increases with increasing frequency. Finally, most man-made noise is vertically polarized, and thus vertical polarization provides the poorest signal-to-noise ratio. This is the very reason why horizontal polarization was chosen as the standard for commercial television in the U.S.

Now, to circular: There is an automatic 3-dB loss associated with a circularly polarized antenna receiving a linearly polarized wave, or vice-versa, *but* the loss is constant. A linear wave can arrive at any polarization angle, and the loss will remain 3 dB. The wave can shift with time, yet *no fading* will be apparent, unless, of course, the path attenuation increases, thereby causing a reduction in the total energy arriving at the receiving point. When a circularly polarized antenna is used for transmitting, and a linear (horizontal, vertical or anything in between) receiving antenna is used, the loss will likewise be a constant 3 dB. The circular wave may undergo reflections and instantaneous polarization shifts along the path, but the net energy at the antenna remains the same.

Ideally, of course, the circular configuration should be used for both receive and transmit. The techniques of construction are quite well-established, using crossed Yagis offset a quarter wavelength, or with phasing lines, etc.[2] As a standard practice, some convention must be chosen with regard to whether we shall all use right-hand (clockwise) or left-hand (anticlockwise) circular, as there is a 30-dB loss factor between the two. This author favors right-hand (clockwise) as the standard.

One final note: G3JVQ/DJØBQ has suggested using circular polarization for repeaters, with either right-hand or left-hand for transmit and the opposite for receive. This would add 30 dB of isolation between transmit and receive (input and output), and both would work equally well with either horizontal or vertical antennas at the user end, i.e., mobile or fixed station.[3]

References

[1] Blake, *Antennas*, John Wiley & Sons, NY, 1966.
[2] Jessop, *RSGB VHF-UHF Manual*, 1969.
[3] Bittan, "Circular Polarization on 2 Meters" and Hock, "Theory, Advantages, and Types of Antennas for Circular Polarization at UHF," *VHF Communications*, Vol. 5, No. 2, May, 1973.

THE VOYAGE OF N6NB/UT, NV, WV, VT, CT, RI, DE

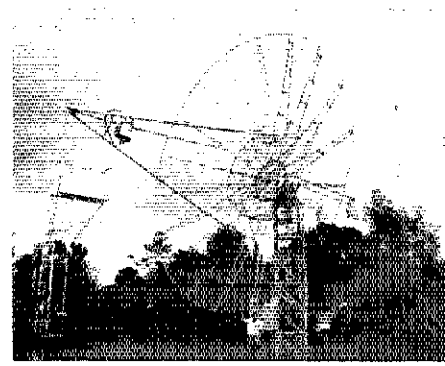
That intrepid portable operator N6NB (new call for K6YNB) was at it again during the summer of '77. Although his moonbounce efforts were not met with as much success as in last year's trek to AK, Wayne more than made up for it with first-rate tropo efforts on all bands from 6 meters through 23 cm. And, he made good on a long-time ambition to do some mountaintopping from the East Coast and to take part in the kind of tropo which this part of the country has to offer. While set up on Spruce Knob, WV, N6NB/8 provided the state for many needing it on 2 meters, 1-1/4 meters and 70 cm. Altogether some 200 stations were worked from this location. The 2-meter band sounded as if it were a contest weekend. One week later from Mount Equinox, VT, Wayne did it all over again. The signal on 2 meters was like nothing this conductor has ever heard from that location. Another 200 contacts went into the N6NB log. From RI the effort was principally 2 meter EME, and contacts with W6PO and WA7KYZ resulted, giving these fellows a very hard-to-get state. But Wayne couldn't resist trying that coastal tropo, so by Friday, August 12, he was at it on that mode. Luck was with him as he hit one of the best east/west tropo sessions in quite some time and worked as far west as Ø land. In his last stand in the east, N6NB showed up in DE especially to provide the state to some of the Pack Rats who needed it on 23 cm.

Wayne and Donna, WB6IDK, are to be congratulated on a great effort. They overcame equipment failures, vehicle difficulties, cold, heat, fog, rain, you name it, to provide new states and lots of fun for many. Once again, the vhf fraternity is indebted to the Northern CA DX Foundation for helping support the N6NB expedition.

Where will it be next year, Wayne?

ON THE BANDS

6 Meters – What can only be called the "Super Es Season" continued through July and on into August. If there was any part of the U.S. which did not fully share in the excellent conditions earlier in the summer, it was the northwestern corner of the country. This was largely made up for during the latter part of July and early August. The evening of August 3/4 is a good example with a fine opening from that part of the country to the East Coast. Stations worked by this conductor included W7NFC, WA7UPS, K7EZP and WA7RTA all OR as well as K7DBR, W7GRH, WB7PMP and K7GGJ in WA. WA7RTA informed me that he had QSOed VO2AG a few minutes before. Another example of 1977 long skip! Although not as well favored as those in southern CA, the Pacific Northwest did get in on a few of the JA openings. K7VNU in Sequim, WA, west of Seattle, contacted JA7QVI at 2210 UTC, July 9. John says that, like those JA openings reported to the south, signals were very weak. Other



Responsible for the current rash of 70-cm WACs, ZE5JJ and his fully steerable 32-foot dish.

*Send reports to Bill Tynan, W3XO, P. O. Box 117, Burtonsville, MD 20730 or call 301-384-6736 and record your message.

stations were heard but could not be pulled out of the pileup. WB6VIN believes the skip conditions to Japan are not as unusual as many of us think. Carl feels that similar weak openings may have been present during other years but passed unnoticed. Next year may shed some light on this. You can bet that there will be a lot of people at both ends of the path listening very closely.

A letter from W2BN provides the tally on his operation from C6A over the weekend of the June VHF QSO Party. During the contest Dave made 372 contacts in 50 sections. Altogether, he worked 802 different stations while on Grand Bahama. Quite a record. Incidentally, Dave reports that on July 8 about noon local time, from the home QTH, he heard what seemed to be a beacon signing A35BC. Signals peaked S9 for a short time. The day before at 2252 he received a station signing A8QX. Beam heading on that one was about 75 degrees.

Many stations in various parts of the country picked up KH6 this summer, but conditions did not seem to favor openings to KL7 to the same extent. There is hope, however, in the form of KL7IFP in Ketchikan. John is refurbishing a Johnson Thunderbolt which will give him a kW on both 6 and 2. You can bet that a lot of WAS-hungry 6-meter men will be gunning for you next season, John.

A wild piece of DX news is excerpted from the vhf column published monthly in *Amateur Radio*, the organ of the Wireless Institute of Australia. It states that on March 3, 1977, a station signing WB9AK? was heard in VK3. Does anyone have log entries which might shed some light on this one?

The WA5IYX report for July shows conditions somewhat down from June with the band open in San Antonio during 28 days as opposed to 29 for a total of 8490 hours of Es as opposed to 11,660 the previous month. The number of hours in which Pat observed TV DX with no amateur 6-meter signals heard went from 2,580 in June to 4,680 in July. He attributes this either to the Es favoring areas sparsely populated by amateurs or people believing that the band doesn't open much in July.

This was quite a season! Distances covered via Es were unprecedented. The WAS tally now stands at 170, an increase of 18 over the number listed in the May column. Another measure is the number of 600 Club awards issued. This stands at 64 and the award was made available only last January. This is not an easy award to get so its possession signifies both good operating and fine conditions.

2 Meters – As on 6 meters, the 2-meter Es season lasted through July and into August. July 12/13 was one of the better days. WBØYSG in Harvard in central NE reports working 22 East Coast stations in NH, CT, NY, NJ and PA. Another report on this opening comes from W2BLV in southern NJ. George lists stations in TX, OK, NE, IA and MN. He also mentions a fine tropo session which took place the night of July 14/15 with six VE3s heard or worked along with many stations in OH and ML July 29/30 produced another good Es session which appeared to be best in the southern part of the country although one station here in the Washington area, WA4GVE, was able to work some TX stations. K7UOD/5 in San Antonio along with W5VY, W5HBI and W5RCW of the same area worked a dozen or so stations in VA, NC and SC. South FL stations including WA4JID and WA4OWC were having a field day working into TX and OK. But E skip was not through yet. August 3/4 brought a pretty good opening from the East Coast to the Midwest. Your conductor caught his first Es session after missing all the rest this season due to travel. WBØULX and WØSD both SD along with KØWLU MN, KØDAS and NØAN IA along with K9UYK IL were nabbed. Other local stations had similar results while to the north of here, the more southerly midwestern stations were being worked. One notable accomplishment coming out of this opening was a contact between K5CM OK and K1BKK VT for K5CM's 48th contiguous state on 2 meters. Connie's neighbor K5SW came up with VE3FN Ottawa, W1YTW ME, W1JSM NH, K1FO (new call for WA1FFO) CT as well as K1BKK. All in all, a tremendous session for so late in the season.

EME Annals

Figures are number of different stations worked, number of U.S. states and number of countries.

6 Meters			
K5WVX*[1]	2	2	1
WA5HNK*[2]	2	2	1
WB6NMT	2	2	1
W7FN	1	1	1
[1] combined effort of W5WAX and K5WVX			
[2] combined effort of W5SXD and WA5HNK			
2 Meters			
K1WHS	62	27	10
WA7KYZ	45	29	8
SM7BAE	40	16	8
WA7BJU	34	27	2
K2RTH	33	19	6
WA2BIT	29	17	7
W7FN	28	17	5
VE2DFO	27	14	5
W4DFK	23	14	6
K6YNB/KL7	16	13	1
K7NII	16	13	1
K6QEH	13	7	4
W8WN	14	9	3
WA4GPM	14	8	2
K5MB	12	7	2
VK5MC	11	7	4
WA9DOT	11	7	3
W2AZL	10	7	3
K4IXC	10	7	1
KØMQS	10	5	5
WA4MVI	9	7	2
W7RUC	8	8	1
W5FF	7	6	1
KP4DJN	7	4	4
WA6UAM	7	2	2
K6MYC	7	1	6
K5VWW	6	5	3
K1FO	6	5	1
VE7BQH	6	2	5
SM6CKU	5	4	3
WA7BBM	5	4	2
WB5LUA	4	4	1
W3BHG	4	4	1
K3AP	4	3	1
NØJA	4	3	1
N6NB/1	3	3	1
W1FZA	2	2	1
K5FF	2	2	1
W6DNG*	2	0	1
OH1NL*	1	1	1
W1JR	1	1	1
W1MX	1	0	1
1-1/4 Meters			
WB6NMT*	3	3	1
W7CNK*	1	1	1
K2CBA	1	1	1
70 Cm			
K2UYH†	57	24	16
WØYZS†	34	18	12
VE7BBG†	30	17	9
F9FT†	30	9	15
W1JR†	26	10	14
W4WD†	26	10	13
I5MSH†	25	14	6
KØTLM†	23	13	10
K3NSS†	22	10	10
VK2ALU	18	9	8
PAØSSB	18	—	10
WB5LUA	15	9	6
FY7AS	13	2	11
W3CCX†	12	5	7
WØOQI	10	7	3
W4NUS	9	6	2
WA2WVL	6	5	2
K4QF	4	3	2
W4FJ	3	3	1
K1WHS	2	2	1
W1BU*	1	1	1
W2UK/KH6*	1	1	1
23 Cm			
W1BU*	4	2	4
W2NFA	4	2	3
PAØSSB	4	2	3
WB6IOM	2	2	2
G3LTF	2	1	2
HB9RG	2	2	1
W6HB*	1	1	1
KH6UK	1	1	1
W1FZJ/KP4	1	1	1
13 Cm			
W3GKP*	1	1	1
W4HHK*	1	1	1

*indicates participation in first EME QSO on particular band

†indicates WAC

Es wasn't the only game in town for 2-meter devotees. July 28/29 produced a fair aurora for stations located somewhat to the north of Washington. W2AZL reports working a string of 9s but nothing farther west.

The Perseids, the champion of meteor showers for vhf men, received mixed reviews for this year, W2AZL termed it as "quite good" while WA4MVI citing the short bursts thought it only fair at his location. Just the same his string of stations worked is impressive. Jim snagged W2AZL NJ, K1ABR RI, W1XZ CT, K1BKK VT, WAØQLP SD, WBØIUT NE, WBØHBN ND and VE3FKX for two new states. Quite a haul for a "fair" shower, Jim. The Aquarids, which preceded the Perseids also produced results for W2AZL. On this one Carl managed QSOs with WA9WHJ IL, KØDAS IA and NØJA (new call for WAØCHK) MO. He also completed with about 20 stations during the Perseids.

Another enthusiastic 2-meter operator has arrived via the OSCAR users route. He is KØRI/4 of Albany, GA. During the Perseids, Lou made the grade with WA3LND in MD and that merely whet his appetite for more. Lou needs almost all states and is desirous of schedules. He can be reached at 912-436-4925.

WØLER found the Perseids "better than last year but still not super." Nevertheless, John got a new state out of it, number 46, in the form of K7KOT WA. He also had a QSO with K2OVS who was running a little over 100 watts output from one of the new solid-state amplifiers. Apparently, Jay had quite a good m.s. signal. WØLER urges other stations with moderate power to try meteors. They might be surprised at what they can work.

1-1/4 Meters – M.s. activity is not confined to 2 meters. Contacts are made on 1-1/4 meters and even on 70 cm. K7NII near Phoenix is one vhf man who is putting his major effort into the 1-1/4-meter band. Therefore, Tom set up Perseids schedules with W7JF MT and W5HN TX and made contacts with both of them. This brings K7NII's state total to six, not bad for being located out in the middle of AZ! Another avid vhf man who is giving 1-1/4 a try is K9OXY in Hudson, WI. Chuck has a homebrew transverter going which puts out 8 watts to a 20-element collinear. With this setup he has worked K9UYK in IL over a 265-mile path. Cw was used on a frequency of 220.05 MHz.

Numerous letters from around the country tell of increasing fm activity on 1-1/4 meters. One such letter from WBØIJZ in Springfield, MO, lists the calls of 10 stations active on 223.5-MHz simplex in that area. Construction of a repeater is being considered.

70 Cm – Converts continue to be attracted to 70-cm EME. According to the K2UYH/VE7BBG *432 EME Newsletter*, long-time vhfer K6ODV is one. Ed is putting the finishing touches on an array of 16 Yagis and has a kW final going. A new station which should stir up considerable interest is KH6IHP. Steve should have his 8-element Yagi array up and working by the time this appears. K1WHS, of 2-meter EME fame, is another new 70-cm moonbouncer. From France, it is reported that a group at the Radio Club of Evry are working on an array of sixty-four 21-element F9FT Yagis. That should allow F6KEK to make a name for itself.

ZE5JJ reports experiencing QRM on several of his schedules on 432.000. The trouble apparently comes from other EME stations who cannot hear him probably due to Faraday rotation. Those with fixed polarization are particularly apt to be in a position to put in a signal at another location when they are not able to hear anything. Naturally, the converse is true also. K3LFO reporting for K3NSS says that the group's new GI 6942 amplifier seems to be working FB. July brought them QSOs with WØYZS, KØTLM, K9ZGT, F9FT, ZE5JJ, YV5ZZ and K2UYH. The last contact was on ssb. Jim says that the new antenna at YV5ZZ is giving a good account of itself so Edgar should be handing out QSOs at a good clip by the time this appears in print. K3LFO does sound one note of alarm. He says that K3NSS has been hampered in its moonbounce operations on some occasions by nearby stations working terrestrially between 432.0 and 432.020. Jim expresses wholehearted support for the custom employed in TX and OK of using 432.1 for tropo and other local-type work.

Speaking of tropo, WØYZS reports a good session the night of August 12. From his QTH in the Kansas City area, Mike was able to work K8AT (new call for W8KPY), W8NRM, WA8TXV all OH; W8JWN and WA8VPD MI, W3RUE near Pittsburgh, PA and K2CBA near Troy, NY, as well as IL stations W9YYF and WB9SNR. WØYZS still needs TN and is particularly looking for a station in the Memphis area. Any takers? Other 70-cm terrestrial news is passed along via the OVS report of WA1EHF. Dennis notes a good tropo opening along the East Coast the night of July 11/12 with many 3rd-district stations coming in S9 at his Bridgeport, CT, QTH. He also mentions that K1PXE is one of the stalwart 70-cm operators. Pete can be heard almost every evening looking for contacts. K1WHS of ME mentions holding regular schedules with WA4GPM in Norfolk, VA and making it about 75 percent of the time, despite a power of only about 100 watts on the southern end of the circuit.

23 Cm and Down – It's no wonder that so much of our 23-cm news comes from CA with dedicated people like K6ZMW around. Joe writes that he now has a pair of water-cooled 7289s (the WB6IOM design) delivering 200 watts. With this setup he is able to regularly work K6UQH, WB6MYC, W6CHV and WA6UAP all in the Bay area, a distance of about 100 miles from his QTH in Jackson. In the San Joaquin Valley are W6KOC at 125 miles and WA6NRV at 160 miles who are also regularly workable. Joe plans to start scheduling N6CA (new call for WA6GUY) in the L.A. area soon. This is a path of about 325 miles. Good luck fellows.

Our 3-cm band is beginning to be a factor in the world above 50 MHz thanks to the availability of the Microwave Associates Gunnplexer. According to the *Northeast VHF News*, W1JR, during the June VHF QSO Party, contacted six stations using one of these units. It may not be long before any self-respecting contest station will have to be equipped for 3 cm in order to be competitive!

Public Service

Conducted By Robert J. Halprin,* K1XA

QRM Call

In response to the disastrous La Mesa fire, New Mexico Senator Peter Domenici characterized amateur radio's public service record as follows, quoted from the Congressional Record, July 21, 1977:

"Mr. President, countless times American citizens have been the recipients of assistance during times of emergency and crisis by the selfless, dedicated amateur radio operator. At a time when our newspapers and television screens are filled with stories of man's inhumanity to man, and we scramble for examples of genuine compassion for our fellow citizen, it is always refreshing to find another instance when the men and women of America rise to meet the challenge of a natural disaster.

"Such a case arose several weeks ago when the costly La Mesa fire near Los Alamos, NM, destroyed thousands of acres of land and timber, and threatened residential areas in and around Los Alamos. I would like to bring to the attention of my colleagues portions of a recent letter received from Mr. Barry S. Newberger (W5KH), a member of the Los Alamos Amateur Radio Club, concerning the club's response to the plea for assistance during the eight days of this catastrophic disaster:

" 'In the spirit of the Communications Act of 1934 and the FCC's test of public interest, convenience and necessity which all radio services must meet, we wish to call your attention to the communications service provided by the Los Alamos Amateur Radio Club through its station W5PDO and repeaters WR5AFP, WR5ARO and WR5AEQ (the last three belonging to the Santa Fe VHF Society, Jemez Mountain Repeater Association and the Caravan Club of Albuquerque, respectively).

" 'For over eight days, the club and its volunteer members and friends provided continuous round-the-clock communications service for all the agencies involved in the emergency. The agencies served included the U.S. Forest Service, weather service and the military. All the Forest Service administrative traffic was handled through the radio club, including 145 pieces of priority traffic. In addition, approximately 565 health-and-welfare phone patches were handled for the firefighters, many of whom had come from California, Idaho, Washington, Oregon, Montana and South Dakota and other states. These men and women, in not a few instances, had to leave pressing personal problems at home to help fight the fire and many would have found it difficult to resolve them without our phone-patch service.

" 'We were told by many of the firefighters that they had never before had such a service provided for them and were given a substantial boost in morale for having it.

" 'In all, 55 people were involved for a total of nearly 1900 man hours, using their own personal equipment.'

"I am certain my colleagues will join with me in commending the Los Alamos Amateur Radio Club and the many volunteers who provided this valuable and urgently needed assistance. We are, indeed, fortunate to have this body of competent, disciplined and dedicated amateur radio operators in times of distress. Our heartfelt thanks go out to all who responded to the call for help."

PUBLIC SERVICE DIARY

□ Denver, CO — February 15. EC WB0NTQ mobilized members of the Castle Rock Repeater Group after a plane was reported down. They readied a command post although the plane was found within an hour. (W0SIN)

□ Spring Valley, CA — May 3. Pacemaker-wearer W6KBD relayed between a doctor at San Diego Naval Hospital and W6PSD who was transporting his wife because of a pacemaker malfunction and imminent heart failure. Upon arrival the equipment was ready. Her condition was eventually stabilized. (W6PSD)

□ Southern FL — May 16. During a four-hour power outage about 45 ARES stations participated in the Dade Emergency Net. When the battery supply on the repeater diminished, they switched to simplex. (*Florida Skip*)

□ Rockport, IN — May 24. At the mayor's request, hams provided communications for the local c.d. rescue squad during recovery of a drowned man. (W4OYI)

□ Owensboro, KY — May 31. Local and regional weather nets were activated during a tornado warning. Several touchdowns and power outages were observed, but only minor damage resulted. (W4OYI)

□ Knox Co., OH — May 31, June 18 and 30. Severe-weather watches were handled by the Knox Co. ARES for NWS through the Richland Co. MASER Net facility. On the first date high winds and hail disrupted telephone and power service including the Sheriff's Department, while the net went to their own backup generator. (WB8AYM, EC Knox Co.)

□ Swan Island — June 12-13. Immediate medical attention was required for a NWS employee with a multi-fractured leg. After medical consultation, HR6SWA was patched by WB4BLX to the Overseas Weather Bureau for contact with USAF retiree W4RFA, an air-evacuation expert. They successfully coordinated the transfer, which used a smudge pot- and headlight-illuminated grass runway. (W4RFA)

□ Sierra Vista, AZ — June 18-22. Deep in Carr Canyon of the Huachacha Mountains, members of the Cochise Amateur Radio FM Association were the only available communicators during a 9,000-acre fire. Tactical and logistics traffic was handled for the Forestry Service and Sheriff's Department. (K7NKS)

□ Mt. Rainier, WA — June 17. ARES members set up links for the Aberdeen Explorer Scouts Search and Rescue to communications centers in Tacoma and Seattle during a missing-hiker search. Within a day the victim was found. (K7CYZ)

□ San Vicente, Baja California — June 24. Just after the Flying Samaritan Net closed, XE1ZQ/2 reported a fatal auto accident. W6HCD contacted the Policia de Caminos in Ensenada and stayed on frequency with other stations until officials arrived in the remote village three-and-one-half hours later. (W6HCD)

□ Birmingham, AL — June 26-27. Less than a week after the city's ARES and ARC concluded an agreement with NWS, severe storms hit the area. Although the wide-coverage repeater was knocked out, other repeaters, Alabama Emergency Net M and Georgia Sideband Net were effectively used to provide the weather service with fast, accurate information. (WB4CXD, EC Jefferson Co.)

□ Fremont, OH — June 30. Extensive damage took place after a tornado touched down. Amateurs supplied liaison between police and Red Cross. Other hams in and around the area supplied emergency gear. (K8HHB)

□ Mt. Rainier, WA — July 3-6. In near-blizzard conditions, WA7AYB and WA7PIN accompanied the Explorers Search and Rescue on a mission. The Pierce Co. ARES conducted liaison to ESAR hq. in Tacoma, though no trace was found of the hiker. (WA7RWK, EC Pierce Co.)

□ Crabtree Falls, VA — July 3. While picnicking, WB4AYE, WD4DSU, WA4WIJ and WB4MDC learned of a lost hiker and established an improvised vhf net. They accompanied a Nelson Co. deputy sheriff and searchers, providing information to the rescue units, until after the injured man was brought out. (WB4MDC, EC Lynchburg)

□ New York, NY — July 13. After the power outage across the metropolitan area, amateurs backed up police with much-needed communications and generators and even accompanied patrol units. Further details will appear in an upcoming issue.

□ Pacific Ocean — July 15. On the Pacific Maritime Net, VK4AEM coordinated reports from A35CH to notify USCG in Long Beach, CA, of an overdue yacht. It was located safe the next day. Assisting were 5W1AU and W6SYQ. (WB6YID)

□ Marquesas Island — July 17. A round table picked up a medical emergency call from TI8RJ/R3. WA6QFV/R3 and TI7WYM/R3 contacted a doctor in the islands, who advised treatment until the boat could reach port. (WB6YID)

□ Caribbean Ocean — July 17. While operating the Georgia Tech station, exchange student DF3TJ/WD4CPK intercepted an early morning distress call from a Panamanian freighter and reported it to the local FCC monitoring station. Soon, and throughout the day, Coast Guard stations all along the East Coast came on the 20-meter frequency. Several times amateurs relayed the weak messages until nearly sunset when the crew was sighted on a makeshift raft after the vessel went down. (WD4CPK)

□ Johnstown, PA — July 21. Amateurs in the area and around the region responded to the surprise flood with various hf and vhf nets. Details will follow in a future issue.

□ Los Padres National Forest, CA — August. Over 250 amateurs, led by Santa Clara Valley SEC WB6IZF, provided essential communications for the 3000 firefighters at the scene of the massive blaze in the Big Sur area of central California. The hams were called in by the U.S. Forestry Service on August 2. They were a vital factor in keeping supplies and transportation moving, and in augmenting regular emergency communications channels. More than 70,000 acres were claimed by the blaze in the first week alone. A complete

*Asst. Communications Mgr., ARRL

report will appear in a future *QST*. (W1RU)

□ *Repeater Log.* According to reports received to date, repeaters were used to report 84 auto accidents and related occurrences, seven fires and four suspicious persons. Repeaters involved were WR3AIZ, WR4AWG, WR5s AEK AHN ABY AJG ABA ABE ADP, WR6ADQ, WR7s AEL and ACA, WR9ABY.

□ For the month of July, 34 SEC reports were received, showing a total AREC membership of 12,763. Last year at this time 32 reports were submitted, with a total membership of 10,961. Sections reporting were Alta, Ariz, Ark, Colo, Conn, Del, ENY, EMass, Ga, Ind, Kans, Me, MDC, Mich, Mo, Mont, NLI, NC, NFla, NNJ, Ohio, Okla, Ont, Org, Ore, SDgo, SJV, Sask, SFla, SNJ, Utah, Va, WVa, WMass.

NATIONAL TRAFFIC SYSTEM

The First Region continues to submit one report for all activities and the Second Region managers have followed suit. Who's next? NTS circuits handled a large amount of traffic relative to the Johnstown, PA, flood disaster. W@NUB is now CAN-D assistant manager. K@CVD has moved to the Big Apple and a new job; K@EVH has been appointed his successor as TEN manager. W5PNY reports that July was a record low for traffic and representation on TWN-D. EAN-D had its best month for representation since December 1976. *Who's Who*, continued: N4KB (W5RE), N6PZ (WB6OUD), N7RC (W7KWT), W7GM (W7GYF), W7UV (WA7VTM), N7DH (WA@KKR/7), N@GW (WB@NXX), K@BN (K@OTH), W@FV (W@KLE), N2RD (W2GAM), W2SQ (WA2DSA). The following received CAN-D certificates: WA4EUD WB4EKJ WA4TXM W4KLV W5SHN WB5LXX WB5NKC WB5NKD WB8DKQ W9HOT WB9SKA WA@AUX WB@HOX WB@MEO W@NUB WB@NXX WB9OQJ/@ WB@YSG WB9UAB N5YL. RN7 certificates went to W7AIB W7APS W7DAN W7GB W7DXZ W7GIP W7GHT W7KZ W7LG W7LLM W7ZIW K7CHY W7GXZ K7IFG K7IWD K7OUF K7OZA K7QFG K7VM WA7BDD WA7OJI WA7TXV N7AJ N7AM N7DH N7RC WB7AIX WB7AVB VE7DDL VE7DFY VE7OM VE7ZK.

July Reports

(evening sessions)
(daytime sessions)

1	2	3	4	5	6	7
EAN	31	1722	55.5	1.271	96.7	
EAN	62	1020	16.4	.622	91.9	
CAN	31	1066	34.4	.758	99.5	
CAN	59	331	5.6	.205	92.3	
PAN	31	1138	36.7	.996	99.4	
PAN	31	539	17.3	.370	94.0	
1RN	88	730	8.3	.411	94.0	
2RN	124	836	6.7	.514	90.4	93.5
3RN	62	348	5.6	.423	97.3	96.7
3RN						100.0
4RN	61	432	7.1	.322	70.9	100.0
4RN	62	396	6.3	.314	66.7	100.0
RN5	62	645	10.4	.381	91.5	100.0
RN5	31	284	9.1	.316	88.7	91.9
RN6	62	627	10.1	.483	100.0	100.0
RN6	31	176	5.6	.208	84.1	100.0
RN7	62	496	8.0	.584	92.8	100.0
RN7	62	198	3.1	.200	53.2	96.7
8RN	53	323	6.0	.348	76.3	90.3
8RN	30	162	5.4	.630	84.9	100.0
9RN	62	530	8.5	.389	93.1	100.0
9RN	29	100	3.4	.408	68.5	87.0
TEN	61	352	5.7	.299	73.4	98.3
TEN						93.5
ECN	60	619	10.3	.665	89.8	96.7
TWN	62	509	8.2	.362	97.7	98.3
TWN	11	22	2.0	.118	20.0	83.8
TCC 108[1] Eastern		701				
TCC 77[1] Central		485				
TCC 100[1] Pacific		713				
Sections[2]	4490	17095	3.8			
Summary	5810	30696	5.3			
Record	5386	27143	15.2			

[1] TCC functions not counted as net sessions.
[2] Section and local nets reporting (127): BCEN (BC), APN (Mar/NFld), MTN (MB), ODN OPN (ON), WQV/UHF (PQ), SATN (SK), AENB AEND AENJ AENM AENW SENS (AL), ASN (AK), ATEN HARC (AZ), AMBN ARN (AR), NCN NEN SCN (CA), HNN (CO), CN CPN NVTN (CT), DEPN DTN (DE), FAST FMTN FPTN QFN QFNS TPTN (FL), CVEN GARES GSSBN (GA), IMN MTN (ID, MT), ILN (IL), ICN ITN (IN), I75MN TLCN (IA), KPN KSBN KWN QKS (KS), KNTN KSN KYN MKPN (KY), LAN LRN LSN LTN (LA), SGN PTN (ME), MDCTN MDD (MDC), EMRI EMRIPN NENN WMN (MA), HEN MACS MNN MWN QMN WSBN (MI), MSN MSPN MSSN PAW (MN), MTN (MS), MOSSBN (MO), NHVTN (NH, VT), NJN NJPN (NJ), SWN (NM), NLI NLIPN WDN (NY), CNN NCSSBN SCSSBN THEN (NC, SC), BN OSN OSSBN (OH), OAN OFON OLZ OPEN OTWN STN (OK), BSN OSN WCN (OR), EPAEP&TN WPA WPAP&TN (PA), ETTMN TNN TPN (TN), BEN TTN TEX (TX), UCN (UT), VFN VN VSN VSBN (VA), WVN WVPN (WV), BEN BWN WIN WNN WRN WSBN WSSN (WI).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVG.
5 — RATE
6 — % REP.
7 — % REP. AREA NET

Transcontinental Corps

1	2	3	4	5
Eastern	124	87.1	1987	701
Central	93	82.7	938	485
Pacific	124	80.7	1456	713
Summary	341	83.5	4381	1899

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (July): Eastern Area (W2FR, Dir.) — W1s NJM QYY, K1s BA EIR GN SSH XA, WA1FCM, W2s CS FR GKZ RQ, K2HI/VE2, WA2s ICB KCW/1, WB2ASD, K3s KW PA, WA3VBM, W4UQ, K4KNP, W8s LTA PMJ, K8KMQ, WB8KKI, VE1AAO, VE3s GOL SB. Central Area (W5GHP, Dir.) — N4s DY MD, WB4SKI, W5s GHP MI RB, K5s GM TTC, N5YL, WA5s HNN IQU, W9s CXY DND FC NXG, N9TN, W@s AM HI QMY, K@EVH, N@IN, WA@TNM. Pacific Area (K5MAT, Dir.) — W5KH, K5MAT, N6GW, W6s EOT MLF OZ VZT ZRJ, K6HW, W7s DZX EP GHT, K7IWD, N@IA, W@s ETT FG FV IW LQ, K@s BN TER, WB@s QOT TAQ, VE7ZK.

Independent Nets (July)

1	2	3	4
Amateur Radio Telegraph Society	30	498	477
Clearing House	30	368	540
Hit & Bounce	62	1006	456
Hit & Bounce Slow	19	351	90
IMRA	26	374	927
North American SSB	25	306	219
North American Traffic and Awards	31	14	482
Washington Region PON	18	44	243
20 Meter ISSB	26	445	427
75 Meter ISSB	31	590	985
7290 Traffic	40	348	1827

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll July 1977

This listing is available to amateurs whose public service performance during the month indicated qualifies for 40 or more total points in the following nine categories (as reported to their SCM). Please note maximum points for each category: (1) Checking into cw nets, 1 point each, max. 10; (2) Checking into phone/RTTY nets, 1 point each, max. 10; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned liaison, 3 points each max. 12; (6) Phone patches, 1 point each, max. 20; (7) Making BPL, 3 points regardless of traffic total; (8) Handling emergency traffic directly with a disaster area, 1 point each message; (9) Serving as net manager for entire month, 5 points. This listing is available to Novices and Technicians who achieve a total of 20 or more points.

69	WB8VLR	WB6PVH	WB5OYU
K4BKX	WB8YDZ	K@EVH	WD8AVY
68	VE7DKY	W@FT	W8VPW
WA4JDH	54	WA@TNM	WD9AUD
66	WB2ASD	VE1ACU	W9GGW
WA1ZAZ	WB5NKC	48	W9NXG
WB@HOX	WA5YEA	W2YJR	W@JTW
64	53	WA3HGX/2	WB@QOT
WB2EMU	WA1YWK	47	W@RFF
63	WA2AYY	WA3WPY	VE1AAO
WB3ETD/4	WA2ERT/1	WA4PSL	VE1AMR
61	WA2HTP	N5TC	VE1HJ
WA2ECO	WB4QBB	WB7AAK	VE1IG
WB4DBK	WB5NEZ	46	VE1ZH
K4ZN	WB8WTS	K1DFS	43
W6RFF	52	WB3EDX	WA1TBY
WA7MEL	W2JI	WA4OZT	W2CS
WB8JGW	WA3VBM	WB8III	WB2HVB
59	WA4EPJ	45	N6GW
WB2IDP	W7GHT	WB2VTT	42
WB4ARJ	51	WA4FKE	W1DMS
W4OGG	K5OWK	W4FMN	WA3PZO
W5KLV	50	W4MEE	WB5MTQ
WA6UAZ	W1BVR	WB5PVL	W9UW
58	N3KZ	WA5VBM	W@OYH
W7VSE	W5GHP	44	41
56	WB5GVO	WA1POJ	WB2RMK
K1BA	VE3GOL	W1TN	K3ORW
WA1FCM	49	WA1VQR	WA4TXM
WA1VGP	W1RWG	W2ZQ	WB5OSN
W2MLC	K3YHR	WA3NOQ	WA9QCF
N4WA	WB4AID	W3PQ	40
W6RNL	WB4GHU	WA3PRW	WA4KSO
WB@HBM	K4NAN	WB4EKJ	WB4TEK
WB@VHN	WA4OEM	K4EV	WA6VBS
VE3GT	K5MAT	WB4NJU	K8YL
55	WB5NKD	N4SS	WA9GBW
N5YL	WA5RKU	WB5LBR	22
	WB6FTY	K5MC	WA4QGV/T
			WB9YMF/N

Brass Pounders League July 1977

BPL Medallion (see December 1973 *QST*, p. 59) has been awarded to the following amateurs since last month's listings: W2YJR, WA4EPJ, WA4WBM.

The BPL is open to all amateurs in the United States, Canada and U.S. possessions who report to their SCM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

Winners of BPL Certificates for July Traffic

1	2	3	4	5	6
W3CUL	622	1676	1939	131	4368
K3NSN	950	1350	950	400	3650
W@WYX	52	858	351	507	1768
WA3VBM	91	468	428	123	1110
W3VR	342	263	429	14	1048
K@YFK		488		488	976
WA4JDH		451	427	2	880
W3CVE	179	275	216	150	820
K@ZSQ	1	386	1	386	774
N3KZ	21	380	349	31	771
WB8DKQ		389	355	2	746
W2ZQ	51	294	293	52	690
WA@AUX	79	197	396	3	675
WB2IDP	1	334	308	29	672
VE1IG	16	294	15	45	670
W5KLV		375	279	8	662
K9CPM		393	58	200	651
W4MEE	3	316	297	5	621
VE1AKL	1	298	298		596
WB2EMU	2	319	249	23	593
W2YJR	8	279	251	38	576
W5GHP	88	284	180	6	558
WB4ARJ		257	287		544
W3ATJ	164	102	164	102	532
VE3GOL	26	224	261	11	522
WB@HOX	15	245	240	11	511
K3KW	4	214	250	41	509
VE3SB		233	226	47	506
WA3WQP	21	220	250	14	505
K@ONK (June)	1	674	142	12	829

Multioperator stations

CG1CR	1191	279	1191	279	2940
WA3PZO	30	846	773	27	1676

BPL for 100 or more originations-plus-deliveries

WA2AYY	293	WA5VBM	123
WA3ATQ	235	WA4TXM	111
W3TI	222	WA4CRI	106
W7TZK	190	WA2HTP	100
WA1KHP	169	WA3BSV	100

Multioperator stations

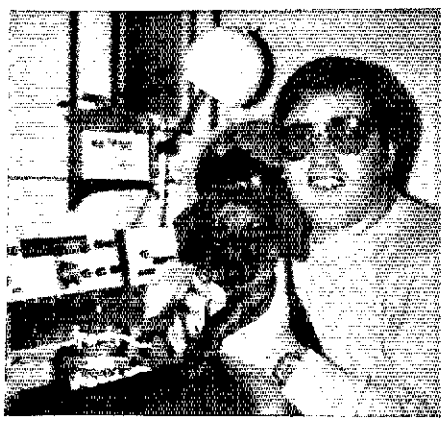
W8MRM/8	222
K4BV	104

1 — CALL
2 — ORIG.
3 — RECD.
4 — SENT
5 — DEL.
6 — TOTAL

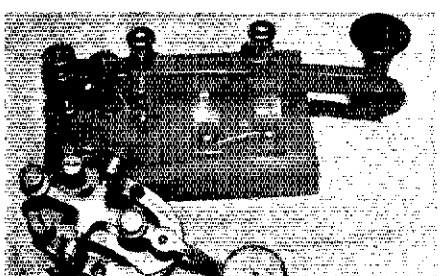
Straight-Key Night

Do you have the mettle for poundin' brass?

By Bill Jennings,* K1WJ



John, K7ED, and his "Dash — Hound," Otto, teamed up for SKN. Make no bones about it, they had a ball.



The SKN arsenal of WA2JAM/6. In the background is his old railroad key, vintage 1890. It has a vertical pivot to adjust for operator comfort and expansion rather than compression type springs. According to Ron, the key has a beautiful resonant sound. The Bunnell Key in the foreground belonged to Ron's dad, 3UK (W2UM), in 1920.

'Twas on the fourth this past July
And straight-key time was runnin' high.
Like bygone days we pounded brass
With "left foot" sounds and "touch of class."
If sweat and toil could just be caged,
Our straight-key steam could not be gauged —
We'd tap that source and help a bunch
To solve the country's power crunch.
— W5JOV

Roots. The book, the hit television movie and a resulting widespread interest in finding one's origins. A security in the belief that a knowledge of events past will, in some way, prove useful in the present and the future.

The Morse code. Cw. The universal amateur language, a keystone in building operator proficiency through license class upgrading, which when finally mastered, is a useful skill, no matter how infrequently used, not easily forgotten.

Rare, indeed, is the amateur whose first encounter in sending cw is with anything other than a manual sending device, a straight key. No matter how complex subsequent ways of generating cw are employed: electronic keyer, keyboard, computer, the straight key is basic, ingrained in the very roots of amateur radio.

The July 4th running of Straight-Key Night brought in 66 formal entries, reporting a total of 412 stations active, including DX stations from Nicaragua and Brazil. The sixth U.S. call area showed the greatest number of stations participating at 64, followed by the fourth call area with 58 and the eighth call area third with 51 participants recorded.

A real horse race developed in the competition for the "Best Fist" title, with W4BEY collecting five votes to nose out second-place finisher, W4NIB, who received four votes. Ten stations got two votes apiece to tie for third place. They are (listed by call area and suffix, alphabetically) W1GAT, W2LYH, WD4AAA, W4UA, W5KL, W6HHG, W8GMH, W8LXQ, W0NQ and WA0QEY.

K6DQA was the only operator to receive more than one nomination (he got two votes) and takes top spot in the voting for the "Most Interesting QSO" honors.

Stations receiving at least one vote in *both* categories deserve mention. They are W1GAT, K1KAV, W2LYH, N4OW, W5RUH, W6CYM, W6HHG, K6IX, K7EF, W8GMH, W9PNE and WA0QEY.

The next SKN will be held o January 1. It offers a chance to get bac to basics and develop an empathy wit those pioneers who laid the founda tions of amateur radio.

Sideswipes

Eureka, I've been using a straigh key, the same one that I started with i 1930, and now you say, "Change ov to straight key for one night" -- How d I start? Hi! (W4ZRI) Completely fo got the ache of the arm. How did I do as a Novice? (WA2WOV) I could nc find any activity on the 10-, 15-, 40-meter Novice bands. Apparentl SKN is meant for Generals only or th participants prefer to stay on the Ge eral frequencies. Even though I did nc get a chance to work anyone, I di listen quite a bit. (WD4GWJ) Persona ly, I prefer the evening-only format fc SKN. It seems to do a better job grouping the activity. (W4KFC) Steve W6YPO, had the most unusual key. H keyed the wires of a microphone cabl for a 20-minute QSO. All with a tape finger! (W1FD) I was using a keye paddle to key my rig through the VO relay. About halfway through my QS with W6TSU, the relay froze shut. I ha to finish the QSO by sending good ol Morse, using the transmit/standb switch on my rig. No key at all yo might say. (WB6RXE) Started SKI early by accident. I was going to prac tice on Sunday night and my first QS gave me SKN instead of RST. I finall looked in *QST* and found out about th 24-hour format this time. H (WB5QGE) Now, when I use m keyer, I feel like I'm flying on Aut Pilot! (N4OW) Let the skeptics sa what they want about cw being a anachronism. I personally feel that it actually an art form. More than that, "separates the men from the boys. (W8LUX/9) Signals were copied wit an old horn loudspeaker. (W2FW/e 8FU) Thanks to Ron, W8GMH, wh explained to me how to enter SKI during our QSO at 3 A.M. local time (WA2HTP) As usual for SKN, it wa nice not hearing those "extra dits. (W6VPV) I have been licensed sinc 1961. In all that time, I have alway used a straight key, until I received keyer last Christmas, which I have use ever since. Now that my "fist" is rusty I decided to enter my first SKN (W4NUG) It's a great feeling to ge back to "grass roots" and listen to fellow's personality, thinking and accen come through his key. (W7QO) Mos interesting key was that of K6KI, Vibroplex bug. He was using the das paddle only. He had been given this ke 40 years ago by an old telegraph opera tor, who had used it 75 years ago in th Oklahoma (then Indian) Territory, be fore it became a state. (KH6CZ) QST

*Communications Assistant, ARRL

44th ARRL November Sweepstakes Announcement

Cw, November 5-7 . . . phone, November 19-21.

November Sweepstakes is only for dyed-in-the-wool contest enthusiasts, right?

Wrong. SS is for everyone, the newcomer as well as the veteran operator. Each entrant has an equal opportunity to achieve an award level. The rules are the same for everyone.

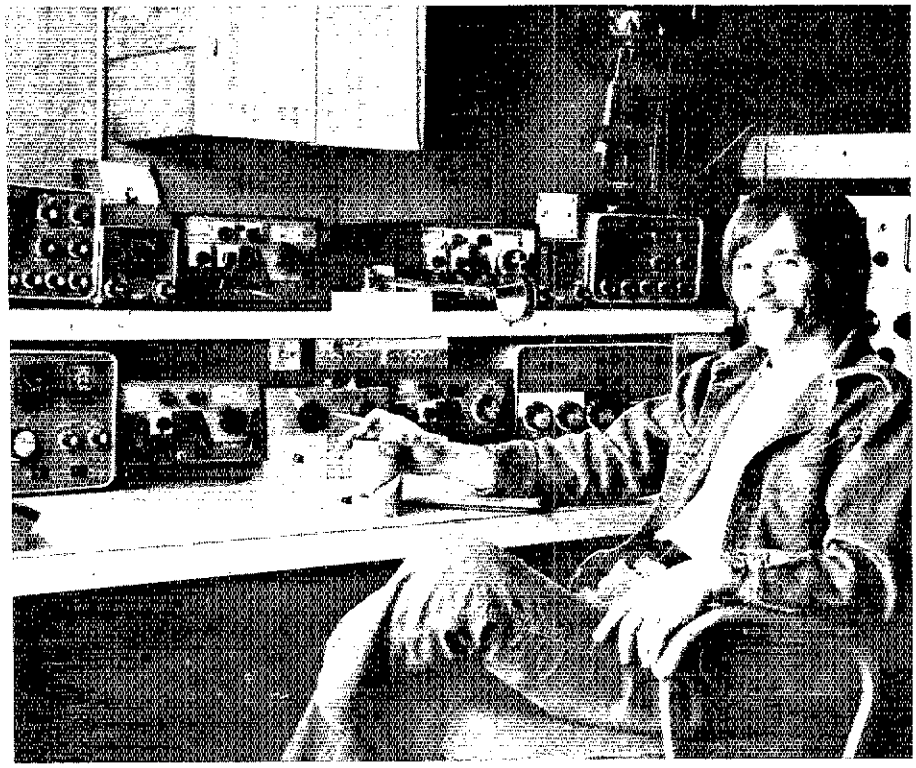
Read on!

Be sure to allow plenty of time to request the forms you will need to participate: One log sheet per 100 contacts and one each dupe sheet (Operating Aid 6) and summary sheet per mode operated (weekend). Send your request with an s.a.s.e. and affix one unit of first-class postage for each five sheets requested.

In order to minimize interference to noncontest stations, suggested frequency ranges are shown in Table 1.

Look for Novices and Technicians around 3710, 7110, 21110 and 28110.

After the SS, be sure to postmark your entry by December 26, 1977; send it first-class mail! If you want to make sure it arrived at Headquarters, enclose a self-addressed postcard which we will mail back to you. Club secretaries are requested to send a list of *call signs only* of all club members who were eligible to participate for the club in the SS. Good luck!



WBØDJY (now WØUA) operated WØTR to the number one score for single operators in the phone portion of the 1976 Sweepstakes. George also turned in the number eight score, nationally, (as WBØDJY) for single operators on cw. Holy Mackerel!

Rules

1) *Eligibility:* This contest is open to all radio amateurs in (or officially attached to) sections listed on page 8 of this issue of *QST*. U.S. possessions in the Pacific are part of the Pacific section. KP4, KV4 and KG4 are all part of the West Indies section.

2) *Object:* To exchange QSO information (as explained in section 5) with as many amateurs in (or officially attached to) ARRL sections.

3) *Conditions of Entry:* Each entrant agrees to be bound by the provisions as well as the intent of this announcement, the regulations of his licensing authority and the decisions of the ARRL Awards Committee.

4) *Contest Period and Time:* All contacts must be made during the contest period indicated elsewhere in this announcement. Time spent listening counts as operating time. No more than 24 hours of operation are permitted during the 30-hour period. "Off" periods may not be less than 15 minutes at a time. Times on and off and QSO times must be entered in your log.

5) *Valid QSOs:* Contacts must include certain information sent in the form of a standard message preamble, as shown in the example. Cw stations work only cw stations and phone stations only other phones. Valid points can be

Table 1

CW	*Phone*
3550-3650	3850-3950
7050-7100	7200-7250
14050-14100	14250-14300
21050-21100	21300-21400
28050-28100	28550-28650

Contest Periods

Starts	*Ends*
CW	
Saturday, Nov. 5 2100 UTC	Monday, Nov. 7 0300 UTC
Phone	
Saturday, Nov. 19 2100 UTC	Monday, Nov. 21 0300 UTC

ARRL Sweepstakes

CALL USED..KØDX/4..   ARRL SECTION......VA.............

C.W. ☐   PHONE ☒

PREC	CALL	CK	SEC
B	KØDX/4	64	VA

SENT (1 POINT)   RECEIVED (1 POINT)

Separate logs and summary sheets required for each mode.

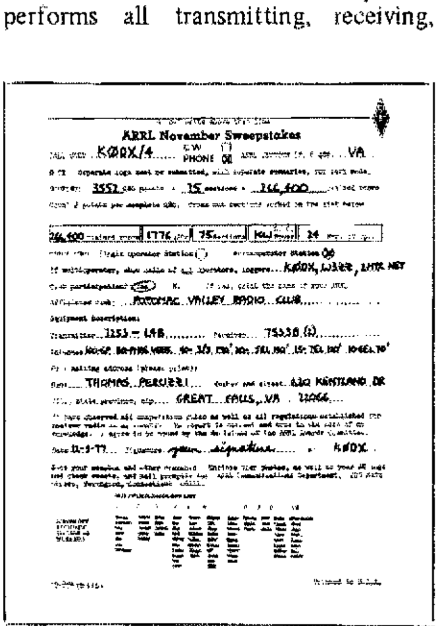
BAND	DATE	TIME ON/OFF	TIME	NR	NR	PREC	STATION WORKED	CK	*SECTION	POINTS
3.8	11/21		0251	1	165	B	W2SHM	38	NNJ	2
			52	2	~~1313~~	~~B~~	~~K1ZX~~	~~70~~	~~CT~~	DUPL — 0
				3	87	A	WA3MUB/4	63	VA	2
			53	4	914	A	K3UA	72	WPA	↓
			54	5	362	B	W1SD	33	75 ME	
14			56	6	199	B	K9KM	59	IL	
			58	7	451	A	VE3IXE	76	ONT	
		OFF-0300	59	8	286	A	WB6KPN	64	LA	
				9						
				10						

earned by contacting stations not working in the contest upon acceptance of your preamble and receipt of a preamble.

6) *Scoring:* Each station from which a preamble is received and to whom a preamble is sent and acknowledged, results in 2 points. Partial QSOs do not count for scoring purposes. No additional points can be earned by recontacting the same station, regardless of the frequency band (i.e., repeat QSOs, even if on different bands, are not allowed). The total number of ARRL sections (plus VE8) worked during the contest is the section multiplier – maximum possible total of 75.

The final score equals the total points times the section multiplier.

7) *Entry Classification:* Entries will be classified as single- or multiple-operator stations. Single-operator stations are those in which one person performs all transmitting, receiving, spotting and logging functions. Multiple-operator stations are those obtaining any form of assistance, such as from spotting or relief operators, or keeping the station log or records. The use of any type of "spotting" or "multiplier" net places the entry in the multiple-operator class.



8) *Reporting:* Contest forms (log sheets, summary sheets, Operating Aid 6) are available free from ARRL hq. or you may use forms of your own design provided they follow the indicated format. Every competing entry claiming 200 or more QSOs must have cross-checking sheets (Operating Aid 6 or similar) attached. *Any log omitting times on and off, or omitting QSO times, or omitting cross-check sheets (when required), or omitting a summary-sheet or any information requested therein (see sample) will not be considered for competitive QST listings or awards.* Such logs will be classified as "check-logs" and will be processed accordingly. All entries become the property of ARRL and none can be returned. Although FCC rules no longer require most log-keeping, each competitive entry submitted must include date, QSO times, times on/off, exchange sent, exchange received, band and mode.

9) *Misc. Rules:* A transmitter used to contact one or more stations may not be subsequently used under any other call during the contest period (with the exception of family stations where more than one call is assigned to one location by FCC/DOC).

Yukon-N.W.T. (VE8) counts as a separate multiplier, for a possible total of 75 multipliers.

If your power is 200-watts dc or less, send "A" as your precedence; otherwise send "B."

The operation of two or more transmitters simultaneously is not allowed.

10) *Awards:* Certificates will be awarded in both the cw and phone contests to the highest scoring class "A" entrant and the highest scoring class "B" entrant in each section, provided that *either* (1) there are at least three single-operator competing entrants from that section in that power class, *or* (2) the top single-operator score from that section in that power class has 10,000 points or more. Similarly, a certificate will be awarded to the highest scoring Novice or Technician licensee in a section provided that *either* (1) there are at least three single-operator competing entrants of that license class in that section, *or* (2) if, in the opinion of the Awards Committee, the entrant displayed exceptional effort.

Multiple-operator entries, regardless of license class of operators, are not eligible for certificate awards and will be listed separately in the final results in *QST*.

11) *Club Competition and Disqualifications:* See January, 1977, *QST*, page 85.

Explanation of Exchange

	NR	Precedence	Call	Ck	Place
Exchanges	Consecutive serial number	Power input less than 200 watts dc	Send your station call	Ck (Last two digits of year first licensed)	Your ARRL section
Sample	NR1	A	WA1QNF	72	CT

Results: 1977 ARRL International DX Competition

Happiness is a good run.

By Jim White,* K1ZX/WA1NNC and Dan Street,** WA1QNF

Journey back into the past. The year is 1965 and then as now, February and March meant only one thing – the International DX Competition. Things look a lot different now than they did then. Or do they?

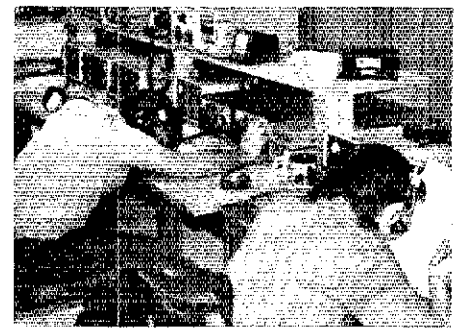
The quota system was still in effect back in '65 – on cw at least. The quotas limited you to working six stations in a given country. Just *six* stations. Once you worked six DLs or six JAs you could work no more. That was pretty frustrating for the DX station in a country with a large ham population. Many times calling a big signal on the band resulted in "sri, I've filled my quota." Phone had no quotas. (Back in '65 there weren't enough DX stations active to warrant them.)

Quotas would seem odd today. When you think about the number of JA QSOs W7RM made, or the number of DLs worked by W2PV, it would seem even more out of place. The same goes for everybody. The majority of contacts are with a small number of countries, say Europeans. Although you can run up a multiplier of over a hundred on a band, many countries have one or maybe two stations representing them. For the VEs things were a little easier . . . they had a quota of eight.

The scoring of the DX Competition was much different back then. But, looking at some of the calls from those "ancient" years isn't as odd as it may seem. Familiar call signs abound and the charm of the DX Competition is proven. The perennials show up. In '65 HI8XAL made 2700-plus QSOs on cw and almost 1800 on phone. Today K3ZO made the top ten on cw and placed 11th on phone. Going back we find W1BIH active in Connecticut. Today PJ9JT is an expected QSO on both modes, all bands. John makes his religous trip to Curacao for two weeks every year (in which time the first cw weekend and the second phone weekend always manage to fall). Hawaii was stateside back then but today KH6s work Ws and VEs. Either way KH6IJ was and is an active participant. Nowadays he is a regular in the top ten on both modes. Back again is VP2VL, his proficiency making VP2V an easy multiplier on cw.

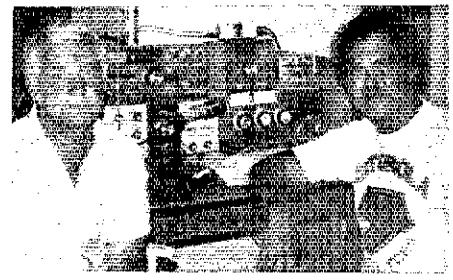
Could it be the DX Competition is addictive? Ask the above ops. Year after year they're back. The many facets of the DX Competiton make it a continuing attraction. To the newcomer working gobs of DX is great (to the big gun it isn't a charm). That does not mean the lure ceases. Tricks of the trade are numerous, numerous enough that there's something for everybody. The gun can't forget any of the tricks he's learned . . . working JAs long path . . . knowing where to look for Russians transmitting on 75 . . . the ins and outs are so numerous you can't know *too* much.

"Great, just what I want to hear about, I'm no big gun – all I do is casually get on for a few hours in the contest. That's all I can stand with those big guns taking up the band, they make it impossible for me to work any DX." Are they taking up the band and making it impossible for you to work DX or are they just one step ahead of you and know something about DXing you don't? Are you trying to get on and work DX at inopportune times? The big guns started out where you're sitting. DX contesting is something mastered with experience, and experience only. Are you getting on in the peak of the band opening? If so, you're probably working the DX. . . . Are you being practical in entering the pileups where the DX station only has a marginal opening into your area? Those from your area who are working him are only making it through because they know you don't beam straight in on 'em – you work 'em skew path at this time of day. If you want to make a big score from a modest setup you have to be



80 and 160 meters at WA5LES . . . Tom's suggested caption: "0710." Somehow, I get the feeling I've been there.

Six of the seven smiling Seven-RM superstation stalwarts, successfully seizing slot numero uno in multi-multi phone. Back row people: WA7OTT, K7SS (K7JCA), Mr. W7RM, W5QQQ. In front: VE7ZZ and K7JA (K7VPF). Not pictured is K7CW (K7HTZ).



High Montserrat one-weekender went to VP2MNK. Expeditioneers WA0ONK and W0NAR made nearly 3900 QSOs with the aid of VP2MGB.

*Communications Assistant, ARRL
**Contest Aide, ARRL

One-Weekend DXpeditions
(All Are Certificate Winners)

CW

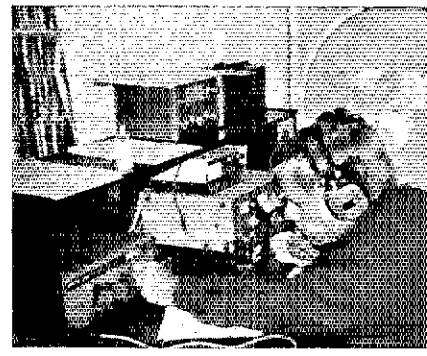
Continent	*Made by*
Africa	
3B8DT	K4FOK
Europe	
C31IU	FØAXP
DL1YA/OE7	
W5ONL/HB	
OHØXZ	
OH3XT/OHØ	
OH3PE/OHØ	
N. America	
WA8TOB/C6A	
WB6UAG/FMØ	
PJ8CO	K1CO,WB2DRW,WB2OEU, WB2WOI
W6QL/VP2A	W6QL,W6KG
VP2KN	K9OTB
VP2LBH	K2IGW
VP2MAQ	W6KG,W6QL
W1HUY/VP9	W1HUY
XE2MX	K6NA
S. America	
PJ9JT	W1BIH
PY1ZCF	K5MA

Phone

Europe	
W5ONL/HB	W5ONL
N. America	
W4SS/C6A	W4OO,W4PJG,W4RA, W4SS,WB4PQB
PJ8CO	K1CO,W1GYZ,WA2DYK, WB2DRW,WB2GIO,WB2OEU, WB2WOI
W6QL/VP2A	W6QL,W6KG
VP2LDQ	WA9FXJ
VP2LCG	KØKJS
VP2MAQ	W6KG,W6QL
VP2MNK	VP2MGB,WØNAR,WAØONK
VP2SZ	WB8JEY
W9ABA/ZF1	W9ABA
FOØRS	K6NA
S. America	
PJ9JT	W1BIH

The Man himself — Sig N3RS/W3WJD at 40 cw on your left, and on your right, N3RD, Dave operating 20. I bet they knew they won.

W1 representative for the CAC, and low-power King WA1SSH. Ken now holds eight "firsts" — four code and four phone. Just recently he purchased a linear and goes high power to join the ranks of Connecticut "guns."



I bet it's 40-meter phone. W5ONL/HB, a on weekend DXpedition active on both modes this year. Originally slated for a two-week stay in Switzerland, Dick was lucky enough have his stay extended by two weeks allowin him to catch the cw weekend.

practical. Studying propagation charts like those in the "How's DX?" column each month will tell you a lot — when optimum conditions will favor communications to any part of the world. If you're trying to work 'em during a lull point in the day (and your station isn't more than a dipole and a barefoot transceiver), you're just asking for grief. Working that station is probably no sweat-at the peak time of the day. Save yourself the aggravation by knowing when conditions are best. Once you learn about propagation you know where to improve your station . . . thanks to the knowledge you've gained in how it's done. Knowledge is cumulative, and with patience (and the desire you probably have now you aren't pounding your head into the wall) the only thing you have to worry about is whether or not a visit from Mr. Murphy is scheduled.

W/VE Single-Op Highlights

The W/VE entrants of 1976 only managed one score greater than two million points. This year W3LPL (last year's Two-Million-Point Man) did himself one better and upped his cw score by 160 kilopoints. Frank's 2.4 million score is dangerously close to the all-time cw record of K1ZND, set in '72. Only one cw score greater than 2 megapoints last year . . . this year six of 'em. A record in itself with W3LPL, W2GXD, W1ZM, WA1STN, W6PAA, and W7RM sharing the honor. The remaining four top-ten slots were outstanding too, in that K3ZO's number-ten score would have landed him in second place last year. Last year's second highest score (from 7RM) wouldn't have made the big box! Last year's cw top tenners back in the box are W5WZQ — now as W5UN, W7RM again operated by K7VPF/K7JA, W3LPL, W2GXD and K4 (pause) GSU.

Last year's high man for Frankford RC, W2HMH, comes back with that title and along with it the first-place phone seat in W/VE. Charlie's winning score is up by 800k over the W6HX winning score in '76. WA8ZDT (oping W4QCW), WA1ABW, K4VX, and WA7WXY all pulled in at over 2 million. K2LE/1 at 1.4 meg rounds out the phone top te And, like cw, the phone scores are wa up from last year . . . even more when you figure last year's number te score W1YK, operated by WA1JLD, wa 835k and this year WA1JLD (ope ating WA1STN) came in ninth. It too doubling his score to 1.7 million to kee him in the box. Yes, things were a b more competitive on phone this yea Like cw, a record number of greate than-2-meg logs were received, five 'em — and none were made last yea Conditions were just OK, nothing sp cial. Thinking about the scores to b made in the next few years boggles th mind. The winning phone multi-singl W5TMN, lead the fest in 10-met multipliers with 48. A few years fro now 48 will be peanuts. Anyone with long wire and a transceiver will be ab to catch 50. Wow, conditions weren great, conditions aren't at their prim but five logs on phone and six logs c cw are better than 2 million poin Eleven single ops over two million, t average score in the top ten this ye was 1.99 million. The average-scor record standing from the '71 contest also 1.99 million. Conditions were pea ing about then and now we're still couple of years away from the ne peak. Any guesses as to what the ave age score will be in 1979?

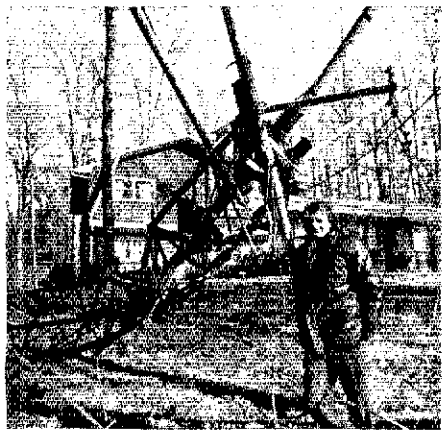
Master of low power WA1SSH put

his final low-power effort this year. He went out in style. On code Ken had over 550k and on phone 275k. For the fourth year running Ken is low-power champ both modes. He'll be back next year in C class . . . "I broke down and bought an amplifier, next year I'll have to compete with the big boys." VE3AIA decided to make a big noise from up north in the Maritimes, putting VE1BKB on both phone and cw, the latter to the tune of a million points. Other heated cw battles included the race for number-one single op in Connecticut. WA1STN was edged out by W1ZM (WA2CLQ/K1ZM as op), an extra 100 QSOs for 'STN, but 15 more multipliers for 'ZM . . . net W1ZM first in CT, number three in W/VE and WA1STN second in CT and fourth W/VE. The second weekend conditions weren't exactly favorable for the West Coasters, W7RM only worked eight (yes, eight) JAs. Without the JAs for the West, scores can't make it up there (ever wonder what they did in the days of the quotas?). Europe is far away from W6 and a multiplier difference of about 25 or 30 means you run JAs or don't score. A classic example of this is fifth-place finisher on phone WA7WXY. Rick (now K7GM) cranked out more Qs than anyone else. However, his multiplier of 286 was the lowest in the top ten . . . a whopping 2359 QSOs. True, but with a multiplier 102 down from first-place finisher W2HMH, the net is fifth place. The sole finisher in the top ten on both modes was W2GXD, giving Frankford RC 3.9 million points toward their aggregate score.

High-band competition on cw was good this year. Interest in this category seems to be increasing. Not content with his first-place finish in the low-band cw category last year, K1NOL came back this year entering and winning the high-band competition. Jim's low-band record score of last year still stands so he now holds both the low- and high-band cw records. High-band phone number one this year is N4MM and low-band phone winner is K4YFQ. Yet another four, N4PN, takes a first-place slot, this one low-band cw.

Multi-Singles

Multi-single provides an excellent opportunity for clubs to teach their members the ins and outs of contesting. Sitting a newcomer down alongside a seasoned operator can teach the neophyte more in one hour than endless hours of club talks and slide shows can hope to. Entries from W5TMN and WA1NRF proved to be a good race on cw. There were 100 QSOs more for 'NRF, but two multipliers more for 'TMN. WA1NRF took the title. NCDXCC took advantage of this aspect – they had almost as many multiops as single ops on in the contest! W5TMN did make it in as phone multi-single winner, just missing out on three million points by 50 contacts, scoring 225k better than phone single-single winner W2HMH. Strong club ties show up in



An awful sight – the contester's nightmare. K4VX was lucky, in the sense that his tower made it through the DX competition; 49 hours post-test it was another story. Lew's expression tells the story.

EL2 Tango, Bud is another one of those guys who put a smile on your face. Working Bud on four bands this year was a sure thing. And in a year or two, five EL2T QSOs will be more sweatless.

DX Continental Champions

CW			*Phone*	
Single Op	*Multiop*	*Single Op*	*Single Op*	*Multiop*
ZS6WW		Africa	6W8DY	
JA2JW	JA7YAA	Asia	JA7GAX	JA3YKC
CT4AT	YU3ZV	Europe	*CT4AT*	YU3DBC
KP4EAJ	KP4EAS	N. America	KP4EAS	*PJ8CO*
KH6IJ		Oceania	*KH6IJ*	*KH6GQW*
PJ2VD	LU8DQ	S. America	YV4TI	PY1BAR

italicized callsigns indicate "repeaters" from 1976

Low-Power Champs

CW		*Phone*	
WA1SSH	722,766	WA1SSH	506,100
WØPRY	314,415	WØPRY	321,408
WAØUCU	310,116	WAØUCU	214,728
W2BA	302,742	WB2SJG	196,020
WA2HAI	285,600	WB7BNP	194,334
WB4KSS	255,420	WA1TFF	192,390
WB2SJG	250,974	W9YH	186,984
W3ARK	250,848	WB2LOF	136,620
K3KO	242,880	W1HAF	101,682
K1NH	180,999	WB4FOT	100,080

Top Forty

Single-Operator CW				*Single-Operator Phone*			
W/VE		*DX*		*W/VE*		*DX*	
W3LPL	2,424,464	KP4EAJ	5,272,383	W2HMH	2,621,328	KP4EAS	7,782,324
W2GXD	2,061,900	PJ2VD	4,708,935	W4QCW	2,190,459	VE2AQS/TG9	4,327,155
W1ZM	2,052,618	KP4EKI	4,648,644	WA1ABW	2,093,904	KH6IJ	4,244,226
WA1STN	2,041,572	XE2MX	4,346,712	K4VX	2,071,224	YV4TI	4,163,922
W6PAA	2,025,147	KH6IJ	3,481,890	WA7WXY	2,024,022	XE1LLS	3,928,344
W7RM	2,015,145	KH6HKM	2,803,356	K5LWL	1,908,498	CT4AT	3,870,792
N6AA	1,993,680	CT4AT	2,621,772	W3BGN	1,857,240	KP4DSD	3,544,944
K4GSU	1,962,360	ZS6WW	2,246,244	W2GXD	1,824,642	6W8DY	2,919,996
W5UN	1,795,692	PJ9JT	2,194,686	WA1STN	1,691,352	PJ2FR	2,595,957
K3ZO	1,762,605	EA2IA	2,180,892	K2LE/1	1,461,042	HC1BU	2,442,192

Division Leaders

Phone

Single Op				*Multiop*	
All	*Low*	*High*		*M-S*	*M-M*
W2HMH	WA3SWF	K3ZOL	Atlantic	W3BWZ	W3AU
W9LT	WB9MOG	WB9HAD	Central	W9RX	K9DX
WAØONL	–	WØOUE	Dakota	WAØFQF	–
K5KLA	WB5HVY	K5FVA	Delta	W5WMU	–
WA8YWX	W8TWA	WB8JBM	Great Lakes	K8IDE	W8NGO
W2GXD	W2HHC	W2MB	Hudson	WB2RKK	W2PV
WØFHE	WBØOED	WØPRY	Midwest	KØAZV	–
WA1ABW	W1FC	K1CSJ	New England	WA1ABV	W1RR
WA7WXY	W7YTN	W7ISX	Northwestern	K3MNT/7	W7RM
WB6GFJ	W6NLZ	WB6OOL	Pacific	N6MG	W6PAA
W4QCW	WA4YBV	N4MM	Roanoke	WA4APD	W4BVV
K5EVK	–	WBØQHV	Rocky Mt.	WBØLLR	–
N4PN	K4YFQ	WA4CQD	Southeastern	WA4LZR	–
K6AC	WB6NRK/7	WA7YRP	Southwestern	W6YRA	W6ONV
K5LWL	K5JZY	K5BZU	West Gulf	W5TMN	W5BJA
VE1BKB	VE3BBN	VE3HGN	Canadian	VE8ML	–

Division Leaders

CW

Single Op				*Multiop*	
All	*Low*	*High*		*M-S*	*M-M*
W3LPL	WA3SWF	WA3SZX	Atlantic	W3NX	N3RS
K9DX	K9DWK	WB9LHI	Central	WA9IVL	W9CL
WØHP	WBØANT	WØOUE	Dakota	–	–
W5WMU	–	N4ZZ	Delta	–	–
K4GSU	W8IQ	K8ETO	Great Lakes	K8IA	W8ROF
W2GXD	W2HHC	WB2PYM	Hudson	WA2UOO	W2PV
WØZLN	WBØNOU	WØPRY	Midwest	WBØRRA	–
W1ZM	W1NJL	K1NOL	New England	WA1NRF	W1RR
W7RM	W7YTN	WA7OBL	Northwestern	N7XX	–
W6PAA	WA6SFT	W6HJP	Pacific	WA6DQM	K6ZM
K4VX	W4HBK	N4MM	Roanoke	W4WIN	W4BVV
W7HS	WA5YTX	–	Rocky Mt.	–	–
N4RR	N4PN	W4WHK	Southeastern	WA4LZR	–
N6AA	W6DYD	WA6WZO	Southwestern	K6SE	W6BA
W5UN	W5KLB	WØPCO/5	West Gulf	W5TMN	WA5LES
VE1BKB	VE6AYX	VE6KW	Canadian	VE4OY	–

the phone multi-singles with Frankford, PVRC, NCDXCC and MM all putting in multiple entries. Use of spotting nets for conveying hot multiplier news is the main reason. Some ops normally running single-single decided to use the net for score aid – foregoing single-op status and entering the ranks of the multi-singles. The scores of the phone multi-singles fall into the 1.5- to 2.5-million-point range with the exception of the TMN winning score of 2.9 million – a clear victory.

There is only one set of rules for multi-single operation, but two distinct methods of operating a multi-single exist. Interpretation of the rules for multi-single vary, some seeing the "single" as meaning one transmitter while others say one signal. The classical view of multi-single is that the category is an extension of the single-op category, i.e., the only way it is different than a single op is there's more than one operator of the station – to assist in keeping the station on the air for the full 96 hours. The second op(s) can man a second receiver, looking for band openings and multipliers. Some multi-singles have taken this to an extreme and have set second *stations*, manning them simultaneously. The number of contacts possible from a multi-station multi-single is far greater than a single-op station with more than one operator can match. Contest rules are not meant to discourage participation in the contest, and because of this entrants using the multi-station format were not reclassified into multi-multi. This has been done with the proviso that the Contest Advisory Committee and the Headquarters Awards Committee thoroughly review the reason for the category's existence, and possibly redefine multi-single contest participation. The Contest Advisory Committee is responsible for conveying the participants' interests in contesting to Headquarters, where the rules are implemented. If you feel strongly one way or the other about an issue, like "what is multi-single?" contact your

Total Logs Received (Including Check Logs)	*1976*	*1977*
	2405	*3034*

'76 W/VE: 1368 DX: 872 Check Logs: 16
'77 W/VE: 1631 DX: 1123 Check Logs: 28

Returns Up 26 Percent

1978 ARRL DX Competition

Phone

February 4-5 and March 4-5.

CW

February 18-19 and March 18-19

CAC representative (or mail your lette to him via the Hq. liaison) to let hir know how you feel. If you don't write don't complain about the rules.

Multi-Multi

Yes, these are the big boys. To th single op they're seemingly merciless o the bands. Their constant presence o the bands make them *so* conspicuous No matter what band the single o switches to the multi-multi is there "sentinels of the bands." It didn't tak long to figure out who N3RS was . . Sig (alias W3WJD) put together a win ning multi-multi effort on code thi year. Nearly six million points worth o effort, the 80-meter signal of Willi John David fame came through produc ing 664 QSOs. On 15 meters, W4BV (KØDDA op) managed 100 more QSC than anyone else. We add that Lloyd i sightless and along with John, K3NPV (also blind), WA3AMU, K3OAE, W3ZZ K4GKD and K1JX, W4BVV manage the second-highest multiplier in the 'tes – 432 countries – including 80-mete contest high of 73 by K3NPV. In third is W2PV, but not by much as WA5LE multi-multi came within 200k of 'PV That's right, a 4.5 million point multi multi from South Texas – hats off t Tom for the well-organized effort Geography didn't discourage the Soutl Texas crew, they just went out to worl a contest and did so in style. K1VBL' New Hampshire multi-multi operatio signing W1GQO on cw lost most of thei aluminum in the storm on the Thursda and Friday before weekend two – only one weekend for them, but almost tw million points, nevertheless. . . . M Murphy struck!

On to phone. Now grit your teeth the beacon of W7RM skunked everyon with an eight-million-point victory Number two finisher W2PV managed 5 more multipliers than 'RM. Sound pretty impressive, huh? Impressive, bu not as impressive as the 1350-QSO lea by 'RM – over a million points abov W2PV . . . where did it come from

Try 650 more QSOs on 40, 600 more on 15, and 100 more on 75 – that adds up to JA, right? Twenty meters was dead even in contacts; 'RM worked Europeans like crazy, and took 'PV in multipliers: 145 to 134. Competition for number-two slot was possible – can anyone compete with W7RM? We'll tune in next year and see (perhaps). Oh yes, back to competition for number-two slot. The scores made by second and fourth finishers W2PV and W3AU are way up over last year's, 'PV by 52 percent and 'AU by 44 percent. Multi-multi scores are good indicators of propagation and there is no denying these kind of increases spell upswing on the propagation charts. K1VBL's multi-multi signed W1RR, and in their first year out came in third, right at the heels of W2PV.

DX Horizon

At one time East Coasters worked JAs on 10. This is a few years back the other side of the lull in the cycle, but they did indeed work 'em. The West Coast has been having trouble making it to JA, but this year JA has started up, meager signs, perhaps, but further proof that the conditions are getting better. In the last hour of the contest (on phone) JA1PUK had a run of 12 QSOs into the states. JR1CFG and JA1CG also lucked out and made a few W QSOs on 10. With the trend as it is for West Coast scores, 20 meters could well become the lowest contact-producing band – boggles the mind, eh? Way over on the other side of Asia 9D5A surprised many with a usually unheard country – Iran. If you listened hard you lucked out and caught him. On phone things were pretty tough for Bill (K6KM/W6HQN). Running 60 watts makes the distance between Iran and W/VE seem further. "Believe it or not, my 69 phone contacts represent an all-out effort in the contest. Few but the 'big guns' heard me call them, and not one CQ got a response . . . except from Europe and Africa." Those of us who heard you say thanks, Bill, especially the three of us lucky enough to work you on 75. On cw 9D5A was multi-single, with K5MM assisting. Over 600 contacts, not bad for a TH3 and 60 watts.

The whopping 2.9-million-point score by 6W8DY (number Six, letter W, number Eight . . .) brings an African score back into the top-ten box. Aiding in keeping Africa on the ham radio map are the kilos of QSOs made by EL2T, ZS6DN and 9G1DN. Fifth worldwide cw scorer ZS6WW entered the top ten, too – making two Africans successful at thwarting the NA/SA/Oceania guns.

Flash! Switched to 40 meters, worked CT4AT. Good gawd, K7ZZ's last DX test from Portugal proved a winning one with his phone score of 3.8 million setting an EU record. Though he claimed not to know the code, Don made 3800 cw contacts, nailing down high Europe single-op on both modes . . . the word is that Don has gone down to the Carribean. But we'll wait and see what comes of it. EA2IA (?) broke two million on cw again, and YU3ZV put together a 2.2 million point multi-single . . . two Europeans you *always* work. Multi-singles from Russia were plentiful again. Active on both modes, the UK2 Bravo Bravo Bravo and UK2GKW crews each broke 2000 phone QSOs. Lithuania and Latvia were duck soup on four bands.

If you didn't work KP4EAS you were in a very small minority. Mike set an all-time world record DX score this year; his 7/8-pound log was filled with 8132 QSOs, and 309 multipliers . . . 43 on 160, 55 on 75, 56 on 40, 20 on 15 and 53 on 10. Pretty good show when you consider it's only possible to work a

Affiliated-Club Scores

State/Prov.	Call Area	Club	Score	Entries	CW Winner	Phone Winner
VA	4	Potomac Valley RC	65,437,392	98	W3LPL	K4VX
PA	3	Frankford RC	50,776,590	80	W2GXD	W2HMH
CT	1	Murphy's Marauders	41,064,741	38	W1ZM	WA1ABW
CA	6	N.CA DX & Contest Coop.	35,542,482	99	W6PAA	WB6GFJ
WA	7	Western WA DX Club	22,452,069	54	W7RM	K7DZ
IL	9	N.IL DX Assn.	19,187,088	40	K9DX	W9BW
TX	5	TX Assn. of Contest Oprs.	15,604,563	14	WØPCO/5	K5VTA
MA	1	NE Contest Club	14,045,268	39	K1GQ	K1CSJ
NJ	2	Wireless Inst. of the NE	13,339,967	41	W2REH	WB2RJJ
CA	6	S.CA Contest Club	10,799,631	21	K6AC	K6AC
OH	8	Mad River RC	9,781,374	22	K8RMK	WA9BWY
TX	5	TX DX Society	6,001,908	10	W5UN	K5LWL
CA	6	San Diego DX Club	4,865,796	16	W6ABT	WAØOOL/6
CA	6	S. CA DX Club	4,504,236	11	N6AA	W6BA
NY	2	Order of Boiled Owls of NY	4,092,105	13	K2LE/1	K2LE/1
MI	8	Mich. DX Assn.	3,555,759	6	K8ETO	–
AL	4	N.AL DX Club	3,432,672	7	–	K4TIG
LA	5	Delta DX Assn.	3,069,312	5	–	K5FVA
AZ	7	Central AZ DX A.	3,038,037	15	WA7YRP	WA7YRP
VA	4	Central VA Contest Club	2,940,228	5	WA7YRP	WA7YRP
IN	9	INDY DXers	2,886,696	4	–	–
MN	Ø	Twin City DX A.	2,797,194	12	WØHP	WBØANT
CO	Ø	Colo Contest Conspiracy	2,316,690	3	–	–
GA	4	SE DX Club	2,146,491	9	N4PN	N4PN
TN	4	Mid-South ARA	2,012,376	11	WA4FDR	WA4EAV
NJ	2	S. Jersey RA	1,810,940	13	K2JOC	W2FGY
IA	Ø	E. IA DX Assn.	1,466,712	17	KØFLY	WØFHE
WI	9	Four Lakes ARC	1,282,587	6	K9KGA	–
NY	2	Overlook Mtn.ARC	1,236,198	14	WB2BXL	K2SD
IL	9	Kankakee Area RS	1,090,599	4	–	–
NY	2	Buffalo Area DX Club	1,058,310	4	–	–
OH	8	OH Valley ARA	1,001,505	8	W8RSW	–
FL	4	N.FL DX Assn.	964,554	8	–	W4ZTW
MAN		Winnipeg DX Club	868,143	10	–	VE4RP
MO	Ø	MO Valley DX & Contest Club	785,583	11	WØTDR	WØHBH
ONT		Toronto DX Club	752,037	4	–	VE3HGN
IN	9	INDY DXers	720,924	3	–	–
TX	5	Alamo DX Amigos	714,900	11	W5BE	W5BE
IL	9	Waukegan VHF Society & ARC	703,671	6	–	W9LUH
VA	4	VA Century Club	674,037	10	–	WB4OXD
OH	8	Columbus ARA	621,663	7	W8ZCQ	W8ZCQ
NJ	2	Old Barney ARC	562,959	6	W2EQK	W2EQK
MD	3	ARINC ARC	556,965	7	N3OS	W3PWO
NS		Halifax ARC	539,852	4	VE1MX	–
NY	2	Poughkeepsie ARC	482,463	5	–	WA2LJM
KY	4	River Rats ARC	352,704	3	–	–
NC	4	Charlotte ARC	327,036	4	–	K4GFH
ALTA		Calgary DX Club	253,284	8	VE6AMR	VE6AMR
NJ	2	Gloucester Co ARC	185,847	4	–	–
NY	2	Lake Success RC	168,972	3	–	–
KY	4	Bluegrass ARC	166,521	3	–	–
NC	4	Brightleaf ARC	108,990	5	–	WA4NHP
CT	1	Meriden ARC	92,892	6	W1KKF	–
OH	8	Parma RC	34,134	4	–	–
IL	9	Chicago Radio Tfc.A	26,292	5	W9REC	–

maximum of 57 multipliers on each band. Speaking of Puerto Rico, Chet, KP4EAJ came back as number-one code man. His score was up by 36 percent . . . a big increase when you made as many points as Chet made last year. . . . Also returning to the top ten, in sequential order, are PJ2VD and KP4EKI, repeating number two and three this year. Other returners to the top-ten box from '76 are KH6IJ (on both modes); KH6HKM, cw (no, it's not KH6SKM or KS6SKM as found in many a log); KP4EAS, phone and XE1LLS, phone. Number-ten single op on phone, HC1BU, deserves commendation with his high-band effort. EA2IA's score also is encouraging as there are two Europeans in the top-ten cw, another indicator of improving conditions. There haven't been any Europeans in the top ten since '74.

K6NA/W6MAR had a little fun this year, operating XE2MX to a fourth-place finish on cw. Glenn went to French Polynesia to operate FO0RS, handing out 2200 plus QSOs, an interesting way to spend a March weekend. Nice weather was in the offing for the K1CO/PJ8CO crew again this year. Operating multi-multi, they made 7810 QSOs in a weekend; on phone that is. On the cw weekend they just missed 4000 Qs — not bad for a few vacation contacts. (Not to mention the contacts that bachelors tend to make on a Caribbean vacation.) On the waves and the airwaves, the Colvins continue their jaunt around the world. Island-hopping to Antigua in February, and Montserrat in March, they totaled just shy of 11,000 QSOs. Close to 20 one-weekend DXpeditions were made to the Caribbean this year — fun was had by many and we're sure many a time ham radio was forgotten in favor of time in the sun.

Recognizing every outstanding effort is a tough job, that's why we are lucky to be able to print all the scores. Statistics are always easy to extract. . . . You name it, the number of stations operating portable, the number of calls ending in V, what you seek is here, extract as you please!

Affiliated-Club Competition

Back on top again this year, the Potomac Valley Radio Club took first first, with Frankford Radio Club second. The two traded positions from last year. Excellent efforts by PVRC members netted 65 million points to the club. Returning to third place was the now-split Murphy's Marauders. The majority of their membership joined with the Northeast Contest Club and formed the Yankee Clipper Contest Club. Next year YCCC will be a force to watch for! Northern California Contest Club members merged with the Northern CA DX Club. The marriage resulted in the Northern California DX and Contest Cooperative. NCDXCC took number-four slot this year. (Last year NCCC took fourth, netting an ersatz return to fourth position.) In seventh with only 14 entries (most of 'em multiops) was TACO, the Texas Association of Contest Operators. It was another marriage of clubs, this one a bit more spicy, the Richardson Wireless Klub joining with the Texas DX Society. Notable, too, is the turning to by members of the Northern Illinois DX Association — entering the coveted top ten and placing sixth.

Alms, Pse?

Putting together the data for a DX Competition writeup isn't easy. Just ask Dan, WA1QNF; Bill, K1WJ; Rita, WA1WEV or myself (K1ZX). Between the hours of working on 2754 logs and Rita's hours of typing at the composing machines, stock in Excedrin *must* be up.

As we've stressed throughout this writeup, conditions were way up. By next year we should be rewarded for our years of suffering with the merciless Griznoid, Ruler of Bad Propagation.

1977 DX Competition

Scores are grouped with U.S. and Canadian entries first, DX later. Logs are broken down by continent; within a continent alphabetically by country prefix. Line scores read call sign, score, contacts, multipliers, power category and hours of operation. Example: W1ZM, 2,062,618 points, 2179 contacts, 314 multipliers, power over 500 watts and operating time of 96 hours. Power categories are A, 150 watts or less, B, 150-500 watts, and C, greater than 500 watts. An asterisk next to a U.S. or Canadian entry denotes ARRL staff member, ineligible for award.

U.S.A.

CW

Single-Op

1

Connecticut

W1ZM(WA2CLQ,opr.) 2,052,618-2179-314-C-96
WA1STN* 2,041,572-2276-299-C-85
W1YG 1,124,352-1536-244-C-
WA1SSH 722,766-1024-233-A-78
W1HKH 563,472-1092-172-C-51
W1GPK 419,490- 790-177-C-52
WA1NSW 251,424- 487-144-C-
W1VV 153,639- 397-129-C-22
W1AR 140,049- 351-133-C-20
W1VH 99,528- 286-116-C-44
WA1AHI* 94,446- 297-106-C-22
W1BIH 71,820- 190-126-C-
W1CNU 69,678- 237- 98-B-47
W1KKF 61,965- 255- 81-B-23
WA1OWR 55,224- 236- 78-A-16
W1EWD 44,064- 144-102-B-25
K1IHQ 34,056- 132- 86-A-13
K1VDF 25,740- 132- 65-C-16
W1BL 23,544- 109- 72-A-
WA1KOC 19,488- 116- 56-B- 8
WA1UHN 189- 9- 7-B- 1

Eastern Massachusetts

W1YN 992,616-1402-236-C-71
W1PL 416,670- 731-190-C-40
N1EE 376,830- 790-159-C-43
W1DLF 268,275- 611-175-B-56
WA1LKX 107,910- 327-110-C-10
K1VBS 101,007- 261-129-A-49
W1OPJ 23,010- 130- 59-A-22
W1HUU 13,446- 83- 54-C-
W1KZR 11,613- 79- 49-B-10
W1EQY 10,224- 71- 48-A-35
WA1PNX 4368- 52- 28-B- 6

Maine

W1SD 163,602- 366-149-C-
K1SA 119,733- 373-107-C-20
K1VMQ 100,500- 335-100-C-20
W1ERW 8850- 59- 50-B-11

New Hampshire

K1GQ 1,587,936-1904-278-C-68
WA1ABV 1,307,136-1702-256-C-75
K1NH 180,999- 507-119-A-55
WA1TVB 155,232- 462-112-B-42
W1JSM 31,785- 163- 65-B-15
W1LQQ 6510- 62- 35-B- 4

Rhode Island

K1GMW 118,503- 297-133-C-28

Vermont

K2LE/1 1,377,090-1605-286-C-74
W1KQ 1208- 36- 26-C- 5

Western Massachusetts

WA1ABW 1,649,508-2044-269-C-68
W1YK(K1IR,opr.) 316,776- 788-134-C-29
W1DKU 91,476- 252-121-A-31
W1PWK 27,216- 126- 72-B-25

2

Eastern New York

W2AZO 487,674- 821-198-C-48
W2HO 449,880- 815-184-C-67
WA2HAI 285,600- 560-170-A-
WB2BXL 223,440- 532-140-C-48
W2AWF 171,450- 450-127-C-56
K2BK 160,290- 411-130-C-25
WA2LJM 95,658- 298-107-C-45
K2SD 69,495- 205-113-C-11
W2FPG 55,860- 196- 95-C-15
W2MNK 22,656- 128- 59-B-
WA2AUB 14,193- 83- 57-C-12
K2HA 5148- 52- 33-A-11

N.Y.C.-L.I.

W2AEE(WA2ZKY,opr.) 715,950-1075-222-C-58
WB2SJG 250,974- 573-146-A-
W2EUO 208,800- 435-160-B-50
K2MFY 179,955- 387-155-A-47
K2YGM 168,630- 385-146-C-41
W2GKZ 122,301- 321-127-C-20
W2CP 88,530- 227-130-C-15
WB2FKF 88,368- 263-112-B-
W2IRV 87,963- 269-109-A-20
W2SGK 71,820- 210-114-C-24
W2TE 65,007- 233- 93-C-15
WB2LWE 33,180- 140- 79-C-22
WB2MVS 13,197- 83- 53-B-10
WA2CXQ 8448- 64- 44-C-22

Northern New Jersey

W2GXD 2,061,900-2291-300-C-82
WB2FIT 1,004,724-1329-252-C-74
WB2RJJ 973,896-1364-238-C-58
W2HTR 245,340- 470-174-C-44
WB2RKK 217,551- 571-127-C-15
WA2DBD 133,620- 340-131-B-
WA2ZWH 127,908- 418-102-A-52
W2ZZ 86,070- 302- 95-C-20
WA2EJZ 82,716- 244-113-B-27
W2HUG 65,934- 198-111-A-23
WA2IRS 65,088- 226- 96-A-22
WB2SZO 52,614- 237- 74-C-18
W2HN 41,850- 150- 93-C-17
W2RS 19,392- 101- 64-C-12
W2MB 6612- 58- 38-C- 3
W2UL 1575- 25- 21-A- 8

Southern New Jersey

W2REH 1,588,176-1614-328-C-55
W2HBT 961,704-1444-222-C-60
K2SB 848,925-1225-231-C-50
K2FL 536,484- 724-247-C-67
K2JOC 318,780- 660-161-C-
W2LYL 312,576- 704-148-C-26
W2PAU 297,500- 500-195-C-42
WA2AEJ 275,049- 549-167-C-75
W2HMH 248,775- 535-155-C-25
WA2VAT 175,671- 393-149-B-
W2EA 132,969- 349-127-B-53
K2TD 120,930- 290-139-C-35
WA2VYA 63,252- 251- 84-C-16
WB2GFE 62,712- 312- 67-C-18
W2SDB 47,214- 183- 86-C-17
N2CG 46,008- 213- 72-C-12
W2FGY 7869- 61- 43-B-10

Western New York

K2NY 1,499,124-1804-277-C-66
K2TQC 1,405,206-1661-282-C-80
WB2ZOW 133,452- 337-132-C-54
WB2ABD 119,370- 346-115-A-24
W2FOI 44,073- 177- 83-C-44
WB2KNZ 11,088- 88- 42-B-

3

Delaware

W3DA 175,098- 379-154-B-30

Eastern Pennsylvania

K3II 897,435-1221-245-C-
W3JSX 855,177-1173-243-C-77
W3AP 770,718-1066-241-C-80
W3OV 734,613-1243-197-C-49
W3KFQ 588,984-1012-194-C-37
W3YIK 558,675- 975-191-C-60
WA3MHD 461,835- 933-165-C-
K3ZOL 375,888- 764-164-C-
W3GK 366,490- 710-173-C-58
W3NZ 336,117- 619-181-C-40
WA3WRD 326,025- 621-175-C-
W3KV 260,896- 608-154-C-
W3ARK 250,848- 536-156-A-45
W3KT 148,230- 366-135-C-48
W3GID 133,266- 334-133-C-30
W3EVW 125,730- 330-127-C-20
WB3BKD 91,800- 306-100-C-45
W3DT 28,830- 155- 62-C-10
WB3ELF 16,422- 119- 46-B-26
W3HMR 15,150- 101- 50-B-13
W3MM 8667- 107- 27-C-

Maryland - D.C.

W3LPL 2,424,474-2391-338-C-84
K3ZO 1,762,605-1965-299-C-78
K3GJD 1,472,532-1772-277-C-82
WA3KOC 912,516-1364-223-C-79
N3CW 765,765-1309-195-C-60
W3AZ 595,608-1079-184-C-61
W3EYF 467,832- 772-202-C-
K3AV 438,162- 709-206-C-50
W3FCI 232,344- 461-168-C-47
N3II 219,924- 447-164-B-42
N3OS 178,500- 425-140-B-56
K3TW 141,264- 327-144-C-14
K3ZZ 130,065- 299-145-C-50
W3EUJ 72,822- 229-106-B-45
WA3RSK 72,306- 206-117-C-19
W3KA 62,568- 264- 79-C-20
W3HVM 38,808- 154- 84-C-10
WA3UHJ 21,507- 107- 67-C- 7
W3TN 18,054- 102- 59-A-34
K3DQ 1368- 24- 19-B- 3
W3TUX 48- 4- 4-B- 3

Western Pennsylvania

K3KO 242,880- 506-160-A-54
K3HZL 167,808- 368-152-C-24
W3HDH 162,900- 362-150-B-29
K3HWL 11,745- 87- 45-C- 7

4

Alabama

W8FAW/4 1,088,640-1296-280-C-60
N4NO 1,049,904-1268-276-C-70
W3IZJ/4 126,492, 254-166-C-35

Georgia

WB4KSS 255,420- 473-180-A-76

Kentucky

K4GSU 1,962,360-2070-316-C-76
W4BCV 208,803- 427-163-C-34

North Carolina

W4TYE 523,629- 797-219-C-61
N4AA 418,950- 798-175-C-35
WB4JKP 129,861- 307-141-B-55
WA4LWO 122,850- 315-130-C-44
W7JUI/4 56,100- 187-100-B-
N4GC 48,216- 164- 98-B-21
K4GFH 25,920- 144- 60-C-12
W4OMW 17,112- 92- 62-C- 9
WB4KZG 2856- 34- 28-B- 5

Northern Florida

K4YFQ 838,320- 998-280-C-52
W4WKQ 56,163- 193- 97-C-33
WA4BAX 6240- 52- 40-A-11

South Carolina

W1WVL/4 243,675- 475-171-C-51
K4OAQ 50,430- 205- 82-B-32
K3YGU/4 17,490- 110- 53-C-26

Southern Florida

N4RR 1,217,430-1670-243-C-74

WA4ZHU 633,828- 884-239-C-60
K4CL 396,066- 706-187-C-58
W4BV 366,894- 561-218-C-69
K4JRF 88,515- 281-105-C-49
WB4OGW 65,949- 247- 89-C-15
K4PB 55,554- 197- 94-C-23
WB4QNX(WB4NTH,opr.) 468- 13- 12-C- 4

Tennessee

W4XJ 757,875-1075-235-C-71
W1FCC/4 728,472- 956-254-C-60
WB4WHE 31,320- 145- 72-B-27
K4TTA 12,168- 78- 52-C-10

Virginia

K4VX 1,413,531-1939-243-C-64
K4PQL 1,306,383-1763-247-C-76
W3ZKH/4 1,087,350-1318-275-C-
WA4TLB 926,100-1225-252-C-72
N4DD 692,037-1083-213-C-30
K4IAF 596,736- 896-222-C-70
W4YZC 539,847- 861-209-C-42
N4RA 418,122- 801-174-C-50
W4XR 415,143- 717-193-C-42
W4EI 350,550- 615-190-C-59
W4KFC 340,200- 648-175-C-24
KØCMF/4 236,220- 508-155-C-54
N4RP 234,558- 498-157-C-25
N4QQ 200,697- 503-133-C-35
K4JM 174,624- 428-136-B-25
W4RW 169,320- 415-136-C-56
WA4TZM 144,900- 345-140-C-48
WA4DUS 87,483 241-121-C-
K4KA 82,377- 243-113-A-18
W4NH 77,250- 250-103-B-20
WA4WYN 52,452- 186- 94-A-25
W4DM 50,955- 215- 79-C-10
W4KMS 32,109- 139- 77-C-16
W4JAT 30,267- 171- 59-C-17
W4OW 19,950- 95- 70-C-
WA4EAZ 9990- 74- 45-B-20
W4EZ 25,938- 131- 66-C- 8

5

Arkansas

W5RUH 30,720- 128- 80-B-38
WA5HNN 28,305- 111- 85-C-12

Louisiana

W5WMU 1,254,252-1646-254-C-86
W5RTX 923,286-1246-247-C-68
W5OB 197,547- 409-161-C-69
K5UA 130,848- 376-116-B-

Mississippi

W5RUB 263,169- 613-171-C-31
W5AQ 132,102- 358-123-B-48
N5XA 126,096- 284-148-C-31

New Mexico

K5MAT 105,084- 278-126-C-21
W5VIW 104,412- 308-113-B-53

Northern Texas

W5IUW 49,959- 183- 91-B-40
W5SOD 29,484- 156- 63-A-35

Oklahoma

WA5HJX 8364- 68- 41-B-40
W5AS 612- 17- 12-B-17

Southern Texas

W5UN 1,795,692-1982-302-C-95
W5BE 196,128- 454-144-C-57
K5TSQ 115,020- 284-135-C-41
W5SBX 100,062- 306-109-A-18
WB5JID 52,704- 183- 96-B-34
WB5DDI 46,368- 161- 96-C-30
K5RF 16,950- 113- 50-C-30
W5LUU 4650- 50- 31-B- 8
K5LZO 3864- 46- 28-A- 4
K5JZY 3627- 39- 31-A- 9

6

East Bay

W6PM 341,649- 561-203-C-49
K6JB 32,436- 159- 68-C-20
WA6BFL 8400- 80- 35-B-24
W6RQZ 3024- 56- 18-B-
W6EJA 2394- 57- 14-B- 6

Los Angeles

N6AA 1,993,680-2556-260-C-92
K6AC(N6TR,opr.) 1,733,487-2231-259-C-90
W6AM(W6BHY,opr.) 647,190-1269-170-C-40
K6MP 66,528- 252- 88-C-19
W6UQQ 56,826- 246- 77-C-24
W6RZ 34,500- 230- 50-A-46
K6YPZ 6231- 67- 31-C-17

Orange

K6OS 425,088- 864-164-C-70
K6TXA 200,124- 654-102-C-32
WB6YPX 137,808- 464- 99-C-
WA6FIT 13,764- 124- 37-A-
WB6BGV 11,583- 99- 39-A-17

Santa Barbara

K6WI 220,440- 668-110-C-42
W7CB/6 210,795- 611-115-C-24
W6PN 154,246- 455-113-C-49
N6DE 142,911- 711- 67-C-30
WA6LBP 34,506- 213- 54-C-17
WA6VBS 19,008- 176- 36-C-17

Santa Clara Valley

W6PAA 2,025,147-2437-277-C-89
K6RU 693,780-1492-155-C-74
W6HOC 303,960- 680-149-C-41
W6ATO 99,876- 406- 82-C-53
K6BR 78,447- 331- 79-C-19
W6EYY 76,608- 304- 84-C-16
W6VG 42,966- 231- 62-C-30
WA6TKT 28,341- 201- 47-B-
WA6RIR 14,229- 153- 31-B-23
W6UR 9828- 91- 36-B-35
WB6GFJ 9546- 74- 43-C-12
W6KHS 9009- 91- 33-C-10
W6QDE 3384- 47- 24-C- 6

San Diego

W6BS 39,816- 168- 79-C-13
W6IA 20,655- 135- 51-C-16
WA6ORJ 384- 16- 8-A- 4

San Francisco

W6WB 212,574- 499-142-C-70
WB6ZHD 56,940- 260- 73-C-30
K6LRN 456- 19- 8-A- 3

San Joaquin Valley

W6BVM 83,259- 319- 87-C-
W6AFH 19,539- 167- 39-C-31

Sacramento Valley

WA6JVD 515,928-1036-166-C-80
K6SG 351,090- 830-141-C-75
K6DR 315,792- 731-144-C-72
W6NKR 294,309- 617-159-C-63

7

Arizona

WA7HRE 363,330- 734-165-C-84
W2GGL/7 129,918- 367-118-C-56
W7ZMD 54,327- 199- 91-B-25
WB7AEB 52,863- 263- 67-B-30
K7JVR 22,344- 152- 49-B-13
W7KPL 11,520- 120- 32-B-37

Idaho

W7LLM 46,410- 238- 65-A-22

Montana

W7JYW 176,814- 627- 94-C-20
K7CTI 158,304- 544- 97-C-32
K7ABV 150,597- 497-101-C-32
W7LR 115,227- 413- 93-C-27

Nevada

W7MRS 81,270- 430- 63-C-15
W7HI 16,848- 117- 48-B-13

Oregon

W7TML 1,126,044-2018-186-C-76
K7GGY 64,479- 271- 83-B-31

Utah

W7HS 199,104- 544-122-C-67

Washington

W7RM 2,015,145-2655-253-C-
W7HAO 280,350- 890-105-C-34
K7DZ 609,513-1483-137-C-71
N7DX 235,809- 591-133-C-51
W7OF 117,612- 396- 99-C-24
W7WMY 104,247- 429- 81-C-20
K7ZR 83,676- 367- 76-C-23
K7MOK 81,468- 372- 73-C-36
W7LZF 67,221- 291- 77-C-26
W7JEG 22,050- 147- 50-C-10
WA7RKJ 33,825- 205- 55-B-15
W7BCS 18,060- 140- 43-B-32
K7CHT 10,494- 106- 33-C- 8
W7IIT 10,332- 82- 42-C-29
WB7ALT 6480- 80- 27-B-16
K7EFB 2025- 45- 15-A-

Wyoming

W7JFG 280,980- 669-140-C-48

8

Michigan

W8FF 280,140- 805-116-C-51
W8TWA 198,000- 528-125-C-54
W8DA 126,351- 303-139-C-49
K8LJG 27,255- 115- 79-B- 8
K8CVV 20,898- 129- 54-C-35
W8WVU 19,440- 108- 60-A- 7
WD8APD 7560- 63- 40-B-12
WD8BVI 5673- 61- 31-B-15
WB8DCR 1449- 23- 21-A- 2

Ohio

N8AA 1,123,470-1387-270-C-69
K8RMK 985,344-1283-256-C-75
W8RSW 566,955- 879-215-C-50
W8ZCQ 299,796- 602-166-C-65
W8BO 108,585- 285-127-C-30
W8GOC 107,508- 289-124-A-
W8YGR 84,864- 208-136-A-21
K8MR 68,904- 232- 99-C-12
W8NPF 34,656- 152- 76-C-33
K8CXM 32,436- 159- 68-C- 5
W8DWP 31,968- 148- 72-C-30
W8GS 25,752- 116- 74-C-
WB8SVN 9324- 74- 42-C- 4
K8MLO 2784- 32- 29-C- 7

West Virginia

W8AH 466,521- 737-211-C-60

9

Illinois

K9DX 1,697,124-1892-299-C-91
K9KDI 1,115,100-1239-300-C-40
W9BW 845,790-1165-242-C-68
W9OHH 746,640-1037-240-C-
K9UKM 666,315-1005-221-C-65
W9CH 517,725- 767-225-C-63
K9AB 452,400- 725-208-C-65
W9RX 397,488- 676-196-C-55
W9DWQ 392,190- 769-170-C-40
W9VBV 272,850- 535-170-C-35
K9KWK 242,136- 531-152-C-25
K9BGL 205,620- 460-149-C-32
W9JUV 202,530- 430-157-C-58
K9UIY 164,334- 449-122-A-60
WA9JCO 134,874- 381-118-C-60
WA3KFR/9 95,526- 261-122-C-29
W9RW 90,024- 242-124-A-30
WA9VOL 61,857- 261- 79-C-16
W9RT 31,395- 161- 65-C- 5
W9AG 25,620- 122- 70-C-10
W9REC 13,776- 82- 56-B-27
W9AZP 11,340- 70- 54-B-14
W9NNE 8127- 63- 43-C-12
W9HPG 7656- 58- 44-B-14
W9UDK 7011- 57- 41-C- 4
W9NU 6882- 62- 37-C-26
WB9DVQ 5850- 50- 39-B-14
K9CW 5406- 53- 34-B- 6
W9WR 3360- 40- 28-B-15

Indiana

WA9RJI 32,292- 138- 78-C-14
K9VQK 17,304- 103- 56-C-15
W9GSB 4263- 49- 29-A-13

Wisconsin

K9KGA 645,660-1055-204-C-70
W9NA 459,315- 865-177-C-
W9ZM 455,836- 701-212-C-65
K9CAN 363,573- 609-199-C-43
W9HJT 293,265- 665-147-C-43
K9QXY 157,608- 398-132-C-55
W9BG 20,400- 100- 68-C-14
WB9FKL 7440- 62- 40-B-10
W9OW 5643- 57- 33-C- 5

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Colorado

WØCP 114,750- 425- 90-C-55
WØKMV 60,984- 264- 77-C-
WBØWNU 51,408- 204- 84-A-66

Iowa

KØMM 567,765-1023-185-C-40
KØFLY 422,625- 875-161-C-61
WBØIPH 107,856- 321-112-B-40
WØEQN 54,120- 220- 82-C-21
WØMUH 31,080- 140- 74-C-30
WØMJN 17,976- 107- 56-C-41
WØVX 6144- 64- 32-B- 6

Kansas

WØIUB 348,000- 725-160-C-45
WAØTAS 49,140- 210- 78-C-17
WØWPL 40,584- 152- 89-B-24
WØRT 5928- 52- 38-C- 5

Minnesota

WØHP(WØZZ,opr.) 1,257,303-1513-277-C-76
WAØUCU 310,116- 601-172-A-65
WØYCR 209,502- 678-103-C-70
WØNG 130,077- 447- 97-C-21
WØOXN(WAØVKF,opr.) 31,680- 192- 55-C-10
WØLP 30,879- 141- 73-C-30

Missouri

WØZLN(WBØOED,opr.) 867,693-1297-223-C-74
KØODB 182,214- 382-159-C-59
WAØYEF 60,165- 191-105-C-
KØGSV 28,416- 128- 74-C-28
WØPKO 4896- 51- 32-C-16

Nebraska

WB6FHK/Ø 8514- 66- 43-C-26

South Dakota

WAØONL 1,083,852-1428-253-C-
WAØCPX(WBØDGA,opr.) 214,011- 553-129-C-40

Canada

Maritime-Newfoundland

VE1BKB(VE3AIA,opr.) 1,047,384-1492-234-C-71
VE1MX 348,285- 749-155-C-47
VE1BCZ 122,760- 310-132-A-36
VE1AIH 60,894- 199-102-B-20
VO1AW 55,800- 248- 75-C-12
VE1AJP 52,425- 233- 75-A-37
VE1EP 51,360- 160-107-C-20
VE1BHA 20,274- 109- 62-A-15

Quebec

VE2AYU 351,120- 770-152-C-72
VE2WA 229,758- 514-149-C-30

Ontario

VE3KZ 379,620- 666-190-C-38
VE3DU 346,248- 916-126-C-49
VE3IR 124,266- 278-149-C-42
VE3DZV 69,750- 250- 93-C-38
VE3GCE 59,220- 210- 94-C-31

Manitoba

VE4XJ 159,003- 453-117-C-30
VE4MP 14,040- 90- 52-C-36

VE5DX 656,292-1202-182-C-90

Alberta

VE6LU 253,485- 645-131-C-56
VE6APN 21,450- 130- 55-A-30

British Columbia

VE7FE 20,829- 131- 53-A-39
VE7DTA 7560- 60- 42-C-34

Multi-Single

U.S.A.

1

Connecticut

WA1NRF(+WA1s MAO QNF, WR1AEP) 2,431,308-2486-326-C-90
K1JHX(+K1VTM,WR1AEP) 1,710,072-2088-2V3-C-75
K1ET(WA1s OCU RYL SQB STO, WR1AEP)* 348,810- 755-154-C-31
K1TZD(+WA1OCU,WR1AEP) 127,437- 397-107-C-20
K1ZZ(+WR1AEP)* 31,920- 140- 76-C- 8

Eastern Massachusetts

W1RR(+W1KM) 2,082,270-2239-310-C-96
W1MX(WA1s RJX SHO,WA2DRC, WB2FUH,WA4TTG,oprs.) 1,022,868-1353-252-C-96

Maine

K1RQE(+K1OEY) 1,242,042-1511-274-C-80

Vermont

K1IIK(+K1RQF) 999,708-1468-227-C-79

2

N.Y.C.-L.I.

WA2LQO(K2s KSP UAT,W2DKM, WB2s GSU PYK TZW) 266,910- 574-155-C-61

Northern New Jersey

WA2UOO(+W2FVS,WB2FLF) 1,659,144-1894-292-C-95
W2YD(+WB2s RKK SZO) 1,036,800-1728-200-C-40
WA2AYY(+WA2GMO) 33,966- 153- 74-B-17

Southern New Jersey

K2AA(K2s FT KA,W2NEA,oprs.) 410,025- 781-175-C-66
W2UI(+WA3KRD) 336,420- 630-178-C-62

3

Delaware

W3NX(+W3s HB DRD) 846,192-1156-244-C-

Eastern Pennsylvania

N3LR(+WA3LAB) 689,472-1216-189-C-80
W3YFV(multiop) 99,540- 316-105-C-28
WA3NAF(+WA3SXU) 69,549- 239- 97-C-12

Maryland - D.C.

K3WX(WA3GUI,WB3FKG,W5TWT oprs.) 182,280- 490-124-C-30

Western Pennsylvania

K3RN(K3BSY,W3GXF,oprs.) 191,976- 421-152-C-
W3YI(WA3s GSB TBL TIQ VJL) 34,440- 164- 70-C-21

4

Southern Florida

WA4LZR(K4XF,N4s AM RU, WA4s ARL LOZ,WB4s QLN RRC) 830,760-1288-215-C-96

Virginia

W4WIN(+WA4WKY) 329,208- 638-172-C-61

5

Northern Texas

W5TMN(+K5VTA,W5LUJ,WA5RXT, WB5s AOF OOE SBH SFX) 2,342,904-2381-328-C-96

Southern Texas

K5PFL(+K5RLW,N5OM,WA5s NVF WCT,WB5s HOD LIC MYO QWX) 1,209,780-1551-260-C-90
W5KFL(+WA5ZWC) 75- 5- 5-C- 5

6

East Bay

WB6JIK(+WA6s BFL BMV VEF VZN,WB6ION,WA7RPI) 591,192-1288-153-C-76
K6HIH(multiop) 439,848- 984-149-C-
WA6JUD(+W6OAT) 278,835- 641-145-C-57
K6RK(multiop) 32,844- 161- 68-C-39
K6CSL(+2M Net) 810- 30- 9-A-73

Los Angeles

K6SEI(+WB6CEI) 1,586,004-2212-239-C-88
W6RTT(N6DE,WA6OTU,WB6KJI, oprs.) 431,964-1014-142-C-51

Santa Clara Valley

WA6DQM(+W6BJH,VE7ZZ) 1,292,451-1849-233-C-96
N6MG(+WA6PGB,WR6ACZ) 1,244,196-1819-228-C-96
W6OKK(+WA6MQS,WB6DSV) 1,094,688-1629-224-C-96
K6DC(+W6BJH) 991,737-1597-207-C-95
N6GG(+K6QX,WA6HJV) 952,620-1587-200-C-90
K6UD(+W1ARR,W6XR,WA6TLV) 698,493-1483-157-C-56
W6CF(+Net) 202,752- 528-128-C-
N6OM(multiop) 124,584- 358-116-C-55
WA6GFY(K6CN,WB6EXW,oprs.) 49,140- 260- 63-C-10
K6CN(multiop) 8250- 110- 25-C-10

San Diego

W6ISA(+WA6CXK,WAØOOL) 1,086,981-1897-191-C-90

San Francisco

W6BIP(+WA6DJI) 733,788-1308-187-C-75

San Joaquin Valley

K6AO(multiop) 434,922- 838-173-C-51
K6AYA(+WA6OEC) 330,750- 875-126-C-64
K6YK(+WA6BXI) 137,172- 497- 92-C-23

7

Arizona

W7RUK(multiop) 87,957- 337- 87-C-24

Idaho

WA7WXY(+K7NHV,WA8VRB) 1,048,866-1547-226-C-54

Washington

N7XX(+WA1KKM) 1,516,086-2418-209-C-95
W7FR(W7PHO,WA7TLK,oprs.) 242,235- 769-105-C-38

8

Michigan

K8IA(+W8TD,WB8VWE,K8s ED MD) 1,534,992-1808-283-C-88
W8CQN(+K8QKY) 1,118,754-1366-273-C-84
W8GLC(+K8IFE,WA8s MEC OJR, WB8ITB) 273,525- 521-175-C-96
WA8ZCO(+WA8V11) 42,048- 192- 73-C-38

Ohio

WB8JBM(WB8s DQP LSN,oprs.) 652,014-1221-178-C-90
WD8CPU(+WA8QLF) 305,712- 579-176-C-65
W8LT(WA1LKU,W8MDB,WB8s IBZ JXS PHI TXE,oprs.) 204,633- 429-159-C-50

9

Illinois

WA9IVL(+WA9LZA) 728,343-1051-231-C-88
W9KNI(multiop) 648,993- 953-227-C-
W9LKJ(+WA9PBK) 456,960- 896-170-C-37

Indiana

WB9QNB(+WB9s RZU YBE) 265,608- 527-168-B-80

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Missouri

WBØRRA(+WBØSEO) 99,990- 303-110-A-
WØJU(+KØVBU) 84,105- 267-105-C-20

Canada

Ontario

VE3AKG(+VE3BVD) 48,870- 181- 90-C- 9

Manitoba

VE4OY(+VE4VV) 86,592- 328- 88-B-34

Multi-Multi

U.S.A.

1

New Hampshire

W1GQO(multiop) 1,966,869-2253-291-C-48

2

Eastern New York

W2PVI(+K1ZZ,W1CW,WA1NNC, K2ITG,WA2SPL,WB2s AXY CKO OFU) 4,655,016-3748-414-C-96

Northern New Jersey

K2CW(multiop)
1,926,482-1779-286-C-89

3

Delaware

W3SL(multiop)
24,156- 122- 66-C-18

Eastern Pennsylvania

N3RS(+N3RD,W3IFG,WA3s FFR LRO) 5,821,140-4420-439-C-96
W3GM(+K3s JLT KPV, W3s DT GID, WA3s JYB WIM)
3,483,480-2860-406-C-96
WA3NNA(+W3GRS)
1,225,008-1448-282-C-80
W3GU(+K3CY)
670,800-1040-215-C-51

Maryland - D.C.

W3FAI+K3NA,W3ABC,WA3s QIA TOE ZAS,WB8IJW)
5,812,242-2686-349-C-96
W4NL/3(+W3NL,WA3s AFQ NGS, K4s FJ WVT,W6AXX)
2,748,636-2524-363-C-96

Western Pennsylvania

W3IV(+W3s AOH VW)
1,697,706-1899-298-C-60

4

Virginia

W4BVV(+WA1JLD,KJ0AE,W3ZZ, WA3AMH,K4s GKD YF,W8LHL, K9DDA) 5,464,440-4236-430-C-96

5

Northern Texas

W5MYA(+W9s BJA ZSX,WA5UCT, WB5IZN)
2,092,953-1999-349-C-96

Southern Texas

WA5LES(+K5s AAD KG LWL WA, W5s VAH VQ VX,WA5s OCN ZNY, N5AM) 4,456,722-3742-397-C-96

6

East Bay

K6ZM(+K6STI,W6UZX,WA6s DGX VEF,WB6s CEP OQT)
1,957,446-2529-258-C-96
W6RGG(+K6RM)
907,410-1490-203-C-96

Orange

W6HA(+N6AV,WA6DGQ,WB6FGE)
1,741,680-2460-236-C-96

Santa Clara Valley

W6NLZ(+W6s LPK OOL)
1,146,303-1901-201-C-96
W6YX(WB4SMA,WA6ITV,WB6ZUC WA7s MMK MGX, oprs.)
928,404-1517-204-C-96

8

Michigan

W8ROF(+K8LJR,W8s HBK KPL SRK,WA8s LYF EYE)
1,687,260-1844-305-C-96

9

Illinois

W9YYG(multiop)
866,592-1224-236-C-78

Indiana

W9CL(multiop)
2,165,772-2242-322-C-94

High Band

U.S.A.

1

Connecticut

W1HFB	163,305-	573-	95-C-12	
K1KW	113,475-	425-	89-C-82	
WA1FCN	33,831-	179-	64-A-	
W1CDC	24,648-	168-	52-C-18	
K1WJL	300-	10-	10-A-	4

Eastern Massachusetts

K1NOL	950,274-	1703-	186-C-65	
W1FJJ	359,968-	677-	128-C-32	
WA5YL/1	180,942-	569-	106-C-17	
W1PLJ	4872-	56-	29-B-18	
W1YS	4680-	65-	24-B-	6

Maine

W1HWL	159,216-	496-	107-B-36	

New Hampshire

K1FWE	348,552-	824-	141-C-56	
W1HMF	91,455-	321-	95-B-24	
W1GME	30,378-	166-	61-C-19	
W1NH	5808-	44-	44-B-	6
WB1AHX	2418-	31-	26-A-	8

Rhode Island

W1GYY	57,204-	227-	84-B-35	
W1YNE	27,594-	146-	63-C-12	
WA1YKW	561-	17-	11-A-	4

Western Massachusetts

K1DKX	277,851-	917-	101-C-60	
W1AUT	11,004-	131-	28-C-18	
K1KNQ	3402-	42-	27-C-	4

2

Eastern New York

W2AO	237,696-	619-	128-C-36	
WA2MBB	3105-	45-	23-B-	5
WB2WRR	2109-	37-	19-A-10	
WB2CRV	2016-	32-	21-C-	5

N.Y.C.-L.I.

WB2PYM	526,131-	1103-	159-C-45	
W2BA	302,742-	726-	139-A-69	
W2NY(WA2YCQ,opr.)	286,604-	749-	132-C-41	
W2AYJ	169,912-	446-	124-C-26	
WA2ZBW	130,500-	375-	116-A-40	
W2GC	73,377-	263-	93-C-19	
WB2AMU	72,105-	253-	98-B-40	
WB2GDZ	63,666-	262-	81-C-20	
W2AFM	59,064-	214-	92-B-39	
WA2FNY	29,835-	195-	51-B-18	
W2CKR	4116-	49-	28-C-	5
K2VWN	12-	2-	2-B-	1

Northern New Jersey

W2EQK	344,304-	797-	144-C-55	
W2WD	248,532-	556-	149-C-53	
WB2RWY	225,156-	647-	116-C-20	
W2FWY	20,967-	137-	51-C-30	
WB2GGO	9315-	69-	45-B-14	
WA2PCF	8h70-	85-	34-C-	
K2EAC	600-	20-	10-B-	3
WB2ASD	360-	12-	10-B-	1

Southern New Jersey

WA2BZX	99,084-	359-	92-B-46	
W2ESX	39,600-	264-	50-B-21	
W2FBF	39,000-	200-	65-C-11	
W2BZ	28,116-	142-	66-C-	
W2HAZ	6840-	57-	40-A-	5

Western New York

W2SEC	140,580-	426-	110-B-41	
W2AEM	76,110-	299-	86-C-34	
W2FTY	42,408-	186-	76-A-48	
W2LK	24,966-	146-	57-C-10	
WA2ABN	11,421-	81-	47-A-32	

3

Eastern Pennsylvania

W3JO	248,352-	796-	104-C-55	
W3BB	81,864-	379-	72-C-28	
WA3YXR	57,581-	237-	81-C-40	
WA3ZV	29,892-	188-	53-C-21	
W3DRD	5304-	52-	34-B-	8

Maryland - D.C.

W3GRF	673,575-	1283-	175-C-50	
W3GG(WA3VGP,opr.)	157,920-	458-	80-C-	
W3ZSR	95,931-	323-	99-C-27	
W3CRE(WA3VGP,opr.)	43,473-	337-	43-C-10	
K4KWE/3	41,382-	209-	66-C-	
W3ML	28,908-	95-	37-B-	6
WA3YMA	21,924-	126-	58-A-10	
W3EE	12,394-	81-	51-B-23	

Western Pennsylvania

WA3SZX	717,933-	1433-	167-C-	
K3DR	9009-	77-	39-C-	7
W3BRG	168-	8-	7-A-	4

4

Alabama

W4RAL	10,800-	72-	50-A-	
K4GUS	6084-	52-	39-B-10	
WB4VKW	390-	13-	10-A-	1

Georgia

WB4TDH	245,784-	539-	152-B-41	
K4KZP	191,646-	507-	126-C-45	
K4BAI	165,504-	431-	128-C-21	
W4BBP	129,042-	402-	107-C-11	
K4DXI	84,480-	256-	110-C-37	
WB4OPG	80,115-	245-	109-A-44	
WB4HNC	4752-	48-	33-C-10	
WB4WRM	2775-	37-	25-B-16	
W4GXW	5-	1-	1-A-	1

Kentucky

WB4FOT	52,290-	210-	83-A-14	
WB4KTR	52,008-	197-	88-C-18	
WB4ZCH	9372-	71-	44-A-12	

North Carolina

K4CBY	32,928-	196-	56-C-19	
WA4PSL	13,158-	102-	43-B-	4

Northern Florida

W4WHK	258,534-	542-	159-C-60	
WB4CTI	7584-	79-	32-C-10	
W4EEO	4800-	40-	40-A-20	

South Carolina

WB4NRI	53,580-	235-	76-C-48	
WB4WOK	12-	2-	2-A-	1

Southern Florida

W4NQI	40,581-	167-	81-C-34	
WD4CWL	7998-	62-	43-B-22	
W4NTE	6237-	63-	34-B-19	

Tennessee

N4ZZ	178,176-	518-	116-C-25	
WA4FDR	102,144-	304-	112-C-17	
WB4WFT	44,280-	180-	82-B-14	
WA4MKU	38,151-	157-	81-A-23	

Virginia

N4MM	711,810-	1438-	165-C-50	
K4HLJ	344,871-	723-	159-C-49	
K4ZVS	125,664-	374-	112-C-49	
N4XD	116,358-	451-	86-C-49	
WA4MSX	11,454-	83-	46-A-	6
W4ZM	4410-	42-	35-B-	2
WA4SGV	160-	10-	5-A-	1

5

Arkansas

WA4ARV/5	60,720-	230-	88-C-31	
WB5EYEM	35,910-	171-	70-C-11	
W5EIJ	8844-	67-	44-B-13	

Louisiana

K5KLA	106,260-	322-	110-C-23	

Mississippi

WB5KIW	15,903-	93-	67-B-28	

New Mexico

W5TVX	11,040-	115-	32-B-72	

Northern Texas

W5PCO/5	374,178-	826-	151-C-42	
WA5VUW	170,430-	437-	130-C-51	
WB5SBH	7881-	71-	37-C-	9
WB5PIP	1701-	27-	21-A-10	

Southern Texas

W5GO	219,504-	538-	136-C-68	
W5JC	93,534-	262-	119-C-46	
W5OSJ	3864-	46-	28-B-	6
W5QO	540-	15-	12-B-	
WA5IYX	243-	9-	9-B-	6

6

East Bay

WA6BMV	11,448-	106-	36-C-10	

Los Angeles

W6AQ	179,487-	777-	77-C-64	
K6ELX(WB6GHH,opr.)	136,218-	622-	73-C-48	
WA6TLA	89,394-	317-	94-C-35	
WB6PNB	41,454-	282-	49-C-13	
WA6ZKI	6966-	86-	27-B-21	
W6FZX	4293-	53-	27-A-72	

Orange

WA6WZO(K6LL,opr.)	490,464-	1248-	131-C-55	
K6CYX	107,520-	512-	70-C-40	
W6HJ	16,146-	138-	39-C-28	
W6TFK	1296-	36-	12-A-10	

Santa Barbara

K6OW	94,464-	384-	82-C-56	
N6MA	28,080-	208-	45-B-	7
W6OUL	2451-	43-	19-C-	7

Santa Clara Valley

W6HJP	337,125-	775-	145-C-56	
W6CLM	44,469-	245-	61-C-34	
WA6HJV	17,340-	170-	34-C-25	
W6OL	1767-	31-	19-B-	4
WA6NKK	405-	15-	9-C-	2

San Diego

W6ABT	123,600-	400-	103-C-30	
W6BZE	66,912-	326-	68-C-28	
W6FF	52,992-	276-	64-C-45	

San Joaquin Valley

N6EE	200,586-	662-	101-C-39	
W6BYH	960-	20-	6-B-	6

Sacramento Valley

W6KYA	17,112-	124-	46-B-10	
W6AJY	378-	21-	6-C-	6

7

Arizona

WA7YRP	373,725-	825-	151-C-65	
WB7BEY	29,736-	177-	56-A-50	
WA7KLK	12,423-	101-	41-C-14	

Nevada

WA7YHP	34,029-	199-	57-B-43	

Washington

WA7OBL	213,624-	774-	92-C-53	
W7ETZ	175,104-	608-	96-C-41	
WA7TIM	161,700-	770-	70-C-52	
WA7ICB	160,612-	704-	76-C-36	
W7WMO	82,080-	380-	72-B-34	
W7APN	56,880-	316-	60-C-11	
W7BUN	29,193-	263-	37-C-14	

8

Michigan

K8ETO	473,229-	1031-	153-C-66	
K8QWG	18,252-	117-	52-B-22	
WB8DTT	12,324-	79-	52-B-	9
WA8KME	10,062-	86-	39-C-	7
WA8RXI	7854-	77-	34-B-	6

Ohio

K8UQA	402,705-	1413-	95-C-60	
K8RRM	153,300-	511-	100-A-40	
WB8RIJ	106,080-	340-	104-C-35	
K8PSG	101,850-	350-	97-B-40	
WB8QIS	35,991-	279-	43-C-29	
W8GQU	21,114-	138-	51-C-21	
WD8AOM	17,331-	109-	53-A-25	
K8NXV	6075-	81-	25-B-11	
W8ICC	5664-	59-	32-B-30	
W8IRT	1794-	26-	23-B-	7

9

Illinois

W9NLR	233,160-	580-	134-C-47	
W9FT	89,178-	334-	89-C-30	
W9UQN	65,493-	383-	57-C-22	
WB9HAU	45,342-	229-	66-C-60	
K9MMS	36,000-	200-	60-B-	
W9QWM	24,000-	125-	64-B-	
W9TNZ	12,402-	78-	53-A-26	
WB9QGU	2673-	33-	27-B-	9

Indiana

WB9LHI	821,100-	1664-	178-C-58	
W9LT	554,580-	1185-	156-C-54	
W9JQO	131,544-	378-	116-C-36	
W9WCE	48,837-	223-	73-B-27	
WA9FFZ	15,105-	95-	53-A-36	
WA9BWY	2277-	33-	23-C-	2

Wisconsin

WB9BJO	50,358-	218-	77-B-	
WB9TSL	45,069-	181-	83-A-40	
WB9NME	28,359-	137-	69-B-21	

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Iowa

W0PRY	314,415-	685-	153-A-40	
WA0WCR	167,805-	495-	113-C-46	
WA0VBW	18,054-	102-	59-B-25	
WB0LJU	17,100-	100-	57-A-23	
WB0PYD	16,435-	105-	49-A-10	

Kansas

K0FPC	2625-	35-	25-A-	9

Minnesota

W0QUE	427,140-	1017-	140-C-61	
WA0KDI	52,059-	259-	67-C-25	
WB0OLL	528-	16-	11-B-	8

Missouri

W0TDR	270,570-	622-	145-C-27	
W0EO	235,440-	654-	120-C-48	
W0SO	49,842-	213-	78-A-22	
W0HBH	35,478-	162-	73-C-	
WB0TDZ	32,550-	175-	62-C-30	
W0RJK	11,766-	106-	37-C-32	
W0NN	11,610-	90-	43-C-	6
K2EKM/0	1514-	23-	22-B-	4
WA0QOA	60-	5-	4-B-	2

North Dakota

W0JWL	24-	4-	3-B-	2

Canada

Maritime-Newfoundland

VE1EK	19,968-	128-	52-A-13	
VE1UNB	585-	15-	13-B-	4
VE1AMN	90-	6-	5-B-	1

Ontario

VE3DCI	118,575-	426-	93-C-60	
VE3EJK	98,208-	352-	93-B-30	
VE2AEJ/3	20,511-	129-	53-B-28	
VE3WW	4488-	44-	34-B-	6

Saskatchewan

VE5YA	114,300-	508-	75-C-30	

Alberta

VE6KW	157,680-	720-	73-C-42	
VE6AMR	17,649-	159-	37-C-22	
VE6AVO	6864-	88-	26-A-10	
VE6CEC	510-	17-	10-C-	3

Low Band

U.S.A.

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Connecticut

WA1UAC	71,841-	311-	77-C-35	
WA1YFW	960-	20-	16-B-	6

Eastern Massachusetts

W1NJL	209,880-	583-	120-B-54	
W1BB/1	969-	19-	17-A-	9

New Hampshire

W1UN	82,620-	306-	90-C-23	
K1CZM	200-	20-	10-A-	6

Rhode Island

K1TZQ	144,126-	471-	102-C-48	

Western Massachusetts

WA1FBX	3690-	41-	30-C-	6

2

Eastern New York

W2HHC	154,344-	472-	109-C-36	
W2IB	143,016-	404-	118-C-	

Northern New Jersey

WB2CST	49,225-	228-	67-C-30	
WB2VFI	2415-	69-	23-B-	2

Western New York

WA2MBM	23,123-	181-	61-C-35	
K2VV	25,944-	184-	47-C-11	
WA2ZRI	390-	13-	10-B-	7

3

Eastern Pennsylvania

K3NPC	9675-	75-	44-B-20	

Maryland - D.C.

W3GZQ	29,106-	154-	63-C-33	

Western Pennsylvania

WA3SWF	51,000-	200-	85-C-20	

4

Georgia

N4PN	300,753-	711-	141-C-47	
WA4APG	19,714-	97-	64-C-15	
WB4RUA	7656-	58-	44-C-	6

Northern Florida

W4VQ	158,100-	425-	124-C-27	

Virginia

W4HBK	172,236-	463-	124-C-49	

5

New Mexico

WA5YTX	8811-	89-	33-C-	5

Northern Texas

W5KLB	52,887-	289-	61-C-50	
K5JVF	3960-	40-	33-A-30	

6

East Bay

WB4TJV/6	624-	26-	8-A-	4

Los Angeles

W6DYD	64,668-	634-	34-C-36	
N6KA	60,390-	306-	66-C-	
WB6VVS	72-	6-	4-A-	2

Orange

WA6WZN(K6LL,opr.)	3729-	113-	11-C-	3

Santa Clara Valley

WA6SFT	184,671-	467-	71-C-34	
K6SMH	3960-	55-	24-C-	7

San Diego

K6LLL	3519-	51-	23-C-	5

San Francisco

WA6UNM	13,770-	170-	27-C-11	
K6ILM	1836-	51-	12-A-	2

7

Arizona

WB6NRK/7	38,340-	213-	60-C-	
W7AYY	11,664-	162-	24-C-	9

Washington

W7YTN	234,784-	892-	84-C-68	

8

Ohio

W8IQ	11,223-	87-	43-B-	7
WA8RCN	6804-	63-	36-B-	7

9

Illinois

K9DWK	54,676-	213-	84-C-36	

Wisconsin

WB9MOG 10,449- 81- 43-C-24

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Iowa

WØFHE 18,054- 102- 59-C-16

Minnesota

WBØANT 22,770- 110- 69-C-35
KØIHG 756- 21- 12-B-

Missouri

WBØNOU 44,100- 196- 75-C-37
WAØFBQ 25,530- 115- 74-C-45

Canada

Alberta

VE6AYX 405- 15- 9-B-12

U.S.A.

Phone

Single-Op

1

Connecticut

WA1STN(WA1JLD,opr.) 1,691,352-1668-338-C-71
W1HFB 1,012,626-1114-303-C-71
W1YG 892,920-1063-280-C-
WA1SSH 506,100- 700-241-A-68
W1GPK 479,196- 783-204-C-49
WA1KOC 118,950- 305-130-B-20
WA1NSW 99,900- 300-111-C-
K1THQ 62,790- 182-115-A-20
W1VV 51,300- 171-100-C-15
W1AB 41,184- 143- 96-C- 9

Eastern Massachusetts

W1YN 1,260,765-1415-297-C-70
WA1JUY(WA2ROZ,opr.) 304,920- 605-168-C-43
W1MR 295,182- 529-186-C-50
WA1RBR(WB2GXW,opr.) 219,726- 626-117-C-35
W1HWM 161,109- 351-153-B-39
W1YZL 88,572- 242-122-C-
W1DYH 77,490- 246-105-C-47
W1FJJ 70,305- 215-109-C-
W1IUU 34,020- 135- 84-C-
W1CRL 2916- 36- 27-A- 6

Maine

K1RQE 389,788- 762-258-C-36
W1SD 161,109- 351-153-C-
K1VMQ 10,665- 79- 45-C- 5

New Hampshire

W1LQW 141,870- 390-121-B-
W1HAF 101,682- 269-126-A-34

Rhode Island

K1HMO 243,576- 408-199-C-40

Vermont

K2LE/1 1,461,042-1551-314-C-70
K1IIK 610,080- 820-248-C-67

Western Massachusetts

WA1ABW 2,093,904-2096-333-C-71
WA1FRX 125,202- 271-154-C-43

2

Eastern New York

WA2AUB 196,875- 375-175-C-43
W2AZO 150,396- 332-151-C-19
K2SD 81,096- 218-124-C-14
W2MNK 48,594- 182- 89-A-
W2PFG 37,947- 139- 91-C-11
WA2LJM 27,324- 132- 69-C-28

N.Y.C. - L.I.

WB2FLF 459,837- 811-189-C-38
WA2YHK 236,400- 400-197-C-40
WB2SJG 196,020- 396-165-A-
W2LEJ 155,064- 364-142-B-55
W2GKZ 130,806- 338-129-C-19
W2SGK 84,456- 204-138-C-24
WB2ISB 21,240- 120- 59-C-18
W2IRV 18,600- 100- 62-A-10
W2OIS 12,696- 92- 46-A-10
K2VWN 714- 17- 14-C-13

Northern New Jersey

W2GXD 1,824,642-1821-334-C-87
WB2RJJ 532,134- 799-222-C-55
WB2SZO 371,385- 655-189-C-40
WA2UOO 172,272- 388-148-C-13
W2ZZ 74,229- 227-109-C-24
WB2FII 69,324- 212-109-C-14
W2EQK 67,068- 207-108-C-18
WA2ZWH 63,450- 225- 94-A-36
WA2EJZ 21,840- 104- 70-B-14
W2HN 17,955- 95- 63-C-15
W2RS 13,578- 73- 62-C-11
WB2HJW 5294- 63- 28-B- 4

Southern New Jersey

W2HMH 2,621,328-2252-388-C-78
K2FL 848,232- 918-308-C-71
WB2HAN 497,553- 817-203-C-63
W2HBT 460,305- 795-193-B-34
WB2JJN 384,282- 577-222-C-55
WA2AEJ 149,247- 309-161-C-35
W2FGY 144,900- 350-138-B-46
W2REH 131,880- 280-157-C-12

K2ID 99,750- 266-125-C-31
W2LYL 80,976- 241-112-C-10
W2PAU 79,125- 211-125-C-27
W2FBF 77,592- 212-122-C-20
W2FHY 59,892- 217- 92-C-25
K2SB 21,624- 106- 68-C-
W2SDB 2100- 28- 25-C- 6

Western New York

WB2LOF 136,620- 330-138-A-30
K2JZT 25,545- 131- 65-C-12

3

Delaware

W3WD 13,680- 80- 57-B-18

Eastern Pennsylvania

W3BGN 1,857,240-1848-335-C-75
W3JSX 569,904- 766-248-C-69
W3GID 464,310- 670-231-C-55
WA3WRD 349,566- 574-203-C-96
W3KHB 285,354- 498-191-C-70
W3KFQ 277,368- 508-182-C-36
K3WOK 234,741- 463-169-C-60
K3MBF 223,200- 775- 96-C-23
K3II 213,675- 385-185-C-
WA3MHD 192,858- 487-132-C-56
W3GRS 183,762- 369-166-C-96
K3AWZ 180,900- 335-180-C-24
W3ALB 177,225- 425-139-C-48
W3EVW 129,210- 295-146-C-20
WA3ATX 87,630- 230-127-C-21
W3OV 82,836- 236-117-C-22
WB3BKD 58,710- 190-103-C-29
W3KV 54,144- 188- 96-C-96
W3AP 39,996- 132-101-C- 6
W3MM 15,660- 90- 58-C-96
W3DT 1800- 30- 20-C- 3

Maryland - D.C.

K3ZO 1,423,896-1502-316-C-75
W3GRF(WA3VQP,opr.) 844,434-1091-258-C-
W3FCI 419,100- 635-220-C-49
W3KA(WA3SXH,opr.) 388,512- 608-213-C-80
W3GZQ 330,096- 529-208-C-52
W3AZ 143,232- 373-128-C-50
W3HVM 58,800- 200- 98-C-16
WA3AFQ 32,508- 126- 86-C- 8
W3KWB(K3NA,opr.) 31,242- 127- 82-C-11
WB2JYM/3 27,492- 116- 79-C-12

4

Alabama

K4TIG 589,500- 750-262-C-66
K4TO 69,216- 206-112-C-
K4FHO 13,272- 79- 56-B-21

Georgia

N4PN 1,259,664-1288-326-C-76
W4WRY 213,312- 352-202-C-
W4GKI 12,432- 74- 56-B-47
W4UUH(W3CM,opr.) 9900- 66- 50-A-28
W4UYC 9672- 62- 52-C-96
WA4WSY 3690- 41- 30-B-26

Kentucky

WA4DCP 453,747- 697-217-C-67
WB4KTR 300,186- 459-218-C-40
WA4QMQ 173,160- 370-156-C-56
W4BCV 83,328- 217-128-C-19
WB4YPW 82,080- 240-114-C-68

North Carolina

N4AA 388,851- 571-227-C-37
K4GFH 248,310- 465-178-C-39
W4OMW 38,610- 143- 90-C-17
N4CQ 38,190- 134- 95-C-16
WB4KZG 11,289- 71- 53-B-10
W4UW 3906- 42- 31-C-19

Northern Florida

W4WKQ 163,533- 361-151-C-42
WB4CTI 21,528- 138- 52-B-10

South Carolina

W1WVL/4 221,364- 429-172-C-45

Southern Florida

K4CL 373,980- 542-230-C-62
WA4ZRU 341,640- 520-219-C-54
WB4OGW 187,590- 338-185-C-39
W4WBC 159,390- 330-161-C-31
W4HVU 34,485- 121- 95-C-22

Tennessee

WA4EAV 216,576- 384-188-C-80
W1FCC/4 210,936- 374-188-C-26
W4DUP 121,380- 238-170-C-

Virginia

W4QCW(WA8ZDT,opr.) 2,190,459-1877-389-C-90
K4VX 2,071,224-2007-344-C-75
W3ZKH/4 1,293,003-1377-313-C-
N4RA 618,888- 856-241-C-60
WB4OXD 377,676- 538-234-C-45
K4VT 303,501- 541-187-C-31
KØCMF/4 255,339- 441-193-C-52
N4DD 193,950- 431-150-C-36
WA4QOC 107,679- 251-143-C-25
K4DTO 75,600- 225-112-C-26
WA4HPF 64,260- 210-102-C-21
W4KMS 59,472- 177-112-C-21
W4OM 54,756- 169-108-C-25
W4XR 52,323- 163-107-C-12
W4JVU 49,914- 141-118-C-30
W4LEU 43,680- 140-104-C-16
WB4YPT 30,552- 134- 76-C-15
WA4TLB 28,782- 117- 82-C- 7
K4IAF 28,677- 121- 79-C-10
WA4WYN 18,000- 100- 60-A-15

W4UBE 17,952- 88- 68-B-38
WA4DUS 8280- 60- 46-C- 6
W4DM 6786- 58- 39-C- 2
K4WVT 4950- 50- 33-C- 5
W4EZ 4257- 43- 33-B- 3
K4ZVS 2652- 34- 26-C- 9

5

Arkansas

W5NF 93,696- 244-128-C-53

Louisiana

K5KLA 632,610- 781-270-C-62
K5UA 66,054- 218-101-C-
W5OB 26,352- 122- 72-C-18
WA5WEY 6150- 50- 41-C-

New Mexico

K5EVK 161,352- 332-162-C-40

Northern Texas

K5VTA 362,355- 493-245-B-66
WA5VOQ 72,468- 198-122-C-27

Oklahoma

W5JME 84,963- 223-127-C-50
K2GKK/5 42,390- 157- 90-A-30

Southern Texas

K5LWL 1,908,498-1777-358-C-91
W5BE 123,216- 272-151-C-52
K5TSQ 112,119- 281-133-C-36
W5LUU 84,366- 218-129-B-32
WB5HGS 83,496- 284- 98-C-16
W5SBX 72,963- 201-121-A-15
WA5CBT 68,400- 200-114-C-26
W5ELN 27,702- 162- 57-A-47
K5EWJ 19,899- 99- 67-C-11
K5RF 7680- 64- 40-C-25
WB5YVQ 1380- 23- 20-B-26

6

East Bay

W6PM 234,024- 392-199-C-46
W6KNH 222,480- 515-144-C-55
WA6BFL 765- 17- 15-A- 8

Los Angeles

K6AC(N6TR,opr.) 1,212,330-1610-251-C-65
W6CN 48,792- 214- 76-A-49
N6ZZ 28,782- 123- 78-C-17
WB6KJI 15,300- 85- 60-B-12
WB6CBY 2070- 30- 23-C-13

Orange

WA6WZO 550,449-1073-171-C-56
W6BA(WB6FCE,opr.) 124,236- 493- 84-C-24
WB6YPX 64,116- 274- 78-C-32
K6TXA 62,118- 238- 87-C-16
W6YMV 41,796- 172- 81-C-24
WA6HGS 3024- 42- 24-C- 9

Santa Barbara

W7CB/6 184,626- 526-117-C-
K6QPH 164,424- 403-136-C-31

Santa Clara Valley

WB6GFJ 691,416-1067-216-C-64
K6BR 427,728- 938-152-C-40
W6EYY 357,420- 851-140-C-36
K6SSJ 226,512- 572-132-C-36
W6LQC 187,695- 485-129-C-32
WB6JGS 127,608- 409-104-C-32
W6VG 124,080- 376-110-C-30
K6DC 88,290- 270-109-C-18
W6BJB 62,622- 294- 71-C-25
W6YVK 59,013- 237- 83-B-24
WA6SFT 33,600- 200- 56-C- 5
K6RU 28,755- 213- 45-C- 9
W6IKW 3003- 91- 11-C- 4
K6SMH 1935- 43- 15-B- 7

San Diego

WAØOOL/6 665,820-1233-180-C-86
W6RCD 390,978- 612-214-C-54
W6IA 17,751- 97- 61-C-19

San Francisco

W6WB 52,416- 192- 91-C-32

San Joaquin Valley

W6PXG 460,782- 954-161-C-33

Sacramento Valley

K6SG 222,480- 515-144-C-73
K6DR 189,891- 541-117-C-65
W6NKR 28,875- 125- 77-C-22

7

Arizona

K7NN 638,928-1044-204-C-55
W7DTL 268,272- 552-162-C-76
K7NXH 264,492- 558-158-C-41

Idaho

WA7WXY 2,024,022-2359-286-C-73
W7IY 3240- 60- 18-A-18

Montana

W7JYW 303,408- 903-112-C-54
W7LR 81,528- 316- 86-C-19

Nevada

W7JUO 28,350- 126- 75-C-31

Oregon

W7TML 1,250,571-1921-217-C-72
WA7IHN 356,574- 887-134-C-72
K7VIC 167,577- 673- 83-C-56
K7GGY 34,365- 145- 79-B-25

Utah

W7HS 143,640- 360-133-C-55
WA7HCQ 43,890- 209- 70-C-27

Washington

K7DZ 736,485-1327-185-C-72
W7HAD 252,627- 787-107-C-40
K7MOK 103,305- 355- 97-C-24
W7BRU 102,018- 347- 98-C-41
W7WMY 67,200- 224-100-C-12
W7OF 33,180- 158- 70-C-24
W7LZF 7626- 62- 41-C-10
K7RSB 2331- 37- 21-C- 4
WB7ALT 1767- 31- 19-C-13
W7JEG 1224- 24- 17-C- 4

Wyoming

W7INH 68,670- 218-105-C-30

8

Michigan

W8FF 471,585- 745-211-C-50
K8CVV 56,502- 219- 86-C-37
W8QGP 51,450- 175- 98-C-21
WA8KME 7866- 57- 46-C- 6

Ohio

WA8YWX 805,467-1087-247-C-77
W8ZCQ 137,259- 303-151-C-26
W8SQ 104,877- 271-129-C-68
W8NXF 102,114- 279-122-B-42
W8YGR 70,785- 195-121-A-17
W8NPF 50,904- 168-101-C-35
W8CFG 45,864- 168- 91-C-15
K8DJC 44,322- 166- 89-A-35
K8CXM 21,312- 111- 64-C- 6
W8DWP 21,216- 104- 68-B-24
K8MR 4305- 41- 35-C- 3
K8MLO 1200- 20- 20-C- 5
WD8ACM 168- 8- 7-A- 8

West Virginia

W8AH 63,654- 206-103-C-17

9

Illinois

K9BGL 640,584- 868-246-C-73
W9BW 617,787- 783-263-C-57
W9CH 472,140- 610-258-C-63
W9OHH 445,374- 654-227-C-
W9DWQ 398,934- 599-222-C-39
W9NB 380,190- 551-230-C-65
K9KWK 376,035- 583-215-C-30
K9AB 366,300- 550-222-C-60
W9LUH 268,128- 456-196-B-36
K9UKM 240,597- 399-201-C-34
W9NZM 226,944- 384-197-C-52
K9KDI 204,792- 371-184-C-30
W9YH(WB9TIY,opr.) 186,984- 371-168-A-42
WB9IYO 93,312- 243-128-C-62
WB9UZU 64,746- 198-109-C-35
WB9EBO 64,584- 184-117-C-12
W9JUV 53,976- 173-104-C-21
W9RW 13,952- 86- 54-A-18
W9UOK 7644- 52- 49-C- 4
WA3KFR/9 3600- 40- 30-A- 8
W9JUI 1173- 23- 17-A- 7
WB9DVQ 765- 17- 15-B- 5
W9HPG 75- 5- 5-B- 5

Indiana

W9LT 1,202,928-1319-304-C-85
WA9BWY 1,166,400-1296-300-C-60
KØCVA/9 562,698- 727-258-C-69
WB9CEP 420,246- 631-222-C-70

Wisconsin

K9TZH 779,121-1043-249-C-67
K9CAN 228,420- 405-188-C-35
W9NA 184,860- 390-158-C-30
W9PJT 146,376- 321-152-C-23
WA9UEK 96,012- 252-127-C-27
K9DXO 56,430- 190- 99-C-28
WA9FXJ 17,889- 89- 67-C-10

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Colorado

WBØWNU 18,762- 106- 59-A-75

Iowa

WØFHE 329,130- 540-207-C-41
WBØOAZ 17,820- 90- 66-C-11
WAØVDX 1134- 21- 18-B- 3
WBØJTH 912- 19- 16-C- 6

Kansas

WØIUB 215,634- 433-166-C-34
WAØAGN 102,912- 256-134-C-61
WBØRET 72,036- 261- 92-C-20

Minnesota

WBØANT 391,848- 563-232-C-50
WAØUCU 214,728- 389-184-A-55
WØNG 61,200- 204-100-C-31
WØLP 16,416- 96- 57-C-19
WØSFU 2100- 28- 25-C- 7

Missouri

KØGSV 14,418- 89- 54-C-12
WØQYG 11,742- 103- 38-C-28
WØJRP 11,178- 69- 54-B-
WØPKO 1701- 27- 21-C- 8
WØFF 1512- 24- 21-A- 2

Nebraska

WØSBZ 18,612- 94- 66-C-21

North Dakota

WØJWL 17,298- 93- 62-B-30

South Dakota

WAØONL 1,020,225-1115-305-C-
WAØCPX 840,084-1022-274-C-80
WØWUU 36,105- 145- 83-C-

Canada

Maritime - Newfoundland

VE1BKB(VE3AIA,opr.) 750,000-1250-200-B-43
VE1AIH 168- 8- 7-C-

Quebec

VE2AYU 341,640- 730-156-C-67
VE2YU 20,079- 97- 69-C-

Ontario

VE3KZ 340,704- 546-208-B-25
VE3MV 40,257- 189- 71-C-23

Manitoba

VE4KE 340,197- 793-143-C-58
VE4RP 106,704- 312-114-B-62
VE4JK 70,596- 212-111-B-31
VE4XJ 36,975- 145- 85-C-15

Saskatchewan

VE5RA 481,320- 840-191-C-

Alberta

VE6LU 224,220- 505-148-C-60
VE6AGV 56,916- 306- 62-C-16

British Columbia

VE7AZG 89,622- 383- 78-C-30

Multi-Single

U.S.A.

1

Connecticut

K1JHX(+K1VTM) 1,999,488-2032-328-C-74
WA1NRF(+WA1s MAO NSW OCU, 220 Net) 1,839,447-1767-347-C96
WA1QNF(+WA1s SQB STN STU, WA8TBQ,WB8NAS, 220 Net) 1,018,095-1135-299-C-85
WA1WEM(+W1GNC) 768,768-1001-256-C-88

Eastern Massachusetts

WA1EUV(+WA1SSX) 427,176- 698-204-C-60
W1MX(WA1RJX,WA4TTG,oprs.) 243,360- 390-208-C-44

New Hampshire

WA1ABV(+WA1JYY,K2SIL) 2,095,203-1903-367-C-96
W1FMK(+W1FJJ,K1FWE) 240,996- 532-151-C-36

Western Massachusetts

K1RQF(+W1DKU) 237,804- 596-133-C-26

2

Eastern New York

WB2BXL(+K2BK,WA2MBB' WB2ECA) 381,060- 580-219-C-85

N.Y.C. - L.I.

WA2LQO(K2UAT,W2s DKM NZ, WA2s HSQ PYK,WB2s EJU TZW, oprs.) 252,540- 460-183-C-40
WA2JAS(multiop) 218,370- 502-145-C-48

Northern New Jersey

WB2RKK(+WA2s AJN DBD) 993,870-1227-270-C-90

Southern New Jersey

W2UI(+WA3KRO) 307,764- 498-206-C-63
N2SS(+ 2Mtr Net) 291,084- 508-191-C-28
K2AA(K2s FI KA, W2s NEA ORA, oprs.) 266,724- 478-186-C-50

Western New York

K2IGW(+WA2s ECA MBM) 897,897-1001-299-C-81

3

Delaware

W3NX(+W3s DRD HB)
505,344- 658-256-C-82

Eastern Pennsylvania

W3US(+N3II,WA3TZT,K8ETO)
1,426,572-1428-333-C-89
WA3YHT(multiop)
1,401,540-1645-284-C-48
W3DHM(multiop)
861,540- 830-346-C-76
W3YFV(multiop)
159,390- 330-161-C-30
W3KT((+net)
140,895- 303-155-C-96
WA3NAF(+WA3SXU)
136,320- 284-160-B-18

Maryland - D.C.

W3HWZ(+W3NL,WA3NGS,K4FJ,
WA3KOC/+K3AVT,WA3KQM)
1,068,408-1254-284-C-91
K3GJD(+WA3s URO VUQ)
1,058,196-1082-326-C-82
LU1BAR/W3(multiop)
416,091- 611-227-C-76
W3ZH(W3s HVQ TUX,oprs.)
7722- 66- 39-C- 7

Western Pennsylvania

K3HZL(+W3GXF,WA3FYJ)
762,912- 883-288-C-74

4

Alabama

W8FAW/4(+WN4KKN,2mtr net)
499,260- 628-265-C-40

Georgia

WA4PUJ(multiop)
87,516- 286-102-C-70

Kentucky

WB4NTB(WA4UNJ,WB4OEM,oprs.)
169,128- 324-174-C-65

North Carolina

WA4APO(+K4s CEB MQG NLH,
WA4s RJX UPA VCC,WB4s IZP
LBJ) 628,593- 809-259-C-76

Northern Florida

WA4UFW(+WA4PVT,WB4YKU)
258,300- 492-175-C-43
WB4OKY(multiop)
24,750- 110- 75-B-45

Southern Florida

WA4LZR(multiop)
781,284- 917-284-C-
W4SME(multiop)
89,208- 236-126-C-34

Tennessee

W4MI(multiop)
803,772- 996-269-C-90
K4TTA(+W4s NPB RIM)
576,612- 684-281-C-75
K4LN(+K4s APH IAF LSP,W4DMS,
WA4s EJX LOE MCZ QDQ ZAL,
WB4s NIR RJG RRJ)
531,570- 754-235-C-96

Virginia

W4OW(multiop)
17,820- 90- 66-C-96

5

Arkansas

N5DX(+WA5s RTG SDT,WB5YEM)
907,515-1005-301-C-96

Louisiana

W5WMU(+K5YMY)
2,334,375-2075-375-C-96

Northern Texas

W5TMN(+WA5s JMK RXT,
WB5SFX)
2,916,342-2266-429-C-96
WB5MWZ(+WB5PIP)
73,395- 233-105-C-35

Southern Texas

K5PFL(+K5s NA WA,WB5DOW)
444,675- 605-245-C-83
K5LZO(multiop)
1296- 24- 18-A- 4

6

East Bay

K6HIH(+WA6DGX,2Mtr Net)
1,201,464-1804-222-C-96
WA6JUD(+Net)
149,628- 674- 74-C-29
W6UZX(+2Mtr Net)
4698- 58- 27-C-10

Los Angeles

W6YRA(K1TOL,K6SVL,WA6MLZ,
WB6ICK,WA7DAC,WB0MRU,
oprs.) 1,694,250-2250-251-C-96

W6RR(+W6BHY)
1,521,300-1844-275-C-70
K6SE(+WA2THV,W7KUI)
788,499-1109-237-C-63

Santa Clara Valley

N6MG(+WA6PGB,2Mtr Net)
1,762,236-1998-294-C-96
N6GG(+K6QX)
825,840-1240-222-C-90
WA6CRI(+WA6HCI,WB6PYI)
669,636-1068-209-C-85
K6MA(+ 2MtrNet)
180,180- 420-143-C-31
K6OP(multiop)
48,000- 250- 64-C-29
W6CF(+ 2 mtr net)
39,846- 229- 58-C-96
W6ZYC(multiop)
34,476- 169- 68-C-26
K6CN(multiop)
15,072- 157- 32-C- 9

San Francisco

W6BIP(multiop)
452,412- 652-177-C-75

San Joaquin Valley

K6AYA(+K6TE,WA6OEC,WB6UJD)
584,151-1093-169-C-60
K6AO(multiop)
446,880- 784-190-C-56
K6YK(multiop)
43,260- 206- 70-C-13

7

Arizona

W7RUK(multiop)
297,864- 591-168-C-44

Nevada

WA7NIN(+W6OAT,WA6JUD,
WB6CEP)
1,601,235-2065-273-C-90

Washington

K3MNT/7(+WA1KKM,N7DX)
1,996,800-2560-260-C-92
K7RSC(+WA7UWE,WA0GQI)
1,377,978-2107-218-C-70
W7VRO(+W7s DQM EKM WA7ZWG)
1,298,970-1698-255-C-96
WA7URW(multiop)
352,230- 995-118-C-40

8

Michigan

K8IDE(+I1MOL,K8s ED IA)
3,274,625-3375-309-C-96
WB8VZU(+WA8PPF,WD8BWS)
527,094- 681-258-C-90

Ohio

K8RMK(+K8MR,WA8UQH)
858,600-1060-270-C-90
W8OKF(+WB8MMF)
344,520- 522-220-C-58
W8LT(WA1LKU,WA8YBT,WB8s
IBZ ICQ JXS TXE,oprs.)
224,640- 390-192-C-67

9

Illinois

W9RX(+ 2 meter net)
1,062,999-1077-329-C-94
W9KNI(multiop)
361,080- 510-236-C-96
WB9TXO(K9s HMA UGN,WA9WHB,
WB9s ACY ZUC,oprs.)
123,900- 350-118-C-75
WA9VOL(multiop)
108,900- 300-121-C-22
W9BLDH(multiop)
3240- 40- 27-C- 3

0

Colorado

WB0LLR(+WA0YFU,WB0NYY)
1,584,435-1993-265-C-86

Minnesota

WA0FQF(+WA0VPN,WB0LZR)
568,620- 780-243-C-90

Missouri

K0AZV(multiop)
43,650- 150- 97-C-30

Canada

Maritime - Newfoundland

VE1UNB(VE1s BCZ BEC BHA BJC
QT,oprs.) 142,848- 372-128-B-40

Ontario

VE3DFH(+VE3s BZP CDZ OPG ELI
EPJ FOU GNF GNP HGE,K8IFE,
W8GLC) 295,260- 532-185-C-96
VE3AKG(+VE3BVD)
213,444- 588-121-C-16

Manitoba

VE4EW(+VE4AH)
378,504- 751-168-C-36

Saskatchewan

VE5RG(VE5s DX UG)
703,485- 965-243-C-96

Alberta

W7AEK/VE6(+VE6BET,VE8RO)
12,575- 475- 79-C-55

Northwest Territories

VE8ML(multiop)
182,988- 884- 69-C-96

Multi-Multi

U.S.A.

1

New Hampshire

W1RR(+K1s LPA PLX VBL,W1s
FJI GQO,WA2s CLQ EKH,WB2s
HZH JAM,W4SYL)
6,450,000-4300-500-C-96

2

Eastern New York

W2PV(+K1s AR OMF ZZ,WA1s
JKJ NNC QZH,K2VV,WA2SPL,
WB2s AXY CKO MZE OEU)
6,884,703-4599-499-C-96

Northern New Jersey

K2CW(multiop)
1,438,863-1513- 317-C-84

3

Delaware

W3SL(multiop)
7524- 76- 33-C-17

Eastern Pennsylvania

K3WW(+K3s DZB WJV,WA3s LNM
RID) 3,518,343-2799- 419-C-96
W3GM(+K3s JLT KPV,WA3s JYB
WIM) 3,221,904-2408-446-C-96
N3RD(+N3RS)
1,933,560-1640-393-C-
W3GU(+K3CY)
733,194- 966-253-C-60
K3TGM(multiop)
412,800- 640-215-C-96

Maryland - D.C.

W3AU(+WA1FEO,K3EST,W3s AZD
IN,WA3HRV,W6UM,CX1EK)
5,867,910-3798-515-C-96
W3LPL(+WA2LQZ,WB3s AJQ AVN,
WB4SGV)
3,341,739-2549-437-C-96
W3FA(+WA3s LJP QIA TOE ZAS,
WB8IJW) 2,472,336-2124-388-C-96
K3NSS(multiop)
609,042- 853-238-C-78

Western Pennsylvania

W3TV(+W3s AOH VW)
248,940- 461-180-C-24

4

Virginia

W4BVV(+WA2TPW,K3s NA ZNV,
W3ZZ,WA3AMH,WB3BSV,K4GKD,
WA4TLB,WB4UKA,K0DDA,LU2DC)
5,465,424-3673-496-C-96
K4CG(K3WHW,W3IDT,WA3FUV,
K4YEP,W4s RVE ZM,WB4s BQX
FDT OZH,oprs.)
1,965,960-1720-381-C-96

5

Northern Texas

W5BJA(+W5MYA,WA5UCT)
2,828,034-2272-414-C-92

6

East Bay

K6RV(+K6RM,W6RGG)
1,813,968,1976-306-C-96
WA6NGG(+K6PJY,N6VV,WA6FVJ)
1,788,618-1994-299-C-88

Santa Clara Valley

W6PAA(+W1ARR,K6s KLY SMH,
W6GFF,WA6s BMV HJV VEF,WB6s
LPK SHD UOL)
3,080,025-2925-351-C-94
W6OKK(+WA6MOS,WB6DSV)
2,146,932-2316-309-C-96
W6YX(WB4SMA,WA6ITY,WB6ZUO,
WA7s MMK MQX,WB9INQ,
DK2BZ,oprs.)
1,485,765-2065-241-C-96
WB6AIN(+K6KLY,W6OWQ)
327,960- 911-120-C-57
WA6GFY(K6CN,W6HJP,WA6MQJ,
WB6EXW,oprs.)
314,916- 644-163-C-60

San Diego

W6ONV(+K6s AAR NA SDR)
1,923,219-2203-291-C-72

7

Washington

W7RM(+W5GQQ,K7s CW JA SS,
WA7OTT,VE7ZZ)
5,021,385-5955-449-C-96

8

Michigan

W8NGO(+W8KR,W8ONA)
236,844- 459-172-C-54

9

Illinois

K9DX(+K9MM,WA9LZA)
1,878,438-1858-337-C-92
WA9PBK(+W9YYG)
1,114,350-1150-323-C-78

High Band

U.S.A.

1

Connecticut

WA1OBY(WA1QGC,oprs.)
317,760- 662-160-C-62
W1GSH 292,422- 598-163-C-57
W1BMY 173,280- 380-152-C-38
WA1NRG 122,838- 347-118-C-35
K1YXG 90,576- 296-102-B-48
W1DO 30,000- 100-100-C-22
W1OR 18,513- 121- 51-C-30
WA1UCY 6156- 76- 27-B-10
W1KKF 3870- 43- 30-B- 6
K1WVX 972- 18- 18-C-10
WA1NGL 828- 23- 12-C- 3

Eastern Massachusetts

K1GSK 188,658- 446-141-C-36
W2EVV/1 116,550- 350-111-C-22
WA1UZH 73,308- 298- 82-B-96
W1HSS 30,954- 134- 77-A-15
K5GOE/1 20,604- 101- 68-A-28
W1TSP 13,230- 105- 42-A-15
W1PLJ 7038- 69- 34-B-22
N1EE 4851- 49- 33-A- 6

Maine

W1HWL 205,920- 528-130-B-36

New Hampshire

K1CSI 922,320-1464-210-C-

Rhode Island

WA1TFF 192,390- 530-121-A-48
K1KYI 89,250- 250-119-C-24

Vermont

WA1ZLD 218,652- 548-133-B-44
WA1GKS 50,544- 324- 52-C-30

Western Massachusetts

WA1IAI 168,720- 380-148-B-96
WA1WFS 133,476- 454- 98-B-36
W1GG 96,030- 291-110-C-51
W1COI 62,952- 244- 86-C-35
W1GLK 38,916- 138- 94-C-24
K1KNQ 37,548- 149- 84-C- 6
W1DKU 13,350- 89- 50-A-17

2

Eastern New York

WB2QOH 30,051- 189- 53-B-40
WB2WRR 21,783- 137- 53-A-20
WB2CRY 2475- 33- 25-C- 9

N.Y.C. - L.I.

WA2YQG 271,830- 533-170-C-31
WA2VHH 181,692- 412-147-B-36
W2MQY 134,062- 331-134-C-24
WA2NTF 39,410- 183- 90-C-13
WB1ABV/2 41,001- 173- 79-C-13
WA2ZBW 32,148- 141- 76-B-25
W2CKR 25,347- 119- 71-C-19
W2TF 15,180- 92- 55-C- 6
WB2LWE 13,260- 85- 52-C-15
WB2AMU 4794- 47- 34-B-15
W2AYJ 2418- 31- 26-C- 2
WB2NXF 1653- 29- 19-B- 7
WA2OVG 1566- 29- 18-B-96
W2UL 1560- 26- 20-A- 6
WB2DWP 1440- 24- 20-B- 8

Northern New Jersey

W2MB 290,560-1220-216-C-47
WB2RWY 415,914- 673-206-C-48
WB2VFT 291,456- 528-184-B-96
WA2PCF 100,536- 284-118-C-28
W2LWY 21,420- 140- 51-C-28
WA2UDT 3360- 40- 28-B- 4

Southern New Jersey

K2SNK 204,732- 517-132-C-28
W2HXF 107,100- 300-119-C-39
WB2CHH 68,967- 237- 97-B-26
W2PFQ 27,000- 150- 60-B-32
W2SUA 23,247- 133- 63-C-22
WB2WCE 6372- 59- 36-C-13
WA2VYA 882- 21- 14-C- 2

Western New York

W3HKK/2 331,143- 731-151-B-40
W2HEO 95,565- 277-115-A-36
W2KIM 57,810- 205- 94-C-26
WB2ABD 7920- 66- 40-A- 5

3

Delaware

W3DRD 13,851- 81- 57-B- 9

Eastern Pennsylvania

K3ZOL 530,835- 823-215-C-
W3JO 87,525- 389- 75-A-46
WA3BRW 61,983- 213- 97-C-34
W3ETB 61,182- 198-103-B-50
W3IGQ 48,060- 267- 60-C-10
K3MGQ 4424- 79- 39-C-12
K3DPQ 3069- 33- 31-C- 3

Maryland - D.C.

W3ZSR 453,960- 776-195-C-45
W3FWL 218,160- 505-144-B-56
WB3DET 206,550- 675-102-C-96
W3PWO 144,102- 329-146-C-35
W3GZP 95,472- 272-117-C-96
N3US 76,986- 276- 94-C-10
W3JPT 75,000- 250-100-B-25
WA3ZJT 51,744- 196- 88-C-19
W3EUI 28,359- 137- 69-B-30
WA3RSK 21,816- 101- 72-A-12
WA3YMA 19,992- 98- 68-A-10
WA3UHJ 18,300- 100- 61-C- 6
N3II 17,784- 114- 52-A- 9
WA3RQX 8640- 72- 40-C-19
W3CM 7742- 71- 34-A-15
W3ML 396- 12- 11-B- 1

Western Pennsylvania

WA3S/X 90,909- 273-111-C-16
W3PIX 36,450- 162- 75-B-25
WA3UXP 30,015- 145- 69-A-10
K3KO 12,720- 80- 53-A- 9
W3KQD 3120- 40- 26-B- 7
K3OR 2484- 36- 23-C- 2

4

Alabama

K4MG 113,652- 287-132-C-29
K4ZGB 6384- 56- 38-A- 5
W4RAL 5544- 56- 33-A-96

Georgia

K4KZP 172,368- 399-144-C-45
WB4HNC 115,500- 308-125-C-41
WB4OPG 99,072- 258-128-A-44
WB4TQP 78,588- 246-111-C-36
WB4BBP 61,920- 215- 96-C-11
K4HAV 52,632- 172-102-C-19
K4BAI 27,225- 121- 75-C- 6
W4GXW 60- 5- 4-A- 1

Kentucky

WB4FOT 100,080- 278-120-A-23
W4JHE 510- 17- 10-C- 1

North Carolina

WB4JKP 39,150- 150- 87-B-36
WA4NHP 39,123- 161- 81-C-14
WA4UNZ 14,616- 84- 58-B-27
WB4WSB 4278- 46- 31-A-14
WA4JLU 4128- 43- 32-B- 6
WA4PSL 4032- 42- 32-B- 4

Northern Florida

W4ZCW 204,040- 423-160-C-50
WA4LYR 104,160- 280-124-C-25
W4WHK 60,192- 176-114 B-40
W4WEG 51,216- 176- 97-C-50
W4EEO 5043- 41- 41-A-20

South Carolina

WB4NRI 141,160- 340-158-C-46
K4QAG 6327- 57- 37-B-16

Southern Florida

WA4CQD
1,084,860-1436-252-C-74
W4LCL 49,686- 187- 91-C-42
W4MNZ 8400- 70- 40-C-14
K4GDI 4320- 36- 32-B-10
W4NQI 60- 5- 13-C- 4

Tennessee

W4EFG(WA4CIA,opr.)
214,305- 455-157-C-56
WB4WHE 42,042- 154- 91-B-33
WA4MKU 41,184- 156- 88-A-22
WB4WFT 31,590- 130- 81-B-13
WA4FDR 30,492- 132- 77-C-11

Virginia

N4MM 1,087,110-1542-235-C-50
K5CI/74 317,724- 638-166-C-48
WA4SHL 136,956- 361-148-C-40
W4EI 153,564- 382-134-C-38
W4DAW 100,233- 359-139-C-17
W4JAT 93,732- 292-107-C-45
WA4TZM 83,592- 258-108-A-29
N4XD 81,792- 284- 96-C-53
W4IDG 66,435- 215-103-C-20
WA4GGX 57,300- 191-100-C-53
K4JNM 54,264- 176-103-C-27
WB4NFS 35,862- 159- 71-A-24
WA4MSX 15,312- 88- 58-A-10
N4GG 11,610- 90- 43-C- 7
W4FPW 11,610- 86- 45-B-12
W4IF 8085- 55- 49-C-13
W4KFC 6018- 59- 34-C- 2
WA4SGV 2184- 28- 21-A- 4
W4YZC 1440- 24- 20-A- 2

5

Arkansas

WA5WMG 39,411- 151- 87-A-18

Louisiana

K5FVA 504,888- 872-193-C-61
W5HEZ 100,749- 273-123-C-32

New Mexico

W5VIW 72,216- 204-118-A-55

Northern Texas

WA5VUW 227,808- 452 168-C-44
WB2UFG/5 61,920- 215- 96-C-18

WB5SBH 32,604- 143- 76-C-16
W5FO 32,400- 135- 80-C- 6
K5OJI(K5ZAI,opr.)
20,349- 119- 57-C 17
WB5OON 16,296- 97- 56-A-28
W5SOD 11,844- 84- 47-A-22
WØPCO/5 10,626- 77- 46-C- 4
WA5LUM 5346- 54- 33-A- 9

Oklahoma

WA5HJX 12,087- 79- 51-B-50
WB5MSU 8505- 63- 45-B-15

Southern Texas

K5BZU 403,158- 662-203-C-63
W5JC 45,600- 160- 95-C-34
W5QCL 16,284- 92- 59-A-27
W5EDX 7866- 69- 38-A-40
W5OSJ 3780- 42- 30-B- 5

6

East Bay

WB6BKN 36,423- 213- 57-C-25
W6EJA 621- 23- 9-A- 3

Los Angeles

W6AQ(WB6PXP,opr.)
808,503-1411-191-C-70
K6ELX 106,029- 459- 77-C-32
W6OK 61,671- 337- 61-C-32
W6ORD 29,328- 188- 52-C-96
WB6PNB 24,024- 154- 52-C- 9

Orange

WA6LFF 48,792- 214- 76-A-34
WA6FIT 19,200- 128- 50-C-96

Santa Barbara

W6DKQ 178,500- 500-119-C-43
WA6VYK 116,160- 484- 80-B-96
K6OW 81,480- 280- 97-C-52

Santa Clara Valley

WB6OOL 676,494-1534-147-C-96
W6HXW 198,000- 528-125-C-40
W6CLM 23,994- 129- 62-C-31
WA6TKI 21,306- 134- 53-B-36

San Diego

W6JOT 233,448- 548-142-C-58
K6PO 109,737- 411- 89-C-27
W6ABT 71,550- 225-106-C-25
K6EDA 48,051- 281- 57-B-46
W6FF 28,710- 145- 66-C-45
W6BZE 18,810- 110- 57-C-24
WA6UFY 5880- 70- 28-B-10
W6KBD 231- 11- 7-A- 6

San Joaquin Valley

WB6DYG 115,710- 406- 95-C-40
WB6BPZ 52,560- 219- 80-B-96
WA6FUZ 27,531- 133- 69-B-96

Sacramento Valley

W6AJY 15,372- 122- 42-C-23
W6KYA 8610- 82- 35-B- 6
K5LZT/6 54- 6- 3-A- 1

7

Arizona

WA7YRP 312,592-1296-209-C-70
W7LEL 255,759- 641-133-C-34
W7AYY 162,435- 455-119-C-36
WØSIP/7 103,653- 349- 99-C-36
K7PXI 91,233- 279-109-B-55
K7JVR 28,728- 152- 63-B-19

Nevada

W7MRS 80,484- 353- 76-C-14

Oregon

W7WHB 19,305- 165- 39-B-63

Washington

W7ISX 280,440- 820-114-C-52
WA7SCN 264,690- 865-102-C-43
W7RUN 258,189- 967- 89-C-28
WA7ICB 256,320- 890- 96-C-34
WB7ONX 221,160- 760- 97-C-41
WB7BNP 194,334- 661- 98-A-46
W7ETZ 66,780- 210-106-C-24
K7LAY 52,992- 256- 69-C-40
K7HBN 42,840- 238- 60-C-17
W7OTO 42,084- 334- 42-C- 8
WB7AJR 32,745- 185- 59-C-36
K7CVL 26,712- 168- 53-A-14
W7BQG 22,350- 149- 50-B-30
K7US 15,288- 182- 28-C- 8
N7DX 3213- 119- 9-C- 2
K7RS 231- 11- 7-C- 3

Wyoming

K7FE 34,080- 160- 71-C-28

8

Michigan

W8NWO/8 221,517- 453-163-C-60
WD8CRY 52,419- 173-101-C-21
W8LS 34,056- 132- 86-C-21

Ohio

W88JBM(WB8DQP,opr.)
606,096-1104-183-C-50
WB8WHS 259,170- 530-163-C-50
K8EF 144,837- 363-133-C-34
W8CBA 83,520- 232-120-C-36
K8NXV 10,560- 80- 44-B- 8
K8RJZ 432- 12- 12-A- 3
WA8KIY 390- 13- 10-C- 1

West Virginia

WA8VZO 12,126- 94- 43-B-18

9

Illinois

WB9HAD 640,989-1063-201-C-48
WA9JCO 467,400- 760-205-C-50
WA9IXF 204,678- 411-166-C-30
K9GMT 198,009- 449-147-C-49
W9NLR 171,108- 388-147-C-36
WB9RGA 131,208- 308-142-C-38
WB9MKL 89,376- 266-112-C-34
WA9HPJ 73,776- 212-116-C-38
W9RT 49,680- 184- 90-C- 6
W9UVM 22,650- 151- 50-A-41
K9WR 7020- 65- 36-C- 6
WB9YER 6669- 57- 39-C-96
W9QWM 2475- 33- 25-B-96
WB9MYN 1560- 26- 20-A- 6
W9REC 1425- 25- 19-B-14
K9UQN 1311- 23- 19-C- 2
W9INZ 819- 21- 13-A- 9
WB9SDN 675- 15- 15-B- 4
WB9QGU 210- 10- 7-B- 8
WB9TDR 108- 6- 6-C- 1

Indiana

WB9LHI 919,746-1381-222-C-61
W9LQ 125,934- 278-151-C-41
K9ODF 25,047- 121- 69-C-17
W9BS 10,800- 80- 45-B-20
K9VQK 3696- 44- 28-C- 8

Wisconsin

W9NSM 126,546- 322-131-C-34

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Colorado

WBØQHV 717,210-1226-195-C-75
WØPEL 103,689- 281-123-C-48
WØBWJ 15,045- 85- 59-C-14
WAØTAM 1764- 28- 21-A-15

Iowa

WØPRY 321,408- 576-186-A-40
KØMM 85,374- 306- 93-C-12
WØSML 82,482- 233-118-C-40
KØUPV 74,592- 224-111-C-42
WAØWCR 27,729- 117- 79-C-15
WBØIPH 25,842- 118- 73-B-22
WBØLNF 22,311- 111- 67-B-14
WBØLJU 17,460- 97- 60-A-25
WØMJN 660- 20- 11-C- 3

Kansas

KØFPC 108- 6- 6-A 4

Minnesota

WØOUF 213,840- 440-162-C-33
WBØHAI 118,692- 314-126-C-44
WBØMAE 54,843- 181-101-C-39
WAØTUW 11,466- 78- 49-C-10
WBØPTB 297- 11- 9-C- 5

Missouri

WØHBH 88,560- 246-120-C-96
WØPUD 87,500- 250-110-C-40
WØTDR 61,812- 202-102-C-13
WBØSAA 56,727- 191- 99-C-24
WØZHB 25,410- 121- 70-C-18
WØFXY 3744- 48- 26-B-10
WØNWV 300- 10- 10-C- 2

Nebraska

KØJBL 82,008- 204-134-C-45

Canada

Maritime - Newfoundland

VE1ANH 161,641- 579- 93-C-40
VE1MX 78,048- 271- 96-B-20
VO1AW 44,880- 220- 68-C-12
VE1AMN 6642- 82- 27-B-96
VE1EK 420- 14- 10-A- 1

Quebec

VE2WA 6240- 80- 26-C- 4

Ontario

VE3HGN 307,740- 892-115-C-29
VE3EJK 63,072- 219- 96-B-30
VE3DU 57,792- 301- 64-C-13
VE2AEJ/3 9660- 70- 46-B-22
VE3GCC 2808- 36- 26-C-12

Manitoba

VE4MP 55,752- 184-101-C-30
VE4SW 21,600- 120- 60-B-10
VE4VV 20,412- 108- 63-A-46

Alberta

VE6KW 142,449- 461-103-C-33
VE6AMR 85,440- 356- 80-C-40
VE6SB 82,917- 333- 83-C-40
VE6CCB 2583- 41- 21-B-10

Northwest Territories

VE8CM 14,178- 139- 34-C-16
VE8AS 966- 23- 14-B- 8

Low Band

U.S.A.

1

Connecticut

WA1UAD 86,376- 236-122-C-49

Eastern Massachusetts

W1FC 139,896- 536- 87-C-46
W1NJL 2553- 37- 23-B- 6
W1BB/1 105- 7- 5-A- 5

Rhode Island

K1GMW 8127- 63- 43-C-10

2

Eastern New York

W2HHC 175,086- 411-142-C-48

Northern New Jersey

WB2RTF 24,921- 117- 71-C-96

Western New York

WA2ZRI 90- 6- 5-B- 5

3

Eastern Pennsylvania

K3NPC 13,446- 83- 54-B-30

Maryland - D.C.

W3USS(WA1FEO,opr.)
6048- 56- 36-C- 9
K3ZZ 1056- 22- 16-C- 7

Western Pennsylvania

WA3SWF 50,499- 181- 93-C-20

4

Alabama

K2RN/4 25,704- 119- 72-C-26
K4BYM 22,500- 100- 75-C-10

Kentucky

WB4YDX 14,151- 89- 53-C-18

Northern Florida

K4YFQ 184,353- 377-163-C-

Virginia

WA4YBV 36,162- 147- 82-C-26

5

Mississippi

WB5HVY 1122- 22- 17-C- 5

Southern Texas

K5JZY 16,128- 112- 48-C-13
WB5DDI 4257- 43- 33-C-21
K5RF 7680- 64- 40-C-25

6

East Bay

W6BH 6216- 56- 37-C-15

Santa Barbara

WA6LBP 4620- 55- 28-C- 7

Santa Clara Valley

W6NLZ 83,922- 394- 71-C-96

San Diego

K6LLE 1653- 29- 19-C- 6

San Francisco

WA6DNM 2100- 35- 20-C- 6
K6ILM 135- 9- 5-A- 1

7

Arizona

WB6NRK/7 17,325- 105- 55-A-96

Montana

K7ABV 5940- 55- 36-C-19

Washington

W7YTN 35,700- 175- 68-C-30

8

Michigan

W8TWA 47,658- 169- 94-C-54

Ohio

K8UQA 17,013- 107- 53-C-19
WA8LXJ 11,850- 79- 50-C-31

9

Wisconsin

WB9MOG 43,992- 156- 94-C-44

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Iowa

KØFLY/Ø 84- 7- 4-C- 1

Missouri

WBØOED 12,879- 81- 53-B-11
WBØNOU 3741- 43- 29-C-19

Canada

Ontario

VE3BBN 18,816- 112- 56-B-96
VE3IKN 4680- 52- 30-C-23

Manitoba

VE4SL 4557- 49- 31-C-15

DX

CW

Africa

Angola

High Band

D2AAI 118,800- 550- 72-B-

Canary Islands

High Band

EA8IR 44,073- 249- 59-B-23

Low Band

EA8LK 1530- 30- 17-B- 2

Liberia

EL2T 1,417,872-2168-218-C-62
EL2ET 514,710-1290-133-A-27

Rhodesia

ZE8JJ 14,040- 117- 40-A- 4

South Africa

ZS6WW 2,246,244-3094-242-A-60

Low Band

ZS6RM 39,468- 286- 46-A-11

Mauritius

3B8DT(K4FOK,opr.)
176,649- 583-101-A-22

Asia

Philippine Islands

DU6EG 6336- 96- 22-B-18
K9PNT/DU2 2088- 58- 12-B-

Iran

Multi-Single

9D5A(multiop)
152,139- 611- 83-A-45

Korea

High Band

HM2JN 10,275- 137- 25-C-

Japan

JA2JW 1,000,125-1905-175-C-60
JE1SSE 959,020-1210-154-B-50
JA7GAX 535,953-1199-149-C-51
JA2AXB 449,145-1109-135-B-43
JA2HO 366,048- 992-123-B-50
JA7DAH 361,284-1012-119-B-50
JA1JKG 288,579- 899-107-C-
JA8SW 151,440- 631- 80-A-50
JH3AIU 96,696- 408- 79-A-
JA1ZXX(K8HVT,opr.)
90,000- 400- 75-A-35
JA7CPW 76,500- 375- 68-B-35
JR2RUD 76,416- 398- 64-A-22
JH1LKH 75,270- 386- 65-A-45
JA2AJA 74,517- 421- 59-C-24
JA9JBK 63,000- 350- 60-A-35
JA2PFO 55,233- 323- 57-B-40
JA1PS 50,232- 299- 56-A-37
JA1ILE 48,840- 296- 55-B-28
JA6CNL 48,195- 315- 51-B-
JA1WL 48,114- 297- 54-C-20
JA2EMP 44,997- 283- 53-C-17
JA2DN 44,304- 284- 52-A-
JH2JEV 42,480- 177- 80-A-
JA1AYC 42,075- 275- 51-B-16
JA7UES 32,853- 233- 47-B-16
KA6DX 31,752- 216- 49-C-18
JA3ARM 30,870- 210- 49-C-20
JA2BI 27,735- 215- 43-B-
JA1QKI 27,000- 200- 45-B-16
JH2DVX 26,520- 221- 40-A-27
JA4DZ 25,920- 180- 48-B-
JA6AKW 25,920- 240- 36-A-
JA9HW 24,639- 191- 43-B-13
JH1OEL 20,664- 168- 41-A-20
JA4ZU 18,348- 139- 44-C-15
JH1BRB 18,252- 169- 36-B-
JA7JNF/1 18,240- 160- 38-A-48
JA1NLX 17,205- 155- 37-A-12
JG1GJB 14,040- 130- 36-A-13
JH3ARL 12,960- 135- 32-C- 8
JA1HOM 8904- 106- 28-C-15
JA4AQZ 8580- 143- 20-B-60
JAØJHQ 6780- 113- 20-A-13
JF3GFH 5772- 74- 26-B-10
JA9ANF 5607- 89- 21-A-
JAØVBJ 5355- 119- 15-B- 9
JA9CWJ 5226- 67- 26-A-
JF1UVJ 3402- 81- 14-B-
JAØVFM 2079- 63- 11-A-14
JA1BNW 1590- 53- 10-C-
JAØLDH 1590- 53- 10-A-
JF3EZG 1056- 44- 8-A-
JI1HDX 972- 36- 9-A-12
JA3BCT 552- 46- 4-A-

Multi-Single

JA3YKC(JA2VUP,JA3s ODC QOG REU,oprs.) 384,417-1059-121-C-72
JA2YKA(JA2QHV,JH2s EUV QXG ,oprs.) 99,426- 454- 73-B-35
JE1YTF(JA5FYQ,JA6SRB, JAØSWT,oprs.)
34,704- 241- 48-C-
JA2ZHX(JA2s AO UHL EMP CLA LKO,JH2HUQ,JR2AAZ,oprs.)
21,648- 176- 44-B-

Multi-Multi

JA7YAA(multiop)
517,803-1207-143-C-73
JA2YAQ(multiop)
33,750- 250- 45-B-40
JA1YFL(JAØJCJ,JE1TSD,oprs.)
6336- 88- 24-C-

High Band

JA1CG 388,278-1221-106-B-84
JA2NQQ 303,534-1022- 99-C-36
JE1LSD 250,290- 810-103-B-96
JH1ACQ 249,606- 849- 98-C-
JR1JFO 222,144- 832- 89-B-
JA1PCY 215,985- 847- 85-B-60
JH1PBR 151,704- 588- 86-B-26
JA4TNV/1 96,840- 538- 60-A-21
JA1SJV 83,220- 365- 76-B-24
JA2EIV 78,705- 495- 53-B-56
JA1IDY 59,400- 396- 50-A-
JA8XQI 49,266- 322- 51-B-21
JA1GLT 47,700- 300- 53-B-
JA1CMD 46,845- 347- 45-A-12
JA5FDJ 46,350- 309- 50-C-12
JA1CSB 38,148- 289- 44-C-18
JA8DIM 35,904- 272- 44-B-24
JA2IU 34,443- 267- 43-A-23
JH7GPW 32,535- 241- 45-B-18
JH7CUO 27,735- 215- 43-B-19
JR1XFT 26,091- 223- 39-B-11
JA1DOY 24,960- 208- 40-B-33
JH1MTR 22,680- 189- 40-B-12
JA7ARW 19,872- 184- 36-A-11
JH7BRG 19,539- 167- 39-C-
JAØSC 18,900- 180- 35-C-11
JA6AI 17,982- 162- 37-C-
JA6OKK 17,568- 183- 32-C-
JA2ACH 17,556- 154- 38-A- 6
JA7HMZ 15,717- 169- 31-A- 8
JF1MYI 14,485- 137- 35-B-19
JA7KXD 13,440- 128- 35-B- 8
JA4GXS 10,788- 124- 29-B-10
JA9SV 10,614- 122- 29-B-
JH7OSI 10,044- 108- 31-B-12
JA1JQY 9180- 102- 30-B-
JH4DVV 6555- 115- 19-B- 8
JA2AYH 4686- 71- 22-B- 8
JI1TWZ 3822- 91- 14-A-11
JA2CGB 2052- 76- 9-B-
JF1RBP 1911- 49- 13-A-
JA1BZM 1638- 42- 13-A-

Low Band

JH1RFM 82,665- 501- 55-B-31
JA1ISA 24,120- 201- 40-B-20
JH1YDT 23,865- 215- 37-C-
JF1TFG 18,000- 200- 30-A-28
JH1EYS 8448- 128- 22-B-22
JHØBBA 1159- 81- 13-A-18
JA2TK 2772- 77- 12-A-18
JA2RER 2376- 66- 12-A-17
JA5MOU 2244- 68- 11-A-15
JF1QJD 1815- 55- 11-B-16
JA1ACA 1647- 61- 9-A-
JA5UBW 1272- 53- 8-A-65
JHØBQX 1128- 47- 8-A-12
JA8MRV 1116- 62- 6-A-13
JA5XES 1092- 52- 7-A-10
JA3HUL 828- 46- 6-A- 6
JA7ECI 774- 43- 6-A-
JH1CNN 630- 35- 6-A-10
JF1UKJ 360- 30- 4-B- 2
JH6RIO 312- 26- 4-A- 3
JAØUAN 120- 10- 4-A- 2

Lebanon

High Band

OD5LX 336- 14- 8-B-

Turkey

TA1ZB 16,146- 138- 39-A-

Asiatic R.S.F.S.R.

UAØKAN 261,972- 766-114-A-
UWØLT 233,448-1096- 71-B-
UAØZBP 205,542- 601-114-A-
UW9WL 58,779- 311- 63-B-
UAØAG 46,800- 325- 48-B-

Multi-Single

UKØZAF(multiop)
106,782- 481- 74-B-
UK9HAC(multiop)
41,040- 285- 48-B-
UKØLAB(multiop)
14,256- 132- 36-B-
UKØFAD(multiop)
8814- 113- 26-A-
UK9OAD(multiop)
2850- 50- 19-B-

High Band

UWØIX 257,004-1452- 59-B-42
UAØSAU 72,981- 477- 51-B-
UAØBBN 67,650- 451- 50-A-
UAØBBI 50,490- 374- 45-A-
UA9FAJ 37,539- 291- 43-B-
UA9SAX 22,317- 173- 43-B-
UAØJAD 21,546- 189- 38-A-
UA9CAL 16,740- 180- 31-B-
UA9YAR 16,560- 138- 40-B-
UA9TS 8064- 84- 32-B-
UA9AAB 7470- 83- 30-B-
UA9SAQ 3312- 46- 24-A-
UA9HBD 3024- 42- 24-A-
UA9QAQ 2160- 45- 16-B-
UAØML 1845- 41- 15-B-
UA9FAR 1092- 26- 14-A-

UA9FGF 726- 22- 11-A-

Low Band

UAØCBW 6768- 141- 16-B-
UWØFB 2130- 71- 10-B-

Azerbaijan

High Band

UD6DJT 8976- 88- 34-B-
UD6BW 4056- 52- 26-B-

Georgia

Multi-Single

UK6QAD(multiop) 1722- 41- 14-B-

High Band

UF6CX 36,162- 294- 41-A-

Armenia

High Band

UG6GAF 55,125- 525- 35-B-

Uzbek

High Band

UI8ACC 10,710- 119- 30-B-

Tadzhik

High Band

UJ8JAS 20,910- 170- 41-A-

Kazakh

UL7QH 113,529- 533- 71-B-21
UL7NAF 7380- 82- 30-B-

Multi-Single

UK7PAU(multiop) 2448- 48- 17-A-

High Band

UL7GAA 18,204- 164- 37-B-
UL7LCQ 9450- 105- 30-A-
UL7AFD 6624- 96- 23-A-
UL7TA 5772- 74- 26-A-
UK7NAU 105- 7- 5-A-

Low Band

UL7CT 2220- 37- 20-A- 3
UL7CAD 162- 9- 6-A- 2

Hong Kong

VS6AF 1518- 46- 11-A-

Israel

High Band

4Z4NMB 10,332- 123- 28-A- 8

Europe

Andorra

Low Band

C31IU(FØAXP,opr.)* 105,939- 447- 79-A-14

Portugal

CT4AT 2,621,772-3833-228-C-80

Fed. Republic of Germany

DK3BJ 1,635,060-3206-170-C-
DJ6RX 427,854-1169-122-B-27
DJ2AA 396,759-1093-121-B-32
DL1KS 298,500- 796-125-C-32
DJ5GG 153,357- 527- 97-C-
DK5AD 130,200- 434-100-C-
DL7XB 124,689- 476- 89-B-55
DL3IA 73,062- 297- 82-A-21
DL1OO 43,452- 213- 68-B-
DK8KC 42,594- 229- 62-B-21
DF5XN 30,690- 155- 66-B-
DL7SI 21,840- 140- 52-C-10
DK8AX 20,691- 121- 57-A-
DL1YA 13,068- 99- 44-B-
DA1AX 1215- 27- 15-A- 1

Multi-Single

DKØTU(multiop) 1,592,922-2983-178-C-96
DKØJR(multiop) 857,793-1919-149-C-92
DA2AS(DA1s DJ GS NJ UD,oprs.) 161,865- 495-109-B-43

High Band

DK6IS 377,271-1413- 89-C-45
DJ9ON 269,136-1068- 84-B-
DJØXT 65,400- 436- 50-A-
DL1RB 35,970- 218- 55-B-15
DJØVO 30,636- 222- 46-B-18
DK8BI 27,825- 175- 53-B-
DL1CR 27,720- 210- 44-B-
DF3QN 25,080- 190- 44-B-
DL3CW 18,462- 181- 34-B-
DK4HD 15,480- 120- 43-B-
DL1BV 11,340- 108- 35-B-
DJ4OE 9579- 103- 31-B-
DJ1YH 8064- 96- 28-B-
DF7FG 2862- 53- 18-A
DK9MB 2790- 62- 15-A- 6

Low Band

DK3KD 65,100- 350- 62-C-
DJ6OZ 24,570- 210- 39-B-
DA2LJ 14,364- 133- 36-B- 6
DK3FB 13,746- 158- 29-C-
DK6PY 11,979- 121- 33-C-
DJ2YE 1938- 38- 17-B- 2

German Dem. Republic

DM5PUL 149,352- 508- 98-B-
DM3XM 143,472- 488- 98-A-
DM9AAG 108,630- 426- 85-A-
DM3BE 62,238- 253- 82-A-
DM2CXE 51,840- 240- 72-A-
DM2FFL 38,979- 213- 61-B-
DM3BF 37,107- 217- 57-A-
DM3XMD 23,712- 152- 52-A-
DM3SIC 20,088- 108- 62-B-
DM2AJH 13,608- 108- 42-A-
DM2COJ 12,804- 97- 44-B-
DM2CJJ 12,402- 106- 39-A-
DM2BOH 5670- 63- 30-A-
DM2YLJ 4914- 63- 26-B-
DM2CCM 3075- 41- 25-A-
DM2DEO 714- 17- 14-A-

High Band

DM2FIL 51,747- 367- 47-B-
DM3NKF 36,636- 284- 43-A-
DM2DXD 33,528- 254- 44-A-
DM2YLO 29,400- 196- 50-B-
DM2DCN 20,736- 192- 36-A-
DM2FWL 19,440- 180- 36-A-
DM2BLE 18,768- 184- 34-B-
DM3VAA 16,320- 160- 34-B-
DM2DYH 15,435- 147- 35-A-
DM5JL 12,423- 101- 41-A
DM2BTO 11,931- 97- 41-B-
DM4NEE 11,439- 123- 31-B-
DM2CYE 10,890- 110- 33-A-
DM4SXH 10,890- 110- 33-A-
DM2BGC 10,692- 108- 33-B-
DM2BUB 10,494- 106- 33-A-
DM2BLG 9480- 158- 20-A-
DM3VUH 8772- 86- 34-B-
DM5YVL 3723- 73- 17-B-
DM2FBM 3528- 56- 21-A-
DM3MD 2640- 44- 20-B-
DM2FUL 2550- 50- 17-A-
DM2DBE 1260- 35- 12-A-

Low Band

DM4RWL 12- 2- 2-A-

Spain

EA2IA 2,180,892-3709-196-B-84
EA4QB 479,250-1125-142-B-
EA2HW 28,860- 185- 52-A-
EA2CR 15,444- 143- 36-A-
EA7XQ 10,275- 137- 25-A-

High Band

EA2OP 139,062- 602- 77-A-19

Republic of Ireland

EI9J 721,440-1503-160-A-40
EI2BB 60,390- 305- 66-A-30
EI3CP 34,740- 193- 60-A-21

France

F8VJ 763,329-1561-163-A-
F6EID 709,326-1506-157-A-53
F5IN 293,550- 950-103-B-16
F9BB 77,937- 313- 86-B-19
F3AT 75,078- 291- 86-A-
F6ERZ 18,375- 125- 49-A-
F8TM 14,445- 107- 45-A-38
F2AO 4347- 69- 21-A-

Multi-Single

F6KBZ(multiop) 27,495- 195- 47-A- 7
F6KFN(multiop) 12,060- 134- 30-A-10

High Band

F8TQ 224,595- 805- 93-A-
F6API 34,344- 216- 53-A-
F2VO 31,044- 199- 52-A-18
F6BQJ 20,808- 136- 51-A-10
F6CCI 8640- 96- 30-A-11

Low Band

F8ZF 75,060- 417- 60-B-
F8FW 1488- 31- 16-A-
F8EX 504- 21- 8-A- 3

England

G3FXB 1,782,600-2971-200-A-82
G3MXJ 1,574,166-2806-187-B-71
G3ESF 326,742- 923-118-A-
G3KSH 104,535- 345-101-A-34
G3APN 77,847- 337- 77-B-39
G4BUQ 55,902- 242- 77-A-23
G4FDC 37,248- 194- 64-A-12
G2AJB 11,817- 101- 39-A-11

High Band

G3UJE 611,226-2079-98-A-48
G3SSO(G4BEZ,opr.) 175,392- 672- 87-A-22
G4EHF 130,152- 638- 68-A-
G3UFY 92,016- 426- 72-A-31
G3YBH 65,520- 336- 65-A-11
G6NK 39,780- 255- 52-A-27
G3IQF 4692- 68- 23-A-16
G3CWL 1224- 34- 12-A- 3

Low Band

G2RO 94,392- 437- 72-A-34
G4AMT 36,567- 239- 51-A- 8

Northern Ireland

GI3JEX 531,864-1068-166-A-71

Multi-Single

GI6YM(GI3s AXI IVJ SKH,GI5UR oprs.) 175,560- 760- 77-A-

High Band

GI3KDR 43,569- 309- 47-A-

Scotland

GM3CFS 703,671-1439-163-A-78

Multi-Single

GM3ZRC(GM3s LYI XUJ,oprs.) 42,336- 252- 56-A-21

Low Band

GM6RV 13,563- 137- 33-A-

Hungary

HAØLM 127,710- 430- 99-A-67
HA5KF 74,613- 323- 77-A-20
HA3GA 70,956- 292- 81-B-26
HA5BA 63,756- 308- 69-A-
HA1ZD 31,500- 175- 60-A-39
HAØIG 22,968- 174- 44-B-

Multi-Single

HG5A(multiop) 2,240,670-3931-190-C-96
HA1KSA(HA1s SV TJ TV TY,oprs.) 687,120-1636-140-B-96
HA9KPU(multiop) 598,533-1339-149-B-
HG8U(multiop) 549,120-1280-143-C-
HA8KCI(multiop) 308,448- 864-119-B-80
HA4KYH(HA4s YO YQ YX,oprs.) 211,569- 647-109-B-
HA8KWG(multiop) 198,489- 607-109-A-66
HA8KUC(multiop) 179,100- 597-100-B-
HA5KBM(multiop) 168,360- 610- 92-B-96
HA5KJC 93,873- 377- 83-B-50

HA5KKK(multiop) 82,080- 380- 72-B-
HA1KZB(multiop) 64,980- 285- 76-B-
HA6KZS(multiop) 64,944- 264- 82-B-32
HAØKLL(multiop) 50,268- 284- 59-B-30

High Band

HA7MC 227,298- 881- 86-B-31
HA5MO 65,088- 339- 64-A-32
HA5DJ 59,580- 331- 60-A-
HA8UY 50,388- 442- 38-A-24
HA5JK 28,782- 234- 41-A-
HAØHW 12,987- 117- 37-B-
HA8UT 11,232- 104- 36-A-10
HA2RM 4851- 77- 21-A- 4

Low Band

HAØMJ 1989- 51- 13-A-10
HA5BP 1890- 42- 15-B- 4
HA5MX 780- 26- 10-A- 4

Switzerland

W5ONL/HB* 202,837- 697- 97-B-22
HB9KC 202,134- 571-118-B-20
HB9AGH 155,700- 519-100-B-

Multi-Single

HB9AYZ(multiop) 14,472- 134- 36-B-

High Band

HB9DX 162,324- 668- 81-B-

Italy

I3GNQ 601,920-2090- 96-B-45
IK2FGP 117,747- 441- 89-B-17

High Band

IKØMGM 494,667-1773- 93-B-45
IK6POY 172,872- 686- 84-C-40
I3MGN 106,650- 474- 75-B-42

Low Band

I2XXG 285,957-1071- 89-B-33

Sardinia

High Band

ISØMWE 56,544- 304- 62-A-

Svalbard

JW9WT 90,636- 332- 91-B-

Norway

LA9JM 191,118- 601-106-A-
LA5XO 2160- 36- 20-C-

Multi-Single

LA1K(multiop) 948,393-1893-167-B-
LA8O(LA8XM,LA9OI,oprs.) 455,259-1141-133-B-

High Band

LA8CJ 128,100- 610- 70-B-41
LA6XU 106,434- 657- 54-B-31
LA5SH 72,657- 299- 81-B-18
LA2BG 56,826- 287- 66-B-
LA7FJ 25,224- 192- 49-A-12
LA2Q 20,445- 145- 47-A-
LA3UF 13,440- 128- 35-A-15
LAØAB 12,420- 115- 36-B-
LA1ML 10,602- 114- 31-A-
LA7HJ 7056- 98- 24-A-14
LA8OM 5301- 57- 31-B-
LA3UG 5133- 59- 29-B-
LA7SI 3155- 55- 19-A-
LA6XT 900- 20- 15-A-

Luxembourg

LX1ML 7395- 85- 29-A-15

Bulgaria

LZ1KDP 23,790- 130- 61-B-
LZ1NJ 5022- 62- 27-B-

Multi-Single

LZ1KOZ(multiop) 1512- 26- 14-B-

High Band

LZ1XL 45,696- 238- 64-B-

Low Band

LZ2JF 42,822- 366- 39-B-17
LZ2GS 34,830- 258- 45-A-

Austria

OE6HZG 701,685-1509-155-B-60
OE5CWL 110,580- 380- 97-B-34

High Band

DL1YA/OE7* 10,230- 110- 31-B-

Low Band

OE5KE 53,430- 274- 65-B-
OE2BZL(DK5AD,opr.)* 14,883- 121- 41-B- 8

Finland

OH4RH 84,420- 335- 84-B-
OH5PT 3483- 43- 27-C- 4
OH1FM 108- 6- 6-A-

Multi-Single

OH8OS(OH8s SP UT,oprs.) 175,065-1061-55-C-

High Band

OH2BAH 113,544- 498- 76-C-
OH2BJH 102,180- 655- 52-C-
OH6UM 69,207- 391- 59-A-
OH2LU 56,922- 358- 53-C-
OH8PF 51,456- 268- 64-A-
OH6MM 50,706- 313- 54-A-
OH3MK 42,771- 269- 53-A-
OH7NW 34,776- 252- 46-B-
OH6ZAB 25,623- 219- 39-B-
OH9SV 24,897- 193- 43-B-
OH6UJ 23,547- 167- 47-A-
OH6VV 11,610- 129- 30-B-
OH3XJ 9918- 114- 29-B-
OH9PH 8772- 86- 34-A-
OH1MQ 7740- 86- 30-B-
OH2BN 5103- 63- 27-B-
OH1PI 4800- 50- 32-C-
OH5ZM 4503- 79- 19-B-
OH1XW 4140- 60- 23-A-
OH2JQ 2550- 50- 17-A-
OH2KP 2376- 36- 22-B-
OH2OC 1953- 31- 21-A-
OH9TD 1782- 33- 18-A-
OH7TV 714- 17- 14-B-
OH9PF 432- 18- 8-A-
OH1ZAA/2 351- 13- 9-A
OH2BFS 288- 12- 8-B-
OH2BDA 216- 9- 8-B-

Low Band

OH1AA(OH1NK,opr.) 66,885- 455- 49-B-

Aland Islands

OHØXZ* 85,116- 346- 82-C-

High Band

OH3XT/OHØ 54,636- 314- 58-C-
OHØPA 1848- 44- 14-A-

Low Band

OH3PE/OHØ * 4800- 64- 25-B-36

Czechoslovakia

OK2BLG 269,568- 768-117-B-
OK1DKW 160,200- 534-100-A-
OK1DVK 124,362- 441- 94-A-
OK2KR 90,525- 425- 71-B
OK1KZ 84,132- 369- 76-A-
OK2BWI 72,012- 353- 68-A-
OK2BPO 66,360- 280- 79-B-
OK1FCA 34,560- 192- 60-A-
OK3CIU 32,025- 175- 61-B-
OK2PDD 22,815- 169- 45-A-
OK3TBG 15,738- 122- 43-B-
OK2YN 9180- 85- 36-A-
OK3YCA 8514- 86- 33-A-
OK1MWN 7950- 106- 25-A-
OK2SGW 6120- 60- 34-A-
OK1AIA 5184- 54- 32-A-
OK2KLS 4134- 53- 26-A-
OK3YCV 2100- 35- 20-A-
OK1AWH 1440- 24- 20-B-

OK1KGS(OK1DPB,oprs.) 1224- 34- 12-A-
OK3CJK 828- 23- 12-A-
OK1DXZ 570- 19- 10-A-
OK2LN 312- 13- 8-A-

Multi-Single

OK1KSO(multiop) 1,186,800-2300-172-B-88
OK1KTL(multiop) 783,000-1740-150-C-
OK2KFU(multiop) 99,360- 460- 72-A-
OK3KFO(multiop) 46,230- 230- 67-A-
OK1KCI(multiop) 39,780- 204- 65-B-
OK2KWI(multiop) 10,584- 147- 24-A-

High Band

OK2QX 182,325- 715- 85-C-
OK2BKR 118,500- 500- 79-A-
OK3RKA 49,290- 265- 62-A-
OK2SPS 40,572- 276- 49-A-
OK3FON 31,959- 201- 53-B-22
OK1ATB 20,520- 180- 38-A-
OK3BA 20,297- 178- 38-A-
OK2PAW 15,990- 130- 41-A-
OK3ZAF 14,694- 158- 31-A- 9
OK1DMM 13,965- 133- 35-B-
OK2TBC 12,705- 121- 35-A-
OK1TW 12,000- 100- 40-A-
OK3IF 11,550- 110- 35-B-
OK3CAU 7725- 103- 25-A-
OK1CIJ 7452- 92- 27-A-
OK1DKR 7161- 77- 31-A-
OK1MIN 7110- 79- 30-A-
OK1KIR(OK1DAI,opr.) 6552- 84- 26-A-
OK2WDC 5184- 64- 27-A-
OK1MHM 3705- 65- 19-A-
OK2BJR 3591- 57- 21-A-
OK3ZWA 2220- 37- 20-B-
OK1KRY/p 1548- 43- 12-A-
OK1AYX 1326- 26- 17-A-
OK3EQ 1125- 25- 15-A-
OK1MSO 684- 19- 12-A-
OK2BPJ 627- 19- 11-A-
OK2BEF 312- 13- 8-A-

Low Band

OK3KFF 206,295- 809- 85-B-
OK1ALW 160,650- 765- 70-B-
OK1FAR 92,814- 499- 62-B-
OK1FBH 3600- 60- 20-B- 3
OK1AJY 3087- 51- 21-A-
OK2SOD 2208- 46- 16-A-
OK2KOD 2160- 45- 16-A- 7
OK2HI 1722- 41- 14-A-
OK1KGS (OK1DPB, opr.) 1224- 34- 12-A-
OK3CJK 828- 23- 12-A-
OK1DXZ 570- 19- 10-A-
OK2ZLN 312- 13- 8-A-

Belgium

ON4XG 323,640- 870-124-B-29

High Band

ON6ZW 100,395- 485- 69-B-

Denmark

OZ1LO 1,151,799-2299-167-B-79
OZ6XT 485,331-1337-121-A-20
OZ1W 94,122- 378- 83-A-
OZ7BW 75,945- 305- 83-A-
OZ4HW 57,540- 274- 70-B-
OZ1AIK 9135- 105- 29-B-

High Band

OZ1VY 407,898-1462- 93-B-
OZ7YL 66,960- 360- 62-B-
OZ4KG 35,424- 288- 41-A-
OZ8ND 13,800- 100- 46-A-
OZ8E 11,988- 148- 27-A-
OZ5QU 11,232- 96- 39-A-
OZ4VK 9450- 105- 30-A-
OZ1EE 4176- 58- 24-B-
OZ1BCI 3366- 66- 17-A-
OZ1AJL 378- 14- 9-A-

Netherlands

PAØLOU 284,886- 833-114-A-14
PAØATY 198,990- 670- 99-A-32
PI1MHN 147,693- 541- 91-B-50
PAØCLC 118,854- 426- 93-A-
PAØTA 107,160- 376- 95-A-45
PAØINA 62,694- 258- 81-B-
PAØJR 39,900- 190- 70-A-15
PAØVB 27,219- 211- 43-A-24

High Band

PAØCYW 47,025- 285- 55-B-19
PI1PT 46,782- 339- 46-A-12
PA9AWG(WB9JEN,opr.) 35,496- 204- 58-B-
PAØGT 27,306- 222- 41-A-
PAØUV 26,607- 181- 49-A-
PAØKFF 22,236- 218- 34-B-18
PAØPT 13,137- 151- 29-A-26
PAØYN 5616- 72- 26-B-
PAØJED 4920- 82- 20-B-

Low Band

PAØWRS 2709- 43- 21-A-
PAØCLN 1479- 29- 17-A- 2

Sweden

SMØGMG 254,955- 739-115-A-
SMØCCE 147,645- 579- 85-B-
SM6BZE 122,754- 499- 82-B-
SMØBDS 97,713- 423- 77-A-
SM1CJV 59,202- 286- 69-B-
SMØDJZ 37,584- 216- 58-B-
SM7AAQ 22,752- 158- 48-B-
SMØCGO 17,388- 138- 42-A-
SM6ID 9243- 79- 39-B- 7
SM5FNU 8925- 83- 35-B-
SM6EHY 5688- 79- 24-B-

SM6JY 825- 25- 11-B-

Multi-Single

SK6JA(multiop)
1,216,212-2357-172-B-
SK7CE(multiop)
697,125-1625-143-B-

High Band

SM3GSK 341,352- 862-132-B-
SMJEVR 316,404-1122- 94-B-
SJ9WL(SM4GLC,opr.)
156,510- 705- 74-B-12
SM5XX 74,820- 430- 58-B-18
SM0CCM 72,198- 382- 63-B-
SM6AYM 59,334- 341- 58-B-30
SM6FKF 58,800- 280- 70-B-
SM5AKT 43,326- 249- 58-B-
SL5BQ 33,120- 230- 48-A-
SM7AED 16,320- 136- 40-B-
SM5CAK 15,540- 140- 37-B-
SM5RE 11,904- 128- 31-B-
SM5CMP 11,682- 118- 33-B-
SK2IV(SM2CDF,opr.)
11,526- 113- 34-A-
SM0GMZ 10,890- 110- 33-A-
SM3BP 8892- 114- 26-A-
SM6DGR 6912- 96- 24-A- 9
SM7CZC 6216- 56- 37-A-
SM7FSV 5859- 63- 31-B-
SM5FXF 3657- 53- 23-A-
SM4AWG 2592- 48- 18-B-
SM7VY 2223- 39- 19-B-
SM0IX 741- 19- 13-B-
SM7TV 168- 8- 7-B- 2

Low Band

SM5AYY 94,500- 420- 75-B-
SM5CLE 1632- 34- 16-A- 4

Poland

SP8ECV 923,175-1865-165-B-
SP7CTY 113,130- 419- 90-B-40
SP2ADW 9180- 202- 30-A-12
SP5AFL 7521- 109- 23-B-16
SP5BKA 6660- 74- 30-A-
SP8FNA 4761- 69- 23-B-

Multi-Single

SP9KRT(multiop)
262,257- 817-107-B-
SP7KTE(multiop)
98,880- 412- 80-A-
SP9PDF(multiop)
33,300- 222- 50-A-

High Band

SP6BPY 27,636- 188- 49-A-
SP4GHT 9180- 102- 30-B-11
SP5SIP 6732- 66- 34-A-
SP3CB 6048- 72- 26-B-
SP6AEG 3420- 60- 19-B-
SP9IHP 3135- 55- 19-A-
SP6ATG 1785- 35- 17-A-
SP2JGY 990- 30- 11-A-

Low Band

SP8MJ 9984- 128- 26-B-
SP2JEM 48- 4- 4-A-
SP7IFM 27- 3- 3-A-

Greece

Low Band

SV0WTT 15,327- 131- 39-C-17

European Russian S.F.S.R.

UK3ACR 201,960- 680- 99-B-
UA6LWI 74,688- 389- 64-A-
UA6APP 26,325- 195- 45-B-

Multi-Single

UK6LAZ(multiop)
426,426-1001-142-B-
UK3AAC(multiop)
235,488- 892- 88-B-
UK1ZAO(multiop)
88,392- 508- 58-A-
UK4HBB(multiop)
88,080- 367- 80-B-
UK3DAU(UA3s DKU DKF,oprs.)
55,950- 373- 50-A-
UK4LAC(multiop)
52,884- 339- 52-B-
UK3DCF(multiop)
23,760- 176- 45-A-
UK4PAA(multiop)
9000- 100- 30-B-
UK3XAM(multiop)
3036- 46- 22-A-
UK1ADK(multiop)
540- 20- 9-B-

High Band

UA3GM 82,458- 509- 54-B-
UW1CX 72,063- 471- 51-B-
UW3YY 70,980- 320- 73-B-
UA3NB 49,542- 359- 46-B-
UA3DFK 47,886- 347- 46-B-
UA6LWG 38,016- 288- 44-A-
UA4SM 35,742- 259- 46-B-
UA3EZ 28,158- 247- 38-B-
UV3DN 17,214- 181- 38-B-
UA4HDV 14,892- 146- 34-A-
UA3GO 14,880- 155- 32-B-
UA3DB 12,177- 128- 33-B-
UA4ADY 10,323- 111- 31-A-
UA4PWU 8910- 110- 27-A-
UA4OQR 8748- 108- 27-A-
UA4NDK 5589- 69- 27-A-
UA3AHF 5175- 69- 25-A-
UV3HD 4002- 58- 23-B-
UA3MCJ 3666- 47- 26-A-
UW3UH 2964- 52- 19-B-
UA3MBD 2838- 43- 22-A-
UA3IBC 2805- 55- 17-A-
UA3TR 2484- 46- 18-A-
UA4CK 2079- 33- 21-A-
UA3ADO 726- 22- 11-A-
UA3RAJ 75- 5- 5-A
UA3TA 60- 5- 4-B-

Low Band

UA3EAL 3600- 60- 20-A-

Kaliningradsk

UA2EC 131,208- 497- 88-B-

High Band

UA2DP 72,930- 442- 55-B-
UA2DC 7455- 71- 35-A-

Ukraine

UB5WCW 40,572- 276- 49-A-
UB5LAW 26,871- 169- 53-A-
UB5HQ 8787- 101- 29-B-
UB5AAL 3078- 54- 19-A-

Multi-Single

UK5QBE(multiop)
123,354- 534- 77-B-
UK5KAA(multiop)
76,212- 348- 73-B-
UK5UBB(multiop)
47,340- 263- 60-A-
UK5HAB(multiop)
36,942- 262- 47-B-
UK5UAC(multiop)
20,511- 159- 43-B-

High Band

UY5OO 156,468- 767- 68-B-
UB5MBP 51,303- 349- 49-A-
UB5WCJ 51,300- 380- 45-A-
UB5UAT 47,424- 304- 52-B-
UY5TE 25,857- 169- 51-B-
UB5LCN 14,652- 148- 33-A-
UB5LBI 9639- 119- 27-A-
UT5LN 8670- 85- 34-A-
UB5EAX 8112- 104- 26-A-
UT5HP 4617- 57- 27-B-
UB5UBX 2709- 43- 21-A-
UT5EW 2220- 37- 20-B-
UB5RS 1782- 33- 18-A-
UB5IUBM 1680- 80- 7-B-
UB5LCV 1404- 36- 13-A-
UB5HBH 720- 20- 12-A-

Low Band

UB5ZAT 37,665- 279- 45-B-
UB5IAN 5103- 81- 21-A-
UB5TAG 1755- 39- 15-A- 4

White R.S.S.R.

UC2OAF 5040- 60- 28-B-

Multi-Single

UK2ABC(multiop)
289,614-1027- 94-B-
UK2WAF(multiop)
195,300- 868- 75-B-
UK2OAI(multiop)
56,916- 279- 68-A-
UK2AAB(multiop)
41,028- 263- 52-B-
UK2AAP(multiop)
5928- 76- 26-B-

High Band

UC2LAS 17,745- 169- 35-A-

Low Band

UC2ABI 31,500- 210- 50-B-
UC2OBA 7896- 94- 28-A- 7

Moldavia

High Band

UO5AP 16,764- 127- 44-B-

Low Band

UO5GR 2112- 32- 22-B- 4

Lithuania

UP2CY 589,040-1536-130-B-
UP2BBF 7326- 74- 33-B-

Multi-Single

UK2BAS(multiop)
833,292-1758-158-B-38
UK2BBB(multiop)
679,140-1540-147-B-

High Band

UP2SA 211,140- 828- 85-B-
UK2BAG 30,744- 244- 42-A-
UP2BV 28,431- 243- 39-A-
UP2BAS 13,320- 142- 31-B-
UP2BAW 10,080- 112- 30-B-
UP2BAE 8268- 106- 26-A-

Latvia

UQ2GEY 48,672- 312- 52-A-

Multi-Single

UK2GKW(multiop)
945,063-2143-147-B-
UK2GAC(multiop)
299,052- 923-108-B-
UK2GAX(multiop)
296,400- 988-100-B-
UK2GAB(multiop)
63,288- 293- 72-B-

High Band

UQ2GDQ 68,625- 375- 61-B-
UQ2GCN 10,044- 124- 27-B-
UQ2PP 5037- 73- 23-A-

Low Band

UQ2GEC 135- 9- 5-A- 1

Estonia

UK2RAX 10,488- 92- 38-A-

High Band

UR2RCU 241,056-1116- 72-B-
UR2AW 24,108- 164- 49-A-
UR2RGM 12,870- 130- 33-A-

Romania

YO9YE 52,650- 270- 65-A-
YO3CR 30,912- 184- 56-A-

High Band

YO2BEO 12,870- 143- 30-A-
YO3AQJ 12,090- 130- 31-A-
YO7NK 5070- 65- 26-A-
YO4XF 2646- 49- 18-A-

Low Band

YO3BEJ 25,935- 247- 35-A-

Yugoslavia

YU3EY 1,897,203-3311-191-C-72
YU6ZAN 47,709- 279- 57-A
YU4VBR 3675- 49- 25-A-

Multi-Single

YU3ZV(multiop)
2,208,000-3680-200-C-92
YU1ELM(multiop)
942,786-2054-153-C-
YU1GMN(multiop)
506,490-1207-140-C-96
YU5FAM(YU5s CA XAF XRP,oprs.)
114,798- 361-105-C-39
YU4ELJ(multiop)
54,180- 420- 43-B-
YU4CBC(multiop)
25,200- 240- 35-B-
YU1AEP(multiop)
13,824- 128- 36-B-10

Multi-Multi

YU1BCD(YU1s NQW NZV PCF QBC,oprs.)
1,695,525-3055-189-C-70
YU1JDE(multiop)
187,800- 626-100-A-

High Band

YU2CDS(YU2RTM,opr.)
531,630-1790- 99-C-
YU1NGO 69,192- 372- 62-B-
YU1SF 11,172- 98- 38-A-

Low Band

YU2CTF(YU2RUX,opr.)
76,734- 406- 63-A-

North America

Bahamas

Low Band

WA8TOB/C6A*
95,175- 423- 75-A-12

Martinique

High Band

WB6UAG/FM0*
132,525- 465- 95-A-

Dominican Republic

HI8MOG 598,455-1209-165-A-30

High Band

HI8LPC 18,815- 128- 49-B- 9
HI8EVA 12,192- 127- 32-B- 4

Alaska

KL7GN 652,320-1510-144-A-42

High Band

KL7IRN 127,629- 489- 87-B-24
KL7HDX 2520- 35- 24-A-

Puerto Rico

KP4EAJ 5,272,383-5651-311-C-75
KP4EKI 4,648,644-5031-308-C-78

Multi-Single

KP4EAS(+WB5DLW)
5,301,216-5592-316-C-92

Virgin Islands

KV4JY 1,051,035-1709-205-A-

Greenland

OX3AB 1,101,600-2400-153-B-53
OX3OA 1,044,522-2001-174-B-68
OX3RA 273,429- 741-123-A-

High Band

OX5AB 4872- 58- 28-A-11

Sint Maarten

Multi-Single

PJ8CO(KI1CO,WB2s DRW OEU WOI, oprs.)* 3,348,072-3796-294-C-48

Guatemala

VE2AQS/TG9
17,640- 140- 42-B- 3

Antigua

Multi-Single

W6QL/VP2A(+W6KG)*
1,399,776-2083-224-A-44

St. Kitts

VP2KN(K9OTB,opr.)*
13,407- 109- 41-A- 4

St. Lucia

VP2LBH(K2IGW,opr.)*
161,400- 638-100-A- 8

Montserrat

Multi-Single

VP2MAQ(W6s KG QL,oprs.)*
1,978,914-2597-254-C-44

British Virgin Islands

VP2VL 1,161,216-1728-224-B-30

Bermuda

WI1HUY/VP9*
1,131,840-2096-180-B-40

High Band

VP9HY 449,934-1271-118-B-60

Mexico

XE2MX(K6NA,opr.)
4,346,712-4962-292-B-78

Oceania

New Caledonia

FK8AH 137,865- 455-101-A-

High Band

FK8CL 124,278- 538- 77-A-14

Guam

KG6JAR 78,012- 394- 66-C-

Low Band

KG6JIH 62,976- 328- 64-C-

Hawaii

KH6IJ 3,481,890-4190-277-C-77
KH6HKM
2,803,356-3636-257-C-73
KH6BCX 14,883- 121- 41-A-12

High Band

KH6JBU 300,300-1001-100-C-25
KH6IJA 121,923- 437- 93-B-12
KH6JFI 4293- 53- 27-B- 6

Midway Islands

KM6EB 33,348- 195- 57-A-17

Australia

VK2GW 436,224-1024-142-A-70
VK5RX 5103- 63- 27-A-

Low Band

AX3XB 59,865- 307- 65-A-22
VK3QI 29,568- 224- 44-A-
VK4QK 25,704- 204- 42-A-
VK2BFK 7221- 83- 29-A- 2

New Zealand

ZL3BK 636,552-1263-168-A-40
ZL1AFW 445,662- 917-162-A-43
ZL1AI2 146,124- 396-123-A-19

South America

Bolivia

High Band

CP5NK 18,078- 131- 46-B-

Ecuador

HC2SL 1,505,916-2127-236-C-34
HC5EE/1 324,612- 852-127-A-14

Argentina

Multi-Single

LU8DQI+LU8DLK)
3,154,932-4092-257-C-77

High Band

LU5DVO 332,640- 880-126-B-18

Peru

OA8V 178,875- 477-125-A-18

Netherlands Antilles

PJ2VD 4,708,938-5285-297-C-69
PJ9JT(W1BIH,opr.)*
2,194,686-2938-249-B-33

Brazil

PY1NEW
1,122,957-1791-209-B-54
PY1BOA 834,861-1457-191-A-
PY5AHR 119,616- 448- 89-B-53
PT2JB 2220- 37- 20-B- 2

High Band

PY7DDA 5130- 57- 30-B-
PY1ZCF(K5MA,opr.)*
5124- 61- 28-C- 2
K4LC/PY8 1305- 29- 15-B- 1

Low Band

PY6AVY 16,485- 157- 35-B-

Surinam

JA1PIG/PZ
995,355-1515-219-A-34

Venezuela

YV1NX 1,589,796-2236-237-A-37
YV3AGT 555,408-1102-168-A-26
WA5UKR/YV5
78,390- 335- 78-B-28

Multi-Single

YV5UCV(multiop)
704,520-1236-190-B-61

High Band

YV5SJ 10,176- 106- 32-B- 2

Low Band

YV1OB 409,575-1075-127-C-33

DX

Phone

Africa

Liberia

EL2T 2,357,652-3707-212-C-56

South Africa

ZS6DN 2,097,144-3192-219-B-85

High Band

ZS6WW 747,348-2009-124-A-29
ZS4BU 183,264- 664- 92-B-21

Low Band

ZS6DW 137,256- 532- 86-B-16

Mauritius

High Band

3B8CV 56,925- 345- 55-C- 9

Senegal

6W8DY 2,919,996-4269-228-B-

Ghana

9G1JN 1,154,664-3318-116-C-44

Asia

Iran

9D5A 5382- 69- 26-A-

Korea

High Band

HL9VA 49,086- 303- 54-B-18

Japan

JA8SW	82,212- 442- 62-A-60
JF1HOH	57,081- 359- 53-B-
JH1EYS	39,903- 283- 47-B-
JA6CNL	28,665- 195- 49-B-
JA1WI	25,830- 210- 41-C-
JA1PUK	23,598- 138- 57-B-10
JA0FMB	19,074- 187- 34-A-
KA6DX	18,837- 161- 39-C-14
JA1ALX	15,840- 132- 40-B-10
JH1BRB	13,452- 118- 38-B-
JA4ZU	5187- 91- 19-C-10
JA8OBD	1950- 50- 13-A-
JA9JBK	1680- 40- 14-A- 6
JA8YXW	1638- 42- 13-A-
JR3MTJ	720- 24- 10-A-
JH1OEL	528- 22- 8-A- 6
JH0BQX	294- 14- 7-A-

Multi-Single

JA3YKC(JA2VUP,JA3ODC, oprs.) 250,110- 794-105-C-70
JA3ZBI(JA3s FGJ GFD HBF KGF KIE LXW MTV OLO RWJ,oprs.) 79,200- 352- 75-B-
JA1YFL(JA0JCJ,JE1TSD,JH2KKW oprs.) 22,263- 181- 41-C-
JA2YKA(JH2QXG,JR2PZX,oprs.) 12,393- 153- 27-B-11
JA2ZHX(JA2s AO DHL EMP, JH2HUQ,JR2AAZ,oprs.) 3150- 70- 15- B- 7

Multi-Multi

JA7YAA(JA7s JQG KPK LMU LUR NRQ TNO,oprs.) 223,686- 731-102-C-43
JA1YPQ(multiop) 118,341- 487- 81-B-65
JA1YFL(JA0JCJ,JE1TSD,JH2KKW oprs.) 22,263- 181- 41-C-

High Band

JA7GAX	208,440- 772- 90-C-17
JH1ACQ	159,933- 599- 89-C-
JA3USA	139,500- 620- 75-C-14
JA1HVS	89,700- 460- 65-C-20
JA7DAH	82,824- 406- 68-B-14
JA7BJS	67,083- 379- 59-B-24
JF1INA	65,016- 344- 63-C-33
JA2AYH	51,300- 300- 57-B- 7
JA7PL	50,220- 279- 60-B-24
JA1QZY	48,165- 247- 65-C-
JA4TNV/1	38,475- 225- 57-A-14
JA1IRQ	25,284- 196- 43-B-11
JA9SV	22,572- 198- 38-B-
JA6JRI	18,120- 151- 40-B-17
JA9NFO	15,444- 143- 36-B-
JF1XRB	14,352- 184- 26-A-15
JH1MTR	14,058- 142- 33-B-
JA6WW	13,137- 151- 29-C- 6
JA7BAL	11,160- 124- 30-B-
JJ1JPL	11,016- 102- 36-B-16
JA4GXS	10,005- 115- 29-B-10
JA4UQY	6030- 67- 30-A- 6
JR3CVO	5130- 114- 15-A-
JR3CQC	4641- 91- 17-A-
JG1UNE	4554- 69- 22-B- 7
JH1DUT	4545- 101- 15-A-15
JA1BUI	4464- 62- 24-A-
JA7HMZ	4158- 99- 14-A- 5
JA0UXG	3876- 76- 17-A- 6
JG1RDV	3762- 57- 22-B- 4
JF3JMO	2982- 71- 14-A-11
JA1AAT	2337- 41- 19-B-
JR2MKV	2070- 46- 15-A- 8
JA2TKO	2016- 56- 12-B- 8
JA7BMA	2016- 56- 12-A-
JH3ARL	1677- 43- 13-C- 3
JA1ABV	1320- 44- 10-B- 3
JH7BRG	918- 34- 9-C-
JA1DOY	624- 26- 8-A- 7
JH4LWL	588- 28- 7-A-
JA3BJQ	540- 20- 9-A- 3
JA4LUK	408- 17- 8-A-
JF1VKY	144- 12- 4-A-
JA8FDB	120- 10- 4-A- 1
JA7JGD	72- 6- 4-A-
JA1GJB	24- 4- 2-A- 1
JR6CKG	3- 1- 1-A- 1

Low Band

JA1SJV	43,071- 293- 49-B-36
JA9UX	24,849- 251- 33-B-
JA1EOD	14,670- 163- 30-C-20
JE1BRV	12,168- 169- 24-B-
JA4BKL	8736- 112- 26-B-18
JA7DME	6900- 100- 23-B-30
JA5MOU	3186- 59- 18-A-15
JA1HOM	2565- 57- 15-C-19
JA1RGL	783- 29- 9-A-
JA3BCT	156- 13- 4-A-
JA8MRV	156- 13- 4-B- 2
JF1TEU	144- 12- 4-A- 3

Mongolia

High Band

JT1AN 510- 17- 10-B

Asiatic R.S.F.S.R.

Multi-Single

UK0SAJ(multiop) 180- 12- 5-A

High Band

UW0IX	194,670-1030- 63-B-32
UA0SAU	57,452- 372- 47-B-
UA9CBO	31,602- 229- 96-B-
UA9FU	9024- 94- 32-B-
UA9OBU	1302- 31- 14-B-
UK9HAC	270- 15- 6-B-
UA9QAQ	12- 2- 2-A- 1

Low Band

UA0CCW 270- 15- 6-A

Azerbaijan

High Band

UD6DER 10,584- 98- 36-B-

Georgia

High Band

UF6CX 6825- 91- 25-A-

Kazakh

Multi-Single

UK7LAH(multiop) 5175- 75- 23-B-

High Band

UL7QH	1548- 43- 12-B-
UL7OF	12- 2- 2-B- 1

Israel

High Band

WA9BVB/4X 36,630- 222- 55-A-34

Europe

Portugal

CT4AT	3,870,792-5812-222-C-80
CT1FL	404,352- 864-156-C-
CT1UO	9936- 92- 36-B-14

Fed. Republic of Germany

DK3BJ 798,864-1958-136-B-
DK5AD 242,649- 627-129-C-
DL0CM(DK9ID,opr.) 171,801- 707- 81-B-
DK8AX 16,632- 126- 44-B-

Multi-Single

DK0TU(DC7QU,DKs 1PD 2VQ 6QI,DL7s UG XB, oprs.) 617,400-1372-150-C-70
DK9CW(+DL9PT,OE2VEL) 609,930-1255-162-C-
DA2AS(DA1s DJ GS GW UD, oprs.) 52,416- 273- 64-B-37

High Band

DK0SU(DK8FZ,opr.) 373,302-1338- 93-C-

DA1AY	258,546-1051- 82-B-25
DF6FK	164,715- 695- 79-C-
DK8FS	95,040- 396- 80-C-
DK1QC	84,240- 624- 45-A-
DK7DN	16,074- 141- 38-B-
DF2RG	10,464- 109- 32-B-
DL1RO	4002- 58- 23-B-
DL7QG	495- 15- 11-C-

Low Band

DK3FB	82,485- 423- 65-C-
DF9QO	18,156- 178- 34-C-19
DL8PC	15,252- 164- 31-B-15

German Dem. Republic

DM2AOL	7326- 66- 37-A-
DM2EBL	1653- 29- 19-A

High Band

DM2COL	54,600- 325- 56-B-
DM5UUL	7296- 76- 32-B-
DM5JL	6720- 70- 32-A-
DM3SIC	4779- 59- 27-B-
DM2ARD	3339- 53- 21-B-
DM2YLO	3192- 56- 19-B-
DM2FBN	2397- 47- 17-C-
DM2BTO	1173- 23- 17-B-
DM5YVL	858- 26- 11-B-
DM2CPE	495- 15- 11-A-
DM2AJH	297- 11- 9-A
DM5PUL	180- 10- 6-B-

Low Band

DM3ZEN	504- 21- 6-A-
DM4OLG	180- 12- 5-A-

Spain

EA1PT	875,679-1813-161-B-47
EA3ADW	603,804-1502-134-B-30
EA5TD	489,839-1286-127-C-16
EA3VM	405,000-1000-135-B-49

Low Band

EA2IA 7857- 97- 27-B-

Republic of Ireland

Multi-Single

EI9CB(multiop) 1,449,000-2760-175-B-65

France

F6DJN	367,224-1144-107-A-24
F8QB	38,700- 215- 60-A-
F6BFH	34,632- 222- 52-B
F5BV	9450- 90- 35-A-
F5RC	504- 14- 12-B-

Multi-Single

F5KAR(F3DI,F9CB,oprs.) 570- 19- 10-A-

High Band

F2SI	1,195,314-3526-113-A-76
F9XY	521,632-1756- 99-A-36
F6DWE	402,048-1396- 96-B-35
F6CLM	28,620- 180- 53-A-24
F9OJ	16,614- 142- 39-A- 6
F8BO	5544- 88- 21-A-
F6API	2451- 43- 19-A- 5
F6DLM	429- 13- 11-A- 2

England

G5CP 11,160- 155- 24-B- 7

Multi-Single

G4ANT(G3s JOC LDI MPN VZT XLL,oprs.) 1,771,026-3298-179-A-65
G5YC(multiop) 1,207,410-2410-167-C-91
G3OUR/A(G3YGF,G4s AMJ BUO BYB CNV EWJ,G8s HDR JPL JUD LYB LTE,oprs.) 587,190-1702-115-B-33
G3KMI(multiop) 22,608- 157- 48-B-19

High Band

G3TZH 942,390-2830-111-B-43
G3SSO(G4BEZ,opr.) 461,475-1465-105-C-21
G3TTJ 187,137- 717- 87-B-30
G3NT 52,290- 249- 70-B-
G3IRM/m 3828- 58- 22-A-

Low Band

G3TJW	253,062- 827-102-B-37
G4AMT	151,452- 601- 84-B-18

Northern Ireland

High Band

GI3KDR	252,650-1030- 85-A-
GI5BVN	93,024- 456- 68-B-34

Low Band

GI6YM(GI3IVJ,opr.) 24,948- 189- 44-B-

Wales

GW4BNJ 29,400- 200- 49-B- 7

High Band

GW4BLE 887,040-2816-105-B-45

Hungary

HA0KLL 24,480- 170- 48-B-30

Multi-Single

HA5KFN/5(multiop) 601,818-1246-161-B-90
HA7KLG(multiop) 376,494- 958-131-B-48
HA4KYB(multiop) 90,024- 341- 88-B-78
HA4KYH(HA4s YO YQ,oprs.) 73,899- 391- 63-B-

High Band

HA1ZD	12,240- 102- 40-A-25
HA0HW	3432- 44- 26-B-

Switzerland

W5ONL/HB* 113,820- 542- 70-B-21

Multi-Multi

HB9AUS(+HB9NH,HE9s EEX HWS) 1,016,964-2067-164-C-85

High Band

HB9AAA	596,232-2028- 98-C-
HB9T	120,150- 534- 75-B-20
HB9ARC	57,388- 248- 77-B- 3
HB9DX	43,542- 246- 59-B-

Italy

Multi-Single

I3PAT(I3s BBZ SBB,oprs.) 268,410- 776-115-B-40

Multi-Multi

IK0WX(+I0s IJ WXK) 1,691,760-2968-190-B-87

High Band

IK9KZW	222,894- 854- 87-B-18
I8ZLW	12,672- 128- 33-B- 5
IK2LVN	2310- 35- 22-B-

Sardinia

High Band

IS0MVE 26,784- 186- 48-B-12

Svalbard

JW7FD 89,559- 321- 93-C-

Norway

LA4EU 75- 5- 5-A- 1

Multi-Single

LA1K(LAs 2KM 3BO 3HP 4CQ 5KO 6ES 6MP 7OU 7YN,oprs.) 629,580-1499-140-B-

High Band

LA6HL 698,031-2267-103-B-35
LA2DR 77,625- 345- 75-C-12
LA2IJ 59,160- 290- 68-B-
LA1NG 27,714- 149- 62-B-
LA5JS 6960- 80- 29-B-
LA1SR(LA8LT,opr.) 4158- 66- 21-B-
LA1RN 3150- 50- 21-A-
LA3UQ 2331- 37- 21-B-
LA6VU 390- 13- 10-B-
LA3VU 252- 12- 7-B- 2
LA8OM 36- 6- 3-B-

Bulgaria

Multi-Single

LZ1KAA(multiop) 54,033- 217- 83-C-

High Band

LZ2ES 1872- 39- 16-B-

Austria

OE5CWL 31,785- 163- 65-B-22

Multi-Single

OE6XUG(OE6s EDG EEG HZG MBG,oprs.) 317,745- 921-115-C-35

Finland

Multi-Single

OH1AA (OH1NH, OH3ZE, oprs.) 881,448-1933-152-B-
OH1AR (OH1s IJ IG LW MA ZZ, oprs.) 878,094-1818-161-C-
OH3EW(OH1BA,OH2s BAQ BCV BEP BH BHL BNP CG EC SB VQ, oprs.) 295,290- 965-102-C-
OH8OS(+OH8s SP UT) 292,992-1744- 56-C-

High Band

OH4RH	45,276- 343- 44-B-
OH6UM	38,613- 211- 61-A-
OH2LU	26,520- 221- 40-C-
OH1TD	22,278- 158- 47-B-
OH7NW	16,851- 137- 41-B-
OH1GL	8820- 105- 28-A-
OH5OL	1935- 43- 15-B-
OH7SX	1638- 42- 13-A-
OH2BFS	972- 27- 12-B-
OH3XX	432- 16- 9-B-
OH2BFF	360- 12- 10-B-
OH3XJ	330- 11- 10-B-
OH5OQ	189- 9- 7-A-

Aland Islands

High Band

OH0NI 51,240- 305- 56-B-

Czechoslavakia

OK2BLG 51,408- 238- 72-B-
OK1KPX(OK1AHD,opr.) 12,426- 109- 38-B-
OK2BPO 3384- 47- 24-B-

Multi-Single

OK3KFF(OK3s TMR YCQ,oprs.) 89,856- 416- 72-B-
OK1KIR(multiop) 594- 18- 11-A-

High Band

OK1AGN	62,415- 365- 57-B-
OK1MGW	44,427- 251- 59-A-26
OK1VK	24,090- 146- 55-B-
OK2BKR	19,560- 163- 40-A-
OK2QX	18,189- 141- 43-C-
OK1KZ	15,480- 120- 43-B-
OK2JK	5292- 63- 28-A-
OK1DKS	4356- 66- 22-A-
OK2KLS	2970- 45- 22-A-
OK2PEQ	2496- 52- 16-B-

Low Band

OK1FAR	18,204- 148- 41-B-
OK1XN	7776- 96- 27-B-

Belgium

High Band

ON4XG 54,795- 281- 65-B-13

Denmark

OZ5KF 1,923,240-3410-188-B-

High Band

OZ5EV	62,370- 378- 55-B-
OZ5FY	49,647- 247- 67-B-
OZ6SV	34,686- 246- 47-A-
OZ2BM	13,452- 118- 38-B-
OZ1AP	5670- 90- 21-A-
OZ1ZO	4104- 57- 24-A-
OZ7BW	3000- 50- 20-A-
OZ6YO	2142- 42- 17-A-
OZ1XV	741- 19- 13-A-
OZ3BX	360- 15- 8-A-

Netherlands

PA0SMS	4536- 63- 24-A-
PA0YN	3978- 51- 26-B-

Multi-Single

PA0SMK(+PA9WRR,PA0SPD) 663,765-1615-137-B-32

High Band

PI1ARS	34,024- 389- 72-B-19
PA0EHI	83,160- 385- 72-C-10
PA9AWG	54,768- 326- 56-B-
PA0ATY	46,260- 257- 60-A-13
PA0KFF	21,210- 202- 35-B-18
PA0CLN	1404- 36- 13-B-
PA0TAD	360- 12- 10-B- 2

Sweden

SM5AQD 71,190- 339- 70-B-

Multi-Single

SK6IA(SM6s DHU EQH FPG FYJ, oprs.) 1,109,955-2387-155-C-96

High Band

SM2EKM 263,907-1239- 71-B-30
SM5CAK 155,610- 546- 96-B-
SM6ADW 66,528- 352- 63-B-
SM7DMN 43,200- 288- 50-C-
SM6BXV 40,170- 206- 65-B-
SM5BRW 25,725- 175- 49-B-
SM5BMD 17,955- 133- 45-B- 3
SM7BZV 17,172- 159- 36-B-
SM7FYM 10,323- 93- 37-B-
SM0BDS 10,260- 90- 38-A-
SK2IV(SM2COF,opr.) 9309- 107- 29-A-
SM6GTF 9892- 78- 38-B-
SM5ALY 6750- 90- 25-B-
SM7TV 3240- 45- 24-B-
SM1CJV 2907- 51- 19-B-
SM6CSB 2706- 41- 22-B- 6
SM5EKC 1260- 30- 14-B-
SM3AGO 1071- 21- 17-B-
SM0CGO 450- 15- 10-A-
SM0DJZ 312- 13- 8-B-
SM7GGK 297- 11- 9-B-

Poland

Multi-Single

SP6PZB(SP6s FAF FIH,oprs.) 364,425-1075-113-B-
SP9KRT(multiop) 183,456- 588-104-B-
SP5ALP(multiop) 151- 13- 9-A-

High Band

SP9PEZ	5022- 62- 27-B-
SP6AEG	4680- 52- 30-B-
SP5FHC	432- 16- 9-A- 2
SP1KIZ	27- 4- 3-B-

European Russian S.F.S.R.

Multi-Single

UK3AAC(multiop) 55,062- 322- 57-B-
UK6LAZ(multiop) 25,122- 158- 53-B-
UA3TN(multiop) 4800- 64- 25-A-
UV3CS(+UV3HD) 480- 20- 8-B-

High Band

UV3CF	196,224- 896- 73-B-
UW1CX	101,088- 624- 54-B-
UA1MU	30,744- 244- 42-B-
UA3AAK	13,392- 144- 31-B-
UA3DDF	2268- 54- 14-B-
UA3TR	1530- 30- 17-B-

Low Band

UV3FD 627- 19- 11-B-

Kaliningradsk

Multi-Single

UK2FAD(multiop) 750- 25- 10-B-

High Band

UA2EC	4047- 71- 19-B-
UA2FBZ	2448- 48- 17-B-

Ukraine

Multi-Single

UK5EAQ(multiop) 8160- 85- 32-B-

High Band

UB5MCS	74,550- 497- 50-B-
UT5OV	12,084- 106- 38-B-
UB5FBQ	3843- 61- 21-B-

Low Band

UB5WE 8763- 127- 23-B-

White R.S.S.R.

Multi-Single

UK2WAF(multiop)
37,812- 274- 46-B-
UK2WAO(multiop)
540- 18- 10-A-

High Band

UC2BP 456- 19- 8-B-

Lithuania

Multi-Single

UK2BHB(multiop)
932,274-2058-151-B-49
UK2BAS(UP2S PAJ PAO,oprs.)
376,740-1092-115-B-30

High Band

UK2PAD(UP2PAQ,opr.)
130,872- 574- 76-B-14

Low Band

UP2PBW 900- 25- 12-A-

Latvia

Multi-Single

UK2GKW(multiop)
826,848-2088-132-B-

Estonia

High Band

UR2AW 1530- 34- 15-A- 4

Yugoslavia

Multi-Single

YU3DBC(YU3S TPZ TYX ZV,
oprs.) 1,935,450-3450-187-C-92

High Band

YU1BCD(YU1NZV,opr.)
622,098-1938-107-C-48
YU2CDS(YU2RQX,opr.)
612,990-1946-105-C-

Malta

High Band

9H4G 11,583- 99- 39-B-12

North America

Bahama Islands

Multi-Single

W4SS/C6A(+W4s OO PJG RA SS,
WB4PQB)
1,514,460-2348-215-A-31

Dominican Republic

HI7CMC 466,626- 937-166-C-18

High Band

HI4MOG 470,580-1364-115-C-11
HI8CDS 294,984- 964-102-C-12
HI8LC 26,319- 283- 31-B- 8

Alaska

Multi-Single

KL7HRP(+KL7IUM)
1,407,276-2522-186-C-52

High Band

KL7IRN 630,300-1910-110-B-50
KL7IQN 108,180- 601- 60-A-44
KL7HDX 16,872- 152- 37-A-10
WA2AJQ/KL7
8613- 99- 29-B- 3

Puerto Rico

KP4EAS 7,782,324-8132-319-C-86
KP4DSD 3,544,944-4784-247-C-
KP4EPN(K4WVT,opr.)*
1,247,226-2143-194-C-31

Virgin Islands

KV4JY 234,255- 679-115-A-

Greenland

High Band

OX3RA 135,642- 611- 74-A-

Sint Maarten

Multi-Multi

PJ8CO(K1CO,W1GYZ,WA2DYK,
WB2S DRW GID QEU WOI,oprs.)*
7,239,870-7810-309-C-48

Guatemala

VE2AQS/TG9
4,327,155-4579-315-B-63

Antigua

Multi-Single

W6QL/VP2A(+W6KG)*
2,055,780-2916-235-A-44

St. Lucia

VP2LDQ(WA9FXJ,opr.)*
246,861- 669-123-B-19

High Band

VP2LCG(KØKJS,opr.)*
72,954- 386- 63-B- 6

Montserrat

Multi-Single

VP2MNK(VP2MGB,WØNAR,
WAØONK,oprs.)*
2,869,344-3888-246-B-48
VP2MAG(W6s KG QL,oprs.)*
2,433,552-3352-242-C-44

St. Vincent

VP2SZ(WB8JEY,opr.)*
406,080-1128-120-C- 9

Bermuda

High Band

VP9IF 356,928-1352- 88-B-50

Mexico

XE1LLS 3,928,344-4886-268-B-
XE2MX 867,969-1581-183-B-

High Band

XE1AFU 451,278-1233-122-B-20

Cayman Islands

ZF1AA 760,641-1249-203-A-32
W9AGA/ZF1*
85,398- 331- 86-A- 8

Oceania

Philippine Islands

DU6EG 2580- 43- 20-B- 7

High Band

K9PNT/DU2 135- 9- 5-B- 2

New Caledonia

High Band

FK8AH 49,077- 287- 57-A-

French Polynesia

FOØRSIK6NA,opr.)*
1,517,292-2268-223-A-21

Eastern Caroline Islands

High Band

KC6KO(WB2WSP,opr.)
22,650- 151- 50-B-12

Guam

KG6JHW 6216- 74- 28-B-13
KG6JAR 3024- 48- 21-C-

Low Band

KG6JIH 125,904- 488- 86-C-20

Hawaii

KH6IJ 4,244,226-5089-278-C-77
WB5KVC/KH6
3142- 58- 18-A- 6

Multi-Single

KH6GQW(+KH6GMP)
4,407,690-5285-278-C-96

High Band

KH6BZF 1,605,744-3304-162-C-64
KH6JFI 312,708-1012-103-C-19
KH6IJA 297,330- 935-106-B-22

Midway Islands

High Band

KM6FC 1785- 35- 17-B-19

Australia

High Band

VK2XJ 122,472- 504- 81-B-24
VK4AK 118,818- 483- 82-B-
VK5RX 2832- 59- 16-A-
VK4PJ 1554- 37- 14-A-

Low Band

AX4VU 112,392- 446- 84-A-12
VK3QI 24,957- 141- 59-B-
VK4QK 4725- 63- 25-B-

Indonesia

YBØACH 54- 6- 3-B- 1

Manihiki Islands

ZK1BA 669,900-1276-175-B-24

New Zealand

ZL2ACP 1,237,515-1955-211-A-
ZL3BK 94,620- 415- 76-A-22

High Band

ZL2GJ 30,315- 215- 47-B-
ZL4IJ 5850- 65- 30-A-

Low Band

ZL2HE 49,830- 302- 55-A-16

South America

Bolivia

CP6EL 1,989,900-3015-220-A-36
CP1AT 123,321- 408-101-C- 9

High Band

CP6HE 502,902-1206-139-B-60

Ecuador

HC5EE 371,805- 925-134-C- 9

Multi-Single

HC5CRC/5(multiop)
8742- 94- 31-A- 4

High Band

HC1BU 2,442,192-4904-166-B-60
HD9EE 135- 5- 5-B- 1

Argentina

High Band

LU1ADI 184,032- 568-108-B-19

Peru

OA8V 386,370- 810-159-A-21

High Band

W1DKB/OA4
728,190-1674-145-C-53

Netherlands Antilles

PJ2FR 2,595,957-3367-257-A-
PJ9JT(W1BIH,opr.)*
1,364,688-2106-216-B-19

Brazil

PY3APH 180,711- 621- 97-B-

Multi-Single

PY1BAR(+PY1s CHP DBE)
410,571-1029-133-B-26

High Band

PY2ELV 1,108,800-2310-160-A-
PY2DMT 152,991- 573- 89-C- 9
PY1ZBJ 137,520- 573- 80-B-
PT2JB 432- 16- 9-B-

Suriname

High Band

JA1PIQ/PZ
105,825- 425- 83-A- 8

Venezuela

YV4TI 4,163,922-4721-294-C-
WA5UKR/YV5
78,039- 299- 87-B-25

High Band

YV5FOI 723,398-1757-138-B-35

Check Logs

CW: DK9NH DM2ABL DM2ADC
DM2BLL DM2COO DM2CGF
DM2CGH DM2CKJ DM2CMA
DM2CMF DM2CUA DM2DZH
DM2FBN DM2FDM DM2FQN
DM3HF DM3TNA DM3UFJ
DM3WFJ DM3WYA DM3ZC DM4SWL
F8FE G3PVA G3UFY HA3MB
HI8EVA JF2GAL K1YHK K3TGM
K6DSK K6QPH LA2IE L81G
LZ1XL LZ2JF N6ZZ OK1IAR
OK2BBJ OK2BBQ OK2TBC
OK3CJK OK3KFF OY3H PAØCLN
PAØEFI PAØPHK PAØUV SM2COR
SM4AIX SM5AKT SP7DGB
SP2FMN SP2GRT SP3DAH SP5IXI
SP6EIY SP8GUV SP9AMH
SP9BWA W4BGO/TI2 UA1ACO
UA1OSA UA1ZWW UA3ADC
UA3AFQ UA3DAE UA3DCX
UA3DDN UA3DEA UA3GNW
UA3EAL UA3ECF UA3IAM
UA3QDC UA3TAM UA3UAA
UA3VAD UA3WBO UA4AY
UA4BI UA4CH UA4HEJ UA4PAV
UA4YAU UA6WE UA6LLI UA6LXZ
UA9HAK UA9MF UA9SDB UA9UPP
UA9XV UAØBBR UAØCRW
UAØLJ UAØLLU UAØQWB UB5AAF
UB5CBB UB5EDJ UB5FAQ UB5IDL
UB5IBY UB5JFX UB5LAY UB5NU
UB5QCK UB5TAG UB5UBI
UB5UBU UB5XBO UB5ZCO
UC2ACA UC2LBE UC2RG
UC2RV UC2ZZ UC2ZBP UK2FAA
UK2GAY UK2PAT UK3AAY
UK3VAJ UK5QAC UK6AAJ
UK6LDN UK7AAF UK7CAI
UK9AAZ UK9WBU UKØAAC
UL7CT UL7EAH UL7PBI
UL7PBK UQ2BGJ UV3CM UV3DN
UV9UL UW3UG UV3WZ UW6CV
UW9PT UY5AO VE2DWG
VE2YU WA1TAI WIYZL WA1ZLD
W2LKH W2NCI WA2ZBW W3IPS
W4BBP WB4REV W6BYB/7
W6MUR W6RR W7KXW WB9IWT
WØBX WBØKFB YO9BGV YU1BCM
YU2CDO; Phone: CE5BIB CT1EU
DL1RB DM2CMF DM2DWN
DM2GDL DM3VGC DM3ZC
DM4UCO F3EN G4FGN HV3SJ
JA7KXD JE2GAL K1BUR K3AV
K4KPH K5NM K6DSK/M6
K7GEX K7YDO K9NA KØVUW
LA2IE LA6RLN6AA OH1XX
OH2BAQ OH3XZ OK1DVK
OK2BBJ OK3CFS OK3TAB
O/4JU OZ4VK PAØLEG
PAØTV PAØUV SL5ZW SM1CXE
SM1DYR SM5BFJ SM5GA
SM7DMT SMØIX SP3BQD
SP4AS SP5PTR UA3DFK UA3IAM
UA3LCH UA6AUG UA6LXZ
UAØBAC UF2ACA UJ1RI AG
UK2GCF UK3AAI UK3ACW
UK4YYY UK5VAD UK6LDN
UK6YAB UK7LAF UK9ADM
UKØAAB UKØAAC UO5BZ UR2REN
UW3DN UW3EQ UW9VH
UWØMF VE1EP VE2AHE
VE2CKM VE2EVH VE3FFA
VE7BGK VE7DEW VK4PJ VK4VU
VU2GDG WA1PBE W2GGN
W2IKA W2JGR W3GRK W3IEZ
W3ZLW4OS W6CUW W6RQZ
W6RZ W7BCT W8EZ WØJYT
WØNN WA4BBU WA4PMU
WA6EKL WA8TOB/6A
WA9GFR WA9NPM WAØLEE
WAØTAS WB4JKP WB5TIM
WB9NME WBØNOU ZE1BL
L5T5CJ; Swl: REF 30989

Disqualifications: The following have been disqualified from the 1977 ARRL DX Competition, per the criteria described on page 85 of January *QST*, 1977. *Phone*: K1EA W1NJL W1ZA (operators of W1ZA), W3RJ WA3LRO (operator of W3WJD), W6RTT. *Cw*: K1EA (operator of W1ZA), WA1LNQ K2BMI W2GGE WA2YHK K3UEI K3WJV K3WW W3HXK WA1LNM (operators of K3WW), WA1LNQ CX1EK WA2LQZ K3EST W3AU W3IN WA3HRV (operators of W3AU), N3AD W3BGN W3IGQ (operators of W3BGN), K3DZB (operator of W3RJ), K3JGI WA3YGH WA3YHT (operators of WA3YGH), WA3UFW WB4YKU (operators of WA4UFW), K6MA WA7RKR (operators of K6MA), K6PJY N6VV WA6FWJ WA6NGG (operators of WA6NGG).

Strays

1976 DX Competition

KH6GQW is incorrectly listed as a phone single-op entry. Correct status is as multi-single with KH6GMP as second op. KH6GQW is also Oceania Continental winner, not C21NI as shown. The scores of G4ANT, HB9AUS, YV1AVO are shown in single-op listings; all are multi-single participants. JF1MYI is incorrectly shown as JA1MYI in the single-op scores from Japan.

1976 Sweepstakes

□ Southwestern Division phone winner is W6HX, now K6AC as printed. Midwest Division low-power winner should be WØNVP, not WAØPAO, K1VTM is incorrectly listed as multiop phone winner in New England Division. The correct winner is K1KDP.

Phone single-op winner for the Mad River Radio Club is WA8PLZ (WB8AYC, op), not WA3WIK. Winning single op on phone for Motor City Radio Club is K8SIA, not WA8FRE as shown. K5VTA should be listed as op of Northern Texas Division first-place finisher W5TMN. The club listings incorrectly show the IBM Owego Club as the IBM Oswego Amateur Radio Club.

10-Meter Contest

The second operator at the MDC multi-op station WB3BSV is shown as K3ZZ. The correct call is W3ZZ.

Operating News

Conducted By George Hart,* W1NJM

Response to Restructuring

In the June and July issues of *QST* this year we ran articles concerning the CD appointment structure, one detailing the structure as it now exists, the other proposing some extensive changes. What, you haven't read them? Any ham interested in operating, and especially the League's operating organization, should read them, especially the second article with the proposed changes – although this may not make too much sense unless you understand what it is being changed *from*.

While response hasn't exactly been overwhelming, it has been substantial. Only one thing is disappointing about it. Nearly all of the response has been from amateurs who already hold SCM appointments and are, therefore, suspect of being wedded to the status quo. These are for the most part the same ones who commented on the same general proposals made previously to Communications Department appointment-holders. Only a very small handful of comments were received from nonappointees.

The request for comments did not, of course, amount to a "poll." It was intended purely to see what kind of reaction resulted.

So what kind of a mandate does this give us? No mandate at all. Nonappointee DXers and contesters seem to have no emotions about appointments in their fields, and those DXers and contesters who hold appointments in other fields, some of whom commented, were cool to or opposed to appointments in DX and contest fields. So it would seem that we can forget about Official Contest Station (OCS) and Official DX Station (ODS) appointments, at least tentatively or temporarily. How about the other proposals?

Official Traffic Station (OTS), Official Emergency Station (OES) and the leadership appointments of Net Manager and Section Net Manager received better (but not 100 percent) acceptance, although the cw contingent were understandably reluctant to release their grasp from their special status in the traffic field.

How about the Versatility Factor? So little comment about this that it's hard to determine if it's wanted or not. It sort of leaves one with a free hand – okay to go ahead if we can make it work, but woe unto us if it bombs out.

Is it possible that the amateur public, like the general public, is becoming conditioned to propaganda? The Madison Avenue hucksters know that anything can be sold, provided enough effort and money is put behind it. So the procedure is to get up a proposal that you'd like to put into effect, then *sell* it. Don't mention any disadvantages or point out any fallacies, concentrate on pointing out why the proposal would be beneficial, why the respondent should like it. Perhaps our approach was too soft. All we did was present the proposal and ask respondents to let us know what they think about it. We even suggested you might want to shoot it down, that "this is just something to take potshots at." One respondent took us to task for this noncommital attitude, outlined a program designed at "selling" the proposal.

But we weren't particularly interested in selling it, we just wanted your opinion, your considered thoughts on the matter. Sad to say, we received such only from a very few, but here are some excerpts: I'd like to see a real tightening-up in appointment procedures to go hand-in-hand with restructuring. (VE3SB) Why not have an Official Research Station (ORS) in place of OVS? (WB8UHU/1) The only appointment open to Novices is ORS-H; and the only appointments open to Technicians are ORS-H and OVS. Why? (WB8VLR) Why don't we give a grading (of OTS according to level of net participation) to separate the boys from the men? (VE3DV) I strongly feel that the (Section Traffic Manager) *must* be an active member of all groups represented. (WØHXB) Have you considered an Official Classic Radio Station appointment for hams whose main gear is more than 20 years old? (K9SW) Ask those of us who are not "traffic hounds" whether they would like to see more appointments available in other areas (emergency, DX, whatever) and I'm sure you'll get a resounding YES! (WB8TVD) It was the stodgy old system that did not welcome me or my enthusiasm. Let's implement this plan immediately. (KH6CKJ) I personally feel the guys (OBS) have been of service . . . and I've had more than one person thank me for the bulletin information. (W9TAL) I work DX and contests but I see no reason for separate appointments. How about OOS (Official Operating Station)? (KØFPC) Is the purpose (of appointments) to furnish wallpaper or to designate stations for a particular job? Most of the newly proposed awards seem more along the honorary line, giving recognition to DXers, contesters and such. (K4ZN) "Fun" activities (DXing and contesting) as opposed to "work" activities, such as emergency and traffic operating, don't need a structured appointment to work. (K1MC) I think the distinction of cw versus phone traffic operators should be retained. (K3NGN) It has always amazed me that . . . it is necessary to have two categories for primarily the same function (i.e., cw and phone traffic). However, I *do not* feel that appointments for Official DX Stations or Official Contest Stations are needed. (K2GCE) Surely a contest operator receives his award when he wins a certificate. The avid DXer gets his reward when he makes DXCC. (W5GHP) How about an "Official Emergency Relay Station (OERS)" for medium and long-haul traffic relay between vhf and NTS? (N2NS)

Okay, so what's the verdict? Well, for one thing, it looks like OCS and ODS are out, but the general reaction to OTS, OES, STM and NM seems favorable enough to get some support. Most of the opponents of dropping OBS were OBS appointees, but we'll go slow on this one. Keep the comments coming, if you have any, and watch for an announcement of some changes. To those who have written, many thanks. Your guidance is needed and appreciated.

SCM ELECTION NOTICE

To all ARRL members in the Eastern New York, Eastern Pennsylvania, San Diego, South Dakota, Louisiana, North Carolina, Virginia, Pacific, and Maritime/Newfoundland sections: You are hereby solicited for nominating petitions pursuant to an election for Section Communications Manager. A petition, to be valid, must contain the signatures of five or more full ARRL members residing in the section concerned. Photocopied signatures are not acceptable. No petition is valid without at least five signatures *on that petition*. No member may sign more than one petition. It is advisable to have a few more than five signatures on each petition.

Petition forms (CD-129) are available on request from ARRL headquarters but are not required. The following form is suggested:

(Place and date)

Communications Manager, ARRL
225 Main Street, Newington, CT 06111

We, the undersigned full members of the . . . ARRL Section of the . . . Division, hereby nominate . . . as candidate for Section Communications Manager for this Section for the next two-year term of office.

(Signature . . . Call . . . City . . . Zip . . .)

SCM candidates must have been a member of the League for a continuous term of at least two years and a licensed amateur of General class or higher (Canadian Advanced Amateur Certificate) immediately prior to receipt of petition at Headquarters.

Petitions must be received at Headquarters on or before 5:30 P.M. Eastern Local Time, December 9, 1977.

Wherever more than one member is nominated in a single section, ballots will be mailed from Headquarters on January 3, 1978, returns counted February 28, 1978 and SCMs elected as a result of the above procedures will take office April 1, 1978.

If only one valid petition is received for a

*Communications Mgr., ARRL

section, that nominee shall be declared elected without opposition, for a two-year term beginning April 1, 1978.

If no petitions are received for a section by the specified closing date, such section will be resolicited in April *QST*, and an SCM elected through the resolicitation process will serve a term of 18 months.

Vacancies in any SCM office between elections are filled by appointment by the communications manager.

You are urged to take the initiative and file a nominating petition immediately.

George Hart, W1NJM
Communications Manager

REPEAT SCM NOMINATING SOLICITATION

Since no petitions were received for the Sacramento Valley section as a result of notices in April and May *QST*, nominating petitions for this section are herewith resolicited. See the above notice for details on how to nominate.

5BWAS AWARD

(Updating the list in May 1977 *QST*, starting with number 281): W4KN WA8MOA W8CNL W0MHK K5OVC W4QCW W0DYK WA6RVR W8RSW WB4PAB WA8PPF W8UOQ.

W1AW Operating Schedule (April 24-October 30, 1977)

PDST	CDST	EDST	UTC	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
6 A.M.	8 A.M.	9 A.M.	1300	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Slow[1]		
7 A.M.	9 A.M.	10 A.M.	1400	←		Cw Bulletins[3]		→		
8 A.M.	10 A.M.	11 A.M.	1500	←		RTTY Bulletins[4]		→		
1 P.M.	3 P.M.	4 P.M.	2000	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Slow[1]
2 P.M.	4 P.M.	5 P.M.	2100	←		Cw Bulletins[3]				→
3 P.M.	5 P.M.	6 P.M.	2200	←		RTTY Bulletins[4]				→
4 P.M.	6 P.M.	7 P.M.	2300	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Fast[2]
5 P.M.	7 P.M.	8 P.M.	0000	←		Cw Bulletins[3]				→
6 P.M.	8 P.M.	9 P.M.	0100	←		RTTY Bulletins[4]				→
6:30 P.M.	8:30 P.M.	9:30 P.M.	0130	←		Phone Bulletins[5]				→
7 P.M.	9 P.M.	10 P.M.	0200	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Slow[1]
8 P.M.	10 P.M.	11 P.M.	0300	←		Cw Bulletins[3]				→
9 P.M.	11 P.M.	12 P.M.	0400	←		RTTY Bulletins[4]				→
9:30 P.M.	11:30 P.M.	12:30	0430	←		Phone Bulletins[5]				→

[1] Slow code practice on cw bulletin frequencies, 8 minutes each session; 5, 5, 7-1/2, 7-1/2, 10, 13, 15 wpm.
[2] Fast code practice on cw bulletin frequencies, 8 minutes each session; 35, 30, 25, 20, 15, 13, 10 wpm.
[3] Cw bulletins, 18 wpm, on: 1.835 3.58 7.08 14.08 21.08 28.08 50.08 147.555 MHz.
[4] RTTY bulletins 60 wpm/170-Hz shift on 3.625 7.095 14.095 21.095 28.095 MHz.
[5] Phone bulletins on 1.835 3.99 7.29 14.29 21.39 28.59 50.19 147.555 MHz.

Operating-visiting hours are Monday through Friday 7:30 A.M. to 1 A.M. and Saturday and Sunday 3:30 P.M. to 1 A.M. (all local Eastern Time). The station address is 225 Main St., Newington, CT 06111 (about 7 miles south of Hartford). Maps with local street detail are available upon request. Please note that all footnoted frequencies are approximate. If you wish to operate when visiting, you must have your original operator's license with you. (Schedules can also be arranged to work W1AW.) *Staff:* Chief operator/Asst. Communications Mgr. C. R. Bender, W1WPR; Chris Schenck, W1EH; Stan Gibilisco, W1GV.

In a communications emergency monitor W1AW for special bulletins as follows (times in UTC): *phone* on the hour, *RTTY* at 15 minutes past the hour, *cw* on the half hour.

To improve your fist by sending in step with W1AW (but not over the air!) and to allow checking the accuracy on certain tapes, note the UTC dates and *QST* text to be sent in the 0200 practice from the issue of *QST* two calendar months past: Oct. 3, It Seems to Us; Oct. 11, World Above; Oct. 12, League Lines; Oct. 20, Public Service; Oct. 24, Happenings; Oct. 28, Operating News.

AMSAT-OSCAR 7

Ref Orbit	Date	Time (UTC)	Long W
13159B	1 Oct.	0142	80.0
13171A	2 Oct.	0041	64.9
13184B	3 Oct.	0135	78.4
13196A	4 Oct.	0035	63.3
13209X	5 Oct.	0129	76.9
13221A	6 Oct.	0028	61.7
13234B	7 Oct.	0122	75.3
13246A	8 Oct.	0022	60.1
13259B	9 Oct.	0116	73.7
13271A	10 Oct.	0015	58.6
13284B	11 Oct.	0110	72.2
13296X	12 Oct.	0009	57.0
13309B	13 Oct.	0103	70.6
13321A	14 Oct.	0003	55.4
13334B	15 Oct.	0057	69.0
13347A	16 Oct.	0151	82.6
13359B	17 Oct.	0051	67.5
13372A	18 Oct.	0145	81.0
13384X	19 Oct.	0044	65.9
13397A	20 Oct.	0139	79.5
13409B	21 Oct.	0038	64.3
13422A	22 Oct.	0132	77.9
13434B	23 Oct.	0032	62.7
13447A	24 Oct.	0126	76.3
13459B	25 Oct.	0025	61.2
13472X	26 Oct.	0119	74.8
13484B	27 Oct.	0019	59.6
13497A	28 Oct.	0113	73.2
13509B	29 Oct.	0012	58.0
13522A	30 Oct.	0107	71.6
13534B	31 Oct.	0006	56.5

NOTES

1) All time and date references are in UTC.
2) A-O 7 is operational on Mode A on odd days of the year, and on Mode B on even days of the year. Wednesdays are reserved for special experiments; authorized users only.
3) The Mode B transponder inverts signals. Upper sideband on 432 MHz becomes lower sideband on 146 MHz.
4) All orbits scheduled for Mondays are reserved for QRP use only. Use a *maximum* of 10 watts of erp.

The operating schedule of AMSAT-OSCAR 6 has been discontinued indefinitely. Presently operating at one-half its design voltage, it is difficult to command and is not transmitting telemetry. A-O 7, however, continues to function reliably.

To keep abreast of latest developments, tune into the regular phone and cw bulletins over W1AW (see schedule in "Operating News," above, AMSAT bulletins transmitted over the beacon frequencies on A-O 7 reference orbits, and AMSAT nets (East Coast at 0100 UTC Wednesdays on 3850 kHz LSB; Mid-States at 0200 UTC; West Coast 0300 UTC).

Spacecraft Frequencies

Spacecraft	Uplink	Downlink	Beacon
A-O 7			
Mode A	145.850-145.950 MHz	29.400-29.500 MHz	29.502 MHz
Mode B	432.125-432.175 MHz	145.975-145.925 MHz	145.972 MHz

Operating Events

OCTOBER

1-2: California QSO Party,* VK/ZL/Oceania phone**
6: West Coast Qualifying Run**
8-9: CD Party cw, RSGB 21/28 MHz, VK/ZL/Oceania cw, QRP QSO Party**
12-13: YL/AP cw**
15-16: CD Party phone, RSGB 7 MHz, WADM, Manitoba QSO Party, Scouts Jamboree**
19: W1AW Qualifying Run**
22-23: CARTG RTTY SS, CQ-WE, Indiana QSO Party**
23: W1AW Qualifying Run**
29-30: CQWW phone**

NOVEMBER

2: West Coast Qualifying Run**
3-4: YL/AP phone**
5: Frequency Measuring Test**
5-6: Sweepstakes cw,** RSGB 7 MHz phone, Trilliums***
12-13: Missouri QSO Party, WAE RTTY, IPA Contest, Delaware QSO Party***
13: OK DX Contest***
17: W1AW Qualifying Run***
19-20: Sweepstakes phone,*** WWDXA cw***
26-27: CQWW cw**

DECEMBER

3-4: 160-Meter Contest, TOPS cw, EA phone, CT QSO Party***
8: West Coast Qualifying Run
10-11: EA Contest cw, HA DX Contest***
16: W1AW Qualifying Run (+40 wpm)
17-18: SOWP Christmas QSO Party***
25: HA5WW***
28: W1AW Morning Qualifying Run
31: Straight-Key Night

*Detailed last month
**Details this issue
***Details next issue

OCTOBER

1-2: **VK/ZL/Oceania DX Contest** phone, sponsored by the Wireless Institute of Australia and the New Zealand Amateur Radio Transmitting Society, 1000Z Oct. 1 through 1000Z Oct. 2 (cw Oct. 8-9). Non-VK/ZL/O stations score 2 points for each QSO on a specific band with VK/ZL; 1 point with Oceania stations other than VK/ZL. Final score: Multiply total QSO points by the sum of VK/ZL call areas worked on all bands. (The same area worked on different bands counts as a separate multiplier.) Send RS(T) plus serial starting with 001. Usual log info, underline each new VK/ZL area worked. Log each band separately. Separate summary to include call, name, address, equipment details and band breakdown delineating QSOs and areas worked on each band. All-band score uses the sum of multipliers worked on all bands. Usual signed declaration. Certificates and plaques will be awarded. Logs should be posted to reach the committee before Jan. 31, 1978. Logs go to Contest Mgr., Jock White, ZL2GX, 152 Lytton Road, Gisborne, NZ.

6: **West Coast Qualifying Run** (W6OWP prime, W6ZRJ alternate) 10-35 wpm at 0400Z (Universal Coordinated Time, abbreviated UTC, with Z shown as a time designator). The run will take place at 9 P.M. PDST local clock time the night of October 5. Frequencies are approximately 3590/7090 kHz. Dates are always shown several months in advance and times are always the same local Pacific time, 9 P.M. Underline one minute of the highest speed you copied, certify that your copy was made without aid, and send to ARRL for grading. Please include your full name, call (if any) and complete mailing address. A large, stamped, addressed envelope will help to expedite your award/endorsements.

8-9: **CD Party** cw, open to all appointees and officials, notified separately by bulletin. (Eligibles operate any 20 hours out of the 30-hour period; times off 15 minutes or more. Party starts 2300Z Oct. 8 and ends 0500Z Oct. 10.) **RSGB 21/28-MHz Telephony Contest**, open to all. A station, whether fixed, portable or mobile may be worked only once on each band, single op. only. Each complete QSO with a British Isles station earns 3 points. Final score is the no. of points times the total no. of British Isles prefixes worked on each band. Pertinent prefixes: G/GC/GD/GI/GM/GW 2, 3, 4, 5, 6, 8. Contacts with GB stations do not earn points or multiplier credit. Entries should be sent to D. J. Andrews, G3MXJ, 18 Downsview Crescent, Uckfield, Sussex, England. They should be posted to arrive not later than December 6, 1977. **VK/ZL/Oceania Contest** phone, see Oct. 1-2 listing. **QRP QSO Party**, sponsored by the QRP ARC international, starts 2000Z Oct. 8, ends 0200Z Oct. 10; open to all. Members send RS(T) and state (or province or country) plus QRP number where applicable. In lieu of QRP number nonmembers send power input. Stations may be worked once per band for QSO and multiplier credit. Member QSOs count 3 points, others 2 points. Stations other than W/VE count 4 points. Final score equals QSO points times number of multipliers per band times power multiplier. (Over 100 watts input times one, 25-100 watts times 1.5, 5-25 watts times 2, 1-5 watts times 3, less than 1 watt times 5.) Suggested frequencies: cw, 3540 7040 14065 21040 28040; ssb, 3855 7260 14260 21300 28600; Novice, 3720 7120 21120 28040 (all plus/minus 5 kHz). Certificates. Send full log data including name, address, bands, equipment, power to QRP ARC Contest Chairman W5TVW, E. V. Sandy Blaize, 417 Ridgewood Drive, Metairie, LA 70001. Logs must be received by November 30.

12-13: **YL Anniversary Party**, cw, sponsored by the Young Ladies' Radio League, from 1800Z Oct. 12 through 1800Z Oct 13; open to all licensed women operators (phone, session Nov. 3-4). YLRL members only are eligible for the cup awards. OM contacts will not count. Call CQ YL. All bands, no crossband. Only one contact with each station, regardless of bands used. Exchange call, QSO number, report and ARRL section or country. Usual signed log info. Note that phone and cw are separate, requiring separate logs. All YLs within a section score one point for a YL QSO in a section, two points for a YL not within an ARRL section (i.e. DX). Contestants running 150-watts input or less on cw multiply score (contact points X sections/countries) by 1.25; ssb contestants running 30-watts PEP or less may multiply the score by the same 1.25 factor. Signed logs must be postmarked by November 21 and received by Dec. 16. Logs go to Carol Bourne, WA9NEJ, 362 Hawthorne, Glen Ellyn, IL 60137.

15-16: **CD Party phone**, see Oct. 8-9 listing. **RSGB 7-MHz DX Contest**, cw, from 1800Z Oct. 15 to 1800Z Oct. 16 (phone next month). Exchange report and serial (starting with 001). Non-British Isles stations score 5 points for each contact with the British Isles (those outside EU 50 points). All may claim a bonus of 20 points for each British Isles numerical prefix worked (i.e. G/GC/GD/GI/GM/GW 2, 3, 4, 5, 6, 8). GB contacts invalid. (Non-EUs must have at least 10 QSOs to qualify for an award.) Entries must be addressed to the HF Contests Committee, c/o J. Bazley, G3HCT, Brooklands, Ullenhall, Solihull, West Midlands, England, to arrive no later than Dec. 12 for the cw contest and Dec. 24 for the phone event. **WADM Contest**, celebrating the anniversary of the foundation of the German Democratic Republic, from 1500Z Oct. 15 to 1500Z Oct. 16. Cw operation only, all bands from 80 through 10. Call CQ WADM. Send RST, plus consecutive serial starting with 001. Work only DMs. Each station may be worked once per band. A complete QSO 3 points, incomplete contacts or logging errors make the contact worth 1 point. Each DM district per band counts one multiplier. The final multiplier is determined by the sum of all districts worked on all bands. The special stations DM7, DM8 and DM count for a multiplier only on the band on which the station is worked for any missing district. The DM districts are the last letter of calls (A through O). Maximum multiplier of 73. Categories are single operator all band, multioperator stations all band and SWLs. Please use separate logs for each band and include the usual summary and declaration. Mail logs within 30 days to Radio Club of the GDR, DM Contest Manager DM2ATL, DDR 1055 Berlin, P. O. Box 30, German Democratic Republic. (Applications for all DM awards may be sent with the logs but please use separate application sheets for each award.) **Manitoba QSO Party**, from 2200Z Oct. 15 through 0200Z Oct. 17, sponsored by the Amateur Radio Clubs of Manitoba commemorating the 25th anniversary of the Amateur Radio League of Manitoba, ARLM. The same station may be worked on each band and mode. VE4 to VE4 and 2-meter simplex QSOs are permitted. VE4 mobiles can be worked each time they change municipalities. Exchange RST, name and QTH (municipality). Each QSO counts 1 point. VE4s multiply the number of QSOs times the number of states, VE provinces and DX countries worked. All others multiply the number of QSOs times the number of Manitoba municipalities, local government districts, provincial parks and forest reserves (maximum of 134), times the number of ARLM members worked. Suggested frequencies: ssb, 3770 3905 7195 7230 14190 14285 21245 21355 28600; cw, 3705 7105 14065 21205 28205. Awards. Mailing deadline November 12. Send log data and usual signed declaration to Doug Bowles, VE4QZ, 1104 First St., Brandon, MB R7A 2Y4, Canada.

19: **W1AW Qualifying Run**, 10-35 wpm at 0200Z, transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 and 147.555 MHz. This is 2200 EDST (10 P.M. local Eastern time) the night of October 18. Underline one minute of the highest speed copied, certify that the copy was made without aid and send it to ARRL per the instructions under the October 6 listing.

22-23: Canadian Amateur Radio Teletype Group (CARTG, VE3RTT) 17th annual RTTY DX Sweepstakes, 0200Z Oct. 22 to 0200Z Oct. 24. No more than 30 hours of operation is permitted. Nonoperating periods can be taken at any time during the contest (indicate "off times" in the log). All amateur bands authorized for F1 emission. Countries per ARRL Countries List with KL7/KH6/VO to be considered as separate countries. Classifications are single operator (single transmitter), multioperator (one transmitter), SWL printer. Individual operators of multioperated stations may submit their logs singly instead of a group entry. Messages to include message no., time in UTC and zone (see chart, p. 52, Sept. 74). All complete contacts with one's own zone count 2 points, all others will receive points listed in the zone charge. Additional contacts permitted on different bands. Each country contacted (including your own) on each band counts as a multiplier. Each U.S. and VE district counts as a separate multiplier. Final score: Total exchange points times number of multipliers times number of continents (maximum of six). Add 100 bonus points for each VE/VO contact on all bands. Separate logs for each band. (Note, logs and zone charts available from the CARTG for an s.a.s.e.) Logs must be received before Dec. 31. Plaques, medallions, certificates. Mail entries to Canadian Amateur Radio Teletype Group, 85 Fifeshire Road, Willowdale, Ontario, Canada M2L 2G9. **CQ-WE Contest;** Bell Lab's Murray Hill ARC is host. Western Electric, Bell Labs, AT&T, AT&T Long Lines and Teletype Corp. employees/retirees. For rules send s.a.s.e. to W2EME. Session 1 on Oct. 22, 1700-2200Z hf/vhf phone; session 2, Oct. 22 2300Z through Oct. 23 0400Z hf/vhf/RTTY; session 3, Oct. 23 1700-2200Z hf/vhf cw/RTTY; session 4, Oct. 23 2300Z through Oct. 24 0400Z hf/vhf phone. Info submitted by Robert L. Brown, W2EME, chairman, Murray Hill ARC, 65 Hillside Ave., Berkeley Heights, NJ 07922. **Indiana QSO Party,** sponsored by the Indiana Radio Club Council, the full period UTC. All bands, no 2-meter repeater operation. Contacts should be numbered and the state/country/province used. Novice contestants welcomed. Activity recommended in the lower frequencies of the bands; avoid nets. The same station may be worked on cw or phone and on other bands. Single or multiop. No minimum contacts required. Certificates for any special achievements. Reports must be received by Nov. 30. Send to J. McClain, W9KMY, 700 E. North St., Kokomo, IN 46901.

23: W1AW Qualifying Run, 10-35 wpm, at 2300Z. This is 1900 EDST (7 P.M. local Eastern time) on the 23rd. All other details per the Oct. 19 listing.

29-30: CQWW Contest, phone, full period UTC, 160 through 10 meters. Single op both single band and multiband, multiop (all band operation only) with single transmitter and multitransmitter. Exchange report plus CQ zone. A station in a call area different than that indicated by its call sign is required to sign portable. A multiplier of one for each different zone on each band and a multiplier of one for each different country contacted on each band. You may work your own country and zone for multiplier credit. CQ Zone Map, ARRL Countries List, WAE country list and IARU WAC boundaries are standards. Contacts between stations on different continents are worth 3 points, between stations on the same continent but in different countries one point. Note: For North Americans only contacts between stations within the N.A. boundaries count two points. Contacts between stations in the same country are permitted for zone or country multiplier credit but have zero point value. Final score is the result of multiplying total QSO points by the sum of your zone and country multiplier. Single ops, must show a minimum of 12 hours of operation to qualify for an award, multiops a minimum of 24 hours. A single-band log is eligible for a single-band award only. Awards. Usual log format and summary with all info and signed declaration. All entrants are required to submit cross-check sheets for each band on which 200 or more QSOs are made. All entrants are encouraged to do likewise. Each dupe found by the committee will result in a penalty of three additional contacts being removed. Logs, summary and zone maps available from CQ, send a large s.a.s.e. with sufficient postage. Postmark entries no later than Dec. 1 for the phone section and Jan. 15, 1978, for the cw section (cw event scheduled for Nov. 27-28). Logs go to CQWW Contest Committee, 14 Vanderventer Ave., Port Washington, LI, NY 11050.

NOVEMBER

2: West Coast Qualifying Run (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0500Z (Universal Coordinated Time, abbreviated UTC, with Z shown as a time designator). The run will take place at 9 P.M. PST local clock time the night of November 1. Frequencies 3590/7090 kHz, approximately. Other details under the Oct. 6 listing.

3-4: YL/AP phone, see Oct. 12-13 listing.

5: Frequency Measuring Test, open to all, begins with a callup at 0300Z and 0600Z, Nov. 5. Remember, this is the evening before, Nov. 4, by local time. The periods for measurement start at 0307 (20 meters), 0315 (40 meters) and 0323 (80 meters); for the late run, 0607, 0615 and 0623, respectively. Each measuring period lasts five minutes. Submit your averages for each five-minute period which will be compared with the umpire's averages during the same period. (The umpire is a professional measuring laboratory.) Tell how many readings you took to form your averages. Approximate frequencies for the early run are 14,122, 7050 and 3522 kHz; late-run frequencies are 14,098, 7052 and 3531 kHz. Your report must be received by Nov. 17 to qualify for the January *QST* report of the competition. W1AW will start transmitting the official results in a special bulletin Nov. 23. QST

Strays

AMATEURS RESPOND TO NYC BLACKOUT

As they are likely to do when the occasion arises, area hams responded almost immediately when the lights flickered then died in and around New York City on the steamy evening of July 13.

All over the city, amateur rigs gasped then died at 9:24 as the lightning-caused power failure spread darkness across the nation's largest city and most of its suburbs.

Within seconds of the blackout, hams began putting their SET and emergency-net training to use. Two meters, focusing on 146.52-MHz simplex, became the center of local communications, as thousands of 2-meter operators vied for airspace – often just to make themselves available for providing assistance.

At Shea Stadium in the Borough of Queens, the Mets and Cubs were interrupted by the sudden darkness. Immediately, handheld units were pressed into service, as a diverse group of amateurs began to monitor the crowd's forced departure from the stadium. No one was able to get their exact calls in the confusion, but two Dominican hams were prominent among those helping out by monitoring exit ramps.

Base stations operating on battery power came back to life soon after the power failure began, as did repeaters. In some cases, the groups of control operators had to climb 70 or 80 flights of stairs to reach repeaters located on New York's highest buildings.

Once they came on again, nets were set up on several New York-area machines, including WR2ADC atop the Chrysler Building. Two New Jersey repeaters and several others in nearby Connecticut and Pennsylvania handled traffic when it was most needed.

WR2AHU on the RCA building, had been off the air for technical repairs the night of the blackout, but Dave Hubby, W2SNM, and his control operators got it going the next day and handled a large amount of emergency traffic.

Perhaps in no area were amateurs more helpful than in assisting the overburdened police department. With emergency frequencies and phone lines hopelessly jammed, and their repeaters knocked off the air, the police relied on the likes of Bruce Martin, WA2KJJ, Wally Shapiro, WA2OHN, Dave Minott, WA2EXP, Steve Mendelsohn, WA2DHF, and Jerry Cudmore, WA2TLI, to transfer messages from hams in all parts of the city to mobile stations.

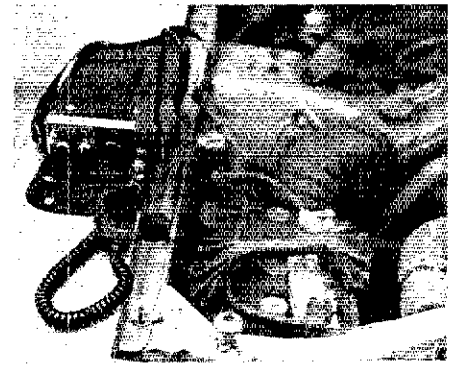
Some amateurs with hand-helds rode in patrol cars to provide communication back to the precincts and to receive emergency traffic from other amateurs for police follow-up. This aspect of the emergency was covered widely in the city's media.

Base station operators relayed reports of lootings, cardiac arrests and other emergencies from mobile operators.

In appreciation, the NY City Chief of Police commended all the amateurs who assisted, many of whom volunteered their services by walking into the nearest precinct house on their own initiative. Three of the most active volunteers have been recruited to set up a permanent network of hams who can provide emergency services in the event of another city-wide disaster.

After nearly 24 hours of nonstop public service, a city of weary amateurs (including one who went through three car batteries to stay on the air) called it a day. It seems ironic that an emergency which was created by a lack of electricity was made a little bit easier to bear by practicioners of a hobby that is so deeply intertwined with that force. – *John Edwards, WB2IBE and others*

Ron Morasse, WB2DWK, maintains contact with a passenger aboard a stranded subway train.



A common mode of operation during the power failure. One ham ran down three car batteries before the lights came back on.

Station Activities

SCM ≤ AREC ≤ ORS ≤ OVS ≤ SEC ≤ OBS ≤ TCC ≤ OO ≤ NTS ≤ WAC ≤

CP ≤ A-1 OPR ≤ EC ≤ DXCC ≤ CLUBS ≤ RM ≤ OPS ≤ RCC ≤ PAM ≤ WAS

CANADIAN DIVISION

ALBERTA: SCM, Sydney T. Jones, VE6MJ — It is with sincere regret that I learned of the passing of VE6XX of Calgary. John was one of the Old Timers and was very active. VE6AFO VE6HR VE6OY VE6WK and VE6MJ attended the Okanagan International Hamfest at Oliver, B.C. VE6HR gave an interesting talk on repeaters. VE6AAT had a short visit to Edmonton but is now back on the lookout station at Nose Mt. VE7UY was a recent visitor to Edmonton. VE6XO has been reclassified as a Class 1 Official Observer following the excellent showing in the May FMT. VE6QM also made an excellent showing in the same test. VE6XC reports a fine attendance at the Glacier-Waterton International Hamfest.

MANITOBA: SCM, Steve Fink, VE4FQ — We welcome four new ECs and invite everyone to join AREC. New ECs: VE4XN Brandon, VE4TF Neepawa—Minnedosa, VE4JK Carman, VE4FK Pinawa. Pinawa AREC provided communications for a local canoe race in July. Newest ARRL Life Member is VE4OY, Winnipeg Repeater VE4XK now signing as VE4WPG, while Brandon's VE4BDN going solid state this Fall. VE4UK QSY to Oakville. MTN: 16 sessions, 84 QNI, 47 QTC. MEPN: 31 sessions, 833 QNI, 49 QTC. Let's all get on for the 1977 Manitoba QSO Party Oct. 15-16! Traffic: VE4PG 101, VE4UL 45, VE4IX 34, VE4B 12, VE3AAD 11, VE4NM 10, VE4FK 9, VE4PA 7, VE4QJ 7, VE4DD 6, VE4VV 6, VE4JA 4, VE4LN 4, VE4XN 4, VE4CR 3, VE4FQ 3, VE4GB 3, VF4IM 2, VE4YQ 2, VE4IS 1, VE4JP 1, K3ZVH/4 1.

MARITIME & NEWFOUNDLAND: SCM, Aaron D. Solomon, VE1QC — Asst. SCM: VO1FG. SEC: VE1DI. PAM: VO1IN. RM and APN: Mgr.: VE1ACU. NTN Mgr.: VO1GW. VE1DI in co-op. CARC and SPARC set up ARRL Am. Radio Demonstration station in P.E.I. handling over 300 messages & phone patches. Congrats. Sydney ARC committee under VE1QD and VE1IG set up CG1CR at Int. Girl Guide Camp in Cape Breton handling almost 1200 formal messages thru APN, 11 and 20-meter phone. Congrats to all operators. In July there were several excellent 2-meter and 10-meter openings. Many VE1s took advantages of condx. MARC has 140 members. VE1AUT & AZT sent Charter Cert. to all members. VE1ACA & XL headed up successful Lobster Car Rally. MARC hosp. incl. VE1s KA NT PI UNB and Pictou Co. ARC now affiliated ARRL Clubs. VE1PZ gave talk on Hazards of Non-ion Radiation. DOC has auth. use of CY for VE and CK for VO for remainder of Queen Elizabeth's Jubilee Year. SONRA has XO1CSG ready for traffic from Can. Summer Games. VO1NP & NB gave int. interview on CBC Nat. Radio on Amateur Radio Field Day operations. VE1AG and K1DZG spending vacations in VO-Land. VO1CU busy running phone patches for Can. Forces/SU. APN Sess. 31, QNI 146/21, QTC 314/301; NTN Sess. (June) 17, QNI 42, QTC 2; NTN Sess. (July) 13, QNI 39, QTC 3. Traffic: (July) CG1CR 2940, VE1IG 670, VE1AKL 596, VE1AMR 397, VE1ACU 362, VE1HJ 154, VE1ZH 95, VE1ASW 74, VE1EJ 44, VE1AAO 42, VE1ABG 28, VE1AMB 6, VO1GW 4. (June) VO1GW 2.

ONTARIO: SCM, Larry Thivierge, VE3GT — Asst. SCM: Noreen Nimmons, VE3GOL. Latest addition to the PL club is the RSO's past pres., Lorne Doreen, VE3SZ, who has retired to the Toronto area. Lorne will be sorely missed in Deep River where he has resided since 1958. A dinner was held in his honour and a presentation made by the local area amateurs. VE3APK has been appointed EC for Oakville. VE3IQR has her Advanced. ORS VE3ISW is mastering a new keyer. We welcome the following ARRL Life Members: VE3s RA SH BKB BJP HIO CRU DOR DMB CUK RM EBF HIR FRU FOY KC GHJ IKK and FVR. 1500 pieces of formal traffic, 1200 outgoing and 300 incoming was handled by CG1CR at the Girl Guide Camp near Sydney, N.S., on the banks of the Mira River. The Ont. Phone Net operates nightly at 1900 local on 3770 kHz to handle formal traffic and I would like to see more representation from the cities of south-western Ont., especially from the Kitchener-Waterloo area as many times traffic goes undelivered for this part of the province. Regretfully I announce the following are Silent Keys: VE3s GMW HO UM and CAX. VE3AUI is enjoying good summertime DX on VHF with a new rig. K2QB is forming a CW WX Net for the Great Lakes and adjacent areas on 7105 kHz at 1130. Interested wx buffs can get details from Jim at 100 Redwood Ter., Williamsville, NY 14221. VE3EBY provided the Windsor ARC with an informative talk on his duties as Harbour Master. Ottawa ARC held a successful amateur display at the Carlingwood Mall, including coverage on the local TV news. Repeater VE3STP to be all solid state shortly. New amateur is VE3JRC. Congrats to VE3s HDH FMI and FDX on obtaining their Advanced. VE3AQJ was voted the Albert Yates Memorial Award winner by the Nortown ARC. VE3CDK is enjoying holidaying in GI-Land where he has met many old friends. Oct. CD Party is an "open" event. CW on the first and second with phone on the fifteenth and sixteenth, good luck to all contestants. Traffic: (July) VE3GOL 522, VE3SB 506, VE3HGJ 322, VE3GJG 203, VE3ISW 133, VE3GFN 125, VE3DPO 112, VE3GT 109, VE3EWD 66, VE3BDM 62, VE3APK 55, VE3UV 47, VE3ATR 14, VE3EBC 12, VE3GNW 25, VE3AWE 23, VE3EHL 13, VE3BLK 3, VE3GCC 2, VE3JJA 1. (June) VE3GNW 15, VE3FHQ 4, VE3GCC 2.

SASKATCHEWAN: SCM, Percy Crosthwaite, VE5RP — There is a lot of interest in WARC and I would like to see our affiliated clubs pass on information which they receive from ARRL-CRRL. Watch for increased Canadian content in QST and other publications put out for affiliated clubs. SATN will be in operation each evening at 6:30 PM on 3690±5 kHz. The SSB net is in operation at 7:30 PM on 3750 kHz. All nets are open for your participation. Our traffic nets were very successful last year and we are hoping for a better season this term. If you should require information concerning any net please contact VE5RP or VE5RN. Traffic: VE5HP 70, VE5QV 26, VE5BO 11, VE5WM 10, VE5RP 8, VE5OL 6, VE5AAG 3.

ATLANTIC DIVISION

DELAWARE: SCM, Roger F. Cole, W3DKX — SEC: W3PQ. RM: W3QQ. PAM: WA3DUM. PSHR: K3YHR 49, WA3WPY 47, W3PQ 44, WA3ZRY, DTN regular and W3EVE were among those doing an excellent job handling Johnstown Flood traffic. It appears that most urgent need in a disaster area is for 4 wheel drive vehicles that can provide power to operate 2-meter and 75-meter equipment. It would be well for each Delaware Club to check the availability of such vehicles in their area. W3EEB is now W3QQ and K3NEZ is W3HB. DTN: QNI 295, QTC 38. DEPN: QNI 69, QTC 6. Traffic: (July) W3PQ 148, WA3WPY 84, W3DKX 36, WA3WIY 34, W3QQ 33, W3WD 20, K3YHR 14. (June) K3HBP 5.

EASTERN PENNSYLVANIA: SCM, Geo. S. Van Dyke, Jr., W3HK — SEC: W3FBF. RMs: WA3SXU WA3VJG. PAMs: WA3PZO W3AVJ. Net reports: PFN QNI 398, QTC 662; AREC (2) QNI 7; EPAEP&TN QNI 279, QTC 150. Reports are still slow! OO reports: W3CUL W3KCM. OBS reports: W3TI W3CUL OVS reports: W3GOA WA3BJQ WB3AZE WA3NDQ W3CUL BPL W3CUL W3VR K3NSN WA3PZO WA3WQP N3KZ WA3ATQ W3TI WA3BSV. PSHR: N3KZ WA3PZO WA3BSV. Traffic totals up, almost everyone involved in the Johnstown Flood traffic. W3ID reports 10M net useless until long skip is over! W3WRE was in need of communications to Johnstown and used Ham Radio. Says she knew we were good but not so good an answer would be back in less than a couple hours! Thanks to the guys that send in their reports before they go on vacation and not late after they return! EPA must be a wealthy section, much new equipment being put in to service. W3GMK reports that finding replacement parts is harder than redesign and rebuilding! W3EU reports spark rigs much simpler to service. OOs report air ways pretty clear! Hope all those active in Johnstown flood made reports to ARRL no matter how small your effort was report it! Tamaqua gang real active in flood, now starting classes for hams. W3HYT now K3AI, W3NIG now W3XM, K3ET did FB job at Allentown Ham Fest, W3GYT W3OI W3OK clubs all participated. Lehigh Valley ARC active with Red Cross during Johnstown Flood. Hope all the summer repairs are finished. Traffic (July) W3CUL 4368, K3NSN 3650, WA3PZO 1676, W3VR 1048, N3KZ 771, WA3ZRY 677, K3KW 509, WA3WQP 505, WA3THT 446, WA3ATQ 418, W3TI 319, WA3BSV 141, K3NGN 138, WB3FKR 131, W3IPX 131, WB3BYP 65, WA3NDQ 64, W3AVJ 43, WA3QLG 43, W3WRE 28, W3ADE 24, W3PD 20, W3ID 20, K3HXS 19, WA3YHR 19, WB3BKV 16, WA3CKA 16, K3FD 16, W3CL 12, WA3WAC 11, K3IJ 10, W3AXA 9, WA3VDQ 4, WA3YDC 4, W3HK 3, W3RJ 3, W3BUR 2, N3AI 1, WA3BJQ 1, W3EU 1, W3GMK 1, W3GOA 1, W3KCM 1. (June) WA3NRV 56, W3ID 16, W3GMK 1, WA3YDC 1.

MARYLAND — DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — Know your SEC, N3II and your EC. Volunteer your services for preparedness. WB3EDX joins WA3PRW and K3ORW on the PSHR for July. WB3AOB is glad to be active again. W3ZNW was hospitalized 2 weeks in June and on the mend. K3HPG sorting cards for DXCC. WA3KCY got 5T2SA after a 2 year wait. W3FCI misses the nets with his new work schedules. WA3SXH is building a super power rig. W3WBY finds 10 open to Europe, 6 stateside and 2 meters to VE1. WB3EDX eyeing a new tower at the new QTH. WA3ZTW is getting out of school education! W3BHE worked himself into the sick bed during Johnstown. WA3ZAK is our new YL ORS. Congrats. WB2TJR/WB3PEN is now in 4-Land, but no new call planned. OOs reporting W3WBY WA3KCY WA3RSK WA3ISZ and WA3SXH. WB3FGO operated KB3BSF in his Bavarian Leather Shorts. K3OMN and W3DFW spearheaded the Cumberland contingent to Johnstown WB3FNN WB3AXV WB3BMR WB3BZZ WB3CFD WB3DUS WA3QGR WA3YSF and WA3WSW. W3AQV W3BHE WA3SVE and W3OYY held down the home fort circuits. W3NKF and K3AF were heard and busy. Many others participated including K3CMY and WA3HEM but full reports are not in to the SEC at this time. With the nets: Mgr.: Sessions/Tfc/QNI/Avg.: MDD, W3QQ (W3EEB), 62/135/6.1. Top Brass W3PQ (K3KAU), WA3WPY and WA3UYE. MEPN, WA3PRW, 21/69/19.2. 100 percenters W3ADQ and WA3ZRY. Others W3LDD W3OMN and WA3PRW. MDCTN, K3ORW 18/117/15.4. MDC PON, W3QYY, 4/14/18.5. WR PON, W3DFW, 18/44/13.5. WA3UFV is fixing his own rig break down. WA3PRW has 4 passing and 2 coming with his at work code classes. W3CVE was on Channel 5. The resultant publicity made his traffic total top. He got one telephone call from San Diego — a former neighbor! W3IKA opines a slow hamming month a busy working month. It is hot and humid, but you will read this cool and raring to go! The Ham Arundel News of the Anne Arundel Radio Club is getting larger. Gaithersburg is Oct. 23rd. See you there. Traffic: (July) W3CVE 820, W3FA 158, WB3EDX 84, W3BHE 80, WA3UYE 65, K3ORW 46, WA3PRW 36, W3IKA 35, WA3ZAK 35, W8RZY/3 26, WB3AOB 19, W3FZV 13, K3HPG 6, W3WBY 3, W3FCI 2. (June) WA3ZTW 4.

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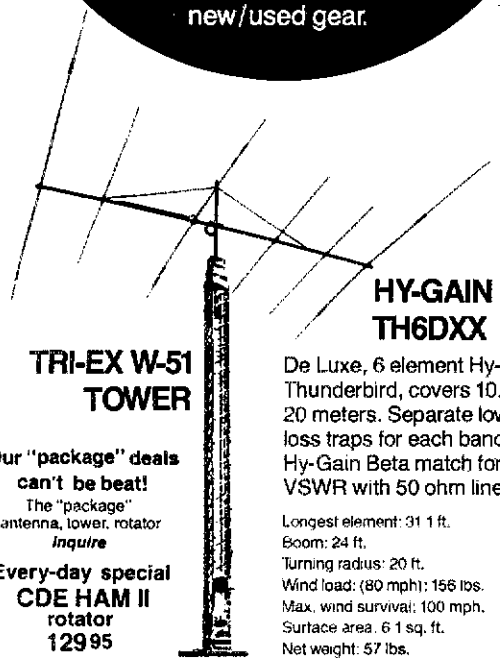

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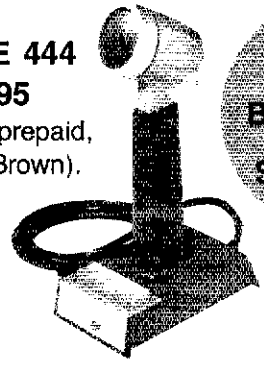

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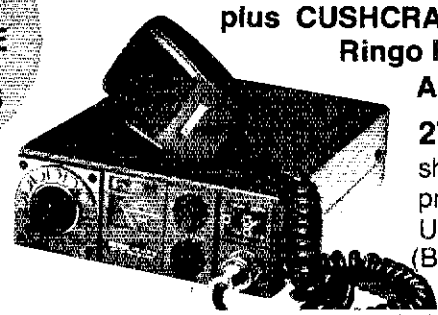

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SOUTHERN NEW JERSEY: SCM, Raymond F. Clancy, WB2GTE — Helping out in the Johnstown Flood was WA3HGX/2 who drove 250 miles to Ebensburg Command center in Co. Court House, stayed 11 days, handled many msg., with 40 other hams at several operating positions. WA2FBL reported car accident on 2M to State Police. WB2JFM also called police to accident at Collins Lakes. W2ONW and W2IL have new rigs. WB2UF has been on 15 yrs. W3FZP is N2LR. KZ5TD is K2TD. W2UFY is K2IF. W2EPA is N2EF. W2TQ is K1TQ. WB2AFM new OBS. Gloucester Co. ARC has new meeting place at National Park. SEC W2HOB has issued new South Jersey Emergency Plan. WB2NBC has new quad. Delaware Valley RA repaints repeater tower and starts new classes Sept. 29, at the Hopewell Adult School. WB2ZJD a Silent Key. West Jersey Amateurs 946D FD contacts for a score of 3348. WB2JMU now General. W2JI handled Johnstown flood msgs., made PSHR. W2ZQ makes BPL. Stone Harbor ARC has plan for disaster alert. SJRA reports successful FD. PAM WB2LCC spent over 40 hrs. handling flood msgs. W2PH has new scan converter. WB2PTH loaded up an old rain gutter for ant. when Apt. said no ant. WA2PTQ wks 3 nets. WB2AYA reports QRM on WR2AJY. Also helped Fire-police msgs. relay in Bass River forest fire. Rancocas Valley ARC plans dinner at Ft. Dix Oct. sez K2BG. Traffic: (July) W2ZQ 690, WB2LCC 60, W2JI 48, WA2WSV 26, W2HIF 5, K2BG 4, W2IU 3, WB2GTE 2. (June) WB2LCC 54, WB2WSV 18.

WESTERN NEW YORK: SCM, Joseph M. Hood, K2YA — Asst. SCM: W. B. Thompson, W2MTA. SEC: N2JC. A large number of clubs became affiliates in July and we welcome the following new ARRL affiliated clubs: Carlton Webster Jr. High School ARC, Jefferson County Radio Amateur Club, and Kodak Activities Assn. Radio Communications Club. Yours truly vacationed in Maine again this year where the first station I worked via the Streaked Mountain Repeater was WA1FCM, the SCM for Maine. Small world. NYSTN has been inactive for the summer months. NYS is looking for more traffic. K2QB is interested in forming a Daytime Weather Net for the Great Lakes Area on 7105 kHz at 11:30 A.M. local. Contact him if interested. W2MTA regrettully reports that W2VD is a Silent Key. More new 2 letter calls: W2HVA is now K2AV, WB2EKM is now N2EF, WA2ICU is now N2IC, WB2QKQ is now N2SY, WA2PJL is now W2CS, WA2CNE is now W2JU, and W2FZK is now W2TZ. K2DNN hospitalized for heart surgery was released on July 31. QVS, WA2ELB reports long 2-meter openings in early and mid July. He is also compiling a list of VHF beacons and needs call, freq., modulation mode, info being sent, time on/off, radiation pattern and location of beacon. WR2ABF now running a pair of five-element beams in phase with their omni and pointed north to cover Rochester better. RRRA plan to move WR2AEI to Cobbs Hill. The AWA National Historical Conference will be held in Dearborne, MI on Oct. 7, 8 and 9. Traffic: W2MTA 175, W2FR 134, W2QE 134, WA2ZJP 98, WA2ELB 81, WA2AIV 32, WA2TPC 23, WA2UAR 17, K2GJC 15, W2TZ 15, K2VR 9, WA2DRC 3.

WESTERN PENNSYLVANIA: SCM, Donald J. Myslewski, K3CHD — SEC: WA3VUP. Asst. SECs: K3SMB WA3LJW. PAM: K3SMB. RMs: K3AT W3NEM W3LOS W3KUN

Net	kHz	Time/Days
WPA CW Traffic	3585.0	7:00 PM Dy
WPA Phone Traffic	3983.0	6:30 PM Dy
Pa. Traffic & Training	3610.0	6:30 PM Dy
WPA RACES	3990.5	9:00 AM Su

It is with deep regret to note the Silent Keys of W3HQW W3ZDW and W3RFH. The Fayette-Westmoreland (FAY-WEST) ARES Net meets on Sun. at 2100 on 146.07/.67 MHz WR3AFQ repeater. WB3EVZ and WB3EKB upgraded to General. K3SQP upgraded to Advanced. A reminder to all clubs in the Section to plan Novice code and theory classes this Fall. Notices have been sent to those appointment holders who have not reported on a monthly basis. All active appointment holders will receive endorsements in Sept. The Johnstown Flood of July 20, 1977 will go down in history as a disaster that amateurs were the only source of communications in the flood stricken area. Many WPA amateurs responded to the call to help with emergency traffic between the various relief agencies. Special thanks to the ARES, RACES and out of state operators who spent many sleepless hours manning their radios. An excellent job was done by the WPA CW Traffic Net, 3RN and EAN handling health and welfare messages. Again, thanks fellows for a job well done. The WPA CW Traffic Net had 30 sessions in June with 368 check-ins and handled 113 messages. The WPA Phone & Traffic Net had 25 sessions in July with 250 check-ins and handled 65 messages. PSHR & BPL credits WA3VBM. Traffic: WA3VBM 1110, K3AT 297, K3CHD 228, W3EGJ 225, WA3BSV 141, N3FM 139, K3SMB 110, W3ATQ 96, W3KUN 95, W3KMZ 90, W3LOS 66, W3AS 22, WB3BTY 20, W3SAY 17, W3SN 10, K3UA 7, K3CR 6, WA3YIR 4, W3IDO 2.

CENTRAL DIVISION

ILLINOIS: SCM, Edmond A. Metzger, W9PRN — Asst. SCM: Harry Studer, W9RYU SEC: W9AES. PAM: WA9KFK. RM: W9NJP. Cook County EC: W9HPG.

Net — Freq.	GMT	Days	Tfc.	Sess.
ILN — 3690	2300/0300	Dy	225	62
Ill Ph — 3915	1300/1800	M-S	181	31
NCPN — 3915	1300/1800	M-S	295	52
IEN — 3940	1400	Su	4	10

The Schaumburg ARC presented a set of ARRL publications to their area library. WB9QMZ is now a General, also WD9AKB, WA9BTT WB9VWR and WB9MKT are the new officers of the LaMoine Emergency Amateur Radio Club. The Executive Committee of the League has approved the application of the Okaw Valley Amateur Radio Club for League affiliation. The League's Board of Directors also approved the West Allis application for a 1979 Central Division Convention to be held in the Milwaukee area. WA9BHH presented an interesting program on "Certificate Hunting" at the Joliet Amateur Radio Society Inc. July meeting. WB9POG received his General Class license. Advance reports indicate that numerous clubs are planning to conduct code and theory classes. Please advise ARRL headquarters of your scheduling so that they can set up a clearing house for this information: Field Day results are still pouring in and those attending the annual exercise have been reporting great results. The Western Ill. Amateur Radio

Club has installed autopatch on their repeater system. NØJA and XYL are the parents of a baby girl born July 1st. W9RVG worked KH6HI on 6-meter CW July 3rd. KH6HI reported that the east coast was also being worked on that day. The CAND report is 331 messages handled during 59 sessions. RN9D is 88.5 % III. representation. The OH QSO party was held on Aug. 27 and 28. Traffic: (July) W9HOT 222, W9KFK 160, W9NXG 159, WA9GBW 148, W9OK 134, W9NJP 125, WA9VEW 106, N9TN 105, WB9LZA 100, W9KR 77, WA9EBT 73, W9LNQ 55, WB9JSR 46, W9JIJ 31, K9EEA 30, WA9GBX 26, W9FLF 24, W9OYL 23, W9PRN 21, K9SW 21, W9LFH 5, W9HPG 5, WB9NEH 5, W9PE 4. (June) W9LNQ 28, W9FLF 20.

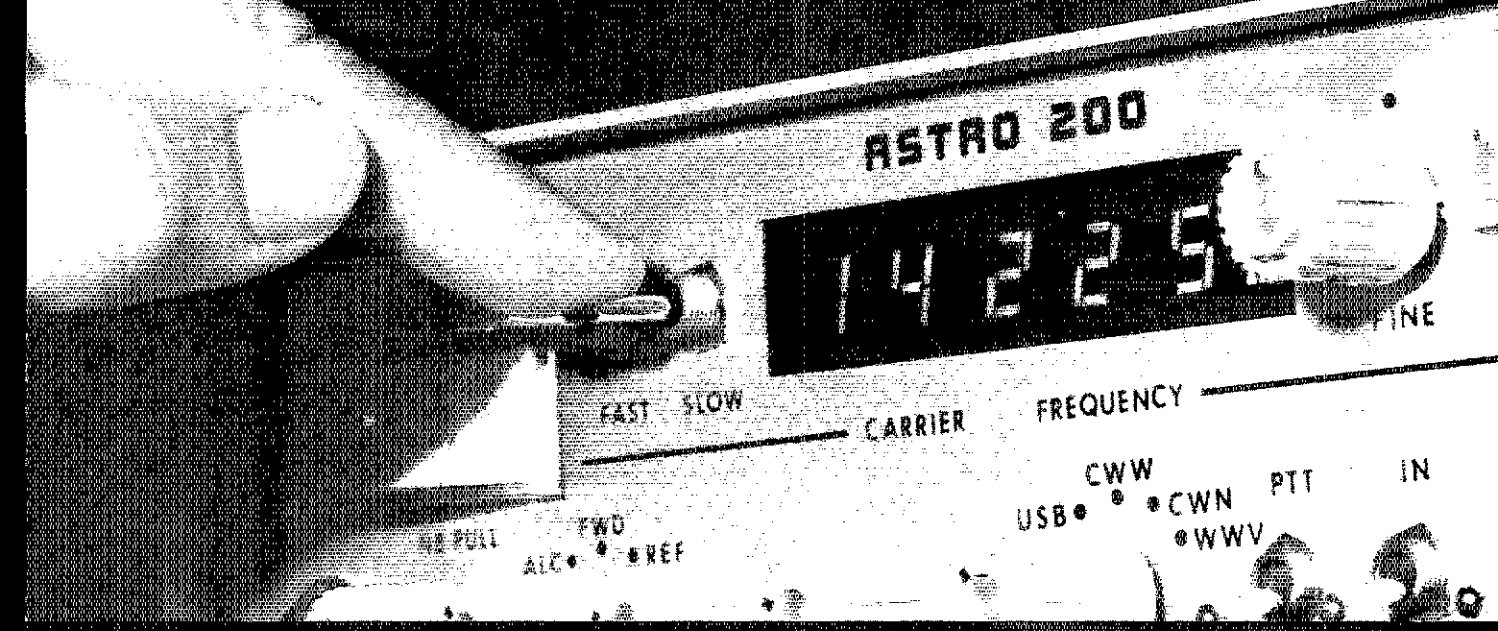
INDIANA: SCM, M. P. Hunter, W9LF — The Indy Hamfest is reported to have been the largest ever. W9TE/9 reports a Field Day score of about 9,000 in the 4A class. Congrats to WB9BPG (W9SU), WA9BWY and WA9NPM for 1, 2, 3 finish in the W9 area in the CQWW and WB9LHI (N9MM), W9ZRX and K9OTB for top single band 20, 40 and 80. Several locals are well underway with new antenna systems. With the reading of this issue of QST, you can mark the beginning of the '77-'78 contest season with the CQWW phone test the last weekend of Oct. WB9FGK is the proud new owner of his Extra. W9LTU dumped his C-line for a Kenwood rig. Lake Co. ARES is now meeting on the Lake Co. repeater (147.84/24) at 7:30 P.M. local time on Week days. FWRC sponsored a 3 day public display of ham radio for the enjoyment of many. Congrats to Madison Co. ARC and Miami Co. ARC on their new ARRL affiliation. The following clubs are soon to be placed on the inactive affiliated club list unless annual reports are soon received: Gibson Amateur Radio Club, Kokomo Firebird Radio Club, Grant Co. Amateur Radio Club, INDXERS and Winslow Amateur Radio Society. Net Tfc.: QIN 264, ICN 26, ITN 437, INTN 50, IPON 3, Hoos. VHF 20. Traffic: (July) W9FC 271, K9DC 209, WB9IHR 205, WB9SKA 182, WB9PIR 171, W9GGW 165, W9HUF 158, WB9FOT 156, W9QLW 154, WA9OKK 130, W9LTU 130, W9EI 121, WA9TJS 104, WA9QCE 84, K9FZX 81, K9YBM 42, WB9WXN 42, W9ENU 40, W9UEM 36, K9TKE 29, WB9OZW 27, WB9QEZ 27, W9PMT 26, K9RWQ 25, K9RPZ 20, WB9FGK 18, WA9OHX 16, WB9DIX 15, K9JQY 14, W9DLF 14, W9EGV 13, WB9HCH 11, WB9SLV 8, W9RTH 8, K9CGS 8, K9EQT 5, W9CMT 3, W9BDP 2. (June) WA9ITB 42, WB9SKA 37, W9TE/9 5.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: K9ZZ. PAMs: W9AYK K9UTQ W9IEM. RMs: K9KSA WB9ICH W9SFL K9LGU K9EN. Nets, freq. time, QNI, QTC, Mgr.: BWN, 3985, 1145Z M-S, 475, 429, W9AYK; BEN, 3985, 1700Z Dy, 856, 156, W9IEM; WSBN, 3985, 2230Z Dy, 1028, 211, K9UTQ; WNN, 3725, 2215Z Dy, 39, 0, WB9ICH; WIN-E, 3662, 0000Z Dy, 226, 77, W9SFL; WIN-L, 3662, 0300Z Dy, 203, 101, K9LGU; WSSN, 3662, 2330Z M-W-F, 29, 1, K9KSA; WRN, 3662 S, 0030Z, 12, 0, K9EN; Wis Ex PO Net, 3925, 1701Z M-F, 545, 30, WA9NIX. K9ZYS is now K9JT. New in Baraboo WD9FFM. WB9DWG is also K9APW. K9GA leaving for Iowa. W9OT received plaque for handling 1915 messages. K9CPM received tag for plaque for handling 10374 messages, also W9DND on handling 2555 messages and WB9KPX on handling 1224 messages, these in 1976. If you would like to get a plaque for handling messages try to make your total points above some of these listed above. WNA picnic attendance was down maybe it was location or other doings at the same time, please let WNA know your feelings. A great big Thank You to the stations that helped in any way for the Phillips area, it's greatly appreciated. WSBN certificate to WB9KAX. (K9LWV is now N9NE — also operated FD using QRP 3 watt transceiver netting 234 QSOs, 33 states, and 5 Canadian Provinces) (from Intercom). New Novices in Stevens Point area WD9ESL WD9ESM WD9ESV WD9ESW WD9EXS WD9TXT WD9FCG WD9FFJ WD9FIN (From Watts Snoo). BEN certificate WD9AUD WB9OAL. K9CPM made BPL. Traffic: (July) K9CPM 651, W9FSL 185, W9DND 179, W9CXY 173, W9IEM 112, K9FHI 94, K9MZO 69, K9LGU 59, K9UTQ 49, W9UW 45, W9VBQ 40, WB9ICH 39, WB9BRE 38, K9KSA 38, W9IHW 27, WB9JSW 25, WB9KAX 22, N9BE 21, N9CP 20, WB9LKC 8, WB9SXX 6, K9ASC 5, WB9OEC 4, WB9QKH 2, WB9YXY 2. (June) WB9KPX 87, WD9AUD 76, W9OT 36, K9KSA 18, WB9OEC 9, WB9QKH 4.

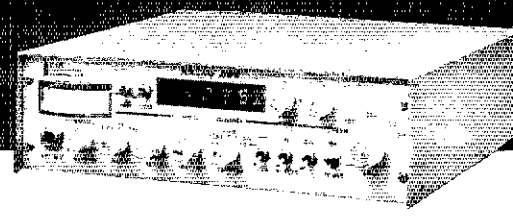
DAKOTA DIVISION

MINNESOTA: SCM, Gordie Olson, KØEC — SEC: WØSA. RMs: WBØOFQ NØHY WBØQWH. PAMs: WBØJYT WBØHOX WAØYVT. Net reports: MSN 1 QNI 140, QTC 93; MSN 2 QNI 54, QTC 23, MSPN-Noon QNI 757, QTC 60; MSPN-Evening QNI 806, QTC 185, PAW QNI 3377, QTC 197. OBS repts: WØOSJ KØSVW. We have a new SEC in our section. Dr. Peter Cross, WØSA, Rochester, MN. Congrats. All ECs please note and send your monthly rpts to Peter each month. The Red Lake County Fair had the first ever Amateur Radio demonstration this month. Thanks to: WØDFX WBØPKG WBØUKI WBØUTV and WAØQIT who traveled from Duluth to help with the 3 day event. WBØLRK found a very old copy of a Scientific Magazine in a local store that contained pictures and an article about the First Trans-Atlantic Radio Communications. This publication is being forwarded to Hq. and hopefully we will see the pictures and article in a future issue of QST. This month I am going to list some of the very active cw operators in our Section — the ten reps — in their order of times they QNIed the Tenth Regional Net in July: WBØLDW WØRQJ KØCVD KØII WØHKF NØYL KØPIZ WØPET WBØPGZ WØKLG and WBØUIP. If you want to increase your cw speed and proficiency, listen to these ops on MSN at 6:30 and 10:15 every evening on 3685 kHz. New call WBØLDW now NØHY, congrats. OK all you contesters, the big one, yes it's Sweepstakes time coming up in Nov. Also FMT and VHF QSO Party. Send me a message as to how you did in the CD Party. PSHR— (July) WBØHOX KØJTW. BPL: WBØHOX. Traffic: (July) WBØHOX 511, KØCVD 212, WAØYVT 120, WBØJYT 113, NØHY 107, WBØQEU 95, KØPIZ 68, WAØTFC 58, WBØPKG 55, WØHZU 43, WBØQWH 43, WØRQJ 42, KØII 32, KØEC 31, WBØPGZ 29, WBØNZB 28, WØOSJ 28, KØJTW 24, NØJP 14, WØWCL 13, WØDUW 11, WØOPX 8, WBØZUR 7, WBØLDO 6, WAØTGM 6, KØs,FLT 4, KØSXQ 4, WØUMX 3 (June) WØOPX 10, WØUMX 4.

NORTH DAKOTA: SCM, Mark J. Worcester, WAØWLP — The Fargo Novice Club finished Summer



Someday . . . all radios will be tuned this way



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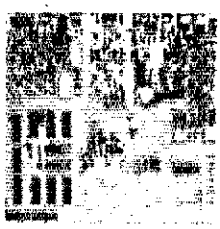

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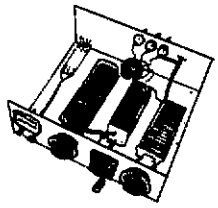

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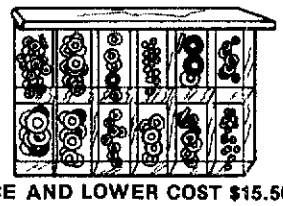

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T12-10	.25	.15	T44-6	.45	.30	T80-2	.60	.40
T25-2	.30	.20	T44-15	.45	.30	T80-3	.60	.40
T25-6	.30	.20	T50-1	.45	.30	T80-6	.60	.40
T25-12	.30	.20	T50-2	.45	.30	T94-1	.90	.60
T30-2	.30	.20	T50-3	.45	.30	T94-2	.90	.60
T30-6	.30	.20	T50-6	.45	.30	T94-3	.90	.60
T37-2	.40	.25	T50-10	.45	.30	T94-6	.90	.60
T37-6	.40	.25	T50-12	.45	.30	T106-2	1.15	.75
T37-10	.40	.25	T68-2	.55	.35	T106-3	1.15	.75
T37-12	.40	.25	T68-3	.55	.35	T130-2	1.75	1.15
T44-2	.45	.30	T68-6	.55	.35	T130-6	1.75	1.15
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Classes, 2 completed exams, 4 completed code and are waiting for exams, 2 have upgraded to General. WBØBHJ went to Miami Beach ARC for the Blind. International Ham Fest at the Peace Gardens was the biggest yet. There were over 200 registered hams and over 200 non hams that registered. KØPVG received Ham of the Year Award. An FB job was done by KØFRP and WAØLRE in setting up this years program. A meeting was held between WAØWLP SCM, WBØRIB Semergency preparedness and to see what NO can do in regards to RACES more on this later.

Net — kHZ	CDT/Days	Sess.	QNI	QTC
Manager				
DATa — 3996.5	1800 S-S	30	234	34
WAØSUF				

Traffic: WAØSUF 31, WØDM 5, WAØJPT 4.

SOUTH DAKOTA: SCM, Ed Gray, WØSD — New Novices from the Huron area are WDØs CFD CXE CXF CXG DBI DBJ DBX DCJ. WAØTNM is the new SEC for S. Dakota and we are looking for Emergency Coordinators for several countries. Anyone that is interested should contact Jim. WAØTNM also made the PSHR this month with 49 points. WDØDME is a new Novice at Spearfish. WAØLYO is back on the DX bands with a new TS-520. WB7PUQ, Spearfish also has a new TS-520 as does WDØDME. Net Reports: WØMZI, Morning, 242 QNI and 8 QTC; NJQ, 685 QNI and 35 QTC; SDN CW, 124 QNI and 88 QTC; Evening Net, 658 QNI and 37 QTC. Traffic: WAØTNM 144, WAØVRE 115, WBØEVQ 39, WØMZI 19.

DELTA DIVISION

ARKANSAS: SCM, S. M. Pokorny, W5UAU — SEC: WA5VNV. PAMs: W5POH WA5ZW2 K5MEA. RM: W5MYZ. Nets, kHz, Times/Day, QNI QTC Mgr. ARN, 3995, 0030/Dy, 608, 74, K5MEA, OZK, 3760, 0030/Dy, 204, 18, W5MYZ. APN, 3937, 1200/M-S, 679, 44, W5POH. M-Bird, 3928, 2230/M-F, 477, 10, WA5ZW2. WB5GVE now N5NA. WB5AHN and WB5SPE exchanged wedding vows June 25th, at Russellville. New EC for Pope Co. is W5BLP. W5KL took part in IARU world tests. Welcome to new hams in Ark. WD5s CPA CPB CPC CPD CPL CPM CPN CPO CPP CPQ CPR CQM CQQ CRF CRO CTF CWB CWF CWW CZU DAN DAK DAL DAR DAM DCO DCP DDU DEE DFD DFL DGA DGD DIZ DJA DJE DJH DJI DJW DJX. Traffic: WA5HNN 96, K5MEA 63, W5UAU 40, W5KL 4, WB5GQH 3, W5SHY 3.

LOUISIANA: SCM, Robert O. Schmidt, W5GHP — Asst. SCM, John Meyer, W5JFB. SEC: WB5CIQ. RM: N5YL. PAM: WB5NEZ. VHF PAM: W5VBX. Regret to report the passing of WA5FNB of Crowley. Jerry was a long time member of LAN, going back to the early 1960s. He will be missed by all traffic handlers. W5MI, of Brusly, in the hospital. We wish him a speedy recovery. The Louisiana Traffic Net Picnic in Alexandria was well attended with 25 members present. Total attendance was 38. The door prize was won by WB5TPG. WB5CDX lost his antenna in high winds. The Tech ARC has started a weekly net on Sun. at 7 PM on their Repeater WR5ASU 147.72/12. All who can work this repeater are welcome to check in. LRN net certificates go to WA5QVN and WA5TQA. New Net Mgr. for LSN the slow speed net is WB5OOM. New OPS is WB5OOM, new OPS is K5MC.

Net — Freq.	Time/Days	QTC	QNI	Mgr
LAN — 3615	7 & 10 PM Dy	313	525	N5YL
LTN — 3910	6:30 PM Dy	125	295	WB5NEZ
LSN — 3703	8:30 PM M-F	28	47	WB5OOM
LRN — 3587.5	6:30 PM Su&W	24	10	WB5FHU

Traffic: W5GHP 558, N5YL 478, K5MC 149, WB5CIZ 121, WB5LBR 108, WB5FHU 95, WB5NEZ 69, WB5CDX 38, WB5VJM 35, N5ES 23, K5TTC 18, W5YN 10, K5BLV 4.

MISSISSIPPI: SCM, E. Ed Robinson, W5TYN — SEC: WB5FXA. Newly elected MSBN Mgr. and appointed PAM WB5SNB announced asst. Net. Mgrs. K5QNE and K4RRG, congrats to all. Magnolia DX information Net, WB5HVY has moved to 21.400 MHz on Wed. nite 2000 CDST. New on 6-meters WB5MUQ WB5VSN WB5TZN. Shannon repeater tower damaged by high winds now back up. Section ARRL appointments being brought up to date. Do you want an appointment? Don't forget to renew your ARRL membership through your club; the club then gets a percentage. DRN5, W5KLV, sess. 31, QTC 284, Ms.Rep. 64% by WA5SNK W5QQC WB5MPQ K5VXV W5LQB. CAND, W5KLV, sess. 29, QTC 331, Ms. Rep. W5EDT, CGCHN, K5OWK, QNI 2048, QTC 70, MSBN, WB5SNB, QNI 1229, QTC 63. MTN, WB5FHA, QNI 150, QTC 55. MSN WB5MTQ, QNI 32, QTC 11. Ms. Lou Weather Net, K5VXV, QNI 93, QTC 3. Shannon ARN, QNI 12. Traffic: WB5FHA 97, WB5MTQ 53, W5LSG 50, W5YTN 48, W5WZ 30, WB5SXK 26, WB5SNB 25, K4VXV 17, K5RRG 10, WA5OKI 8, WA5JWD 7, W5RUB 7, W5NCB 6, N5XA 5, W5LL 4, WB5NJZ 2, WB5VFS 2, WB5NGF 1.

TENNESSEE: SCM, O. D. Keaton, WA4GLS — SEC: WB4DYJ. PAM: WB4PRF. RM: WB4DJU. Net Mgrs.: WA4EWW W4PFP WB4YPO K4YFC WA4CNY WA4WZJ WB4DZG W4EAY WA4VVX W4CYL.

Net — Freq.	Time(Z)/Days	Sess.	QNI	QTC
TPN — 3.980	1140 M-F	79	3218	302
	1245 M-F			
	0130 M-Su			
	1400 SSuH			
TN — 3.635	0130 Dy	24	134	50
TNN — 3.710	2300 M&Th	9	54	30
ETVHFN — 50.4	0200 MWF	11	93	2
ETVHFN — 145.2	0200 TTh	5	17	0
MTTMN — 28.8	0200 TTh	7	77	0
WTVHFN — 146.37/146.97	2330 Dy	30	875	437

The Crossville Hamfest was a success as usual, congrats. go to WA4YEM for carrying away the main prize. The Tenn. Council of Amateur Radio Clubs elected the following officers for 1978; WA4GZZ, chmn.; K4JSF, vice-chmn.; WB4WHE, secy.-treas. The Tenn. Council is meeting on 3.980 MHz at 0300Z Mon. Net Control Certificates have been sent to W4HJR & WA4YSJ. Net Mgr. Certificates have been given to WA4CNY-TNN; K4YFC-TN; WB4YPO-TPN; W4PFP-TPN & WA4EWW-TPN. The outstanding Tenn. Amateur award went to K4LRL. June PSHR: WA4CNY 27, K4YFC 47. Please get in touch with me if you need my services. All affiliated clubs please get your annual reports to ARRL headquarters. As stated

TEN-TEC 544 DIGITAL. Another ahead-of-its-time achievement from the pioneers in solid-state HF amateur radio technology. The 544 Digital joins its successful companion, Triton IV, to chart new paths in engineering.

THE RECEIVER. Deserving of all superlatives. Range: 3.5-30 MHz (plus "160" with option). MOSFET RF Amplifier with Resonate Control for a sensitivity of 0.3 μV for 10 dB S+N/N. And overload minimized. Noise Blanker option: remarkably effective against impulse noise, functions in the IF, controls from the front panel. Hetrodyne crystal mixed VFO: steady as a rock. 8-pole 9 MHz Crystal-Lattice IF filter for a selectivity curve straight out of the text books: steep skirts, flat top, and narrow (2.5 kHz bandwidth, 1.8 shape factor at 6/60 dB points). Offset Tuning, with LED indicator, permits independent tuning of the receiver through a 10 kHz range (approx.). As one owner put it, "it makes SSB nets a breeze." And that beautiful Digital readout: six 0.43" LED digits, 5 in red and the least significant 6th in green, reading to 100 Hz with an accuracy of ± 50 Hz, settable to WWV. (Who needs a calibrator? And, indeed, it has none). WWV reception at 10 & 15 MHz. The sound? So beautifully clean and clear, it wins raves from all. Less than 2% distortion. Built-in speaker to clear the operating position. And External Speaker/Phone jack. CW Filter option, 2-position, 150 Hz width. Zero-Beat Switch for right-on CW. Whether you operate SSB or CW or both, you'll agree the 544 has a truly superior receiver section.

THE TRANSMITTER. 200 Watts Input – *all* bands, SSB or CW. Instant band change *without* tuneup! And no danger of off-resonance damage, even with the wrong antenna. 8-Pole SSB Filter. Automatic Sideband Selection, reversible. Push-Pull Output with the heat *outside* of the cabinet. 100% Duty Cycle so you can use it for RTTY and SSTV. Front panel ALC control with LED to show operation in the ALC region. Meter shows SWR when transmitting. VFO circuit is permeability tuned, has less than 15 Hz change per F° after 30 min. warmup, less than 10 Hz change from 105-125 VAC with accessory power supply. SSB speech quality is completely natural, CW signals clean, articulate. And *full* CW break-in! So right you wonder why it wasn't done before – turns monologs into conversations. Sidetone is adjustable in pitch and volume. Automatic CW offset of 750 Hz. P-T-T. Hi-Z mic. input. RF Output-Z 50-75 ohms, unbalanced.

THE CONSTRUCTION. Styled for today and tomorrow – etched aluminum front panel, black nomenclature, black top and sides. Ruggedized chassis stands up to the rough handling of mobile/portable use. Modular construction: 10 plug-in assemblies, 9 fixed circuit boards (65 transistors, 38 diodes, 14 ICs, 1 LSI, 6 LED displays). Snap-up front feet. Size: 4½ × 13-5/8 × 13. Net weight: 12 lbs.

THE ACCESSORIES. Model 242 Remote VFO for six-mode operation; 241 Crystal Oscillator for 6 spot freqs.; 240 Converter for 160 Meter operation at slightly reduced power level; 215P Microphone & Stand; 252G protected power supply; 262G power supply plus VOX plus 2 speakers; 207 Ammeter for supply monitoring; 249 Noise Blanker; 245 CW Filter; 212 Crystal for 29.0-29.5 MHz; 213 Crystal for 29.5-30.0 MHz. Plus various sized matching blank enclosures.

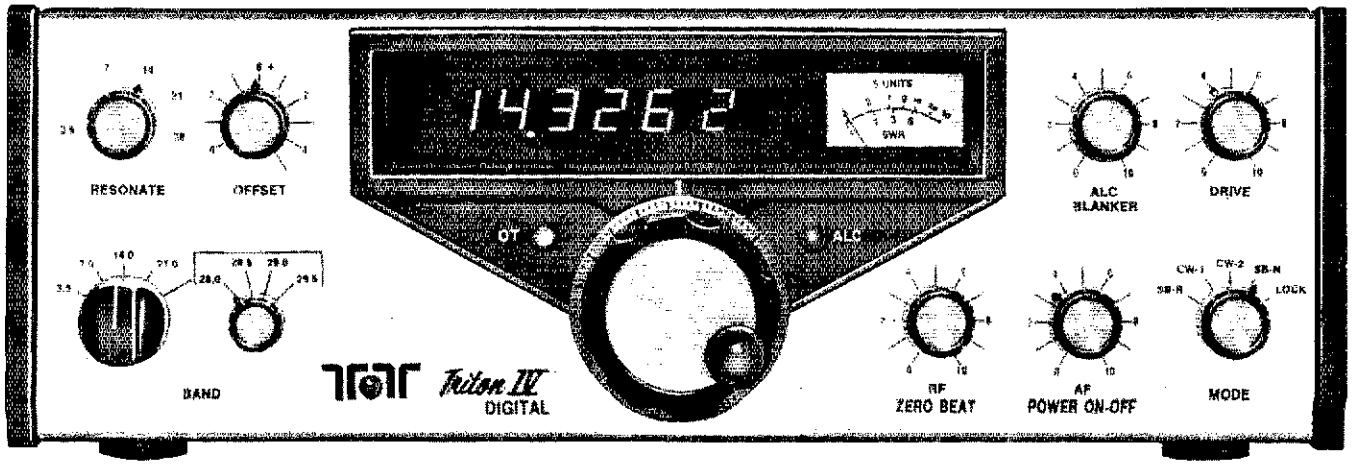
TEN-TEC 544 DIGITAL. So right, so advanced, it may well be the last rig you'll ever need to buy!

544 Digital –$869
540 Non-digital – $699

See the 544 and its companion 540 non-digital transceiver at your nearest TEN-TEC dealer, or write for full details.

TEN-TEC, INC.
SEVIERVILLE, TENNESSEE 37862

ENCORE! ENCORE!
TRITON GOES DIGITAL



last month, the traffic report is for June & July combined. Everyone plan to attend the Memfest '77 on Oct. 1 & 2 and Music City Hamfest Oct. 15 & 16. 1977 officers of TAGARC are: W4IMX, Chmn.; WD4BFJ, vice-chmn.; Kathy Chadwick, secy. Traffic: WA4CNY 245, WB4ZSZ 135, WA4KSO 128, WB4ABKF 114, K4CNY 108, WA4VVX 103, WA4KQR 102, WB4RRK 102, K4WWQ 61, WA4WHQ 60, W4OGG 57, WA4DXC 52, WB4FUR 50, WB4GZF 49, WA4GLS 48, K4JSF 48, WB4HOI 42, WB4DYJ 38, W4RUW 34, K4FSK 29, WA4WXT 29, WB4WHE 28, WA4WVW 26, K4XE 27, W4VS 25, WB4GBI 23, WB4YPO 12, WA4BGH 11, W4PSN 11, W4SGI 11, W4VJW 10, WA4YSJ 9, WB4AYM 6, K4UMW 5.

GREAT LAKES DIVISION

KENTUCKY: SCM, Ted Huddle, W4CID — SEC: WB4ZML. July nets:

Net	QNI	QTC	Net	QNI	QTC
KRN	283	24	KYN	154	78
MKPN	773	62	KSN	32	9
KIN	685	72	KNTN	395	137
KPON	65	14	6DAREC	61	9

W4BAZ reports good activity on the Novice Net KNTN. Look at net totals above and see proof! W4TPB and WA4UBE have upgraded to Advanced. K4TXJ participated with Louisville RACES in a recent industrial explision. Early warning for the annual section meeting in Louisville the third weekend in Jan. This is more than SET planning, it's for all appointees. Traffic: W4BAZ 116, WA4AVY 88, WA4IGS 59, K4TXJ 57, W4CID 44, WA4WSM 39, WA4JTE 29, WA4JAV 28, WB4NPD 24, WD4CQF 24, K4HRF 19, W4CDA 19, WA4AGH 18, K4UMN 15, WA4RCD 15, WA4YPQ 12, WB4AUN 12, WB4KLC 9, WB4EAK 7, WA4UBE 5.

MICHIGAN: SCM, A. L. Baker, W8TZZ — Asst. SCM: Stan Briggs, W8MPD. SEC: WA8EFK. RMs: W8JYA WB8NCD. PAMs: K8LNE W8SOP. VHF PAM: WA8WVV.

Net — Freq.	Time/Days	QNI	QTC	Sess.
MACS — 3953	1500 Dy	969	459	35
QMN — 3663	22/30/0200 Dy	502	290	61
WSBN — 3935	2301 Dy	780	185	31
GLETN — 3930	0130 Dy	744	102	31
BRMEN — 3930	2130 Dy	613	51	31
UPEN — 3922	2130 Dy	657	36	36
MI6M — 50.7	2301 Dy	101	23	17
VHF PAM Report		456	21	25

Election results. Lansing repeater Assn. WA8OCW, pres.; W8BQD, vice-pres.; K8ZJU, secy.; W8MQW, treas. New licensees, Advanced WB8TNC WB8ZYC. General WB8VPM WD8DVL. Novice WD8KBD. MACS Net Amateurs of the Month: Apr. WB8NDB; May WB8JNJ; June K8CCP. Mystic Knights of the Sea Award now available. Contact K8JHA for details New equipment at K8JED is FPM 300 & Swan 1200. W8KZM has DXCC. Who's Who Dept. WA8USU now W8YL. W8JUP very loud from his new QTH in Ivid. New appointees. WD8BPF and WB8VPM OBSs. Regrettully I report W8WMG a Silent Key. No summer slump in Michigan. Record ttc report received. Traffic: (July) WB8DKQ 746, W8MRM 222, WB8YDZ 181, W8VPW 156, WA8WZF 128, W8RTN 117, WA8RXI 117, W8JYA 115, W8OW 91, W8SOP 89, W8TZZ 86, K8CN 85, W8EU 85, WA8DHB 84, WB8POL 76, K8DYI 74, K8LNE 72, K8DD 70, W8YIQ 67, W7KQU/8 53, WB8FBG 50, W8NOH 49, W8MO 40, K8ZJU 35, W8IHX 29, W8PDP 26, W8UOQ 26, W8IUC 25, WB8DJS 24, WB8ITT 22, WB8ETB 21, W8SDB 20, K8JED 19, W8LDS 19, WD8KSF 18, W8VIZ 17, W8MPD 16, WB8KBZ 15, W8CPY 14, K8DTG 12, WA8LXY 11, WA8WVV 11, WD8AYV 10, W8CUP 9, W8HKL 9, W8SCW 9, K8BZL 8, WA8FXR 8, K8MJK 8, WA8TBL 8, W8FZL 7, W8TBP 7, WD8DDV 6, WB8JIX 6, W8JUP 6, K8PYN 6, WB8DYA 6, W8DCN 5, K8ODY 5, W8QBE 5, WA8FJF 3, W8JLD 3, W8LOU 3, W8RNQ 3, W8TXM 2, W8WVL 2, WB8GKB 1, W8JAX 1. (June) W8IHX 28, WA8TBL 26, K8JED 15, WB8NCD 11, N8AG 4, W8DC 3, W8TXM 2.

OHIO: SCM, Hank Greeb, W8CHT/N8XX — Asst. SCM: WA8MCR. SEC: WA8KPN. RMs: WB8JGW WB8KI W8LTA WB8VLR. PAMs: W8DIL W8FU - WA8SSI. Net reports (July).

Net — Freq.	Time(Z)	Sess.	QNI	QTC
O6MN — 50.160	0100	31	237	35
BN — 3.577	0200/2245	61	460	205
ONN — 3.708	2230	30	133	34
OSN — 3.577	2210	31	175	72
OSSBN — 3.9725	1430/2000 2245	93	2296	698

Newly affiliated clubs include Geauga Radio Amateur Assn. (Middlefield), Seneca Repeater Assn. (Tiffin), Univ. of Cincinnati ARC, and Upper Valley ARC (Xenia). Dayton Amateur Radio Club demonstrated Ham Radio at the Air Fair 7/23-24. Clermont County ARES held special SET in conjunction with DSA. K8OCL reports sporadic E on 2 meters to the east coast on July 15. WB8QCU sez PON participation down due to summer heat! Ottawa County ARES has a functional repeater WR8APB, on 147.66/06. OSN certificates were issued to N8CW K8DL W8OYF W8ENI WB8JGW WB8KKI WB8KQJ WB8OZA WB8PSO WB8QXN WA8RQQ K8RXD WB8WEK WB8YVI & W8ZJQ. K2QB invites QNI Great Lakes Weather Net 7.105 MHz, 1530Z, daily. Central OH ARES had a simulated Glaciation Watch, with excellent results with 2-meter simplex. Public Service, Emergency Preparedness? Contact your local Emergency Coordinator and volunteer your services. If you don't now your EC, contact WA8KPN or me. Traffic: WB8TWS 354, WB8OFR 317, WB8KKI 264, W8LTA 203, W8DIL 189, WB8OMQ 120, WB8JGW 114, WB8ITP 110, W8TH 99, W8QZK 94, WD8AVY 92, K8DL 87, WB8MRL 79, K8BYR 76, WB8YVI 67, W8GGX 60, WB8VLR 57, K8LXA 52, WA8VEC 52, WB8HHN 43, WA8VWH 41, WA8SSI 40, WB8TRK 40, WA8TSX 37, W8OE 36, WB8YBJ 35, WB8PIY 29, WB8UIN 28, WA8COA 26, W8ILC 26, W8KB 26, WA8KPN 24, WB8CIU 23, W8KRF 23, W8CHT 22, WD8COS 18, W8IQ 18, WA8ZNC 18, W8ARW 16, W8GGX 16, W8BHL 15, W8RG 15, N8JR 14, W8WEG 14, W8FN 13, W8QCU 11, W8TP 11, N8AA 8, W8LKU 8, K8ONA 8, K9BPX 7, K8CKY 6, W8IM 6, WD8LIU 6, K8ONA 5, K8HF 4, WD8JTT 4, W8ZM 4, WD8KDR 3, K8LT 1.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Guy L. Olinger, K2AV — SEC: WB2VUK. Asst. SEC: K2AYQ. PAMs:

TEST REPORT

ALPHA 374

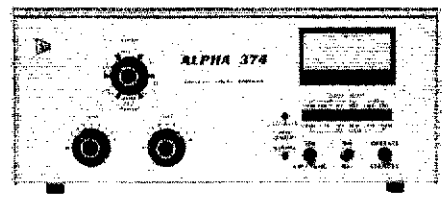
It's a no tune-up power house . . . and the fine print is on your side

You *could* safely load your ALPHA 374 to a full KW, lay a brick on the key, and leave town for the weekend. It's built to take it. Every ALPHA linear amplifier, from the moderately priced ALPHA 76 rock-crusher to the most deluxe models, is engineered and built for continuous "brick on the key" service.

Contests, dxing, and lots of rag chews are just about as demanding as a brick on the key. Wouldn't it be great to own an ALPHA and know that the fine print clearly says "maximum legal power in all modes with no time limit?"

When you go ALPHA you forget about duty cycle limits. You forget about service hassles, too. The fine print in ETO's 18 month factory warranty protects you six times as long as most guarantees!

Flip the bandswitch and instantly your ALPHA 374 is ready to deliver QRM—piercing maximum legal power—even on RTTY and SSTV—10 thru 80 meters. The ultra-convenient ALPHA 374 needs no tune-up in normal amateur service, and it's quickly set up for MARS or other special operation by simply switching to the auxiliary manual tune controls. Put your signal on top with ALPHA POWER. Contact your dealer, or Ray Heaton at ETO for literature on all ALPHA's. And ask for a copy of "Everything You Always Wanted to Know About (Comparing) Linears . . . But Didn't Know Whom to Ask."



Regardless of what transmitter you're using, for an even bigger signal the new ALPHA/VOMAX split band speech processor can boost your SSB talk power as much as ten times when you need it most, for just $179.50. Like the ALPHA linears, VOMAX is exceptionally low in distortion, compatible with all popular exciters, and easy to install and use.

ALPHA: Sure you can buy a cheaper linear . . . But is that *really* what you want?

ETO Ehrhorn Technological Operations, Inc.

P.O. Box 708 Industrial Park · Canon City, Colorado 81212 · (303) 275-1613

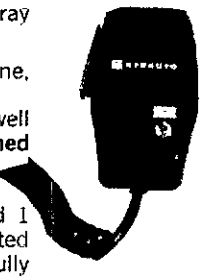
NEW!
FM144-10SXRII

KDK

All Solid State-PLL digital synthesized — No Crystals to buy! 5KHz steps — 144–149 MHz-LED digital readout PLUS MARS-CAP.*

• 5MHz Band Coverage — 1000 Channels (instead of the usual 2MHz to 4MHz — 400 to 800 Channels) • Priority Channel • Audio Output 4 Watts • 15 Watts Output • Unequaled Receiver Sensitivity and Selectivity — 15 POLE FILTER, MONOLITHIC CRYSTAL FILTER AND AUTOMATIC TUNED RECEIVER FRONT END — COMPARE!! • Superb Engineering and Superior Commercial Avionics Grade Quality and Construction Second to None at ANY PRICE.

- **FREQUENCY RANGE:** Receive: 144.00 to 148.995 MHz, 5 KHz steps (1000 channels). Transmit 144.00 to 148.995 MHz, 5 KHz steps (1000 channels) + MARSCAP.*
- **FULL DIGITAL READOUT:** Six easy to read LED digits provide direct frequency readout assuring accurate and simple selection of operating frequency.
- **AIRCRAFT TYPE FREQUENCY SELECTOR:** Large and small coaxially mounted knobs select 100KHz and 10KHz steps respectively. Switches click-stopped with a home position facilitate frequency changing without need to view LED'S while driving and provides the sightless amateur with full Braille dial as standard equipment.
- **FULL AUTOMATIC TUNING OF RECEIVER FRONT END:** DC output of PLL fed to varactor diodes in all front end R-F tuned circuits provides full sensitivity and optimum intermodulation rejection over the entire band. **No other amateur unit at any price** has this feature which is found in only the most sophisticated and expensive aircraft and commercial transceivers.
- **TRUE FM:** Not phase modulation — for superb emphasized hi-fi audio quality second to none.
- **FULLY REGULATED INTEGRAL POWER SUPPLIES:** Operating volgate for all circuits, i.e., 12v, 9v and 5v have independently regulated supplies. 12v regulator effective in keeping engine alternator noises out and protects final transistor from overload.
- **MONITOR LAMPS:** 2 LED'S on front panel indicate (1) incoming signal-channel busy, and (2) un-lock condition of phase locked loop.
- **DUPLEX FREQUENCY OFFSET:** 600KHz **plus** or **minus**, 5KHz steps. Plus simplex, any frequency.
- **MODULAR COMMERCIAL GRADE CONSTRUCTION:** 6 unitized modules eliminate stray coupling and facilitate ease of maintenance.
- **ACCESSORY SOCKET:** Fully wired for touch-tone, phone patch, and other accessories.
- **RECEIVE:** .25 uv sensitivity. **15 pole filter** as well as monolithic crystal filter and **automatic tuned** LC circuits provide superior skirt selectivity.
- **AUDIO OUTPUT: 4 WATTS.** Built in speaker.
- **HIGH/LOW POWER OUTPUT:** 15 watts and 1 watt, switch selected. Low power may be adjusted anywhere between 1 watt and 15 watts, fully protected—short or open SWR.
  PRIORITY CHANNEL: Instant selection by front panel switch. Diode matrix may be owner re-programmed to any frequency, (146.52 provided).
- **DUAL METER:** Provides "S" reading on receive and power out on transmit.
- **OTHER FEATURES:**
  Dynamic microphone, mobile mount, external speaker jack, and much, much more. Size: 2⅛ x 6½ x 7½. All cords, plugs, fuses, mobile mount, microphone hanger, etc., included. Weight 5 lbs.



NEW! 6 METER FM50-10SXRII

Same specifications as above except transmit/receive: 51.00-53.995 MHz. 600 channels
Introductory Price $389.00

NEW!
TONE ENCODER/ DECODER
50-12A 12 CHANNELS... DUAL TONE
Introductory Price $119.00

SUMMER SPECIAL
FM144-10SXRII
$389.00
VALUE $599.00
Regulated AC/PS
Model FMPS-4R ... $49.00

Touch-Tone Pad
MODEL FMTP-1
... $59.00

Manufactured by one of the world's most distinguished Avionics manufacturers, Kyokuto Denshi Kaisha, Ltd.

First in the world with an all solid state 2 meter FM transceiver.

AMATEUR-WHOLESALE ELECTRONICS

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PLEASE ORDER FROM YOUR LOCAL DEALER OR DIRECT IF UNAVAILABLE. DEALER INQUIRIES INVITED.

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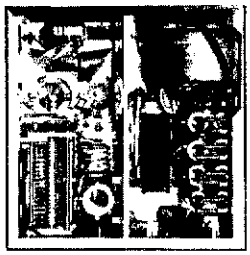
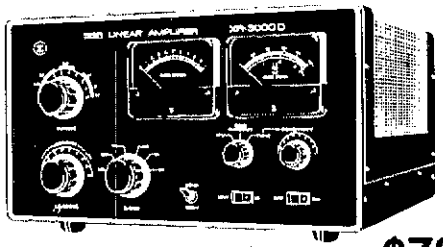
West: Consumer Communications, Inc. Seattle, Wash.

COMPARE! NEW SIGMA XR3000D LINEAR AMPLIFIER





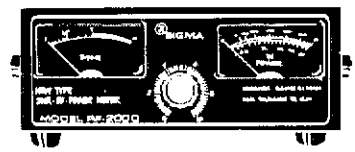
INTRODUCTORY PRICE **$789**

2 DAY AIR SHIPMENT ANYWHERE IN U.S. $35. ALASKA AND HAWAII SLIGHTLY HIGHER.

- FULL BAND COVERAGE 160-10 METERS INCLUDING MARS.
- 2000+ WATTS P.E.P. SSB INPUT. 1000 WATTS INPUT CONTINUOUS DUTY, CW, RTTY & SSTV.
- TWO EIMAC 3-500Z CONSERVATIVELY RATED FINALS
- ALL MAJOR HV AND OTHER CIRCUIT COMPONENTS MOUNTED ON SINGLE G-10 GLASS PLUG IN BOARD. HAVE A SERVICE PROBLEM? (VERY UNLIKELY) JUST UNPLUG BOARD AND SEND TO US.
- HEAVY DUTY COMMERCIAL GRADE QUALITY AND CONSTRUCTION SECOND TO NO OTHER UNIT AT ANY PRICE!
- WEIGHT: 90 lbs. SIZE: 9½" (h) x 16" (w) x 15¾" (d).

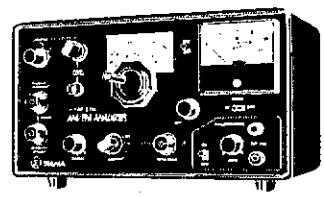
FEATURES

CUSTOM COMPUTER GRADE COMMERCIAL COMPONENTS, CAPACITORS, AND TUBE SOCKETS MANUFACTURED ESPECIALLY FOR HIGH POWER USE—HEAVY DUTY 10KW SILVER PLATED CERAMIC BAND SWITCHES • SILVER PLATED COPPER TUBING TANK COIL • HUGH 4" EASY TO READ METERS—MEASURE PLATE CURRENT, HIGH VOLTAGE, GRID CURRENT, AND RELATIVE RF OUTPUT • CONTINUOUS DUTY POWER SUPPLY BUILT IN • STATE OF THE ART ZENER DIODE STANDBY AND OPERATING BIAS PROVIDES REDUCED IDLING CURRENT AND GREATER OUTPUT EFFICIENCY • BUILT IN HUM FREE DC HEAVY DUTY ANTENNA CHANGE-OVER RELAYS • AC INPUT 110V OR 220V AC, 50-60Hz • TUNED INPUT CIRCUITS • ALC-REAR PANEL CONNECTIONS FOR ALC OUTPUT TO EXCITER AND FOR RELAY CONTROL • DOUBLE INTERNAL SHIELDING OF ALL RF ENCLOSURES • HEAVY DUTY CHASSIS AND CABINET CONSTRUCTION AND MUCH, MUCH MORE.



SIGMA RF-2000 SWR & POWER METER

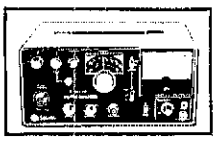
Introductory Price $29 Cal PWR Scales 200W-2000W Freq Range 3.5 - 150 MHz Please do not confuse the RF2000 with similar appearing lower priced units - RF2000 is an individually calibrated professional quality instrument - Unequaled at many times the price Size 7" (w) x 2½" (h) x 2 1/3" (d).



NEW AM/FM ANALYZER SIGMA AF-250L

INTRODUCTORY PRICE **$199**

Deviation/Modulation Meter - FM: 0-20 KHz, AM: 0-100%. Size: 5½ (h) x 10¼" (w) x 7¼" (d) Weight 7 lbs. Frequency: 1.8MHz-520MHz



ALSO MODEL AF-251LW WITH BUILT IN 125 WATT CALIBRATED WATT METER & DUMMY LOAD. PRICE **$289.** PLEASE WRITE FOR COMPLETE INFORMATION.

NEW—CDR HAM ROTATORS—Reg. $159.95 $125.

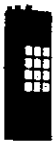
STANDARD NEW 2 METER FM TRANSCEIVERS Model SRC 146A

SPECIAL SALE

SRC 146A	$314
4 Xtals:34/94 and 94/94	NC
USA 2 Deluxe Base Charger	$40
PT3644 Leather Case	$10
AT 19 Rubber Ant and Whip	$6
NI-Cads	$30
Reg	$400

Our Price $289

NEW!!! Touch Tone pad completely wired and ready to plug in-$69.00

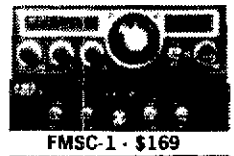


NEW! FMSC-2 SCANNER FOR KDK FM-144

14 CHANNEL PROGRAMMABLE INTRODUCTORY PRICE $109

NEW! 7400 SCANNER FOR KENWOOD TR-7400A

14 CHANNEL PROGRAMMABLE INTRODUCTORY PRICE $109



FMSC-1 · $169

7400 Scanner II-$189

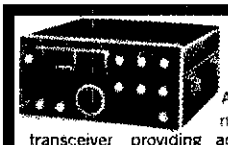
TWO NEW SCANNERS!

FMSC-1 Scanner for KDK FM 144 and 7400 Scanner II for Trio-Kenwood TR-7400A. • Full scan 146 and 147 MHz consecutively or 1 MHz, or any MHz range • Scan rate: 1 MHz/2 seconds adjustable) • Controls: Scan/Hold, Latch/Delay, 600 KHz offset (off, up, down), program 1 MHz • Simple installation.

KDK

ACCESSORIES FOR KDK FM 144

FMPS-4R	Regulated AC/PS	$49
FMTP 1	Touch Tone Pad	$59
FMTP 2	Touch Tone Pad with 10 Number Programable Memory	$99
FMMC 1	Microphone with Built in Touch Tone Pad.	$59
FMTD 1	Private Call Decoder for use with and Programed by Any Touch Tone Pad.	$129
SC 12A	Audible Tone Encoder Decoder	$119
FMSC 1	Scanner – Random, Any Range	$169
FMSC 2	Scanner – Programable, 14 Channels.	$109
MARS-CAP™	Option Kit – Any Frequency, Any Split	$12
FMOF-1	Offset Option Kit – 2 Extra Positions, Crystals Required	$19
FMOF-2	±.1 MHz Offset Option Kit (No Crystals To Buy)	$19
FMTE 1	Sub Audible Tone (100 Hz – Adjustable 67 203 Hz)	$29
FMAT 1	¼ Wave Portable Antenna for Hotel, Motel or Apartment	$7.95
Extra DC Cord & Plug		$3.50
ACC. Socket 5 Pin Din Plug		$1.50
Owners Manual (Extra)		$5.00
Service Manual		$2.00
Mounting Bracket (Extra)		$6.00



NEW — TEMPO 2020 A brilliant new SSB transceiver providing advanced engineering and unique operating features. Please write for information

YAESU FT 101E/FT 301D TRANSCEIVER'S write for special deal.

NEW! $285 NYE VIKING MODEL MB-II 3,000 WATTS

Antenna Impedance Matching Network. Copper ribbon-wound, silver plated variable inductor. Heavy duty 7000 volt variable output capacitor. 10,000 volt fixed capicitors. Silver plated RF conductors. Large precision, easy-to-read dials. 360° readout. Overload protection for SWR meter.

ATLAS 210X-215X and 350-XL

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WB2EMU WB2QEI. RMs: W3CS K2OYG WB2IXW.

Net	Freq	Time (EDT)
NY Public Operations	3913	5 PM
Empire Slow Speed (ESS)	3590	6 PM
NY State Phone Traffic & Em	3925	6 PM
NY State CW (NYS)	3677	7 PM & 10 PM

I urge those of you who do not now support a net to pick your mode & time and check in. Look for you to QNI. Many stations report summer fun and vacations, with activity at the normal summer ebb. Have received a number of letters from prospective hams in the Westchester area. Need help from those willing to teach, train & give exams. Please let me know if you can. Congrats to K2RRR on passing Advanced. Excellent OBS report from WB2COY. Bob also received commendation from ARRL for letter to newspaper rebutting Jack Anderson's column. Losing WB2HVB to 3-Land. Good luck in MD, Bill. Wish to welcome the Adirondack Amateur Radio Club (Glens Falls) to ARRL affiliation. W2CS had a mind-boggling traffic-centered crossword puzzle in the summer NYS bulletin. Still haven't figured it out. WA2YYM is waiting for new TS-520S. Congrats on BPL to WB2EMU (her 2nd) & W2YJR (his 4th). July PSHR: WB2EMU W2YJR WB2HVB W2CS. Traffic: WB2EMU 993, W2YJR 576, WB2TGL 150, W2CS 144, W2ACQ 77, WB2HVB 53, WA2YYM 51, N2EF 47, WA2RKI 41, WB2GOJ 25, WA2CJY 10.

NEW YORK CITY — LONG ISLAND: SCM, John H. Smale, WB2CHY — SEC: K2HTX PAM: WA2ECO. The following are traffic nets in and around the section:

Net	kHz	Time/Day	Manager
NLI*	3630	1900/2200 Dy	WB2IDP
NLI Phone*	3928	1730 Dy	WA2ECO
NLS*	3730	1800 Dy	WA2BMI
Clear House	3925	1100 Dy	WB2AEK
Mic Farad	3925	1400 M-S	W1DFT
ESS	3590	1800 Dy	K2UIR
NYSTPEN	3925	1800 Dy	WA2RSP

*Denotes Section Net, all times are local. Please try and QNI into the nets, help is needed in all parts of the Section, it seems like only a few stations are carrying the heavy traffic. I think the nets have adopted for their motto "We can be very friendly," why not try a few sessions to see what's going on. WB2IDP is now NLI Net Mgr. He will be doing his best to fill the big pair of shoes that WB2LZN left. WB2WFJ now in new QTH in Valley Cottage, NY, which unfortunately in in 6NY, which means I lose a fine Asst. SCM. K2TV reports that the Babylon Town 2 mtr net is now held on WR2AKV (146.085/685 MHz) at 1930 local, every Mon. and they will handle traffic into NTS. WB2YKG is now N2RG. Lots of stations participated in the blackout emergency comm., too numerous to mention in this column, but I do want to pass along my thanks to all that helped and donated their equipt. and time. Who says disasters don't hit the big cities. Welcome to the following newly affiliated clubs: Radio Central ARC (WB2FZE, pres.), Russell Sage Jr. H.S. RC (WB2DLP, pres.), Brooklyn Post Office ARC (WA2EUB, pres.), Kings County Rptr Assn. (WA2UMY, pres.). Congratulations to W2HF, who received a QCWA certificate for 56 years cont. licensed. He was first licensed at 2HB in 1920. WA2IXG now on the air with a TR33C. The Citibank Club, WA2BTC now has the TR4C for its club station. Officers for the Wantagh ARC are: W2SUM, pres.; WA2KOC, vice-pres.; K2PAY, treas.; K2BPY, asst. treas.; WB2VTN, rec. secy.; WB2EFS, corr. secy. Larkfield ARC has resumed their hidden Xmtr Hunts. Contact WA2YLO or WA2TZP for info. Congratulations to WA2ITA who passed his General exam. Also Grumman ARC now has two new Novices: WB2QDS and WB2QDT. WB2MKI is now act. chmn. for KCRA, replacing WB2GGC, who is also to be congratulated on upgrading to Advanced, also WA2NDA and WB2MKJ who have upgraded to General. The FCC now has new hours, for amateur exams that is. Extra Class exams are given Wed. at 8:30 AM Advanced and General Wed. at 9:30 AM and Tech. on Wed. at 1200 noon, this info comes from KCAR Squelch Tale. Congratulations to WB2IDP and WA2HTP on making BPL. Traffic: (July) WB2IDP 672, WA2ECO 256, W2EC 243, WA2HTP 223, WB2LZN 143, W2MLC 85, W2HXT 24, W2NN 14, WA2BRF 6, K2JFE 6, WA2EUB 3. (June) WA2ECO 139.

NORTHERN NEW JERSEY: SCM, Bob Neukomm, WA2MVQ —

Net	Freq.	Time(PM)/Days	Mgr.
NJN	3695	7:00 Dy	WB2CST
NJN	3695	10:00 Dy	WB2CST
NJSN	3730	8:15 Dy	WB2DFO
NJPN	3950	6:00 Dy	W2QC
NJPN	3950	9:00 A Su	W2QC
PVTN	14 .7	8:00 Dy	WA2OPY

SEC: WB2VUF. PAMs: W2QC, WA2OPY (VHF). RMs: WB2CST & WB2DFO. Congratulations to WA2AYY on making BPL. New Novices are WA2LEP WA2LNN WB2LNM and WA2PIR. During the New York City black-out the NJPN was alerted with 37 check-ins and stood by to handle traffic. QO report was received from WB2CST. W2UUH is now W2UH. WA2BSU is N2SW. W2RQ DXCC total 180/163. N2SW has qualified for DXCC. W2UH was a PR man for the Morris and Passaic County AREC FD at their site near Mendham. W2UH is also a new EC and recently acquired an ICOM IC-245. WA2MVQ and WB2GMV from NNJ were operators at the 9th National Boy Scout Jamboree in Moraine State Park along with K2BS W3LPB K3RC W7VTB W1WLU WB2IGW WB9VKO WA7HQU/6 W2GND and WA2BSR. The Jamboree Station was like a week long Field Day with plenty of rain and mud. Your SCM prepared this during a torrential downpour and had great difficulty copying the NJPN but managed some from NJN. The NJN/NJPN annual picnic was a big success at Shark River State Park. It was good to see W2RQ out of the hospital. WB2IXS and WA2CKV passed their Advanced. The Wayne Adult School will have classes for Novice code and theory; Tech and General theory being taught by WA2CKV. WA2DLZ is vacationing in Israel. Old Barney Amateur Radio Club will hold Novice classes in Sept. WB2DFO constructed a QRP attenuator that allows 2 milliwatts. W2GD working on Beverage antenna for 1R8/3R5 MCS. Guess he means 160 and 80 meters. WA2BSU reports his new call as N2SU WA2MVQ is teaching a class for General and Advanced at the Ridgewood Adult School. Reports not received from RMs and PAM and will be included in next month's report. Traffic: (July) WB2ASD 488, WA2AYY 293, WB2VTT 91, W2SWE 68, W2PA 65, WB2RMK 60, W2RQ 52, K2SE 45, WA2PCF 25, WA2MVQ 21, W2SQ 20, WA2WXM 20, W2WHB 19, WA2CNF 19, W2CC 19, WB2ANI 17, WB2JRC 17, W2CU 16, WA2NLP 14, N2NS 12, W2CVW 8, K2ZFI 8, N2SW 7, WA2DLZ 5, K2TJ 2. (June)WB2HSG 28, W2ZZ 21, W2CVW 5.

HARRISON HAS IT!

ATB-34

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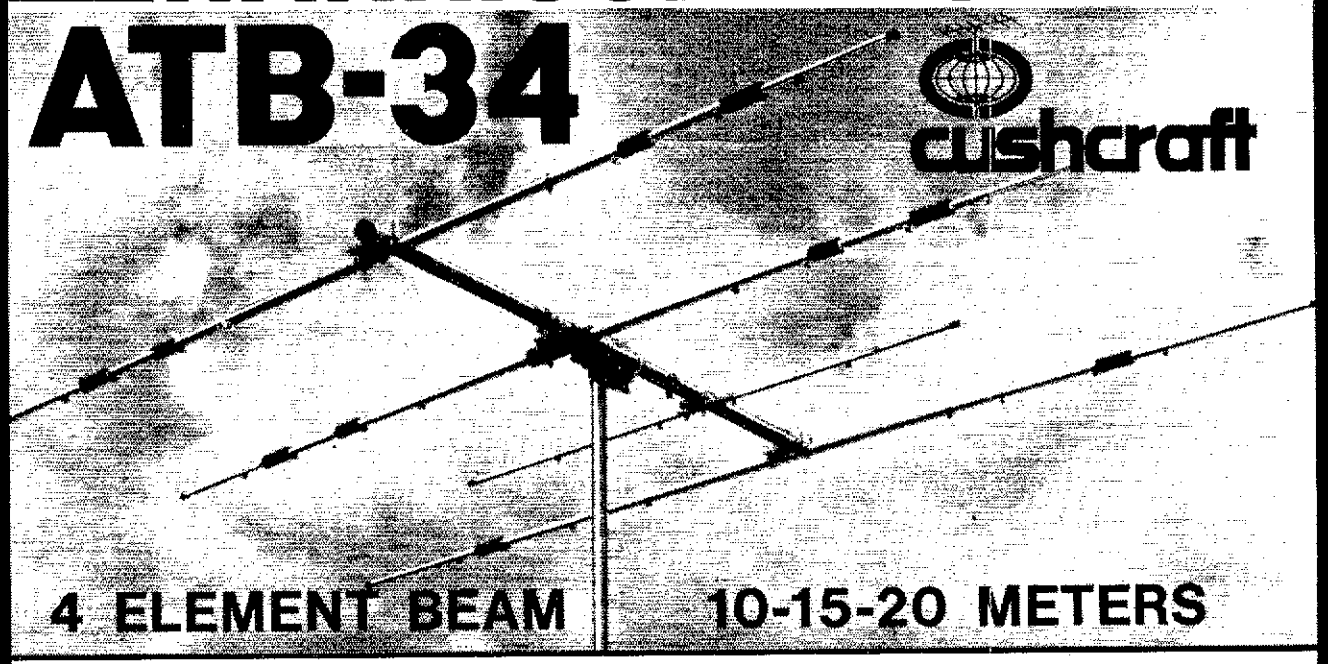

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POWER HANDLING -	2000 WATTS PEP	WEIGHT -	42 Lbs.
BOOM LENGTH/DIA. -	18' x 2 1/8"	WIND SURVIVAL -	90 MPH.

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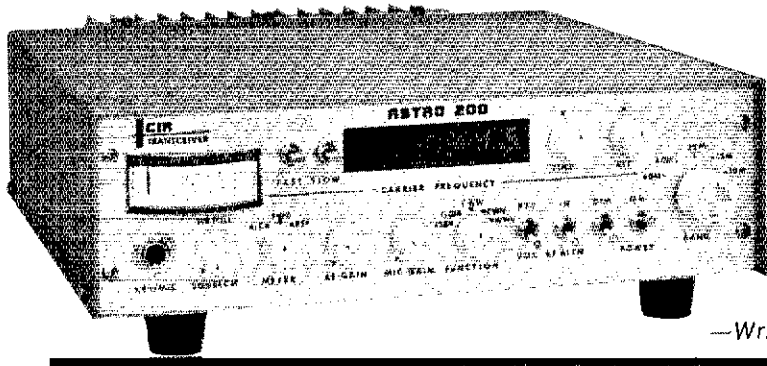

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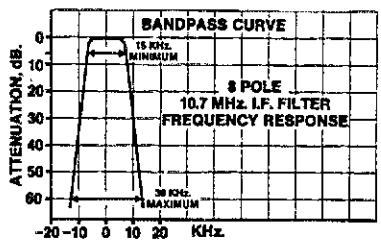
Since its introduction, our hot new HW-2036, featuring optimized digital and RF circuitry applications, has rapidly moved to the forefront to take its place as THE new industry 2M FM standard. One look at the specs and you'll be convinced that the HW-2036 will give you all the sensitivity and punch you'll need to get in on the excitement of 2-meter repeater operation.

Fully Synthesized

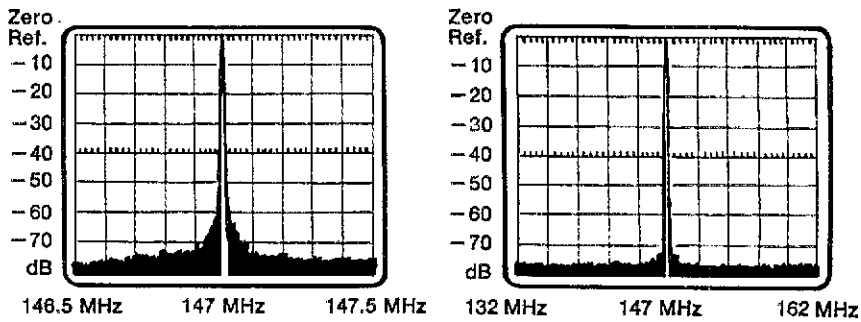
Flick the frequency select switches and instantly you've programmed a synthesizer-controlled VCO loop to the precise desired frequency with a stability of ±0.0015%. Synthesizer operation is pre-settable to any 2 MHz segment of the 143.5 to 148.5 MHz spectrum and a unique NAND gate logic system displays synthesizer status and prevents out of band transmissions by inhibiting transmitter PTT. A turn of the mode switch gives you the option of simplex, or in the ±600 kHz positions, "standard" and "inverted" operation. There's even a crystal controlled auxiliary position that lets you operate any other frequency split that may be desired. "Non-standard pairs" are no problem either, simply move the 0/5 kHz switch to the 5 position and you're into the repeater.

A Hot Receiver with specs to prove it

Whether you're on the fringe of the action or in the thick of urban repeater congestion you'll appreciate the hot dual-conversion receiver we've engineered for the HW-2036. An 8-pole 10.7 MHz crystal filter and IC IF assures you the kind of selectivity you need in congested areas (see bandpass curve below) and a diode-protected dual-gate MOSFET front end gives you 0.5 μv sensitivity with 15 dB quieting... more than enough to pull out the weak ones during band openings. A Schmitt-trigger circuit gives you squelch action that's quick and positive and a bright front panel LED display alerts you instantly to on channel activity. A large easy to read relative strength meter makes signal strength measurement a snap.

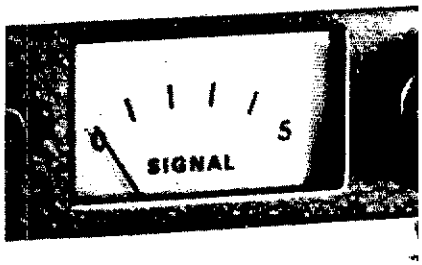


An 8-pole IF crystal filter greatly reduces adjacent channel interference.

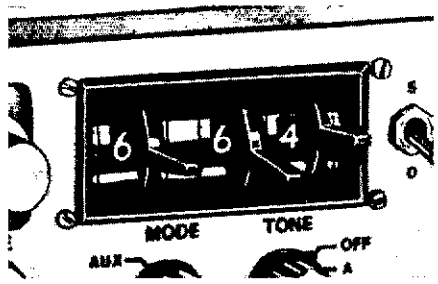


Actual spectrum analyzer reproductions of the HW-2036 transmitter output operating at 147 MHz. Spurs within 20 MHz of carrier are down to a full 70 dB!

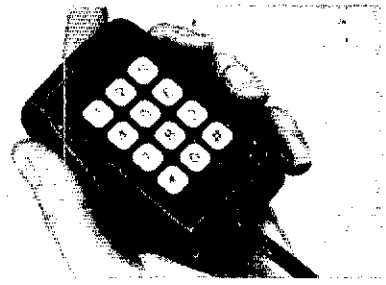
HW-2036 is well on its way to for 2-meter synthesized gear



Signal strength meter lets you adjust for optimum reception.



Lever switches for quick, easy frequency selection.



Optional Micoder for accessing repeaters with auto-patch input.

A clean punch

Key the mike and you've got one of the cleanest signals on the air. Spurious output is more than 70 dB down from carrier reference (see spectrum analyzer reproductions below) and a minimum 10 watts out gives you a solid on-air punch. Transmitter output impedance is a nominal 50 ohms and Heath engineering lets you operate into an infinite VSWR without shutdown! True frequency modulation gives you audio that's crisp and clean. For added performance, deviation is continuously adjustable to 7.5 kHz. The sophistication necessary for complex repeater operation hasn't been forgotten either. Three sub-audible tone encoders, continuously variable from 70 to 200 Hz, let you front panel select any of three tones for repeater access in your area.

You're on the air in no time

Convenient sub-packs, a pre-built wiring harness, easy to assemble circuit boards and helpful illustration booklet shorten assembly time and get you on the air fast. And the HW-2036's built in signal source makes precise receiver alignment a simple matter, with no external generator required. Complete alignment requires only a VTVM. A frequency counter with a range to 150 MHz is recommended, but not necessary.

Accessories give you flexibility

For extra versatility, combine the HD-1982 microphone/tone pad with your HW-2036. This package gives you not only superior on-air audio but also the added convenience of instant autopatch access. And for fringe area mobile operation add the HA-202 to your system. This little amplifier can give you up to 40 watts out... more than enough to quiet distant repeaters.

So grab your HW-2036 and come on up. 2-meter operation provides challenge and excitement and you'll come out on top when your rig's from Heath.

Complete HW-2036 SPECIFICATIONS:

Receiver: Sensitivity: 0.5 μV for 12 dB SINAD (or 15 dB of Quieting). Squelch Threshold: 0.3 μV or less. Audio Output: 1.5 watts at 10% T.H.D. typically 2 watts. (5 kHz deviation). Image Rejection: −45 dB or greater. Spurious Rejection: −50 dB or greater. IF Rejection: −80 dB or greater. Internally Generated Spurious: Below 1 μV equivalent. Bandwidth: 6 dB at 15 kHz min. and 60 dB at 30 kHz max. Modulation Acceptance: 7.5 kHz min. Transmitter: Power Output: 10 watts min. at 25°C and 13.8 VDC, into a 50Ω load. Harmonic & Spurious Output: −70 dB within 20 MHz of carrier; −60 dB elsewhere, −60 dB harmonics. Modulation: FM, 0 to 7.5 kHz, adjustable. Duty Cycle: 100% with infinite VSWR. Tone Encoder: 3 tones, 70 to 200 Hz, approx. ±70 Hz deviation. Transmitter Offset: 0 (simplex), −600 kHz, +600 kHz with crystals supplied. Provision for one additional offset crystal. General: Frequency Coverage: Any 2 MHz segment from 143.5 to 148.5 MHz. (Both receiver and transmitter must be aligned for the same 2 MHz segment.) Frequency Increments: 5 kHz. Frequency Stability: ±.0015%. Operating Temperature Range: 15° to 125° F. (−10° to 50° C). Operating Voltage Range: 12.6 to 16 VDC (13.8 VDC nominal). Current Consumption: RX: 700 mA max. squelched. TX: 2.6 A max. at 13.8 volts. Dimensions: 2¾" high x 8¼" wide x 9⅞" deep. Weight: 6.25 lbs.

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MIDWESTERN DIVISION

IOWA: SCM, Max R. Otto, WØLFF — SEC: WØIYW. PAM/HF: WBØAVW. PAM/VHF: KØLKH. RM: KØEVH. Midwest Division Convention will be Oct 7-8-9 at Wichita. Souland Repeater Assn. provided Communications for the National Missouri River Ratt Regatta. Directly involved were WBØTLD KØAAR WBØYOW WAØPWR WBØSFZ KØTFT WBØWQJ KØBGG WBØWGC WAØCLM WAØTIR WBØQMU and WBØFHD. WØTGQ gave assist to Wis. Badger Emergency Net after their storm. The Boone Area Repeater Inc. is a duly affiliated society. KØPNZ moving to Oskaloosa. WBØSKP has new SB220 and TH6DXX beam, WB5NVB a YL Extra now living in Des Moines. The youngest known ham is 6 years old and lives in Iowa. More on this later. Congrats Dept: WDØANW WBØUBX WBØVWM WBØYKJ WBØSRK WBØPJU WBØQAT new Generals, WBØVNK WDØDCF WBØZPY WDØBBA and WDØBBB new Techs. WØSS KØEVH WAØSSU WØYLS WØOMV WAØLKM WBØPYD KØFLY KØJD and KØGP gave Iowa 90% on NTS-TEN. All by himself WAØAUX gave Iowa 95% on DTRN. New Calls: WAØFIX is NØAN and WØZNT is WØZN. WBØSSV has new Tri-band beam. The Storm Lake Repeater 19/79 now has good coverage. Ia. 75M 3970 kHz 1730Z KØJVO Mgr. QNI 1490, QTC 136, sess. 26, Ia. 75M 3970 kHz 2300Z KØRN Mgr. QNI 1047, QTC 58, sess. 26. Ia. Tall Corn 3560 kHz 2330/0300 WØYLS Mgr. QNI 347, QTC 110, sess. 61. Traffic: WAØAUX 675, KØEVH 191, WØSS 150, WAØSSU 65, WØUPX 60, WØIKT 48, WØLJW 46, WØOMV 36, WØLFF 33, GP 19, WBØS,NSS 17, KØJGI 10, WØBW 7, WØBQJ 3.

KANSAS: SCM Robert M. Summers, KØBXF — SEC: WØKL. PAMs: WAØSEV WBØBCL. RM: WØFT. Nice to hear from WAØOMB, Net Mgr of the CSTN. Tex has been in the hospital again and we did miss the last two months reports. June QNI 768 and QTC 70 and July QNI 566 and 47 QTC. Looks like the summer weather is beginning to take its toll out on the traffic nets. WØFT mgr. of QKS reporting same slow conditions, July QNI 433, QTC 136. KSBN QNI 848 with 126 QTC and KPN 224 QNI and 6 QTC. WAØLBB reports QNI 581, and QTC 151 on the KNN and again no real bad storm sessions. I have been asked to plug the OH QSO party, info came too late for good plug here, it will be over when you read this. WØKL reports ECs WØUT KØRXT WØNYG WØRT WBØOQX KØQLC WBØBIY submitted monthly reports. All ECs are reminded to check in with Doc at least once a month. WØPB had a good time at the Seattle Northwest Division Conv. Again we want others to help the newcomers into our hobby be aware of the good an ARRL membership could do for them. Member or not, your SCM would delight in hearing from all the new holders of ham tickets, your gear, your operating habits, your needs or whatever. Perhaps what you need can be achieved by a line or two. Check page 8 of the QST for my address, and do let me hear from you. A hearty welcome to the Pittsburg Repeater Assn. and the Cimarron Valley ARA, Ulysses on recent affiliation with ARRL. Traffic: (July) WØOYH 98, WØRFF 81, WØCHJ 80, WAØLBB 73, WØAM 68, WBØHBM 62, NØIN 44, WBØLKA 44, WØIX 43, KØBXF 42, WØFT 40, WØHI 34, WAØSEV 34, WØPB 32, WBØLUN 31, WBØOLA 30, WØFOJ 20, WBØKDE 20, WBØPQH 14, KØKD 12, WØRVO 12, WØNYG 8, WBØOQX 6, WØRT 2, WAØTRO 2, WAØOWH 1 (May) WBØGVR 22.

MISSOURI: SCM, L. G. Wilson, KØRWL — Asst. SCM: Joe Flowers, WØOTF. SEC: WBØFKY. Congratulations to WAØSNT on receiving his Extra, to WBØWMD on Advanced, WBØTIJ WBØVPE and WBØYBW on their Generals, to WAØQJE on first phone and to WØRUR on receiving DXCC. CPARA conducted Novice classes with 15 attending. Another class is scheduled for this fall and is to be followed by a General-Technicians class. WAØYEF is sporting a new Drake C-Line.

Net	QNI	QTC	Net	QNI	QTC
HBN	323	16	MSN	84	42
SCEN	69	5	MON	152	71
MON2	115	41	MOSSBN	896	130

It is with sympathy that I report WAØHTP lost his house when his tower received a direct hit by lightning. WAØIYY was married sometime in Aug. WØSHQ/Ø had Murphy strike on Field Day in the form of a neighbor complaining about an un-muffled generator. The most traffic logged was 1013 chigger bites. Congratulations to new licensees WDØs BSY BXV BWQ BWW through BWZ; BXA through BXC BXH BHI BYA BYD BYH BYL BZC CAA CAB CAD CDZ CLZ CMI CMQ CNB CNW through CNZ CPH CPK through CPW CQC CQM CQN CQZ CRF through CRX, CSO through CSZ CTH CTJ CTT and numerous other MO hams. Traffic: (July) KØONK 195, WØNUB 105, WBØLFY 77, WØBV 71, WA-ØFKD 43, WBØMEO 41, WØOUD 38, WBØVHN 35, WØBVL 26, WAØLCV 24, WØQD 24, WØEEE 23, KØBM 19, WAØOCU 14, WØQAU 10, WAØMOF 4, WAØEMX 2, WBØFKY 2, KØRWL 2, WAØYEF 2. (June) WØEPI 11.

NEBRASKA: SCM, Claire Richard Dyas, WØJCP — The last weekend in July was the setting for the Annual Victoria Springs HAMFEST and it was another very enjoyable event. The Lincoln ARC started the festivities off by serving a weiner roast on Sat. evening to about 350 persons. The Hastings, Grand Island and Kearney ARCs served the Sun. morning breakfast to about 340 people. The Sun.-noon steak fry was served to well over 500 persons. There were 223 licensed hams attendance. Congrats to all for a job well done. Some of the out of staters were: WA2JAY of NJ, KØJXN of IA and WØRYM of CO. Congrats to WBØISL & WBØIBT who recently became husband & wife. WØFQB elected to board of directors, National QCWA. Net reports: QCWA, QNI 56; Western Neb Net, QNI 424, QTC 6; Cornhusker Net, QNI 1453, QTC 64; Morning Phone Net, QNI 1096, QTC 51; Sandhills WX Net, QNI 172, QTC 1; AREC, QNI 136; Nebr. Storm Net, QNI 953, QTC 28. Traffic: WØVEA 72, WØCBJ 32, WØHOP 31, WØFQB 24, WBØNFG 23, WBØVDR 16, WAØQEX 14, KØBRS 12, WØEUT 12, WØSGA 12, WBØJWQ 11, WAØPCC 10, WØFUZ 10, KØHNT 9, WBØSYV 9, WBØGMQ 7, WØFOW 6, KØSFA 5, WØATU 4, KØODF 4, WØDFU 2, KØFRU 2, WØYFR 2, WØNIK 1, WAØLOY 1.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, John McNassor, W1GVT — SEC: W1XX. RM: K1EIR. PAM: K1EIC. VHF PAM: WA1ELA.

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FEATURES

- T^2L Logic
- Maximum offset versatility – easily programmed to any IF and transmitter offset between 100 KHz and 30 MHz in even 100 KHz increments.
- Simple jumper wire change enables use on rigs with 18, 9, 6 MHz transmit crystals.
- All frequencies locked to one master crystal oscillator.
- 2 pole output filter on receive line.
- Virtually no measurable difference in spurious outputs between crystal or SYN 220.
- Lockup time typically 150 milliseconds.
- Easily interfaced to most rigs.

SPECIFICATIONS

- Frequency: 220 – 225 MHz
- Transmit offsets: Simplex, +1.6 MHz, –1.6 MHz plus 3 additional field programmable offsets.
- Output: 3 volts to a 50^ load.
- Input voltage: 11 – 18 VDC at .900 amps.
- Size: 8" long x 5½" wide x 2¼" high
  20.32CM x 13.97CM x 5.715CM
- Complete kit including all electronics, crystal, thumb wheel switch, cabinet, etc.
- Shipping weight 2 lb. 4 oz.

KIT $169.95 – Wired & Tested $239.95

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High QNI: CPN — K1DF5 W1NQO & WA1RUR. High QNI: CN — K1GF W1KV & WA1RUR. SEC W1XX reminds all that year round EC action can be followed in "Public Service" via K1XA in QST each monthth, prepare and be available when needed. Director W1HHR will present the Director's Award for Public Relations Efforts at the Convention in Hartford — send your PR results to him now. Clubs are lining up Annual Programs — send list to W1HHR. Suggest clubs add Novice Buddy System to Program and further assist them to get General or better license. "Radio Club News" sent to all affiliated clubs should be discussed and circulated at all meetings. July QO Bulletin contains MUST reading for all OOs, they are a big help to all. Meriden ARC Auction coming during Oct. WA1URA reports RTTY Traffic Nets on .75/.15 and .855/.255 with Autostart capabilities, more check-ins requested. Congratulations to: WA1VDY Extra, K1DFS Advanced, and WA1UOW General Class; Murphy's Marauders, Radio Amateur Society of Norwich and Yankee Clipper Contest Club for ARRL affiliation! Some clubs now planning next year's Field Day, it was great, especially for many new Novice operators. New England Division 1977 Convention coming on Sept. 24 & 25 in Hartford — hope you can make it and hope for the pleasure of meeting you there! Traffic: (July) WA1VGP 316, WA1URA 209, WA1RUR 161, W1TR 69, K1XA 62, W1GVT 56, K1DFS 51, K1OQG 36, W1AW 27, W1CUH 27, W1BDN 26, W1QV 13, WA1BER 4. (May) K1OQG 11.

EASTERN MASSACHUSETTS: SCM, Frank Baker, W1ALP — Asst. SCM: Raymond N. Witt, WA1OWQ. SEC W1AOG received reports from WA1s RTR ZLO AMG HON, W1s BAB BHD JKW, K1s NFW CCW PAD FMM, W1XA. W1PF is a Silent Key. A memorial service well attended for W1NT. Foxboro ARC, WB1EMT affiliated with ARRL. NENN had 153 QNIs, 72 QTC. W1HZU was WB1AGF, WB1ANT age 14, went from Novice to Advanced in 8 months, congrats. K1BJZ has her Advanced. WA1TFF moved to RI. WB1ECJ XYL of WB1BVN. EM2MN had QNI 115, QTC 50. WA1TJP has Extra. W1EHS retired. N1HR was WA1MJD. W1GQN in E. Bridgewater. New Clubs: WB1EGG, Haverhill HS ARC, WB1EGH, Braintree HS Comm. Club. NEEPN had QNI 85, QTC 16; K1BZD is Net Mgr. & PAM. K1FJ was WA1TEH. K1KNM has new tower & beam. WA1VMG is Net Mgr. & PAM for HHTN, WB1AKL Asst. Net Mgr. If you want to get an idea what the weather is in New England, tune to 3905, Mon. thru Sat., between 0545-0645. K1OBL has 1 kW on 80-10, WA1VHY is Asst. EC to WB1AMG. EC WA1HON says classes are being held for local residents. EC W1KTU says the group helped out in the Chatham 4th July parade. K1KVB has a Tempo VHF/One Plus. K1LWI says 10 has been very good. W1OUL got some QSLs dated 1946 from P. O. K1SVP has NCX-1000. WA1UZH has new tower. WA1ZXB General in Everett. WA1ZAZ has new Triton 4. W1DMS doing tone patches for Coast Guard Cutter. K1PAD in Europe for 3 weeks. WA1YMD has 1st Class Fone, beam for 2 home brew. WA9NEW got HF rig on air, trip 3800 mile mobile. EMRI-55, WA1POJ, mgr., Mon., Wed., Fri, 2215Z on 3715 10 wpm. W1NF has Tempo 2020 TC. K1LCQ & WA1YMD new OBSs. W1FJI endorsed as EC & OO. Officers of Framingham RC, W1FY; Lew Myman, pres.; Jim Boates, vice-pres.; Howie Davis, treas.; Mike Keller, secy. WA1OAM WA1IFE worked DX on 6. WA1ONB has Ten Tec Argonaut and spending summer on a 27 ft. sloop and on 20. WB1DIB got his license thru B. C. HS ARC. Officers of Algonquin ARC, Marlboro are: K1ACN, pres.; WA1LXN, vice-pres.; Bill Dodge, treas.; W1HGU, secy.; W1BK, editor; WA1MBJ, N1CW, act. chmn. N1RR was WA1IKG, N1XO was WA1LXU. WA1s QAA QAB have a 96-ft. tower. Chelmsford ARA & Billerica ARS were on FD. K1CIJ retired, has new Yaesu rig. Ex-W1NBS now W4AT. WA1YHV went up to General and then Advance in two weeks. W1LMU and Newton gang are on 160-190 kHz, also W1BVL. W1ATO. Wellesley ARC held a summer outing picnic. K1BA & K1FJ put out a very newsy "zero beat" bulletin of the EMRIN. 1RN picnic was held at W1QYY's QTH. W1SPW celebrating their 37th anniversary in ME. WA1WQC now in Taunton. WA1OHA now in Swansea. Massasoit ARA held a meeting. W1KRU has his Advance. W1FJH in Boston area. K1VVC has a Triton 4. EMRIPN has 236 QNIs, 91 QTC. EM2MN has 118 QNIs, 55 QTC. EMRI for June 487 QNI, 233 QTC, for July 220 QNI, 391 QTC. Traffic: (July) WA1ZAZ 411, K1BA 225, WA1TBY 226, WA1EVY 127, W1PEX 121, W1DMS 94, WA1YWK 86, WA1VQR 61, WA1RVZ 59, WA1OWQ 49, W1FJI 54, K1PAD 43, WB1AKL 17, W1DMH 16, K1LCQ 12, WA1YMD 7, WA1QAJ 7, W1CZB 6, WA9NEW 5, WA1IFE 4, N1EE 2, K1TKI 1. (June) W1FJI 37, WA1PGY 18, W1NF 6, W1CZB 4, WA1PQY 4.

MAINE: SCM, Bill Mann, WA1FCM — Asst. SCM/PAM: Gerald Burns, K1GUP. SEC: K1EF. RM: W1RWG. New EC: WA2KCW/1, Washington Co. For the Friendship Sloop Days (July 28, 29, 30), 19 members and friends of Yankee RC supplied communications from spotters at buoys to race committee boat, public address operator on shore and to a Coast Guard cutter for emergencies. Messages were handled via NTS for race watchers. Fine job under direction of W1KYO. On July 16, N4SS spoke in Houlton urging hams to take a more active role in FCC dockets regarding WARC. Aroostook ARA auction and family picnic July 30 successful. New officers at K1NAN: WB8UHU, pres.; WB1DAB, vice-pres.; WA2SLJ, secy.; July reports:

Net	Freq.	Time/days	Sess.	Tfc.	Ck-in.
PTN	3596	7 PM Dy.	31	148	203
SGN	3940	5 PM M-S	26	95	975
BYN	3960	8 AM M-S	26	34	885

Traffic: (July) WA1FCM 458, W1KYO 162, W1ERW 109, W1RWG 96, WA2ERT/1 91, WA1RDX 59, W1HDC 58, WA1JHT 30, W1CTR 27, K1GUP 26, K1TZH 20, WA2MEQ/1 12, K1NAN 10, W1CEV 9, WA1NKE 4. (June) K1GUP 26, (May) K1GUP 28, (Apr.) K1GUP 25.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1SWX/W1NH — SEC: K1RSC. RM: N1NH. The NHVT Net had 169 check-ins & 145 traffic. Active OO WA1PSI is busy in the Intruder Watch program. W1JB has a new phone patch. WA1PEL handled traffic for the Johnstown, PA emergency. WA1VWL has his Advanced ticket. The GSPN had 363 check-ins, 99 traffic. W2MRG & WA2JLT vacationed in NH. W1HWB handled traffic for VT6TC on Pitcairn Island. K1NH won for rare Sullivan Co. in the NH QSO Party. W1ALE's excellent repeater is the most popular to NH hams and visitors. Retired shipboard operator John

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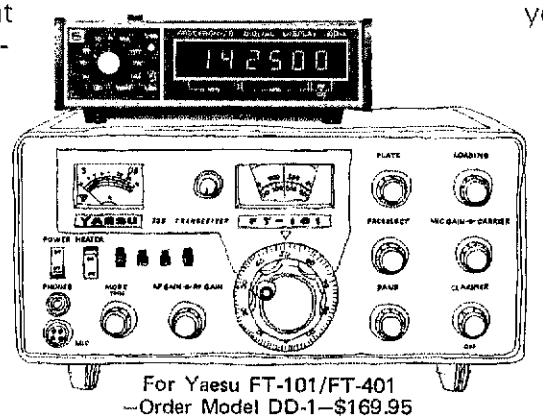

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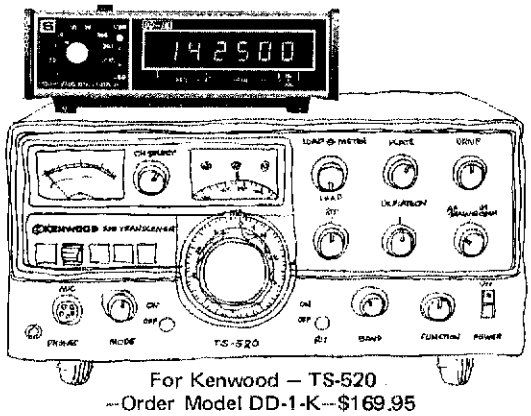

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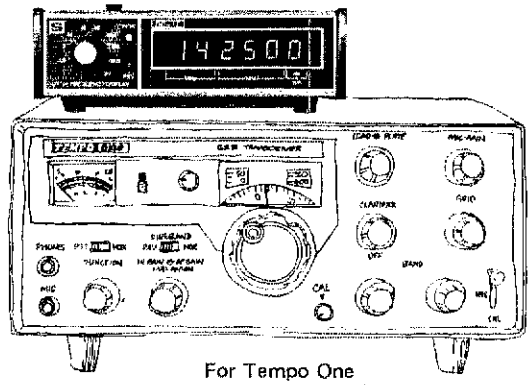

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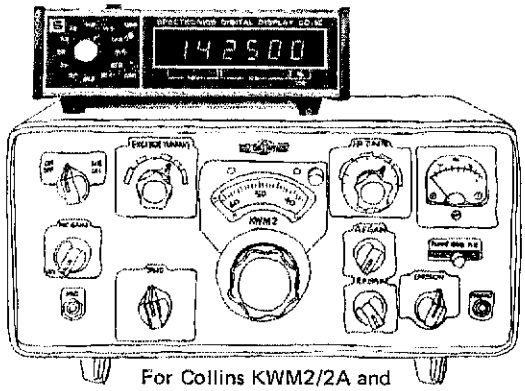

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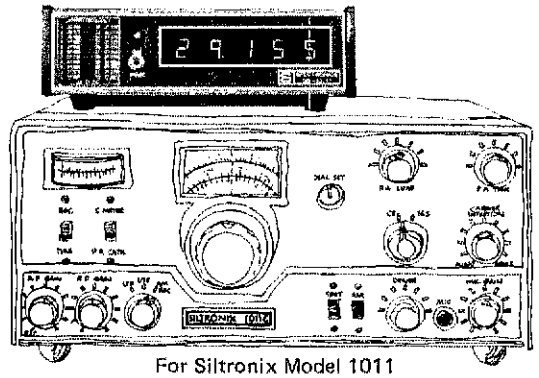

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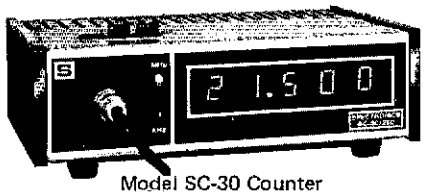

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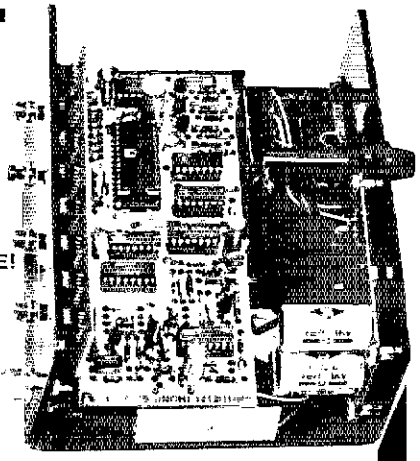

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GATE TIMES: 1 SECOND AND 1/10 SECOND
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SENSITIVITY: 10 MV RMS TO 50 MHZ, 20 MV RMS TO 60 MHZ TYP.
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ACCURACY: ± 1 PPM (± .0001%) AFTER CALIBRATION TYPICAL.
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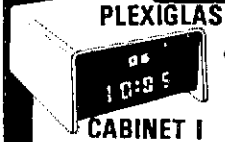

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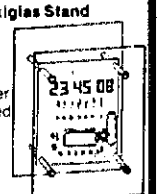

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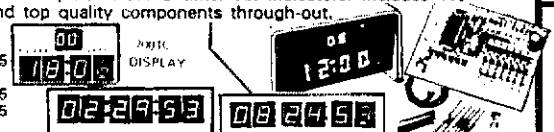

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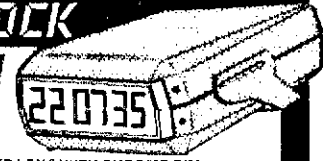

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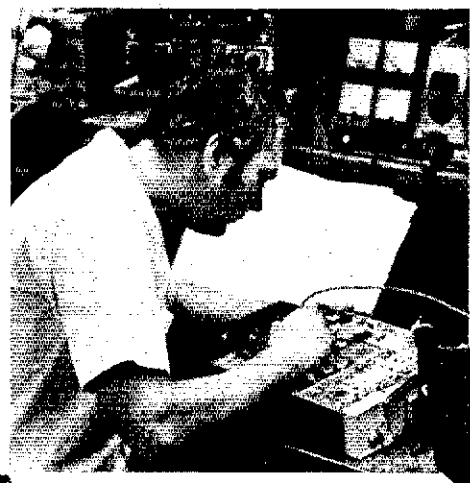

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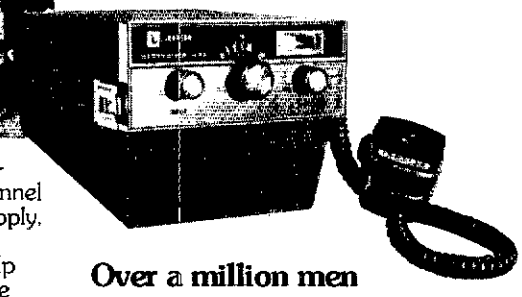

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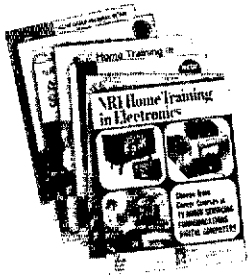

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Mattson of Plaiston is now WB1ELP. K1NH N1NH W1TN K1PQV W1YT WA1UFW K1BCS W1TXY WA1VKM & K1ACL were the top check-ins for the NHVT Net. W1TN doing a fine job of traffic between NHVTN, G5PN & VT5SBN. K1UTI has been working ZLs on 15. K1SHR has been cleaning up the rare ones on 20 meters. N1UH vacationed in CA. W1UN on 220. K1MFQ has a new boat antenna. N6QU (WA1JTM) sends best regards to the NH gang. Happy Halloween to all. Traffic: K1BCS 360, N1NH 266, W1TN 141, WA1YTW 63, K1PQV 60, K1NH 50, WA1SOD 43, K1ACL 28, W1JB 24, W1ALE 14, WA1PEL 11, W1NH 7, W1HWB 4, WA1HOB 2, W1UN 1.

RHODE ISLAND: SCM, John Fitterington, W1EOF — RIEM 2 mtr. tfc. net, WA1CSO mgr., reports sessions 26, QNI 141, tfc. 31. NCRC reports their 2 mtr. repeater now at full efficiency. They had great setup for coverage of America Cup Races. WA1POJ reports EBAWA starting new classes for fall. New Novices in their area, WB1EHN WB1EHO WB1EHP and WB1EIE. PRA has speaking program lined up for fall. Welcome to new OPS, WA1TFF, a transfer from East. MA and congrats to 8 new Extras WA1POJ WA1RFT and W1EOF. The EM-RI Slow Speed Net started again on Aug. 8th. It will run Mon., Wed., & Fri. at 2215Z and on 3715 kHz. The speed will be 10 wpm and it is intended to help those who are planning to upgrade their Novice or Technician licenses. WA1POJ will be mgr. and needs net controls. Traffic: WA1POJ 130, WA1YPN 24, WA1RFT 12, W1EOF 8, WA1TFF 3.

VERMONT: SCM, Bob Scott, W1RNA — SEC: W1VSA. Welcome new hams WB1s: CZG DHV DIE DIM DQY DSD DSR DTJ DWC EDZ EFJ EIX EJC & ELC. Apologies to those I've no word on as being new. Would appreciate hearing from one & all. K1BQB W1AD W1BJL & W1TXY ran a ham activity July 15, 16, 17 with the Bellows Falls Bi-centennial celebration. W1AIM has worked 44 states on 6 mtrs. in last 15 months from new QTH in Cabot. WB1BZR & VE2EDB via 2 FM helped guide police cruiser via NYS Police to motorcycle accident at 0130. Carrier (3934) 26/510/54; GMN (3934) 26/505/74; VTSSB (3908) 452/49; VT Fone (3908) 5/94/13; VT RTD (3908) 5/78/18. VT hams looking for Slo-Speed CW Net — 3702, Dy, 2330 UTC, the NH VT N. Traffic: K1BQB 293, W1RNA 18, WA1UQY 14, WA1BZR 7, W1BKZ 1.

WESTERN MASSACHUSETTS: Percy C. Noble, W1BVR — Since emergency communication is one of our most important functions, the following will give you details of our Section and county Nets set up for that purpose. All of them will be in operation during emergencies. WMEN 3935 (regular session Sun. at 8:30 AM). WMPN 3935 (regular sessions Mon-Fri. 4:30 PM). WMN 3562 (regular sessions daily 7:00 PM). County ARES nets get info from your Co. EC (suggest you get it now). Franklin Co. EC K1RGQ, Berkshire Co. EC W1KZS, Hamphire Co. EC W1GQP, Hampden Co. EC K1IQA, Worcester Co. EC W1JTL. W1TM is back in action after several weeks of hospitalization. K1CYG new Asst. EC for Hampden Co. Monthly reports: WA1DNB for WMEN: 5 sessions, 57 SSB & 139 via 2-meter liaison, W1DVW for WMN: 31 sessions, traffic 166. WA1MJF for WMPN: two-month report next time. Traffic: WA1KHP 410, W1UD 147, W1KK 114, W1BVR 110, W1TM 108, W1DVW 87, WA1LNF 43, WA1OUZ 28, K1RGQ 10, W1DOY 8, WA1OPN 8, WA1PUX 8, W1ZPB 1. (June) W1TM 98.

NORTHWESTERN DIVISION

ALASKA: SCM, Roy Davis, KL7CUK — SEC: KL7ISB. PAM: KL7HOV. Alaska Snipers Net 3920 kHz 0300 seven days a week. ARES Net 146.52 MHz Thur. 7:00 PM local. Alaska Pacific Net 14292 kHz 1830 GMT, Mon. thru Fri. The visit of President Dannals and Bob Thurston Dir. NW Div. was enjoyed by all. The SEA-Q-DX convention was also enjoyed by all. We had a wonderful time. KL7AF is back on the air after a long time off. KL7HMU and KL7IFD report regular skeds between Anchorage and Fairbanks on 6 meters. All those interested in a QSO listen for these stns. KL7HOV reports over 800 ck-ins for ASN this month, also over 20,000 since 1975. The Anchorage and Fairbanks clubs are planning on larg classes for new upcoming amateurs. The Juneau Club just affiliated with ARRL. Congratulations to you all for a very important step. The SEC and myself will be visiting all clubs in AK this fall. The Anchorage Club is constructing a new club station. Traffic: KL7CUK 8, KL7AF 5.

IDAHO: SCM, Dale A. Brock WA7EWV — SEC: W7JMH. PAM: WA7HOS. RM: N7DH.

Net — Freq.	Time	QNI	QTC	Manager
RACES — 3.9905	1415 M-F	386	5	WA7WXI
FARM — 3.935	0200 Dy	961	48	W7CJC
IMN — 3.635	0300 M-F	187	114	W7GHT

Dec marks the 20th anniversary of Pocatello Amateur Radio Club. W7GHT is now an Extra, congratulations. WA7QQD scored over 750 QSOs in the IARU contest. SEC W7JMH reported 22 hams participated in a Red Cross simulated disaster, response time was 14 minutes for 6 cities and 4 hospitals. Traffic: W7GHT 323, W7GBO 124, N7DH 12.

MONTANA: SCM, Robert Leo, W7LR — Asst. SCM: Edward R. Bodenberger, WA7PZO. SEC: W7TYN. PAM: W7DEO. RM: K7CHY. WA7FLG new Butte EC. MTN had 815 QNI, 56 QTC, 20 Sess. in July. IMN had 187 QNI, 114 QTC. MT hams busy in July attending: Glacier-Waterton Hamfest; ARRL Convention, Seattle; and WIMU, Macks Inn, ID. K7LTV was WIMU chmn. and put on good Hamfest. W7PGY and W1YL visited Butte, Bozeman, and WIMU. Events: Hunts, WA7PZO; ARRL, VHF, W7LR; Oscar, W7RZY, DX, K7ABV; Homebrew, K7NM (ex WA7HDD); Slides on Russia, W7QYA; Movie, W7WYG; CW, K7LTV. K7ABV waits for Kingman QSL for 325 confirmed out of 325 countries worked. W7LR attended all 3 hamfests. Traffic: W7DEO 40, W7NEG 26, K7SIK 16, W7LR 8, W7HAH 2, WA9OBH 2.

OREGON: SCM, Dwight J. Albright, W7HLF — Asst. SCM: WA7UJU. SEC: W7LBH. Chief PAM: WA7SSO. PAM: WA7GFE. RM: K7OUF. BSN 3908, QNI 604, QTC 60, 31 sess. WA7GFE, mgr. OSN 3585 QNI 165, QTC 114, K7IWD, mgr. ARES 3993.5 QNI 441, QTC 14, WA7RWM mgr. ARES (JC) 147.06 QNI 90, QTC

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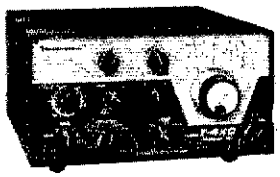

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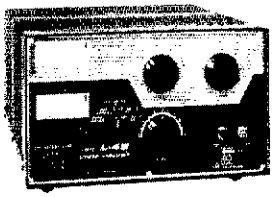

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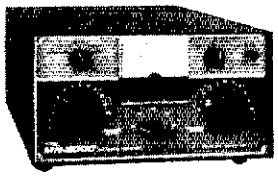

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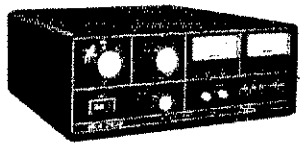

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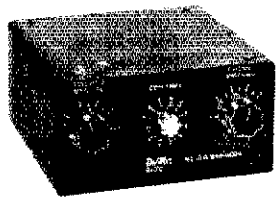

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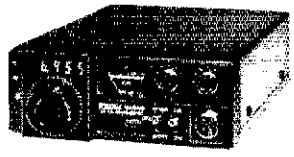

ICOM Transceiver 2M FM
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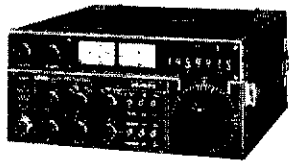

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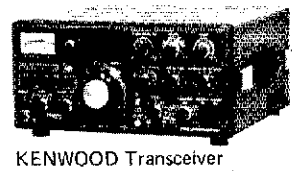

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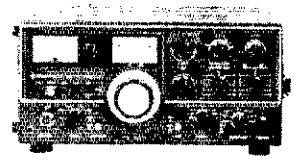

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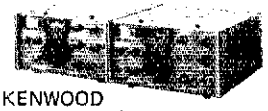

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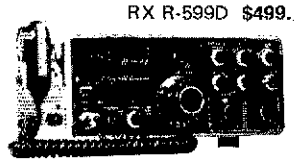

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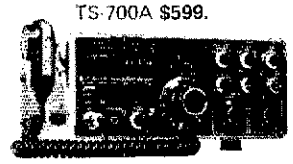

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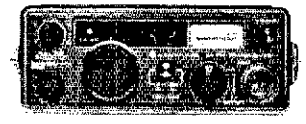

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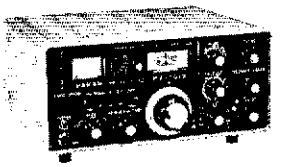

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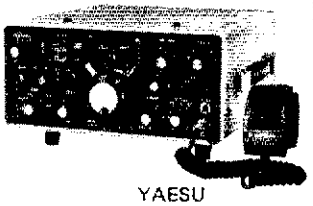
FT-101E, 160 thru 10M $729.



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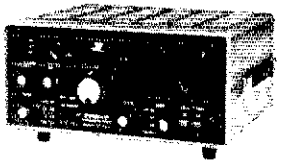
FT-620B, 6 meter SSB $365.



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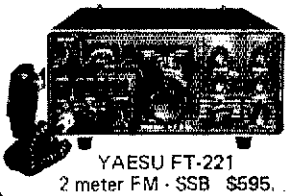

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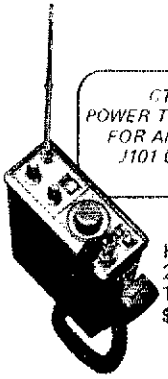

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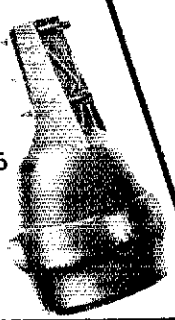

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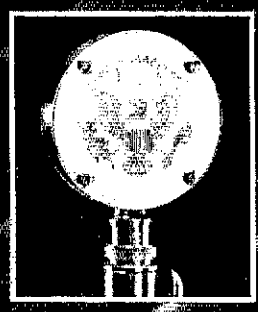

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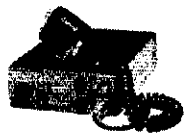
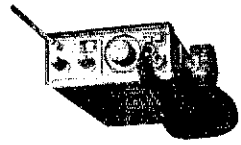


ICOM IC22S
Regular $299, save $50; buy an ICOM IC22S for $299 (no trades) and take a $50 credit for another purchase.



KENWOOD TR-2200A
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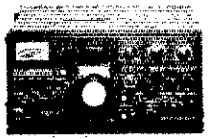
MIDLAND 13-510
Regular $399, save $50; buy a Midland 13-510 for $399 (no trades) and take a $50 credit for another purchase.



KENWOOD
TS 820 — $869.00
TS820S — $1048.00

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FT101E — $729.00
FT101EE — $649.00
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3, WA7UJU, mgr. WCN 3702 QNI 325, QTC 162, K7UJY, mgr. Surprises again, two of our Novice students received mail addressed to them with call signs WB7TBY & WB7TBZ before they have heard from FCC. Lane Co. Hamfair had 492 registered this year. Several good programs during the day (Sat.) "Use of Oscar" "Field Days" "Equipment Building," program by WB6CQW well received at Medford. Present were 35 members of CAP, HAMS, OPA SAR. WB6CQW also gave a demonstration in Portland area. Its a good idea to keep a log of times on & off the air, as OOs do make mistakes on similar call signs sometimes. Its time to get the Novice classes going again. Want to be an instructor? Call W7HLF or write ARRL. Pacific NW SMIRK net 4 sessions 22 QNI this net is on 50.120 MHz 7 PM Thur. K7ZCB NCS. If your sidebands are outside the band you're out of the band! Traffic: K7NTS 284, W7VSE 260, K7IFG 147, K7OUT 135, K7VM 134, W7HLF 83, WA7TXV 72, WA7GFE 57, WA7AAK 44, WA8ZAP 18, WA4HRG 14, WB7CBA 13, W7LT 7.

WASHINGTON: SCM, Mary E. Lewis, W7QGP — SEC: K7VAS. RM: K7OZA. PAM: K7YR. VHF PAM: K7GWE.

Net — Freq.	Time	QNI	QTC	Sess.
Manager				
WARTS — 3970	18:00	1910	51	31
W7QGP				
NWSSB — 3945	18:30	746	145	31
WA7RCR				
ARES — 3930	9:00 Su	46	1	4
K7VAS				
WSN — 3590	10:30	230	97	31
K7OZA				
ESN — 3720	0100	491	41	31
3920				
WA7MIF				

K7MF is leaving for Bell Labs for awhile. K7VAS has new ham shack wired and paneled. WB7FGC reports a new Spokane ARES Net 2M FM 90/30. WB7SHS reported in from Omak. Jim is new to WA. W7JIE reports 44 Intruder Watch reports. Sea-Q-DX convention attendance 1853 paid and with free admission Fri. nite and Sunday afternoon the total attendance was over two thousand. Seen at the convention were SCMs KL7CUK, W7LR of Montana, WB6NHF of SF, and VE7FB. If you worked NW7ARL the convention station, send a QSL to SEA-Q-DX, P. O. 25537, Seattle, WA 98125 for a special QSL. W7PWP home from hospital after throat surgery and doing FB. K7ETY and family have moved to Lake City area from Wa. D. C. Thanks for the letters to the committee members, they are greatly appreciated. Traffic: (July) W7DZX 532, W7LG 63, K7GXZ 57, W7APS 55, W7QZA 41, WA7BDD 36, WA7LQV 32, W7BUN 29, W7IEU 24, W7AIB 12, K7VAS 11, WB7FGC 6, WA7GVB 4, K7MF 2. (June) K7GXZ 88, W7BUN 55, WA7BDD 37, N7AM 32, W7LG 31, W7APS 17, W7BCS 12, WA7AIB 4.

PACIFIC DIVISION

EAST BAY: SCM, Charles R. Breeding, K6UWR. Asst. SCMs: W6ZF VE2AQV/W6. SEC: W6IIH. I would like to devote the major part of this report in thanking the members of the Mt. Diablo ARC for their fine Public Service efforts in the recent Mt. Diablo fire. I would also like to thank the members of the Grizzly Peak VHF ARC for their assistance in this disaster. Under the leadership of WA6JUD the following stations took part in the emergency operation. W6BXO K6DEJ WB6DHH WB6DHN WA6EKT WB6FGB WA6FKU WB6FMA WB6FOA W6GB WA6GBB WA6GCS WA6GQB WA6IRZ WA6JEF K6JPR W6JSB WA6JUD WB6KST WB6ILC W6IKE WB6KXD K6MLZ WB6NMU WA6NTE WA6NTG WA6NTI WB6NWM WA6OCZ W6UAW WA6OVL WA6PWT WA6QAZ WA6QBS W6QEN WB6SHD WA6TBS WB6TTQ WA6TQX WB6UMT WB6VHW W6WAH WA6WGB WA6WZB WB6YBE WB6YCF and W6ZCB. Thanks to WB6FOA for the above report. WB6BNR has a new counter to go along with is FT-101E. Congrats to WB6MKT and WA6IGD on passing their Generals. WB6DXR has a new Tri-Band beam up and looking for DX. W6ZF now working on plan for a new four-element quad. Pacific Division Convention Oct. 15 and 16 in San Mateo. Traffic: K6HW 438, K6OE 364, W6JXK 185, W6OA 98, WB6UZX 50, WA6BFL 13, K6PMG 8, WA6JVZ 5.

NEVADA: SCM, Leonard M. Norman, W7PBV — SEC: K7ZAU. W7BIF reports Clark County Community College is offering a 3 credit course in Amateur Radio Code & Theory. W7QO doing PR work for Amateur Radio at Rotary Club, and running another Novice class. TARA has installed a new J-pole antenna on their repeater. W7IUC rescued 4 people from a burning boat, only one had a life preserver, then with the help of 2M FM contacted the National Park Service, on the Colorado River. K7GHS now a resident of Boulder City. K7ZOK reports WC7RAA 78/18 RACES repeater now on Mt. Potosi about 25 miles SW of Las Vegas, elevation about 8000 MSL, and thinks this is the first licensed RACES repeater in operation in the United States. ON4UN and KH7BZF recent visitors in Las Vegas. K7ZOK now has 4 states on 432 with maximum distance of 240 miles. W7SK K7SER 7VYT K7WLY WB7EIY and WB7ELR provided 2M FM communications for rescue of victims of plane crash. Traffic: W7ILX 140, W7SK 20.

PACIFIC: SCM, Pat Corrigan, KH6GQW — Biggest news in a long time was FCC waiver of 97.61(b) (2) allowing KH6s to operate 1800-1810 kHz. Everyone is making their antenna longer now. Thanks to KH6HI for his work on Pac. Tfc. Net. Anyone involved in helping the public in any way should let KH6CK (SEC Pac) know or let me know for possible inclusion in the Public Service Col. in QST. At all times we need to emphasize and advertise or public service role. The clubs on each of the Hawaiian Islands are now all involved with guiding and training prospective amateurs. W6ANB out for a short visit in Aug. Contrats to Big Island ARC for comments to FCC on recent important dockets. Emerg. ARC had Tweak-in '77 on Aug. 13 where everyone was invited to have their 2m equip. set up. Former KH6IGJ now K5KT. Again July saw an opening to W. Coast on 2m. Informal net meeting on 160m each night at 9 PM local in Hawaii Traffic: KH6IJE 43, KH6JAC 35, KH6HIJ 26.

SACRAMENTO VALLEY: SCM, Norman Wilson N6JV — SEC: W6SMU. New officers for the Mt. Vac Radio Club are: WA6ESA, pres.; WA6BAR, vice-pres. WD6ABF, secy.; K6FO, treas.; W6GO, trustee

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Power connector: 5 pin DIN socket
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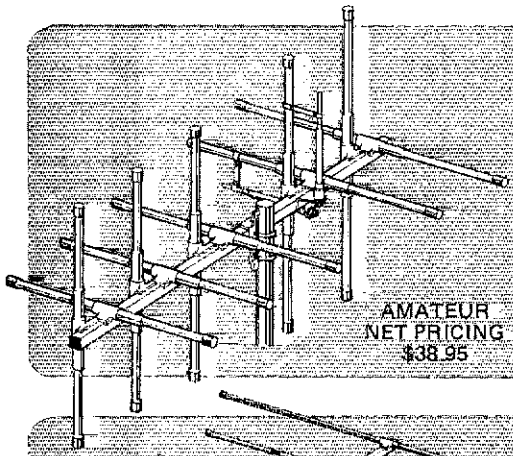

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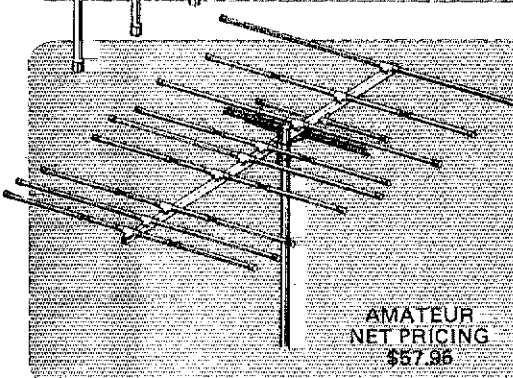
FINCO STINGER A 2+2

2 Meter

The model Stinger A 2+2 is a ten-element, dual polarization 2-meter antenna designed for OSCAR communications or where switching from horizontal to vertical polarization is required. The A 2+2 can even be phased to operate on both horizontal and vertical polarization at the same time (circular polarization). This is not only ideal for OSCAR work but gives your station versatility for ground communications.

Wide, non-linear element spacing gives the A 2+2 superior gain. However, since it is a five element beam in one given plane, the half power beam width does not make satellite tracking difficult because of sharp directivity. The dual gamma match assemblies provide for a very low V.S.W.R. and will withstand 2,000 watts P.E.P.

The Stinger construction features make the A 2+2 extremely heavy duty. Provisions are made for mounting the antenna at the end of the boom — for azimuth control — or at the middle of the boom for normal applications.



AMATEUR NET PRICING $57.95

FINCO STINGER A62

6 & 2 Meter

The model Stinger A 62 is a truly remarkable combination 6 and 2-meter beam designed for optimum performance on both bands yet only requiring ONE transmission line. This is accomplished through the use of exclusive phasing elements to accomplish dual band operation with no sacrifice to either band — NO SWITCHING REQUIRED!

On 2-meters, the A 62 has 6 collinear elements — equivalent to three 1/2 λ 6-element yagis stacked side by side — thus giving outstanding performance. Maximum forward gain is assured on 6-meters through the use of four wide spaced elements. The heavy duty Stinger construction is used throughout so that the antenna will withstand 100 mph plus wind loads.

The A 62 is ideal for mounting on the same mast as your tri-bander or other antenna thus easily opening up the world of 6 and 2-meter VHF communication.

OTHER FINCO STINGER AMATEUR BEAMS AVAILABLE:

MODEL	AMATUER BAND	ELEMENTS	BOOM LENGTH	AMATEUR NET PRICING	MODEL	AMATUER BAND	ELEMENTS	BOOM LENGTH	AMATEUR NET PRICING
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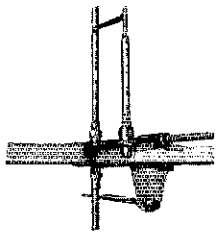
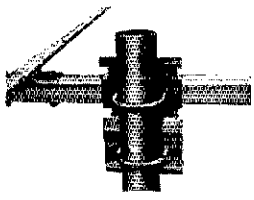
A6-3	6 Meter	3	6′	23.95	A2-10	2 Meter	10	10′	34.95
A6-5	6 Meter	5	13′	35.95	A1¼-10	1¼ Meter	10	8′	24.95

ENGINEERING FEATURES:

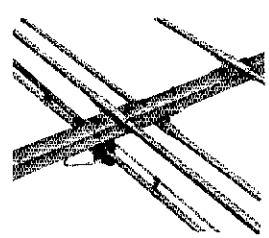


All Stinger Series Amateur Antennas incorporate heavy duty fully adjustable gamma matching systems to allow for maximum power transfer. The design provides for minimum V.S.W.R. and a wide bandwidth. A built in SO-239 type connector assembly is utilized plus the matching systems are power rated at 2,000 watts P.E.P.



A 4"x 6" x full 1/8" thick heavy duty plated steel mast to boom mounting assembly is used on all Stinger Series of Amateur antennas. The bracket assembly locks permanently on the square boom and thus withstands high wind loads and torque without twisting or becoming misaligned. The assembly accepts mast diameters of up to 2" O.D. Provisions for mounting either in a vertical or horizontal plane is incorporated in several models.

Exclusive Stinger square boom construction is used on all amateur antennas. The 1¼" square booms are of .064 wall high tensile strength aluminum which is many times stronger than its round counterpart. Also, special bracket assemblies have been developed to allow instant element to boom alignment — plus they stay aligned in the highest wind and ice loads. All elements are of thick wall high tensile strength aircraft quality aluminum.



Antenna designed engineering is a specialty at FINCO. Top quality lab standard test equipment is used throughout the development and design of all antennas. The FINCO antenna test range has been carefully checked for erroneous reflection characteristics that could cause errors in antenna designs. Shown is the sophisticated stub and matching system that has been developed for the Stinger A62, 6 and 2-meter dual band beam. No traps or coils to burn out or detune, thus assuring you of the highest possible performance on both 6 and 2-meters.

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TPL	
802 2m FM amp	$139
502B 2m FM amp	99
TEMPO	
Tempo One Xcvr	$289
AC/One AC supply	75
VHF-1 2m FM Xcvr	269
FMP 2m FM Xcvr	89
TEN TEC	
Triton II Xcvr	$399
252 AC supply	75
Triton IV Xcvr	549
262G AC supply	99
207 Ammeter	9
210 AC supply	24
KR-20 Keyer	49
KR-40 Keyer	69
VHF ENGINEERING	
HT-144B 2m FM HT	$ 99
VARITRONICS	
HT-2 2m FM HT	$ 89
WATERS	
361 Codax keyer	$ 49
YAESU	
FT-101B Xcvr	$549
FT-101EX/CW/fan	499
FT-401B Xcvr	489
FTDX-400 Xcvr	369
FTDX-560 Xcvr	399
FTDX-570 Xcvr	449
FT-301D Dig Xcvr	749
FP-301 AC supply	99
YC-601 Dig display	129
YO-100 Scope	149
SP-101B/clock	29
SP-101PB Spkr/patch	49
FR-101S/FM/AM	499
FR-101 Dig Rcvr	469
FR-101 Dig/CW	499
FL-101 Transmitter	425
FL-101 w/processor	475
FL-2100B Linear	339
FTV-650B 6m Xvtr	129
FT-221 2m Xcvr	429
200R 2m synth Xcvr	229

8-19-77

(1) This list was prepared from an inventory taken on the date shown above. The quantities vary. In some cases there are several of one item, others, maybe only one. Due to the lead and distribution time of this publication some of the items may have already been sold by the time you see this ad. On the other hand, due to the number of trades we are involved in each day, some items are in stock that are not listed. When ordering state more than one choice, if possible. (2) AES reserves the right to sell matching power supplies and accessories only with matching transmitters or transceivers, depending on our stock situation. (3) To insure quality, our used gear is serviced and made ready for shipment after we receive your order. Please allow 5 to 10 working days delay in shipping your order.

The following are NEW Close-outs, Overstock merchandise, New displays, Demos, etc. Most are factory-sealed, all carry New warranties. Limited quantity. First come, first served. Most Close-outs available at Milwaukee only. Terms of sale: Payment in full with order, Mastercharge, or Bankamericard (Visa); no trades.

	reg.	NOW
BIRD		
4350 2kw Ham-Mate	$ 94	79
4351 1kw Ham-Mate	94	79
4352 VHF Ham-Mate	94	79
BRIMSTONE	reg.	NOW
144 2m FM Xcvr	$650	389
CLEGG	reg.	NOW
FM-DX 2m synth Xcvr	$599	499
COLLINS	reg.	NOW
312B-4 Station console	$546	399
COMCRAFT	reg.	NOW
CPS-6 AC supply	$139	69
CUSHCRAFT	reg.	NOW
AM-147T 2m 3 db ant	$ 29	15
DRAKE	reg.	NOW
L-4B 80-10m linear	$895	749
TR-4CW Xcvr w/no RIT	649	549
SSR-1 Shortwave Rcvr	350	279
SCC-1 VHF calibrator	26	19
BBLT-144D 2m tnk mt ant	27	9
EICO	reg.	NOW
752W DC supply wired	$109	39
GALAXY	reg.	NOW
XO-550 Xtal oscillator	$ 49	29
ZZM Mobile floor mount	6	3
R-1530 .General cov Rcvr	1550	1195
SC-1530 Speaker	60	39
FL-5306 6 KHz filter	80	70
RPA-1530 Rack adaptor	170	99
GENTEC	reg.	NOW
PM50U 500w wattmeter	$ 48	29
HAL	reg.	NOW
DS-3000 KSR Version 2X	1195	1095
HALLICRAFTERS	reg.	NOW
MR-400A Mobile mt - SR-400	$ 89	19
HICKOK	reg.	NOW
239 Color bar generator	$125	65
246 Deluxe bar generator	215	139
215 Semiconductor analyzer	138	69
ITC	reg.	NOW
Multi-2000 2m Xcvr DEMO	$695	399
ICOM	reg.	NOW
IC-230 Synthesized 2m FM	$489	299
IC-21 VFO Receive VFO	119	89
IC-22S 2m FM Xcvr	299	249
IC-21A 2m FM Xcvr	399	299
DV-21 Digital VFO	299	239
KENWOOD	reg.	NOW
R-599A 80-10m Rcvr DEMO	$459	359
QR-666 SWL receiver	289	189
TS-700A 2m Xcvr New Display	599	529
MIDLAND	reg.	NOW
13-500 2m FM Xcvr	$169	139
13-520 2m FM hand-held	239	159
MOSLEY	reg.	NOW
RV-4RK Roof mount kit	$ 19	9
MOTOROLA	reg.	NOW
T-1670A AC supply	$150	99

	reg.	NOW
NEWTRONICS		
G3-144 2m FM base ant, 3 db	$21	12
BBLT-450 450 MHz tnk lip ant	25	15
NYE	reg.	NOW
250-25-2 500w matchbox	$179	129
250-30-2 1kw matchbox	304	239
250-30-3 1kw w/relay, SWR	355	299
REGENCY	reg.	NOW
HR-212 2m FM Xcvr DEMO	$259	189
HR-2S 2m FM ac xcvr/scan	349	189
HR-220 220 MHz FM Xcvr	239	179
ACT-W-10 Whamo scanner	329	189
DFS-5K Dig freq selector	199	149
ROBOT	reg.	NOW
Model 10 Fast scan kit	$ 25	9
f/1.9 lens	30	15
f/1.4 lens	47	25
SBE	reg.	NOW
SBE-12SM Opti-Scan	$399	159
SONAR	reg.	NOW
D-1020 Depth indicator	$160	99
D-1021 Sonar angler	170	99
D-1060 Depth sounder	145	89
STANDARD	reg.	NOW
146A 2m FM hand-held	$298	219
851T 25w 2m FM Xcvr	565	165
811S 2.5w marine FM Xcvr	199	89
SWAN	reg.	NOW
700CX 700w PEP Xcvr	$649	549
117XC AC supply/spkr	159	129
117X Basic AC supply	114	85
14XP DC module, pos gnd	70	49
SS-100 80-10m Xcvr	699	349
PS-10 AC supply	99	79
SS-200 80-10m Xcvr DEMO	779	449
PS-20 AC supply	179	149
P-1215A AC supply	75	49
600R Custom/SS16 USED*	659	449
FM-1210A 2m FM Xcvr, ps	319	189

*Factory reconditioned - with new warranty.

	reg.	NOW
TEABERRY		
T-Scan UHF pocket scanner		39
TEMPO	reg.	NOW
VHF/One 2m FM synth Xcvr	$495	299
DVS/One Scanning adaptor	169	99
FMV 2m FM Xcvr	249	149
DKT Keyer	89	59
ACA AC supply	49	25
TEN-TEC	reg.	NOW
261 AC supply	$109	79
Argonaut 505 QRP Xcvr DEMO	329	249
VARITRONICS	reg.	NOW
FM-20BM 10w AC 2m amp	$235	35
YAESU	reg.	NOW
FT-2FB 2m FM Xcvr DEMO	$239	139
FT-2 Auto 2m FM Xcvr	379	179
FT-224 2m FM Xcvr DEMO	249	125
200R Synthesized 2m FM Xcvr	449	249

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WA6ACF WA6APX WB6DQP and WB6GIF, dir. The El Dorado ARC, population 53, held their annual picnic on July 17 at Gold Ridge. The Golden Empire ARS have scheduled their Steakbake for Sept. 17 at Bidwell Park in Chico. The Golden Empire Hamfest, held July 16 in Durham, was very well attended and will be an annual event. W6HNL has a new KLM 2400. N6JV made CW-DXCC and WPX, 1000. Calif. QSO Party will be on Oct. 1 and 2. Let's try and get all of our counties active this year. Best wishes to Doc, K6ZRJ, our Pacific Div. Dir. who will step down after many years of service to the Division. CU on 20 OM! Traffic: W6RSP 120, W6DEF 34.

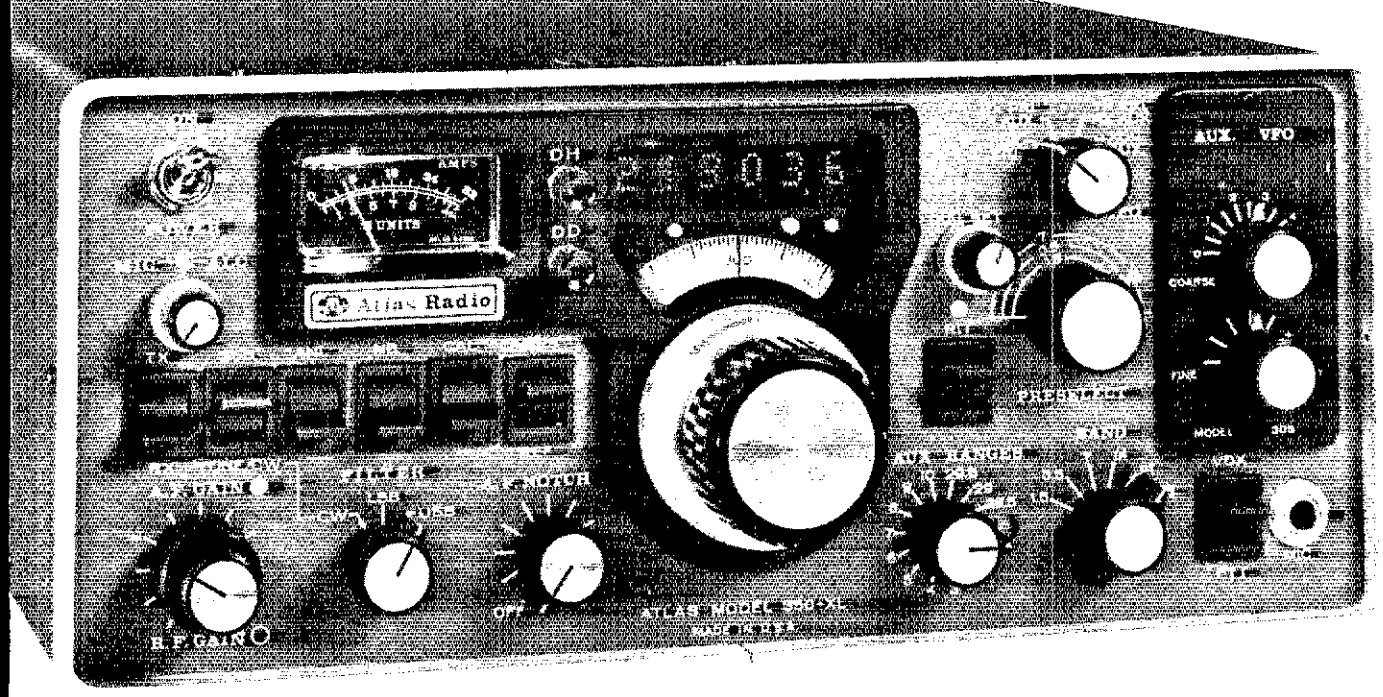
SAN FRANCISCO: SCM, Rusty Epps, W6OAT/N6SF — The WR6ADC gang installed a complete repeater system near King City to aid firefighters combatting the huge fire raging in the Los Padres National Forest. SFRC's W6URA W6VV WA6NDZ WA6PYN and WA6WYZ explained first-hand the benefits of amateur radio to the Vice-Chancellor of Madural (India) University during his recent visit to SF. Congrats to WB6NHF and W6JMO who both passed their Extra exams. N6IT (ex-WB6PMX) is moving to So. Calif. to work on masters degree in mass communications. SEC N6KM (K6SRM) still needs ECs for Sonoma and SF counties. We sadly note that WA6PMV became a Silent Key in July. My sincere thanks to everyone for the wonderful help and encouragement given me during my term as SCM. I hope you will continue to provide the same fine support to WB6NHF when Mark takes over next month. Traffic: W6RNL 278, K6TP 170, W6NL 117, W6IPL 112, K6PB 32, WB6ITN 6, W6RQ 4.

SAN JOAQUIN VALLEY: SCM, Charles McConnell, W6DPD — New appointments: WA6YAK is primary asst. SCM, W6NTK is OBS, W6BWM is EC for Madera County. Appointments renewed: N6AM, OBS; K6YK, OVS; and WA6SXL, ORS. ECs are still needed in Amador, Calaveras, Mariposa, and Merced Counties. If you can help, please contact your SCM. Officers of the Madera County ARC are K6KLV, pres.; W6GR, vice-pres.; WB6BRK, secy-treas. The Club meets the first Tue. at 7:30 PM at the Fruit Basket in Madera. WA6SZE is pres. of the Kings County ARC which meets on the third Thur. at the Armona Elem. School. Fresno ARC is building an Emergency Communications Vehicle. Congratulations to the Stockton ARC on its 40th Anniversary. W6GCF is a Silent Key. K6PBT on Oscar. WA6BXI needs one state for WAS. W6XP worked all states on 6 meters. WA6GJV is building an ST-4. Congrats to the following on new licenses: WB6SJH WB6WVE WA6FXP WA6CDB WB6ZIG and WB6WEM on Tech; WB6ZJF on General, and K6ACR on Advanced. W6JPS attended the Golden Empire Hamfest. K6GZN moving to Lodi. WA6YAK has an FM 28. Start planning now to put forth your best effort in the Nov. SS. Traffic: (July) WB6VJW 23, WA6JDB 16, WA6KMW 8, W6DPD 6, WA6IQZ 4, WA6GJV 4. (June) WA6RXI 13, WB6VJW 4, WB6MGG 4.

SANTA CLARA VALLEY: SCM, Jim Maxwell, W6CF — SEC: WB6IZF. RM: W6RFF. 9 SCVers made the NCN Honor Roll for July. N6AU WB6HBT WB6JGS W6NW W6RFF W6YBV K6YKG W6KZJ and first timer W6IQU. WB6HBT, in spite of his NCN activities, guest op'd at HV3SJ in July, but found nary a 6. W6RFF made PSHR. Last call for the 19Bay Area Hamfest and ARRL Convention! Oct. 15/16 are the dates, with the Royal Coach Motel (San Mateo) the spot. See you there? A new eleven-element beam has added new punch to WB6JGS over the NCN VHF outlet on WR6ADC. Others have also noted the convenience of the ADC traffic outlet which meets daily at 1930 local: 43 are now on the roster. Those in San Mateo and environs shouldn't miss the meetings of the San Mateo Radio Club, held on the 3rd miss the meetings of the San Mateo Radio Club, held on the 3rd start at 7:30 PM local, presided over by Pres. W6MKM. Three Pacific Division hams have already thrown their hat into the ring for the Director's spot being vacated by W6ZRJ: K6RTU, K6UWR and W6ZM. Need an interesting speaker? TAke a tip from the Foothill gang. They recently hosted WA6QEC, who spun a fascinating tale of the use of Radar techniques in exploring the innards of the Great Pyramids of Egypt! The Electronics Museum ARC is pressing forward with plans to tie the new museum microprocessor into the club station WB6WSL. Advisors and kibitzers are welcome to help in the system design. A new open repeater on 2M is planned by the SCCARA group to be operational shortly. Additional details are pending final selection of the site, reports pres. W6ZM. Traffic: (July) W6YBV 124, W6AUC 99, W6RFF 82, WB6JGS 61, W6NW 46, WB6HBT, W6CF, 3. (June) WB6JGS 24.

ROANOKE DIVISION

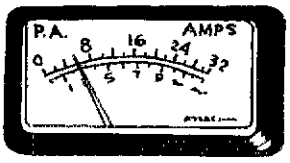
NORTH CAROLINA: SCM, Bill Parris, K4GHR — SEC: W4EHF. PAM: W4OFO. RM: K4MC. Cape Fear ARS & Lumberton ARC active in July 4 Celebration at Parkton, 37 msgs passed. "Communications 77" — the Greensboro Hamfest was a success with over 2800 in attendance and 500 FCC exams given. K4CJZ gave outstanding Emergency Preparedness talk at one of the forums. Good crowds also reported at Asheville Hamfest and Cary Swapfest. WA4OBO K4BWS & WB4BQC put Delaware on the map in the Summer 10-10 Contest. Congrats to Lumberton ARC and Gaston Co. ARS now affiliated with ARRL. K4JO is serving on the WARC-79 Amateur Radio Committee. New appointments this month include WA4OQS ORS, WB4KCS EC Forsyth Co., and WA4PDQ EC Onslow Co. K4CDZ reports NC RATS (Radioteletype Society) now active with repeater on 223.10/224.70, RTTY only. More info may be obtained by writing PO Box 5902, Winston-Salem 27103. Sympathy to relatives and friends of W4EVN, a Silent Key. Hank served several terms as SEC of NC. WA4PSL now working Oscar while WA4KWC continues chasing DX on 20. Thanks to WA4SRD & WA4OQS the CNN continues to be a strong net — join them on 3718 at 2130Z. CNCTN reports QNI 1680, QTC 34. WB4VIM invites all to join them on 146.73. Check in on THEN and pick up details on the 2-meter Murphy-to-Manteo Test to be held on Oct. 18. Mecklenburg ARS, Charlotte, beginning both Novice & General classes Oct. 6. Traffic: (July) W4OFO 177, K4FTB 171, N4ZH 116, WA4PSL 108, WB4MXG 82, K4MC 81, W4FMN 75, W4EAT 68, WB4ZIQ 57, WA4OQS 45, WA4OOS 38, K4GHR 23, W4ACY 22, W4PCN 22, WA4SRD 15, WB4CYN 9, W4WXZ 5, WB4CES 5, K4AIH 3. (June) W4EAT 63, WA4SRD 14.



THE ALL SOLID STATE

ATLAS 350-XL

Its face has many interesting features:

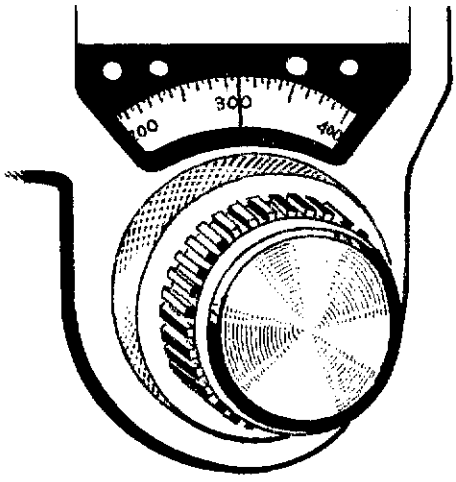


350 WATTS SOLID STATE POWER

P.E.P. and CW input.

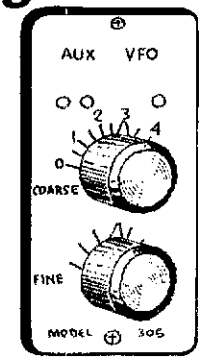
SSB/CW TRANSCEIVER

SSB with PTT or VOX operation and full break-in CW operation.



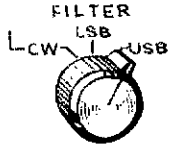
ANALOG DIAL SCALE

0 to 500 kHz dial scale in 5 kHz increments. Velvet smooth dual speed tuning, with 18 kHz per revolution of fine tuning control.



PLUG-IN AUXILIARY VFO (Optional)

Can be either a tunable VFO with the same 500 kHz tuning range as primary VFO or a crystal controlled fixed channel oscillator with choice of up to 11 crystal controlled channels.

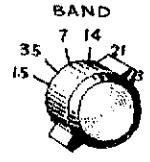


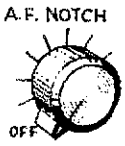
CW-LSB-USB FILTER

Selection of upper or lower sideband with 2700 Hz bandwidth, 1.6 to 1 shape factor, or 500 Hz CW bandwidth with 2.5 to 1 shape factor.

10-160 METERS COVERAGE

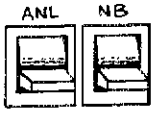
Provides a full coverage of all amateur bands in 500 kHz segments.





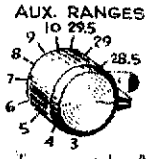
AF NOTCH FILTER

Provides better than 40 dB rejection of an audio frequency, adjustable from 300 to 3000 Hz.



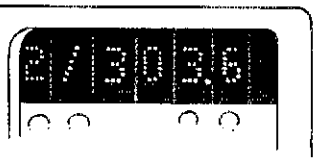
ANL AND NOISE BLANKER

Automatic Noise Limiter reduces hash type noise interference which is not intermittent pulse type. Blanker effectively reduces or eliminates pulse type noises.



AUXILIARY RANGES

Up to 10 additional 500 kHz ranges between 2 and 23 mHz can be added by plugging in auxiliary crystals. (Will not operate between 23 and 28 mHz.)



DIGITAL DIAL READOUT (Optional)

Provides precise frequency readout within 50 Hz. All

RECEIVER INCREMENTAL TUNING

Permits receiving up to 5 kHz above or below your transmitting frequency. Especially useful for CW operation or in a net of SSB stations that are on dif-

ATLAS 350-XL (less options) . . . . . $995.
Model DD6-XL Digital Dial Readout . . . $229.
Model 305 Plug-in Auxiliary VFO . . . . $155.
Model 311 Plug-in Auxiliary Crystal Oscillator . . . . . $135.
Model 350-PS Matching Power Supply $229.
Plug-in Mobile Mounting Bracket . . . . $ 65.

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KLM Multi 2700

A brilliant new 2 meter transceiver with every in-demand operating feature and convenience

★ **Synthesizer and VFO.**

★ **All modes: NBFM, WBFM, AM, SSB w/USB/LSB and CW.**

- **Frequency synthesizer (PLL)** 3 Knob, 600 channels. 10kHz steps.
- **VXO,** plus or minus 7kHz.

★ **LED readout on synthesizer.**

- **Standard 600 kHz splits** plus.....
- **Two "oddball" splits.**

★ **OSCAR transceive 2 to 10 meter operation.**

- **OSCAR receiver built-in.**
- **Connectors on rear for separate 2 meter and 10 meter antennas.**
- **Built-in VFO** (continuous coverage, 144-148MHz in 1.3MHz segments. 1kHz readout).
- **8 pole SSB filter** plus **two** FM filters.
- **100kHz crystal calibrator.**
- **Voice operated relay** (VOX) or p-t-t.

★ **Audio speech compression.**

- **Noise blanker.**
- **RIT,** plus or minus 5kHz.
- **Power out/"S" meter.**
- **FM center deviation meter.**
- **10W minimum output power. NO TUNING!**
- **Hi-Lo power provision.**
- **Built-in AC/DC power supply.**
- **Double conversion receiver.** 16.9MHz and 455kHz I-F's.
- **Receiver sensitivity:**

  FM: 0.5μV for 28db S/N.

  SSB/CW: 0.25μV for 14db S/N.

  AM: 2μV for 10db S/N.

- **Size:** Inches: 5H, 14.88W, 12D. MM: 128H, 378W, 305D
- **Weight:** 28 lbs. (13KG).
- **SOON!** 432 MHz **Transverter.**

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SOUTH CAROLINA: SCM Tom Lufkin, WA4DAX — Asst. SCM: Gary Barnette, WA4MDP SEC: WB4TN5. PAMs: W4MTK WA4DZG. RM: WA4CAK. I enjoyed seeing everyone at the Charlestown Hamfest. W4FMZ big winner, new Triton IV sounds good on the air. The Trident ARC elected WA4MDP, pres.; WA4NIE, vice-pres.; WD4ESA, secy.; WA4OZL, treas. WA4MDP, my XYL, and I had very nice visit to the Lancaster ARC. Included was a delicious dinner with son K4PFC and his wife and a nice gift for my XYL from the club. Received nice report on VHF activity from K4GL. He has some good tips on EME work so if you are interested in moon bounce you might contact Jack. WA4JWS reports he has received Bicentennial WAS. Nets: PX QNI 241, QTC 64, SCSSB QNI 1181, QTC 158, CNN QNI 175, QTC 27, Anderson 2 Mtr QNI 678, QTC 24, Blue Ridge AREC QNI 41. Traffic: (July) WB4ARJ 544, K4ZN 413, W4ANK 161, WA4KXZ 63, W4NTO 59, W4MTK 45, WA4DAX 43, K4FRX 37, WA4DZG 35, WB4UDK 35, WB4PDQ 32, W4OCX 23, WA4LCZ 19, WB4JNE 18, W4FVV 13, WB4CAK 12, W4DRF 10, WB4BZA 8, WB4NBK 4. (June) WB4UDK 41.

VIRGINIA: SCM, Robert L. Follmar, N4RF — SEC: WB4ZNB. PAM: WB4DBK. RMs: VN K4BKX; VSN WA4EPJ; 4RN W4SHJ. WB4PNY leads the tfc. with 429. This gal will make BPL in the near future! WB4DBK rpts gud results from new 80M sloper ant. K4BKX ran fone patch from WB4WUX (Ex-EC), somewhere in the Atlantic to Don's XYL in VA Bch. The following stns were actively engaged in handling flood traffic (Johnstown). N4FM N4RF WB4KIT K4EJ and W4ZM. N4FM was the most engaged. He spent a week in Johnstown (N4RF'S hometown) operating WB3BTC at the State CD Hqtrs. Tfc count when he left was nearly 5000! Kudos gents. Your SCM saw a lot of old and new faces at the Winchester Hamfest. As usual it was a bang-up affair. ARRL Pres. Harry Dannals W2HD & 1st VP Vic Clark added the prestige. K4GR rpts "dull, hot and dry!" WB4ODZ Hampton. Hampton ARES rpts participation in VOPEX '77. The Lynchbg ARC will provide communications for the VA Ten-Miler Race on Sept. 17 & also for the Air Show Sept. 18, says W4WWQ. K4LEF enjoying attending area hamfests. WA4ZAJ passed General at the Roanoke Div. Conv. in Norfolk. W4YE busy with QSL Bureau work and hoping for gud condx on 160 & 10. He says W4PAY FD vy FB with 1300 plus QSOs. K4DHB also rpts much activity in Scottish games in Alexandria. W4TMN put up new wire ant (G5RV) type. EC WA4LJI busy organizing Rockbridge Co. AREC & making arrangements for AM. Rdo Stn for personal tfc at their festival. W4NWM took another vacation — went fish chasing in New Eng. & Canada instead of DX. W4ZM has new job on Fri. Operates NN3SI at Smithsonian Inst. WA4FDV XYL of K4BKX is now NCS on the VSBN Wed. late session, FB Ruth! WA4NYZ OPS/ORS has competion from dance band wrk. WA4AJF's SB401 is off the air for more solid state conversions, 7 Gen. repairs. W4TE & K4LMB check into the Eye Bank Net twice daily. Ethel is now secy of the QCWA. Busy people! Our OBS performs a vy worthwhile svc & more credit is due the following: WB4DRC N4DW N4GI K4KNP WB4ZOH. The SCM reminds all appointees that regular monthly reports are a must and required. This also applies to the EC reports to the SEC. The EC is an SCM appointment but they are required by the SCM to report their activity to the SEC. Both the SCM & SEC must report to Hq. each month and the information for their reports must come from you, the appointees. Use Form 1 cards for your activity rpt to the SCM and the Form 5 to the SEC. Of course you may send a message or letter report to either. The EC reporting is poor. Let's bring it up to where it belongs — thanks. OO reports from W4HU (28) K4ZVS (4) WA4SRC (1) N4NW (IW) 4. Traffic: (July) WB4PNY 429, WB4DBK 406, K4BKX 316, WA4EPJ 277, K4KNP 189, N4FM 160, W4LXB 159, WB3ETD/4 156, WB4ZNB 121, K4GR 113, WB4ODZ 98, N4RF 89, K4JM 69, K4MLC 63, WA4UJX 47, W4SUS 44, N4FP 38, WB4KIT 34, WB4DQZ 33, WA4YIU 29, W4WWQ 25, K4LEF 23, WA4ZAJ 22, W4YE 20, W4YVG 18, N4LE 16, W4OOL 16, WA4PBG 13, K4DHB 13, WA4QQI 13, W4KFC 12, WA4STO 12, K4EJ 11, WA4RBF 11, WA4LJI 10, W4TMN 10, W4NWM 9, W4ZM 8, WA4FDV 7, WB2VYK/4 7, N4DW 6, WA4EQW 4, WA4NYZ 4, WA4NOB 4, WA4AJF 3, W4KXE 2, K4SPS 2, WA4WQG 2. (June) K4KA 4.

WEST VIRGINIA: SCM, Donald B. Morris, W8JM — Congratulations to K8PFK for his excellent pictures showing West VA amateurs in action during recent flood in Southern part of state. WB8OSE/K4CQA photo and rig appears on page 14 of the ARRL book, "Tune in the World with Ham Radio." K8KT and K8WMX received excellent publicity in their Company's telephone "Newsletter" for activities in flood disaster. West VA QSO Party, 1st place, WB8SAW, followed by K8KT and WB8YMJ. Out of state WA2HLP W4KFB N4FM N4GF WA1UWR W3AKD.

Net — Freq.	Time(Z)	Ck-in	Tfc.	Sess.
CW — 3567	2300 Dy	146	53	31
Novice — 3730	2115 Dy	194	108	31
Phone — 3990	1600 Dy	469	81	26
Phone — 3990	2200 Dy	740	190	30
Hillbilly — 142901600 Su		156	47	5

K8QEW received nice write-up in Weirton paper on Public Service activities. Traffic: WB8TDA 121, K8YL 104, WB8III 91, WB8TSE 47, WB8YMJ 43, WB8TJN 34, WB8VAZ 32, WB8TEE 31, W8JM 30, WD8JYM 22, WD8JYN 22, W8JWX 21, WD8LDY 15, W8CKX 14, K8KT 10, K8MHR 8, WB8IHA 8, K8ZDY 8, WD8EGW 7, W8FG 5, WA8LFW 5, WA8OKG 4, WA8ZBM 4, W8VZO 4, K8QEW 4, WB8SAW 3, W7RUA/8 3, WA8GBM 2, WA8NDY 2, WB8TTP 2, WA8RDX 2, WB8CNN 2, K8ZPN 2, K8TCM 2, WD8CQW 2, WD8WNZ 2.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Clyde O. Penney, WAØHLQ — SEC: KØFLQ. RM: KØTER. PAMs: KØCNV WAØYGQ. Congratulations to KØOHU on upgrading to Advanced Class license. WØCP is enjoying his new TH3 beam, as well as his first Harmonic. April, born July 8. WBØMCL & WØKLE, among others, were active in handling emergency Tfc during recent floods in Glenwood Sprgs area. KØHPE enjoyed 61 contacts during 10-X contest, while KØOTU & WAØYNQ had totals of 65 & 242 respectively. Best wishes for a speedy recovery are extended to WBØFQD who is now at home recuperating from heart surgery. WAØYNQ reports membership in the Colo. 10-X chapter has now passed the 1000 mark. KØSPR was active in handling

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H&W Tfc in connection with flood at Johnstown, PA. Net Tfc for July: Hi-Noon QNI 1161, QTC 38, informals 132, QNF 1244, 28 sessions. Traffic: (July) W9WYX 1768, K9YFK 976, K9ZSQ 773, WB9QQT 216, W9EJD 187, WA9YNP 114, WB9MCL 110, W9KLE 108, W9RE 101, K9OTU 58, K9WZN 58, W9MDT 50, WB9QPQ 42, W9LAE 39, W9MYP 13, K9SPR 12, K9OHU 11, WA9YED 9, W9GW 3, W9SIN 3, WB9OKB 1. (June) W9IW 95, K9WZN 65, W9ETT 63, W9MYB 10, W9GO 2. (May) W9MYB 14.

NEW MEXICO: SCM, Joe T. Knight, W5PDY — SEC: W5ALR. PR: W5QNR. PAMs: W5PNY K5IKL. RM: K5KPS. Southwest (SWN) meets daily on 3585 kHz at 1915 local time and handled 192 msgs with 246 stations reporting in. New Mex. Roadrunner Net (NMRRN) meets daily on 3940 kHz at 1800 local and handled 67 msgs. with 821 stations reporting in. New Mex. Breakfast Club meets daily on 3940 MHz at 0700 local and reports 82 msgs handled with 638 stations reporting in. With deep regret we report the passing of W5UNL, active with Eye-Band Net and W5LUX active on 2 mtrs. Congratulations to all who passed the FCC exams in July. Pecos Valley ARC new officers are W5BWV, pres.; WB5PQN, vice pres.; WB5UWD, secy-treas. W5JOV reports traffic on ART's increasing. Traffic: W5UH 302, W5JOV 216, WB5LZF 172, K5KPS 136, K5MAT 126, W5ENI 118, WB5ROP 85, W5TWZ 41, W5YQ 18, WD5BFA 8, W5BWV 2, K5NM 2.

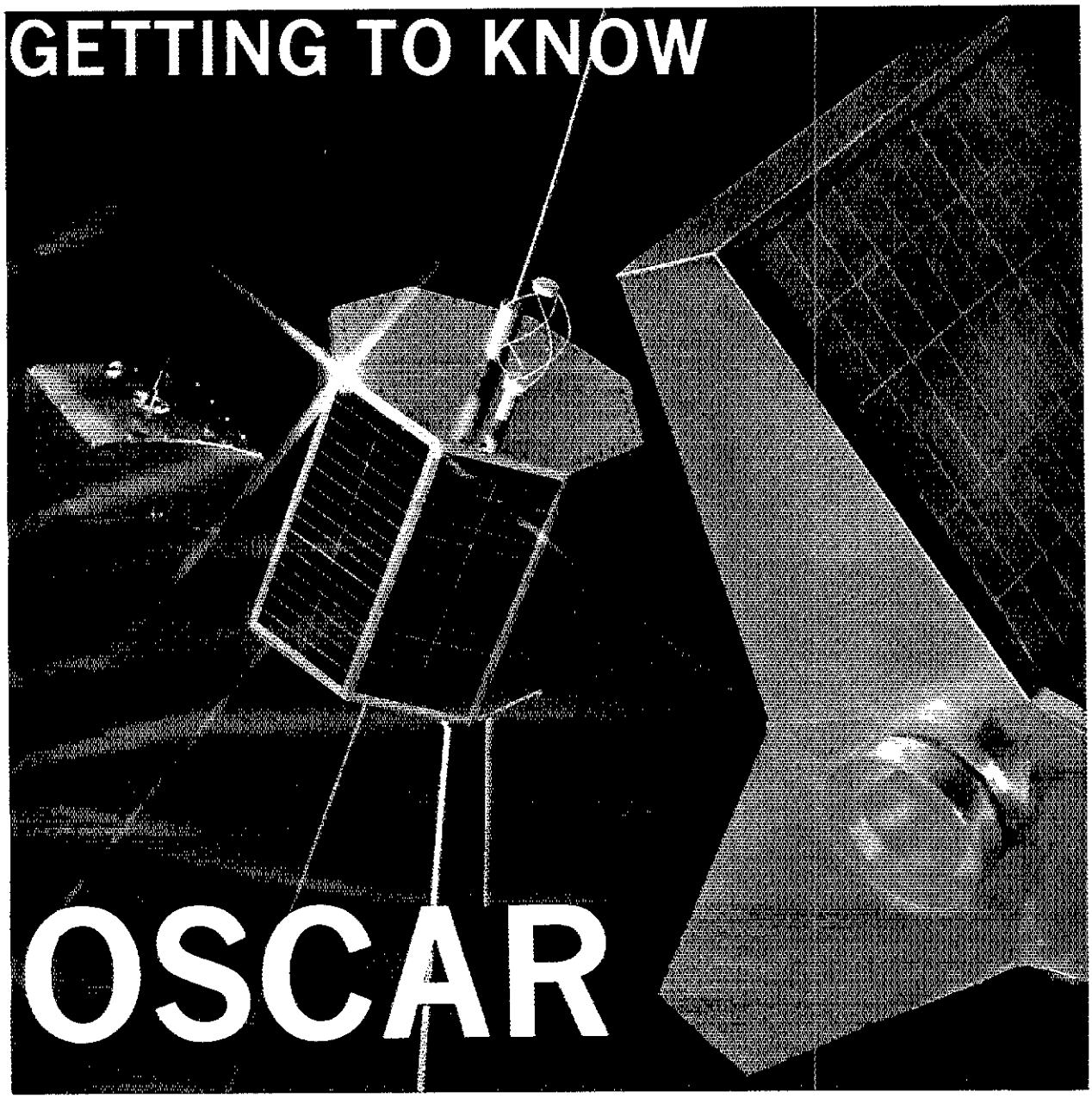
UTAH: SCM, Carl R. Ruthstrom, W7GPN — SEC: WA7ZBO. I'd like to thank W7EU for his help in getting me started as the new SCM. In spite of the summer heat and vacation time, activity reporting has been good. W7OCX off the air on HF, does not expect to be in operation again until home is sold and he's relocated. The Beehive Utah Net continues to operate daily on 7272 kHz at 1830 MDT. Net control conducted by WA7GTU W9LAE WA7MEL and W7QWH. W7OCX no longer BUN mgr., would like to have a qualified individual take this job. W7OCX reports he received a certificate for Armed Forces Day by copying the Secretary of Defense CW message without error at 25 wpm. WA7MEL reports UCN had 31 sessions, 52 messages handled, and 158 check-ins during month. WA7ADK has built and has in operation a 4CX250 amplifier on 2 meters. WA7HQD busy working DX on 15 and 20 meters with new TH6DXX antenna. W7RZ/W7SAD now working on Kwajalein and signing KX6AU on 15 and 20 meters. K7RGY busy building new home. W7TWZ new EC for Tooele Co. Their emergency net meets weekly on 147.48 MHz. The Utah Hamfest was a great success due to the fine work of the UARC. Traffic: K7HLR 85, W7KHY 62, WA7MEL 58, WA7KHE 38, WB7DMI 15, W7BE 14, W7OCX 6, W7UTM 6.

WYOMING: SCM, Chester C. Stanwaity, W7SDA — The Wyoming Hamfest was well attended. Guest speakers were Lewis McCoy, W1CP from ARRL headquarters, and Charles Cotterell, W9SIN Rocky Mountain Director. W7VEW gave a very interesting talk on Meteor scatter, EME and Aurora types of VHF communications. The mobile hunts and swap tables were also busy. W7HEB had major lung surgery. W5AYS now W7LQY. W7KF married. New Advanced W7OGT and WA7WWE. New Novice WB7SYJ XYL of WB7NIJ, WB7RPI. K7SLM reports 21 sessions 573 QNI 14 QTC for Wyoming Cowboy net. Traffic: W7TZK 450, W7SQT 205, K7VWA 196.

SOUTHEASTERN DIVISION

ALABAMA: SCM, Jim Brashear, WB4EKJ — Thanks to those in the Huntsville ARC who nominated and elected me Ham of the Year — quite an honor! WB4CXD reports contacts on 6 and 2 with WI and WØ areas. WA4VEK has new IC22S. Congratulations to Birmingham ARC who will have their hamfest May 13 and 14, '78 in the AC Civic Center. WA4GIV is chmn. Mobile ARC starting on their hamfest for next year with WA4VPI as chmn. The Twin Base ARC maintains a library with over 30 books available for checkout by members. The Sand Mtn Repeater Assn. provided communications for the 38th Annual DixieCup Regatta in Guntersville on Aug. 6 and 7. K4JK says he smuggled a new Dentron MLA 2500 by his XYL and with the Ham and TV antennas on same mast, everything on his color TV turns green! K4HJM has 32 ARES members and very near the 100% mark. Congrats. to him and the Calhoun Co. ARA. They recently held a Severe WX Seminar and AENW Emergency Communication Seminar at the Ala. Power Co. Auditorium in Anniston; representatives of CD Nat'l Wx Service, Law Enforcement, many Hams and guests attended. W4MHO says they will have new solid state repeater soon and stand-by rig with automatic switching. Appointed WB4CXD as OVS. Traffic: (July) WA4JDH 880, N4MD 368, K4LYY 187, WB4EKJ 179, WA4RND 98, WB4KSL 67, K4AOZ 40, WA4VKD 19, WA4ZDW 12, K4UMD 14, W4EF 8, WA4TMG 8, WB4TVY 8, WA4WQH 8, WB4ZHS 7, WB4NNA 6, WA4RMP 5, W4MHO 4, WB4CXD 2, WD4CPF 2. (June) WB4AYO 4.

GEORGIA: SCM, A. H. Stakely, K4WC — SEC: K4YRL. PAM: K4JNL. RM: W4SHL. Congrats to WA4OZT K4EV and WB4TEK making PSHR. CAND QTC 331. DEAN QNI 5 from GA. CVEN No. 2 QNI 951, QTC 71. Cntrl GA. VHF Net QNI 87 QTC 1. Atlanta Radio Club officers for '77-'78 W4GKF, pres.; WA4AKU, veep; W4NJF, secy.; WA4PYF, treas.; WA4PZD, act. mgr. Columbus Amateur Radio Club officers of '77-'78 WA4TBG, pres.; K4JNL, veep; WD4CCE, secy/treas.; K4GOE, act. mgr. Toccoa Amateur Radio Society, Coosa Valley Amateur Radio Club and Colquitt County Ham Radio Society now affiliated with ARRL. N. GA. Skywarn Net QNI 39. CVEN No. 1 QNI 70, QTC 2. GARES Net QNI 82, QTC 1. Sadly we report a real pioneer W4KR and W4LBO becoming Silent Keys. ARES repeater for coastal area is WR4AVO on 10/70 and always open reports WB4NTW. Rome Hamfest Oct. 2 at Coosa Valley Fairgrounds. Augusta Hamfest on Sept. 18 at Julian Smith Park. Fanvention at Stone Mountain Nov. 12-13. W4LRR working on 432. New Atlanta Radio Teleprinter Society RTTY only repeater on Stone Mountain, WR4BAG, 147.105 in 7.705 out. WA4OQO now N4EU. WA4LHH reports formation of GA Repeater Council. W4AAY had ant blown down. W4FOE and W4GH active on daytime 4RN. WA4CCY making CVEN No. 2 a great net. Excellent picnic well attended at Little Ocmulgee State Park by GSSB net. Traffic: (July) W4FOE 203, W4GH 96, WA4OZT 95,



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NORTHERN FLORIDA: SCM, Frank M. Butler, Jr., W4RH — SEC: WA4WBM. RM: WB4GHU. PAMs: WA4TNC/75; WA4TXM/40; WB4BSZ/VHF. WA4CRI appointed ORS-II. SNC's earned by WB4DTS on QFN; by WB4UKX & WB4WWP on QFNS; and by WB4QBB on Ala. Net "B." Orange Park ARC, Central FL DX Assn. & Hernando Co. ARA recently affiliated with ARRL. Congratulations! Traffic ops. had a picnic at Manatee Springs State Park. I m sad to report W4IA of Mt. Dora a Silent Key. WD4HIF WB4JMM WA4PUY WA4SNS WB4UKX & WB4YNN upgraded to General; WB4TVQ to Advanced. WA4RAJ active on D-RN5. Five Flags ARA planning a homebrew contest. Officers of Playground ARC; WA4UFP, pres.; WB4TPR, vice-pres.; W4MMW, secy.; N4GQ, treas.; WA4NDX, activities. K4KPI now N4XS. Officers of the Tallahassee ARC are: WB4CAL, pres.; WB4UPJ, secy.; WB4VDL, treas. W4MNW and N4WA built a putent double-vee antenna for Field Day. Gainesville ARS provided comm. for the Special Olympics at U. of FL. GARS also held a Swaptest recently. WB4QBB & K4MZK added 25 wpm endorsemtnt on ARRL CP certificates; K4MZK also added radar endorsment to 1st phone ticket. WB4RIS busy on 20M CW with a new homebrew tri-band quad. N FL DX Assn. has a simplex 2 fm freq. for alerts — contact N4UF for details. Fernandina Beach BC station WYHI running programs on AR. Daytona Beach ARA and Hernando Co. ARC had traffic stations at public exhibits. WB4YPS NCS on VEN. W1UX/4 very active on traffic nets. WA4DLS earned PSA from ARRL for reporting accident; OM W4MGO received award for efforts in publicizing amateur radio. Traffic: (July) W1UX/4 298, WB4QBB 285, WA4TXM 266, WA4CRI 228, K4BV 224, WA4FKE 198, WB4EXA 189, WB4GHU 180, W4SDR 180, WA4OEM 175, N4WA 150, WB4JMM 138, W4LDM 130, WA4EYW 112, N4SS 92, K4YX 65, W4KIX 61, WB4TZR 60, WB4FJY 58, WD4IIO 57, W4JL 53, WA4TNC 53, WB4HRG 48, W4MGO 48, WB4DTS 47, WA4BZV 45, W4RH 45, WB4VDL 41, WB4UKX 25, WA4IWW 24, WB4NJI 23, WB4OWX 22, WA4EYU 21, WA4NDO 21, WB4YKV 17, WB4RIS 12, K4RNS 12, K4IEX 10, WB4VAP 10, WB4YPS 8, WB4WYX 4, WB4LNO 2. (June) WA4STZ 29, WB4IJR 2.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — SEC: WB4ALH. Asst. SEC: W4WYR. RM: W4MEE. PAMs: WB4AID WA4NBE. New appointments: WB4NJU OPS, W5RE/4 ORS, WA4ISB EC Sarasota. WB4ALH advises revised Section Emergency Plan is ready for printing and distribution. A new Hillsborough County plan is also ready. Pinellas Emergency net is adding another weekly session, this one being on 220 MHz band. PEN is also starting affiliation with NTS by sending liaison stations to FAST Net and QFN. Our only BPL this month goes to W4MEE. Congrats again, Doug. WB4AID K4NAN W4MEE and WB4NJU turned in nice PSHR scores. Our only Tech/Novice PSHR goes again to WA4QGV. Congrats, Bud. K4NAN was the only one to claim credit for handling emergency msgs directly with disaster area. With the Johnstown, PA flood (of 1977), we believe many stations missed a good opportunity. WA4ZHU is leaving Aug. 25 to attend University of Texas, Good luck, Randy. Congrats to ex-WB4FLW on new call N4TW. With so many new calls it is hard to tell who you are talking to, but there are some very distinctive fists you can recognize regardless of what they sign. Then there's the guy who always sets up 200-300 Hz below net frequency and the guy who is always so weak you know it couldn't be anybody else. And how about the guy who always *zeros* in while radiating full power? You soon get to know who they are, even without benefit of call sign! Traffic: (July) W4MEE 621, K4SCL 253, K4SJH 217, WA4JPV 204, WB4WYG 186, WA4GYR 173, WB4AID 135, K4NAN 118, WA4PFK 115, WA4NBE 102, W4WYR 97, W4DVO 88, WB4NJU 81, WB4ALH 70, W4GPL 68, WA4EIC 62, W4NTE 59, W4NFK 56, W4QM 49, WA4ZHU 43, K4CFV 41, W4IRA 39, WB4PIB 35, WA4QGV 32, K4BLM 28, W4GDK 26, K4EUK 18, K4SJA 14, WB4FLW 7, WA4TJG 6, WA4TJM 4, N4TW 3, W4KGJ 2, W4SMK 2. (June) WA4GNI 12, WB4FLW 5, W4MML 4, WB4KYE 2.

WEST INDIES: SCM, David Novoa, KP4BDL — Glad to hear good participation from this Section in the IARU Championship. The YL Radio Club had a mini-hamfest at pres. KP4CL's home. Very nice party. They have a net on Wed. evening over 25/85 repeater. The DX Club of Puerto Rico was reorganized. New Board of Directors: KP4BDL, pres.; KP4CL, vice-pres.; KP4DMZ, secy-treas.; KP4s RK AST and CLB, dir. The DX Net is on Sun. at 1430Z on 7230 kHz. KP4CM back in Puerto Rico after some time in the W4-Land. KG4AN is active on 20 ssb. KV4AA brass pounding on all bands. The Union Carbide Caribe Amateur Radio Club is active again with KP4APB giving a Novice course and presiding. Sorry to report that KP4OA became a Silent Key. KP4BSQ is now EC and is assisting KP4CV in the ARES. Traffic: KP4EHF 92, KP4HG 46, KP4BSQ 42, KP4DGT 6.

SOUTHWESTERN DIVISION

ARIZONA: SCM, Marshall Lincoln, W7DQS — PAMs: W7UQQ WA7KQE. RM: W7EP. Congratulations to W7HFR, honored as Ham of the Year by the Amateur Radio Council of AZ at the Ft. Tuthill Hamfest. The Scottsdale ARC is presenting a set of ARRL publications to the Scottsdale library. K7OO has moved from Kingham to North Hollywood, where he is chief engineer of K1OO. The Mingus AR Assn. of Cottonwood is now affiliated with ARRL. The Cactus Net plans a picnic for the Tucson area in Oct. W6LGC, a conductor on Amtrak traveling frequently through northern AZ, often is heard operating through the Kingman repeater, and handled health and welfare traffic through the machine during a derailment. The Phoenix repeater club now has an autopatch on 440 MHz. Ex-WA7CNP now is N6NR at San Diego. Rick has an article on designing solid-state RF power circuits in Aug. QST. Nets (July): Cactus 182, ATEN 64. Traffic: W7EP 128, K7UXB 82, W7HFR 63, WB7CAG 35, WA7KQE 31, K7NMQ 13, W7RQ 12, K7GH 10, WA7WEB 8, K7RLL 4, W7DQS 3, K7GLA 3.

LOS ANGELES: SCM, Eugene H. Violino, W6INH — RMs: WB6PKA. Well the summer doldrums and vacation time is taking its toll this month. The last

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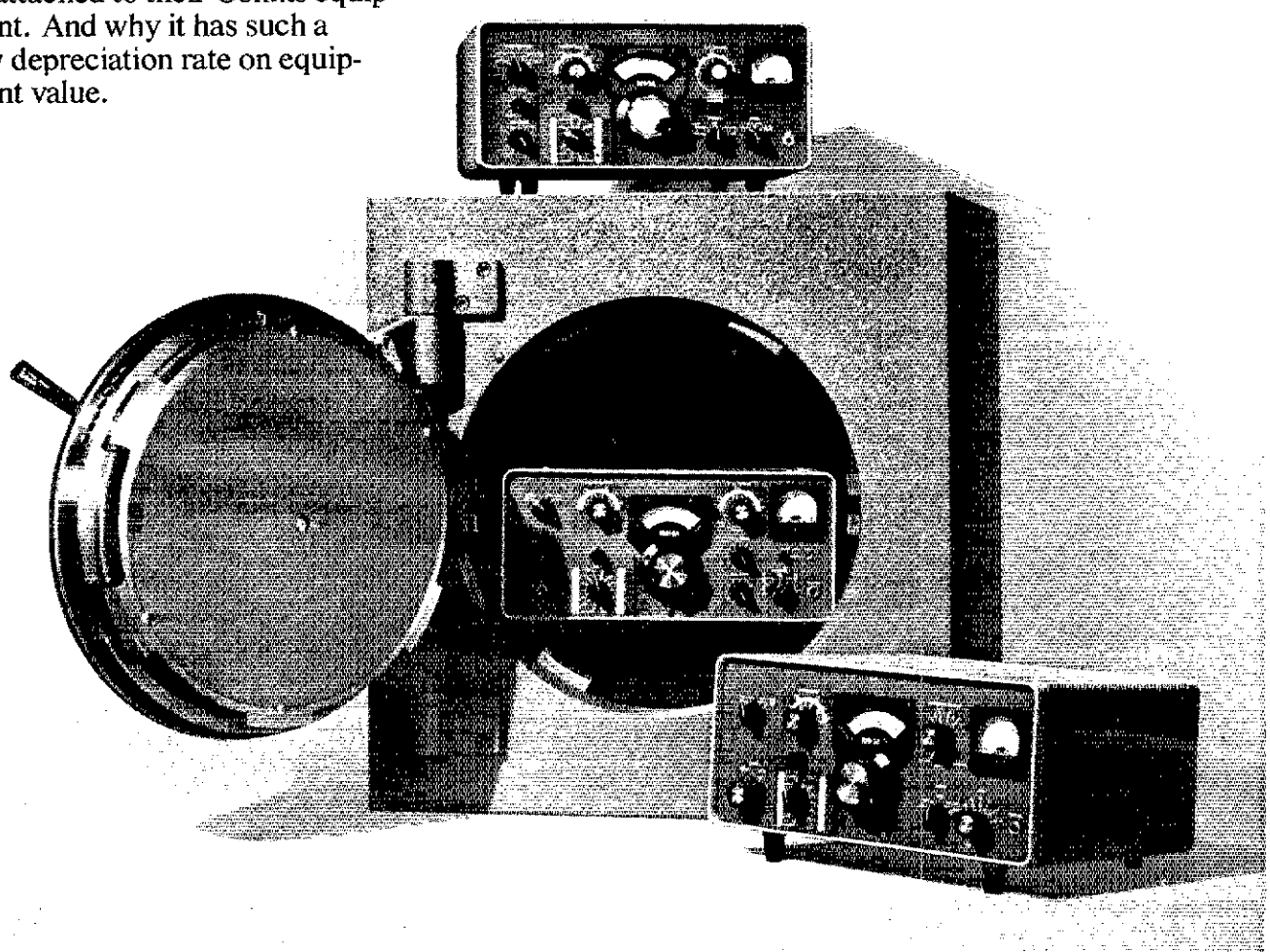

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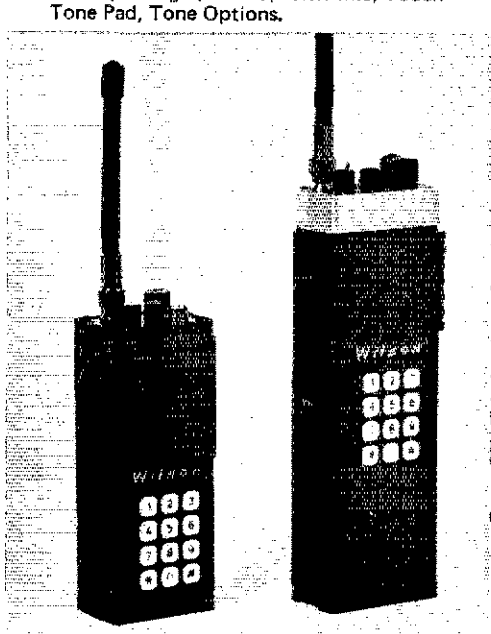

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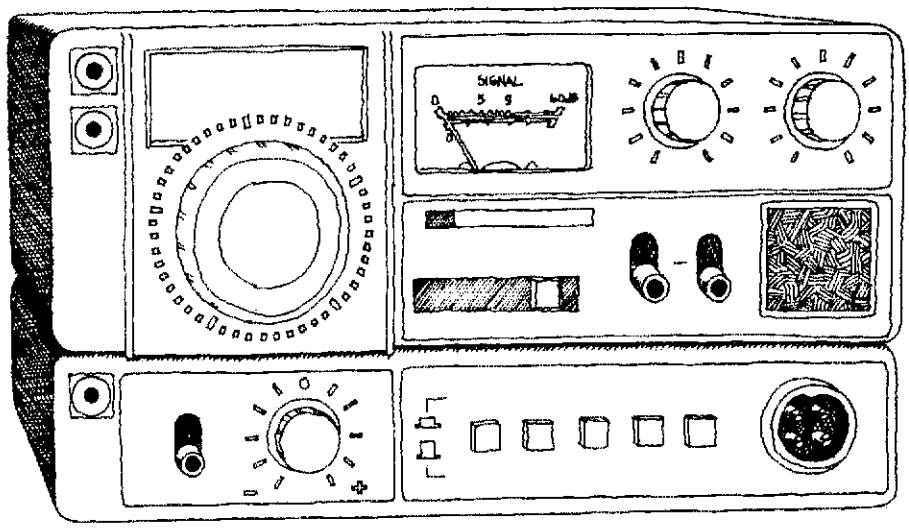

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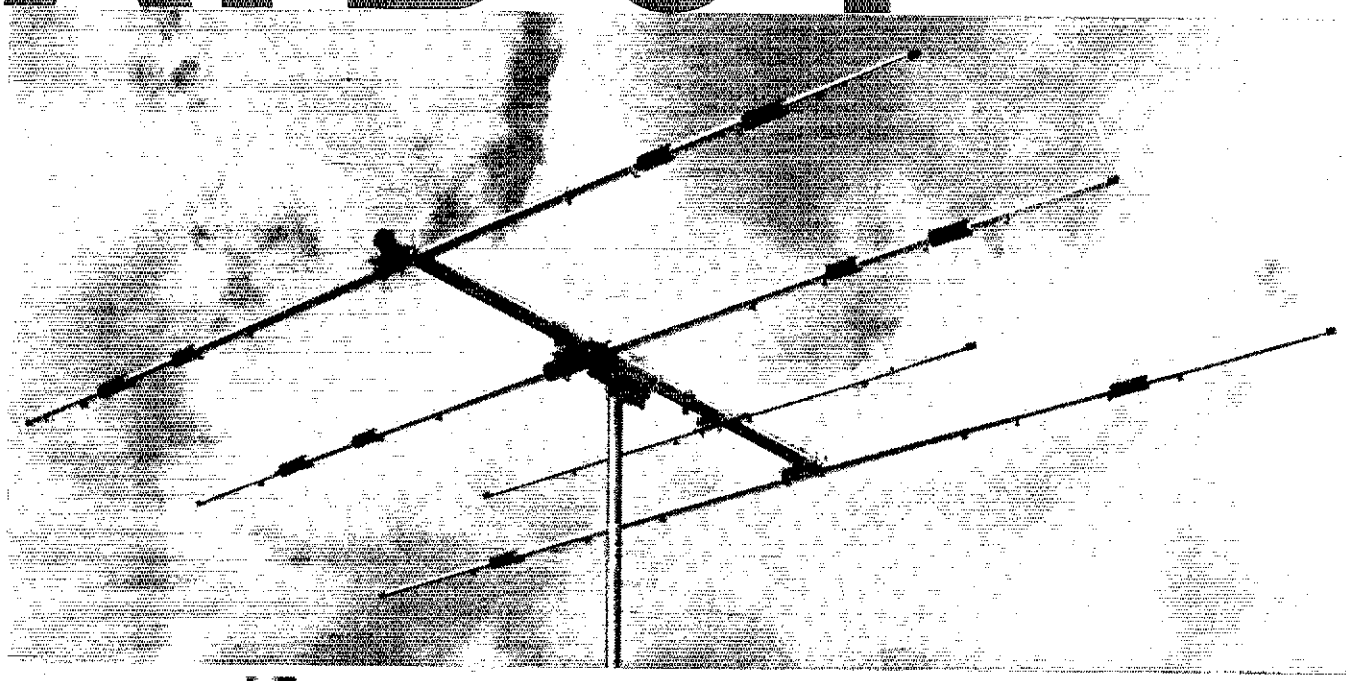

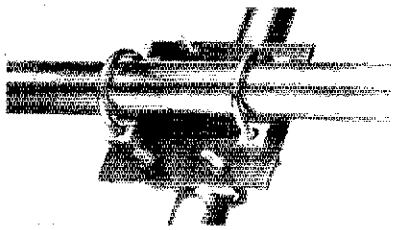

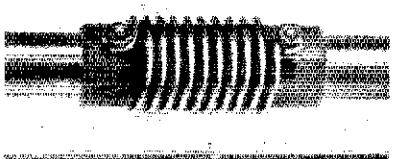

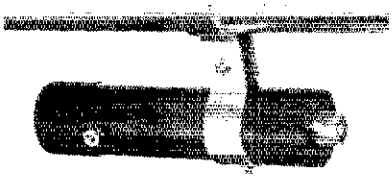

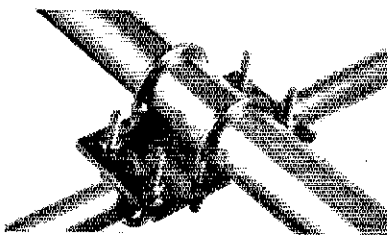

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part of July has been a very dry and warm one, which accounts for the drop in activity. In most cases the regular nets have been keeping up, however, with the regulars doing double duty. WB6PKA is the proud owner of an FT301S solid-state transceiver, which he is also using mobile, is planning to build a solid state 200 watt amp for same. W6NOL is the proud owner of a new TS520 and is putting up dipoles as fast as he can climb palm trees. W6HUJ is house hunting at the moment, expect to be active again soon. The United RC of San Pedro is planning to have a booth at the Santa Maria convention with the P.C. board giveaway. Congrats to WA6ARP on passing the Extra Class exam. Bruce Johnson formerly, WA6IDN, who is now the International Editor ARRL/QST, has been making a whirlwind tour of the local radio clubs. If you remember Bruce used to be very active on SCN. Don't forget the San Gabriel Valley Radio Club annual Dec. dinner at the Castaways near Pomona, the date Dec. 2. Received Bulletin from the West Valley Amateur Radio Club. The WVARC meets at 7:30 PM on the Fourth Tue. of each month at the Boy Scout Clubhouse at 5650 Shoup Ave. at Collins St., Let's help these fellows make a big success of the club by calling Matt Futterman, N6PN 781 1392. The TRW RC next Swap Meet and Auction is scheduled for Oct. 2, 1977, lets make this a big one fellows. Traffic: W6INH 162, N6PZ 102, W6SGZ 60, W6QAE 52, W6BRO 42, WB6YID 42, K6CL 40, K6EA 40, W6HUJ 32, W6BWG 24, WB6JFD 18, W6USY 16, WB6AIT 8, W6NKE 5.

SAN DIEGO: SCM, Arthur R. Smith, W6INI — Only 11 months until the ARRL National Convention in San Diego, Sept. 22-24, 1978. Plan your vacation now. Don't forget the Southwestern Division Convention in Santa Maria, Oct. 7-9. Santa Maria is famous for its barbecue dinners. W6INI represented ARRL at Red Cross Disaster Institute in Claremont, CA, Aug. 1 thru 12. Other amateurs attending: W6ZH WB6PTJ. Santa Barbara fire disaster pointed out need for manual phone patches on 2 meters. N6RU conducts licensing classes at Clairemont High School on Tue. for Novice and General, on Thur. for Advanced and Extra. Time 1830, rooms 102-3. ARES mini-drill on July 31 involved 40 members. Upgraded: WA6ORJ to Extra; WA6FJH, WA6SYN to Advanced; WD6AHE WB6IYR to General. WA6MMH working DX with new 14AVQ. New ARES members: WD6APA W6BFQ WB6DSP WB6EUL WA6LAW WA6LXW WA6LZC WA6NEL WA6NLF WA6OUA W6PEC W6PWH W6QX WB6QQU WB6RWP WB6SMD WA6SMN WB6YFA WB6TFT. Amateurs equipped with gas-engine generators should ensure that they have an approved spark arrestor. Calif. Dept. of Forestry inspected several Field Day sites and acquainted clubs with requirements. Traffic: WB6PVH 430, WB6FTY 320, N6GW 199, WA6UAZ 139, WB2BKC, N6AT 72, W6DEY 33, K6PM 2.

SANTA BARBARA: SCM, D. Paul Gagnon, N6MA — SEC: WB6HJW. RM: K6XO. VHF PAM: W6KPS. HF PAM: Vacant. N6MA spoke at Simi Settlers ARC. Simi hams contact WA6OHX for info. SBARC Bazaar a big success and fun thanks to leadership of WA6TUO. Poinsettia ARC set up a booth at Ventura July 4th celebration and originated 150 msgs. W6NAZ and W6VGQ gave an excellent show on broadcasting at Poinsettia ARC in July and WA6UEO discussed repeaters in June. Satellite ARC Vandenberg, has over 100 members. N6NB spoke on VHF mountaintopping at Camarillo Mike and Key meeting. WA6GRD and WB6VKR provided radio for Santa Paula bike race. Hospital comm drill was handled in TO by ARES and Disaster Comm Group led by W6SPT and WB6WGE. Northern SB County ARES net meets at 1930 Mon. on 147.81/21. The Section ARES net (10 AM Sun. on 3935) was activated during the Montecito fire with WA6BLS NCS for 24 hours. Over 125 msgs handled and over 160 info contacts. ARES performed well using WR6ANW (19/79) to assist the Red Cross under leadership of WA6TUO and WA6OQZ. Congrats to all SB ARES on a job well done. WB6EDA has a new quad up. K6XO found band condx poor for DX/contests. KH6IQU has five bands of antennas up in Orcutt. W6DKQ now N6MB, WB6TFW is N6IR, WA6BQI is N6IS. WB6GRW/WB6HJW/WB6MGJ teaching Novice class for Hancock College. W6ITW moving to OR to do microwave maintenance for Telco. N6NB traveling in the east on an EME DXpedition. XYL and harmonic of K6WI are now WD5FTY and WD5FWX. WA6UDY a Silent Key. PSHR: K6WI 34, WA6VBS 40, WA6LBO 42, N6MA 40. Traffic: (July) WA6VBS 246, N6MA 190, K6WI 166, KH6IQU 108, K6XO 8. (June) KH6IQU 208, WA6LBO 95, WB6HJW 2.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Ted Helthecker, W5EJ — SEC: W5DWL. RM: W5LA. 1977 Field Day activity reports from TI, Plano, Denton County and Dallas Amateur Radio Clubs in this area. It was a good Field Day, and enjoyed by all we talked to. Want to comment on traffic — we receive many messages from TTN and others, service generally better than US mail, meant to be a compliment. Urge you check in to TTN on 3961 or any others you have a chance to make. Two big hamfests in Aug. were Texas VHF Society and Golden Spread at Amarillo. Visited on 2 meters with friends in Amarillo, Borger, Dumas, Clayton and points west while traveling to CO early in month. Dallas Amateur Radio Club through WA5ZNZ and others pursuaded Mayor Folsom to proclaim June 25-26 as Amateur Radio Weekend in Dallas. Good publicity for Amateur Radio! W5TI reports good activity on 160, and is plugging for more activity on that band using special antennas for receiving. Panhandle ARC watermelon feast reported good, with plenty of melons for all, July 17. W5DWL has volunteered to help with NTex activities, and we expect to get him on the line soon. There are a bunch of traffic handlers who always report activity and to them we want to say thanks for sticking in and pushing the traffic through. K5SOR particularly reports Novice activity with WB5VZL WD5BIJ WD5BIK WD5DUT on regularly. K5SOR rebuilding, but not missing a stroke. WA5EQQ reports public service activity, not quite enough for honor roll, but working on it. WB5TMN attended Scout Jamboree in PA in Aug. General activity down some, but with 105 degree weather its expected. Send in reports and make Aug. a good month. Public Service activity by N2TJ/5 WA5EQQ WB5PXM WB5FYE and WA5PLX — Maybe a few honor roll members next month? Traffic: WB5MTN 57, K5SOR 33, W5GSN 1, WA5QXD 1.

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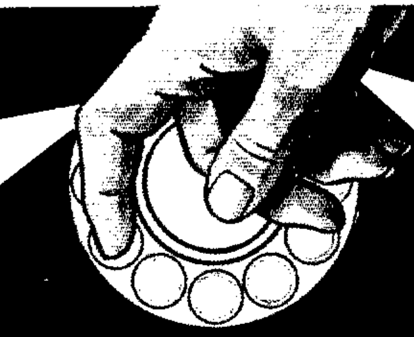

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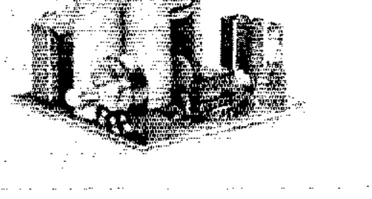

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MV1634		2N3919	$5.00	2N5484	3/$1	LM309K	1.25	N5556V	.95
MV1866 to	$7	2N3922	5.00	2N5486	2/$1	LM311N	.90	N5558V	.60
MV1872		2N3954	3.20	2N5543	$3.00	LM320K-5	1.45	μA7805UC	1.25
MV2201 to	$1	2N3958	1.15	2N5544	2.50	LM320K-12	1.35	8038 DIP*	3.75
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2N2907 PNP Transistor	6/$1	LM723 2-37V Reg DIP	3/$1
2N3055 Power Xistor 10A	.69	LM741 Comp Op Amp mDIP	4/$1
2N3904 NPN Amp/Sw β100	6/$1	LM1458 Dual 741 mDIP	3/$1
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CP650 Power FET ½Amp	$5	RC4195DN ±15V 50mA mDIP	1.25

RF391 RF Power Amp Transistor 10-25W @ 3-30MHz TO-3	$5.00
555X Timer 1μs-1hr Different pinout from 555 (w/data)	3/$1
RC4194TK Dual Tracking Regulator ±0.2 to 30V @ 200mA TO 66	$2.50
RC4195TK Dual Tracking Regulator ±15V @ 100mA (TO 66)	$2.25
8038 Waveform Generator ∿ ⊓ ⩘ Wave With Circuits & Data	$3.75

OKLAHOMA: SCM, Leonard Hollar, WA5FSN — Asst. SCM, Ray Miller, W5REC. SEC: WA5MLT. Oklahoma Nets: OFON, 3900 kHz M-F, 5:00 P.M. STN 3850 kHz M-S, 5:30 PM. OTWXN 3900 kHz, 5:45 P.M. M-S. OAN 3705 kHz, M-S 6:30 P.M. OLZ, 3682.5, 7:00 P.M. daily. OPEN, 3900 kHz Sun. 0800. New officers Lawton-Ft. Sill ARC; WB5OZR, pres.; WA5IDY, vice-pres.; WB5HEN, secy.-treas. Congrats to WB5UQH, 17 yr. old YL, Amateur Extra. Other new Extra's to WB5TQZ & K5LUR. Some new calls in the traffic reports this month. Total traffic up 200 over last month, but down 400 from same month last year. Ham Holiday "77" is now history, very successful. My hat is off to the 2 programs on Radio Talk Shows, "well done." Next get-together will be Texoma Hamrama Oct. 28-30th. New Oklahoma Repeater Assn. slowly getting started. Hope to have it going good before the year is out. We are getting good reports on the Weather net but still need more stations, specially the North-East part of state. Traffic: W5REC 299, WB5NKC 285, W5RB 209, WB5ELG 82, WB5OCZ 82, W5VOR 63, WB5DYU 56, WB5NKD 54, W5RFX 52, K5OWK 49, W5SUG 45, WA5FSN 34, WB5OSN 30, W5FKL 20, W5BYC 17, WB5PVL 11, W5PML 7, WA5OUV 6, W5JJ 3, WA5FLV 2, WB5UCM 2.

SOUTHERN TEXAS: SCM, Art Ross, W5KR — SEC: W5TQP. PAM: N5TC. RM: K5RG to July 31, then WA5RKU. OOs rprtg this month: K5MUK (also a late rprt for June), K5DL W5VAH N5ZZ. OVS rprtg this month: WA5QCP. ORS/OPS WA5RKU is RM effective Aug. 1, vice K5RG, resigned. Thanks go to Ken for a very good job. OBS W5KLV and OPS WA5VBM made BPL in July; Sister Mary rprts successful emergency operation of TS-520 on large battery for three hours during power failure in Lufkin. ORS K5ROZ heard often checking into 7290 Net mobile. Asst. EC WA5RVT has new 3500W emergency alternator. OPS WA5LTW rprts WB5RGN has changed call to N5JD; WB5URV upgraded to Advanced and has new 45-ft. crank-up tower. EC WB5TNN has new FT-101E and homebrew linear amplifier of 4-811s in grounded grid; also rprts K5AJN enjoying new FT-101E on 20-mtr CW DX; WA5HSR has new T4RC, SB-220 and TH6DXX; WB5VER caught VHF-Oscar fever with TS-700 and two eleven-element Cushcraft at 70-ft, plus a Cushcraft "twist" and new 140W KLM amp. ORS WA5JYH enjoyed visiting and operating W1AW while on vacation, also enjoying DX with new TH6DXX. K5QEW reports new Amateur Radio Club in Atascosa County; have 20 members; new repeater on 146.31/.91 will go operational when license is received; K5KTX, pres.; K5TK, secy-treas. Traffic: (July) W5KLV 662, WA5VBM 370, K5HZR 354, WA5YEA 295, WA5RKU 107, N5TC 67, WB5GVO 42, K5MUK 37, W5BHO 28, WB5RWV 25, W5QO 24, W5JYH 24, WB5TNN 22, WB5LTW 18, W5KR 15, K5RVF 8, WA5RVT 6. (June) WB4KSG/5 62, WB5GVO 47, WA5JYH 19, WB5TNN 19, K5MUK 17, WB5BHO 12, WB5LTW 9, WA5RVT 8, K5ROZ 2.

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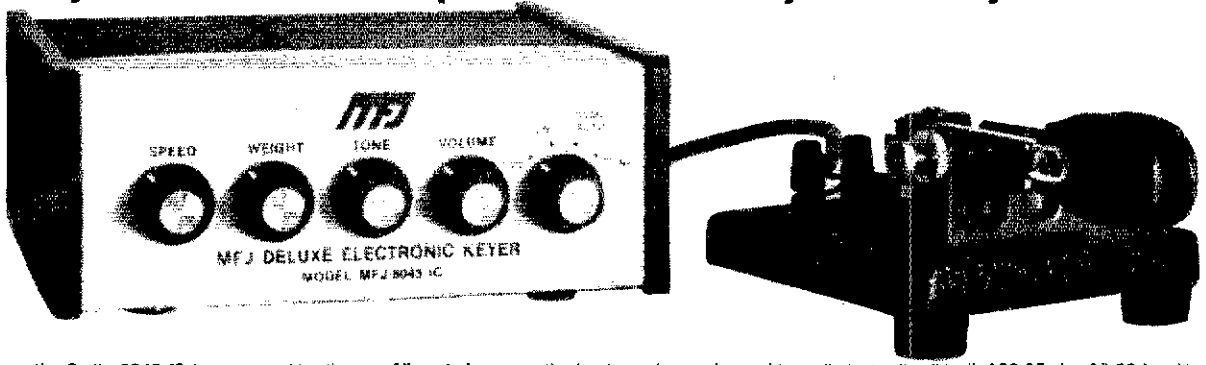

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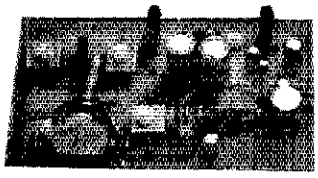

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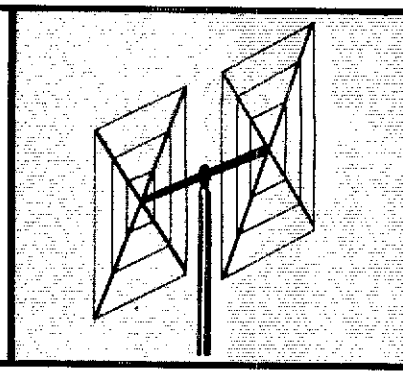

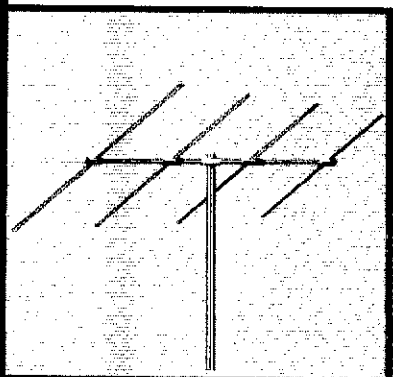

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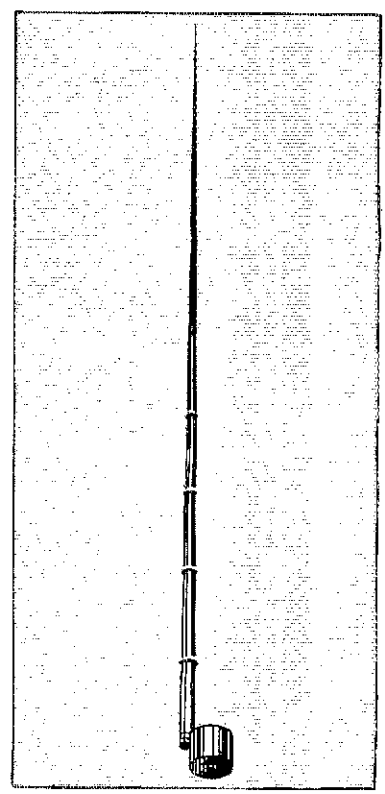

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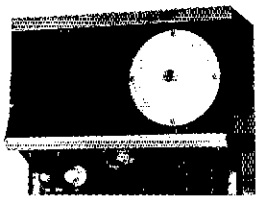

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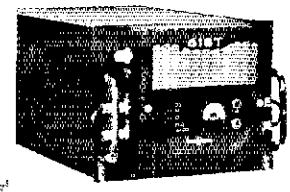

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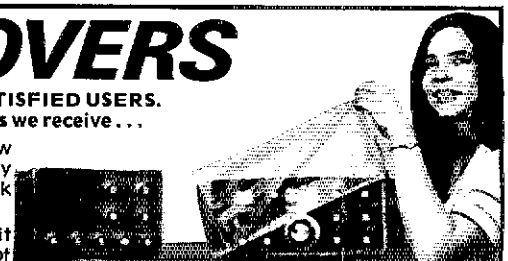

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DRAKE TR-33C SPECIFICATIONS

GENERAL: • **Frequency Coverage:** 146-148 MHz, 12 channels (2 supplied: 146.52 and 146.94). Crystal determines receive frequency. • Transmit frequency offset for repeater operation determined by 5-positon switch: Simplex, +600 kHz, and −600 kHz supplied; any two additional offsets available with accessory crystals. • **Power requirements:** 13.0 volts dc ± 15% external supply OR internal battery supply. • **Current Drain (Batteries):** Squelched receive: 30 mA: transmit: 400 mA. External supply: above plus 45 mA for channel switch indicator lamp. • **Antenna:** 50 ohm external antenna through SO-239 connector OR screw-on telescoping whip antenna supplied, may be replaced with rubber helix antenna. • **Dimensions:** 5.5" x 2.8" x 8.5" (13.8 x 5.8 x 21.6 cm). • **Weight:** 4.4 lbs (2 kg).

RECEIVER: • **Sensitivity:** less than .5 μV for 20 dB noise quieting. • **Selectivity:** + 30 kHz adjacent channel rejection greater than 75 dB. • **Modulation acceptance:** at least ± 7 kHz. • **Inter modulation Rejection:** 70 dB referenced to sensitity level. • **First i-f:** 10.7 MHz with monolithic crystal filter. • **Second i-f:** 455 kHz with ceramic filter. • **Audio Output:** nominal 1 watt at less than 10% distortion into 8 ohm built-in speaker or external speaker.

TRANSMITTER: • **Rf Output Power:** 1.5 watts minimum with 13.0 volts dc supply. • **Frequency Deviation:** Direct frequency modulation adjustable to at least ± 7 kHz deviation, factory set at ± 5 kHz • Separate microphone gain and deviation adjustments • Drake 1525EM Push Button Encoding Mike can be used direct with no modification.

DRAKE TR-33C ACCESSORIES

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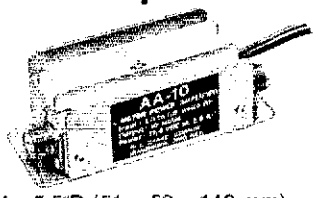
10 dB power increase greatly adds to the transmitting distance covered by any 2-meter fm transceiver running up to 1.8 watts output



Small size: 2"H x 2.1"W x 5.5"D (51 x 52 x 140 mm)

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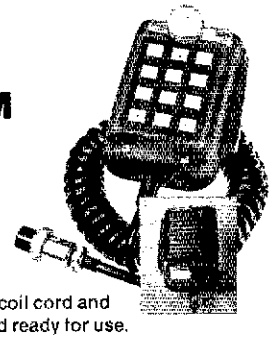
Drake 1525EM Push Button Encoding Mike



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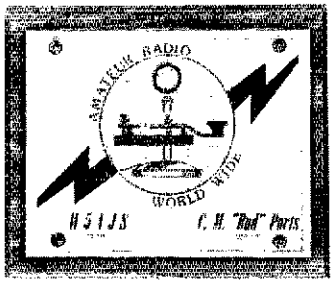

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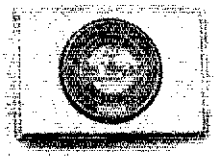

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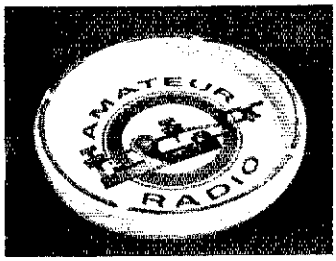

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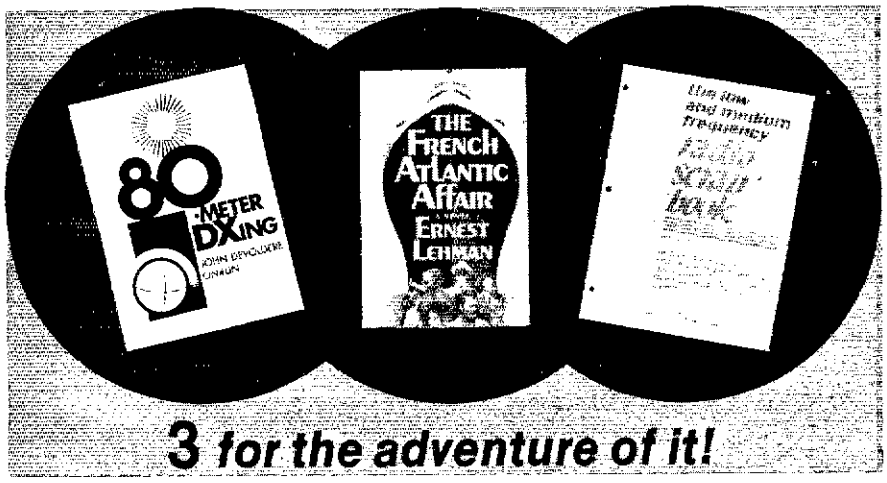

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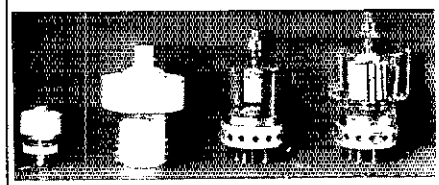

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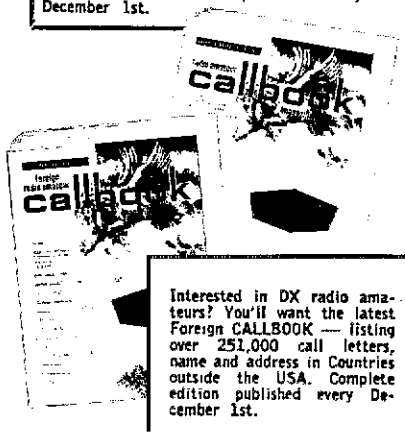

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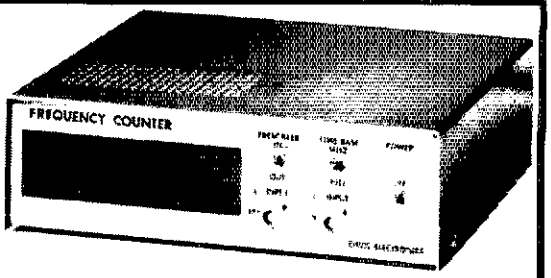

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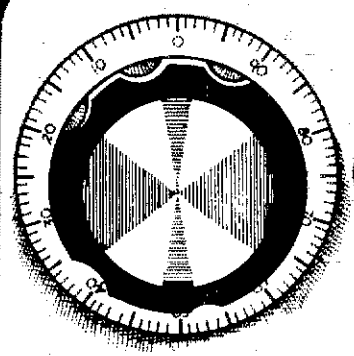

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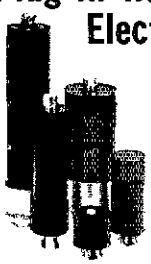

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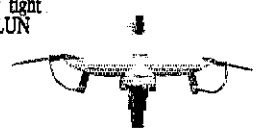

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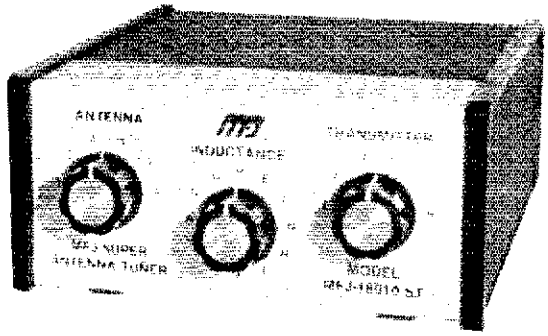

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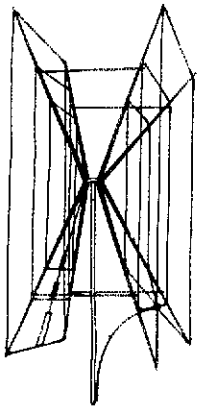

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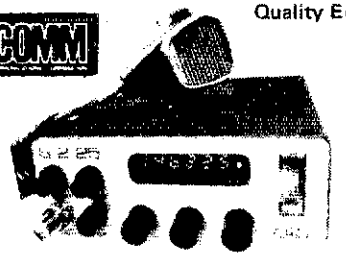

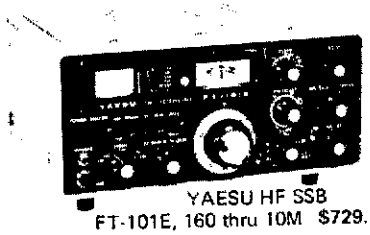

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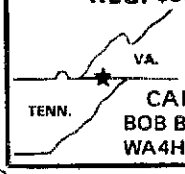

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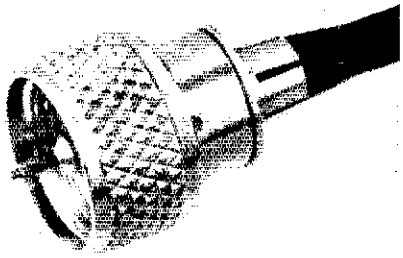

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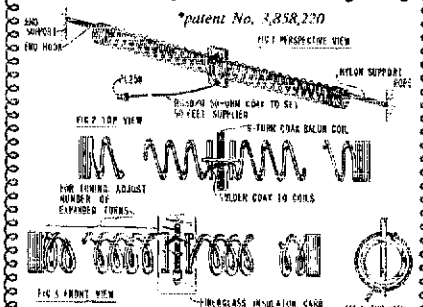

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MEMPHIS is beautiful in October! The Memphis ARRL—sponsored Hamfest, bigger and better than the 4,500 who attended last year, will be held at State Technical Institute, Interstate 40 at Macon Road, on Saturday and Sunday October 1 and 2. Demonstrations, displays, MARS meetings, flea market, ladies flea market, too! Hospitality room, informal dinners. XYL entertainment. Dealers and Distributors welcome. Contact Harry Simpson W4SCF PO Box 27015, Memphis, TN 38127 for further information.

HAMFEST Lima, Ohio October 9. The Northwest Ohio ARC 3rd annual hamfest at the Allen County Fairgrounds. Two large buildings, tables and table space available. Dealers welcome. For information and reservations write N.O.A.R.C. P. O. Box 211 Lima, Ohio 45802. Phone 640-1433 or 991-2716.

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FREE Samples — Stamp appreciated. Samcards, 48 Monte Carlo Dr., Pittsburgh PA 15239.

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General

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ATLAS Motorola FM and SSB Marine Radio. Motorola Pagers bought and sold. W5BCO, Ralph Hicks, P. O. Box 15633 Tulsa OK 74112, 918-266-2525.

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PREPARING for FCC exams? When all else fails, try Posi-Check. 14 years continuous success in self-training study guides. Original expertly devised, multiple choice questions and diagrams covering all areas tested over by FCC. Same form as FCC exams. IBM sheets for self-testing, keyed answers with explanations. All classifications updated for new exams. Novice Class, Element 2, $4.45; General Class, $5.75; Advanced Class, $5.75; Extra Class, $5.95. Also Radiotelephone Third Class, Elements 1, 2 and 9, $9.95. First class mailing prepaid U.S.A. Send Check or money order to Posi-Check, P. O. Box 3564, Urbandale Station, Des Moines, IA 50322.

LOOK no further for an EZ deal on ICOM, Yaesu, Drake, Swan, Cushcraft, Dentron, KLM, Larsen, VHF Engineering, Wilson and more. Call, see or write WØEZ, Bob Smith Electronics, 12 South 21st Street, Fort Dodge, IA 50501. 515-576-3886.

CLEANING House: Variacs — $10, 6883-.75c, xsistors-.05c, Zeners-125v-.10c, Tek-Plug-In-$25, Meters-$3 List S.a.s.e. M. Meinwald, K2JSO, 3522 Ave. "S" B'klyn, NY 11234.

WANTED: Hallicratter receivers and parts, any condition, for private collection. Also want HT-33-B with manual — must be mint — write C. Dachis, WD5EOG, 4500 Russell, Austin TX 78745.

SOMETHING new, solid brass doorplates 1-3/4" X 5" engraved with name and call. Postpaid $3.25 Ben Walker P.O. Box 11603, Raytown, MO 64138.

LOWEST prices on KLM, Dentron, Hustler, Cushcraft, Larsen, Nye. Typical prices: Cushcraft Rangers $26.95, Hustler 4BTV $78. ppd. fm xtals $3.95. Order/write Ferris Radio 308 E. Harry, Hazel Pk, MI 48030.

WANTED: Barker and Williamson model 51SB-B single sideband generator; also original owners manual National. NC173. Norm Parker, WD6ANA, 5448, Briggs Ave., La Crescenta, CA 91214.

28KSR Teletype for sale. $500. Dean Chandler 5116 South Woodlawn Ave., Chicago, IL 60615 312-643-3353.

BI-LINEAR Amplifier, 2-30 MHz, 60-150 watt. Construction plans, $3.00. Wilson, Box 5516-Q9, Walnut Creek, CA 94596.

WANTED!!! Johnson SSB adapter (any condition) for Johnson Viking Valiant Transmitter and Technical Materials Corporation SSB adapter — model GSB-1, call 201-477-4096 or 201-363-2853.

COUNTER, 30/300 MHz, 7 digit, miniportable (4"X2"X4½"), .0001% accuracy, internal batteries or external 8 — 15 vdc (mobile). Plans only: $5.00 Complete kit: $119.95. FC300, Wilson, Box 5516-Q9, Walnut Creek, CA 94596.

SELL: CDR Ham II Unused. $125. 500' RG8/U coax polyurethane diaelectric $90. 500' 8 wire cable round $75. W1GWA 2307 North Benson Rd., Fairfield, CT 06430.

BROADCASTING! Become a DJ, technician. Pass commercial license exams. Start your own station. Receive free records, tapes, equipment. Learn details free. "Broadcasting", Box 5516-Q9, Walnut Creek, CA 94596.

DESK console equipment cabinet. Build from design drawings, photographs: $4.75. Bill Morris WA5RSC P. O. Box 411, Lubbock TX 79408.

MANUALS for most ham gear made 1937/1970. List $1.00 postpaid. WØJJK, H. I., Inc. Box Q864, Council Bluffs, IA 51501.

CASH for any Collins unit, 618T, 490T, modules, parts, accessories. Air Ground Electronics, P. O. Box 416, Kearny, NJ 07032.

WANTED: Pre-1925 QST magazines. W6OU, 529 Kevin Way, Placentia, CA 92670.

CUSTOM engraved accessories for the ham and hamshack: 1 X 3" call letter name badge in red, blue, yellow, orange, black, white, wood grain, gold, silver. Ur name and call — $1.75. 2 X 8" desk sign w/acrylic base — wood grain or black — 4.50. The Elbridge Engraver, Box 118, Elbridge, NY 13060.

YOUR call sign or name or initials engraved on distinctive clear lucite key ring. Great holiday gift. Two styles: 1" X 2-3/4" 8 character max $4.50; 1½ X 5" 14 character mzx $5.50. Action Products, Box 89 Reisterstown, MD 21136.

DRAKE TR-3, RV-3 and AC supply. Excellent condition. $400. Will sked. K6TGE, Route 3, Box 57, Fallbrook, CA 92028 714-728-777.

COLLINS repair and alignment, $75. Former Collins engineer, First Radiotelephone, Extra, Calibration laboratory. K1MAN 207-495-2215.

TEN-TEC Argonaut transceiver with calibrator, microphone, power supply — $320. Mint condition. WB9CQH, 815-732-2501.

WANTED for personal collection — issues of Shortwave Craft and Radio Craft Magazines from the 1930s. Highest prices will be paid. K2JFJ 122 Bellevue Ave., Butler, NJ 07405.

SILVER plated 4-kw pi-network tank coils. Rugged — a bargain at $28/SET. Several sets available. Specs write — K8RA, 2165 Sumac Loop South, Columbus, OH 43229.

FOR SALE: Viking Valiant II, SX-101A, T/R switch WB2KWF 201-575-9219.

EXCESS equipment for sale. (1) Motorola HT-220 two channel slim-line with batteries, 142.125 MHz, excellent condition, H23FFN-1100E series, $200. (2) Motorola HT-220 single channel universal with batteries, 141.100 MHz, excellent condition, H23FFN-1104D series, $250. (3) General Electric Mstr 120 watt two meter transmitter strip, 141.100 MHz, excellent condition, with tubes, $100. (4) Comm Co handie talkies single channel, in excellent shape and with batteries, fully operational, 148.16 MHz, asking $75, each. (5) EBC-144 Jr. synthesized two meter transceiver, very good shape, with bracket, etc., asking $300, or make offer. (6) Altair (S-100 buss) four kilobyte memory boards, assembled, tested, asking $50. each. Write Michael Russell, USNAVCOMMDET Sigonella, FPO New York, NY 09523. All inquiries will be answered.

WANTED to buy: EIMAC 1000T tubes and technical material corporation antenna couplers, models BAC-1 and BAC-2:, K8CCV, 5471 Norquest Blvd., Youngstown, OH 44515.

FOR SALE: 8 room - 2-1/2 baths — colonial — excellent condition, all carpeted, gas heat, corner hill in beautiful Glen Cove, Long Island. 3rd floor radio room complete — 40 ft. tower, concrete base, 2-element 3-band quad. Phone after 6 PM 516-671-4997.

FOR SALE: Drake DC-4 mobile supply. Used only a few hours. Mint condition. $99 anywhere in the 48. WB1AUD, 203-229-0470 after 6 PM Eastern.

YAESU Equipment owners — Present or prospective —join the six-year old, 2500-member, 42-country, International Fox-Tango Club. Members receive valuable monthly newsletter, money-saving purchasing service, technical committee consultation, free ads, FT net, more. Back issues of newsletter available from 1972. To join, send $5 for calendar year (includes all 1977 issues of newsletter) or $1 creditable towards dues, for complete information and sample newsletter. Milton Lowens, WA2AOQ/N4ML, 248 Lake Dora Drive, W. Palm Beach, FL 33411.

COMPLETE Rohn 58ft. tilt-over tower with guying materials, erection fixture. Sacrifice $400. Pickup or deliver Los Angeles area James Collier, W6NSX, 213-641-5456.

SB-101 w/accps, Heath Revisions for '102', WWV good condx, best bid over $300. WA2DMC, Andy. 201-822-2619. Chatham, NH.

WANTED: KWM2 & power supply. Also antenna tuner. L. Daniels, 22 Ridge Lansford, PA 18232.

SB-101, HP-23, CW filter, documented modifications providing RIT, WWV & more, $400. Magnum Six for Heath $100. Jim Stahl K8MR, 3592 Atherstone Road, Cleveland, OH 44121. 216-381-7030.

SELL: Regency HR-440, used less than 1 hour, mint in box, sacrifice, $275 or best over, will ship, Ron Hallmark, WB4FOY, 35 Hunters Trace, Pelham, AL 35124, 205-663-7018.

HW-16, excellent condition, $90 John Metzger, RR 1, Bryan, OH 43506, phone 636-2745.

COLLINS 312B5 station control W/VFO, will ship UPS, $400. firm, WA2VCP 201-377-8799.

SPECTRUM Analyzer, Panoramic SB12a, laboratory grade, not a toy. Can accurately measure distortion products of received signal through your rcvr. If nominal 500 kHz, set for 455 kHz. With external sig. gen. can be used for any if or xmtr to 30 MHz. This model tough to come by, rare to find used. Working unit, no mods, mint condx. W/manual. Pick up, $475 WA2VCP 201-377-8799.

APACHE SB-10 wanted, any condition, WA2ECI, A. Eckman, 11 Fort George, NYC 10040.

HP 400D, 200C, R.C.A. WV 98C, G R 724A wavemeter, Ballantine 320, SB-10 with p.s., all at $50 each. Co-ax RG9U or 214U 25c a ft. WB2CYU 201-335-2573.

SELL: Heath DX-40 xmtr., excellent — $37; Science Fair 100-1 project kit — $17. Both postpaid. WN9PDL, 3517 Libal, Green Bay, WI 54301.

ICOM 215 $175, Yaesu FV-101 $70. Mobile antennas: Webster 160 meter $40, Hustler 40 meter $25 Tatar, 1625 North Park, Cleveland Hts, OH 44106.

SELL Essentially new R-390-A; two model 28 teletypes and two CV-417 solid state converters. $1000. pick up. W4AIS, 306 Thornwood Drive, Taylors, SC 29687 1-803-268-2518.

FOR SALE: Ten-Tec Argonaut 509 transceiver Drake mic ac supply key $240 Clegg Mark 3 two meter fm transceiver for 12 channels 15 watts $135 shipping prepaid offers considered. George Konnick, Spt. C5, 1750 West Main St., Riverhead, NY 11901.

BOOKS Wanted: Vhf For the Radio Amateur by Jones; Vhf Ham Radio Handbook by MacKinnon; RSGB Vhf/Uhf Manual 1st edition; MIT Radiation Lab set; Electromagnetics by Kraus; Radio Antenna Engineering by Laport. Good condition, reasonable prices please. Jim Kearman, W1X?, RFD, Collinsville CT 06022.

ANTENNA wire: New 14 guage solid, enameled, copper wire; lengths greater than 100 ft. 5c/Ft. Add 10% for shipping. B&B Wire P. O. Box 530, Milton, MA 02186.

DIGITAL multimeter, commercial De Forest MM-200, ohms, AC-DC volts and current, internal battery and charger, like new $90. K4JK 7801 Horseshoe Trail Huntsville, AL 35802 205-881-5008.

FOR SALE: Collectors item. E. F. Johnson Co. Viking Avenger. Solid state 10-80 meter transceiver, AC & DC supplys and many spare parts. A-1 working condition. As shown in 1969 WRL catalog. $850. KØJM/WAØJUM 605-845-7508.

MINT Collins 75S3C meatball with both cw filters new tubes, 3253A wing factory overhaul 7/77 new tubes & power supply, spares. All A-1 call Bill Levy 914-241-0251 $2400 takes it.

WANTED: Schematics, manual or any information on Morrow Twins. Also need dial but will buy whole unit. WB7ODA, 356 E. 9th N. 84321.

KENWOOD TS820S digital xcvr w/cw filt. new $935. Redman, K8DR 1770 Ivanhoe Ct., Col., OH 43220. 614-457-1486.

FOR SALE: Kenwood TS-520, excellent with cw filter $500. N2NA, 201-427-0616.

TS-820S $925 Standard HT $190. Jerry Holmes 17 Highfield La. Madison CT 06443.

SALE Instructograph 500 with 11 tapes $65 Like new — George Diament, 15 Rugby Ln., Bridgeton, NJ 08302.

OLD QSTs wanted, also Motorola HT-100, state prices, condition. W1BL, via K1TFA.

FOR SALE: Drake T-4XC, AC-4, cables & manuals. Brand new, never used. $550. Certified check only. Will ship. Crowell 640 Stonehenge Drive, Mary Esther, FL 32569. 904-244-0307.

KENWOOD TS820 with Digital readout cw filter, 6 mo. old. $899, Phil Laspina, 33 Gloria Ann Smith Dr., Bricktown, NJ 08723.

DRAKE C-4 station console wanted. Mint, reasonable priced. W8GZX, 3008 Revlon Drive, Dayton, OH 45420.

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, KS 66204. 913-381-5901.

JOHNSON Ranger or Valiant wanted. KØMNA, Bill Downs, 4805 Sullivan, Wichita, KS 67204. 316-838-5385.

WANT: Metal Loktal tubes 7A7LM, 7B6LM, 7B8LM, 12B7LM. For display need not be operative. Walt Lehnert, 5209 Minnehaha Blvd, Edina, MN 55424.

WANTED: Collins desk mike SM-2. WA2JCJ Hanzl 35 Franklin St., Carlstadt, NJ 07072 201-939-2237.

SELL: Heathkit HW-101 w/p.s. $325. Heathkit Lab Gen. IG-42 $40. Heathkit Capacitor checker IT-28 $25. Heathkit Vectorscope/Colorbar Generator 10-101 $100. With manuals. Pomona high voltage probe w/case Model 3295 $20. Will ship UPS, Ronald Watts P. O. Box 121 Soda Springs, ID 83276 208-547-3715.

WANT: Collins 32S-1, any condition. K1MAN 207-495-2215.

DRAKE R4-C, NB, 1.5, .5, .25 filters, 160, 10 xtals, T4X-C, AC4, MS-4, W4, Henry 2K-4, all mint. $1800, RCS-4, new, $90. SB-610, $70. SB-620, $90. 220' RG-17U, new, w/conn's, $140. Large prop pitch, will turn and hold any antenna, $150. Hy-Gain 400, rotor ok, controls basket case, $100. Mike Renzen, WAØPAO, RT 1, Fulton, MO 65251, 314-642-8780.

TECH Manuals for Govt. surplus gear — $6.50 each: SP-600JX, URM-25D, OS-8A/U. Thousands more available. Send 50c. (coin) for 22-page list. W3IHD, 7218 Roanne Drive, Washington, DC 20021.

SWAN TV2-B two meter transverter, $200, 2.5 kw PE-75 generator, pick-up only $200. K3RYL 215-691-0669.

COLLINS 75S-3B with full set crystals; 454 Hz mechanical filter; winged emblem; superior condition. Write or call $525 R. Berwanger, 2214 Furnace Rd., Fallston, MD 21047 or 301-692-5201.

SB-110A $350, SB-500 $175 SB-301 all exc. cond. KIGAO 59 Eastern Ave., Woburn, MA 01801 617-933-3965.

4-250A mint condition $12.50 Charles Lalloz 625 N. Kelly St., Statesville NC 28677.

HEATH SB104 Xceiver, 104-3 cw filter, HP1149 ACPS, matching Blondertongue twin speaker $515. Cope 5011 F. St. Little Rock AR 72205 501-666-7504.

SB-303 Heath Receiver, VGC, with manual. $250. Al Sudeikis 4316 N. Albany Ave., Chicago IL 60618 WB9NMA 312-478-4156.

SELL Hallicrafter 101-A New tubes, fresh alignment, manual- works perfect $165. Millard Johnson, 566 N. 9th Laramie WY 82070.

FOR SALE: 2 element multiband minibeam K6HO 714-586-2247.

CLEGG Zeus — 6 & 2 meter, 150W, AM & CW transmitter with p.s. and spare 4x150A final $200. Heath HX-30 six meter SSB transmitter $125. Both shipped freight collect. WA2KOI, Lloyd Schoenig, Box 407, Rio Grande, NJ 08242.

SB-230 used one year. Absolutely perfect. After 14 day trial, you pay $350 or return. W4QCU, 904-743-5938.

WANTED: 40' to 50' crank-up/fold-over tower. Richard Schweizer, WB2PCF 20 High Ridge Road, Monroe, NY 10950 914-782-0673.

FLORIDA, 2- BR home&garage, KW SSB station, quad antennas, 1000 ft. chain link fenced plot, 450' on Rt. 315, $29,990. Write W4ZO, Tel (NY) 212-639-3982.

WANT Motorola Metrom 2mtr rig with offset boards. Write WA2RUD, Bill Levy 349 Old Roaring Brook, Mt. Kisco, NY 10549.

COLLINS KWM-2A, 312B-5, 516F2, Magnum-6, all late round emblem all with manuals $1800. WB2HDE 212-592-9769.

COMPLETE Novice rig $100. Knight T60 & R100A, incl. Manuals, SWR-ant relay & key. WA6UHQ P. O. Box 201, Alhambra, CA 91802.

FOR SALE: National SW-3 receiver, two pairs of coils, all tubes. Clean, estate item, operating condition unknown. $100 W5FR, 713-488-0517.

C & I Communications has added Larsen and Dentron to it's line-up of KLM, ICOM, Hy-Gain, Cushcraft, MFJ, Regency, and Bowmar. We're making some of the best deals around. Before you buy call C & I. C & I Communications. P. O. Box 52, Cambridge City, IN 47327. Phone 317-478-3749.

WANTED — Drake 2-B/28Q — RW 160-10 ant. tuner W4PNO M.W. McMillan Rte. 5, Box 47 Decatur, AL 35601.

QUALITY Stainless threaded, washer, hardware! Guying accessories! Lists 20c! W8BLR, 29716 Briarban, Southfield, MI 48034.

ULTIMATE Transmatch, 500 W., Cardwell caps., SWR bridge, twin meters, $75 plus freight. QRP & W. 40 meter cw transceiver, MAVTI 40, QST June 1975. Regulated AC PS, $45 plus freight. WB6NAM, 41 Castle, San Francisco CA 94133.

WANTED 30L-1 or 30S-1. WB@WNU, 303-667-2777.

QST 1932 through 1965. Best offer. Helen Hooper, Box 230-G, Lusby, MD 20657.

TRITON IV Digital and 262 G power supply with external VFO-242, noise blanker and cw-filter $1025 K8CVV, 313-549-2353.

SELL: HT32B $200; SX100 $85; SX71 $70; CDR ham rotator $50; 2kw linear, deluxe rack, unfinished $60; Heath HW22, DC supply $60; BUD 72 inch deluxe rack $50; Viking II, dual command VFO $75. 225 Fulton, Portland TX 78374; 512-643-5286.

COLLECTOR ITEMS: Collins 75A2, SN183; 32V2, SN2450, both operational, both for $135. Also: Galaxy V mark 2, SC-35 speaker, AC-35, DC-35 supplies, complete for $295. K@USC; 1014 East 22nd; Hutchinson, KS 67501.

HOSS-Trader Ed says "We refuse to be undersold, If you didn't buy it from the Hoss you paid too much. Shop around for the best price then telephone the Hoss last." New Demo Atlas 210X transceiver, $519. New Drake TR-4CW, $529. New Display Swan 700CX, $519. Demo T-4XC, $489. New Rohn 50' Foldover tower prepaid $439. Display Atlas 350-XL, $765. Icom-225, $245. Used Ham-II Rotor, $89. Used Atlas 210X, $459. Display Mosley TA-33 Beam, $159. Hoss-Trader, Specials: New Dentron 2000 watt linears on sale, $475. Demonstrator L-4B linear, $695. 30 percent discount on new Collins equipment, or make offer. Moory Electronics Company, P. O. Box 506, DeWitt, AR 72042. Tel.: 501-946-2820.

JOHNSON Viking 275 watt Match-Box $75. K8CVV 313-549-2353.

MFJ Keyer, speech processor, ssb and cw filters all in one Ten-Tec Box $100 K8CVV 313-549-2353.

CALL Letter license plates wanted for collection. Will pay postage. ARt Phillips WA7NXL, Box 201, Flagstaff, AZ 86002.

SELL Heath GX-60B with manual, very good condition, $65 postpaid. WB4WME, 5117 Foxwood Road, Knoxville, TN 37921. 615-588-3987.

FOR SALE: HW-16 transceiver, HG-10-B VFO, HS-24 spkr. $230, new; perfect condition, factory made. WB3EPV, 215-876-7548. 1245 12th St., Eddystone PA 19013.

FREE newsletter listing personal ham gear for sale. Send full description, price. PAN, 27 Madison Springs, Madison, CT 06443.

WANTED: A good used KLM 70cm. Also interested in used tower, self supporting 40, 50 or 60 ft. Contact WB9VAV at 225 Main St., Newington, CT 06111.

GALAXY V MK111 transceiver, crystal cal, mint condition $295. AC400 power supply $95. G1000 DC supply new $95. Boord WB2YLJ 2940 W. 5th St., Brooklyn, NY 11224 212-266-9323.

2 METER: ICOM IC22S, exc., wired for Synthacoder, $225; Synthacoder, new, $65; package $285. Wilson HT 1402SM, Digitran TTP, nicads, ext. spkr/mike, 52/52, 16/76, 25/85, 28/88, 34/94, 148.01/143.99 (+22/82), $190. Cushcraft DX-220, 40-el. horiz. array for 2M-SSB, $95. L. S. Van Orden, WB@QFQ, RR. 2, Iowa City, IA 52240; 319-351-8038.

HALO/SQUALO used/new wanted for six meters W9NTU 311 Burr Oak, Deerfield IL 60015.

WANTED: Drake TR4 or TR4C. Please send details. WB2JJU, 5 Wayne CT., Ardsley, NY 10502.

SELL: Hallicrafters SR2000 2KW transceiver with P2000 PS. Includes 4 spare 8122 amplifier tubes plus large number of spare parts. $700 not include shipping. Ty Bean W3DJD 532 Babylon Rd., Ambler PA 19002.

SELL: Heath TX-1 and RX-1. Good Novice station. Best offer-nothing reasonable refused. SB-10 also available. WA1TZK 225 Main Street, Newington, CT 06111.

SELL: Heath RF load wattmeter HM-2103 perfect, mint, cost $60, sell $45 Dr. Jack Robinson W@RJZ Box 466 Creston IA 50801.

COLLINS 75S-3B, round, mint, $775; 32 S-3, excellent, $680; 30L-1 linear, $450. Heath SB-500 2M transverter, $150. K2KIR, 315-458-0940.

DRAKE R4B, T4XB, AC4, MS4, All mint condition. Cartons, manuals, cables. Pkg. only $675. Shipping extra. W2NZG 201-427-3893.

SELL or swap for equal value, Bell and Howell film-sound motion picture projector 16mm model $400. Bob Ed, 7 Circle Rd., Millersville, PA 17551.

EXCELLENT, repair, modification, alignment all types of radio gear. 18 years experience, FCC licensed, reasonable rates. W6PXL Karl Quigley P. O. Box 1112 Felton, CA 95018 408-335-7520.

1YR. REN begin Sept. 77 iss. Attn: Atkinson-Ind Arts Dept., Columbia Heights Sr. High, 1400-49th Ave NE, Columbia Heights, MN 55421.

WANTED Atlas 180/210X. Trade or sell — Midland 13-500 12-ch 2M transceiver, Eumig television camera with zoom lens; both new with warranty. W6DOM, 6017 Majorca Ct., San Jose, CA 95120 — 408-997-0132.

FREE Gift with each order. Radio wholesale! Where you get a good deal and same day service too. We are direct factory dealers for Yaesu, Drake, Ten-Tec, Hustler, Tempo, Midland, Swan, Dentron, Atlas, Mosley, KLM, KDK and many more. We give the best trade-ins! Mail the trade deal you will accept to us. We will honestly try to deal. Large inventories at all times — same day shipment, UPS, COD, BAC, MC. Call us today 404-561-7000. Radio Wholesale, P.O. Box 7334, Columbus, GA 31908.

EIGHT new 12V coaxial relays, $5 each. Stamp for cleanup list. W4API, Box 4095, Arlington, VA 22204.

HASSLEBLAD 500 C, speed focus ring, film advance speed crank and trigger handle - original boxes - hardly used. Would like to trade for late S.N. KWM-2 (round emblem) and 516 F2 pwr supply or mind condx rig of equal value. Dudley Spears K4GDH, 502-864-5154.

REGENCY HR-212 transceiver. $120. delivered. W8QX, box 452, Birmingham, MI 48012.

HQ-100 Hammarlund general coverage receiver 500KC-30MC. Very good condition $60. Local buyer preferred. W6WY 213-661-4189.

HEATHKIT HX20, HR20, HP20, manuals, good working condition, transmitter needs some work, college forces sale, only $175, Jack Ridgway P.O. Box 523 Castroville TX 78009 512-684-3221.

FOR SALE: Wilson 1402SM 2-meter Handie Talkie, with battery charger, nicads, rubber duckie, carrying case, and external microphone, all in great shape, for $170 or best offer. Mark, WA2SHR, 25 Villa, Eatontown, NJ 07724. Call 201-542-7053 after 6 PM for info.

WANTED, Drake RV4C and AC4/MS4, will pay $60 ea., also any old pocket watches, any cond. Have lots of parts to swap for them. Sell TMC table top rack cabinets 8-3/4 × 19 panel $35 ea. Collins F455F15 $40 ea. A. Bruno, 24 Butternut Dr., New City NY 10956, 914-354-8899.

HEATH SB4100 factory fresh $160, SB 610- $100, WB0RKC.

WANTED: Drake TR4C, AC-4 power supply and C-4 console. All in excellent condition. K4HVL, Fuller, 4970 Sandersville Rd., Old Hickory, IN 37138 Phone 615-847-2655.

HEATH SB102 mint, HP23, HP13, speaker, mobile mount $450 WB4STF 205-661-9147.

WANTED: Hallicrafters HT-6 transmitter, Grebe CR-5, RORK amplifier, state price, W3HWT, 329 Evergreen, North Wales, PA 19454.

NEED B&W TR-Switch, W7KIZ, 1402 Craig, Moses lake, WA 98837.

SELL: Lafayette police receiver PF-300 VHF hi/lo & VHF mint condition. $70. R. J. Colarusso P. O. Box 581 Alpena MI 49707.

MADISON Super station buys — call quote FT301D, FT301, FT101E, TS820S, TS820, TS520S, ETO-ALPHA, Tempo 2020-sealed cartons. New demo Alpha 374 1260.; FT101E demo 650. TS700A, list 599., call; HamX rotor, turns 28Sq. ft. antenna 289.; Kester 1LB 60/40 solder .062 6.50/lb; Bird 43 wattmeters; technical books; Swan SWR1A 21.95; WM6200 VHF wattmeter 49.95; Hygain 18V vertical; 2BDQ dipole 39.95; Ham2 rotor 129. Belden 8 wire rotor cable 14c/ft; 8214 RG8foam coax 23x/ft; Amphenol PL259 59c; call quotes unlisted items. Prices fob Houston, subject change without notice, all items guaranteed. Madison Electronics Supply, 1508 McKinney, Houston, TX 77002. 713-658-0268.

WANTED Used vibroplex, triband quad/beam state model, condition. Have 455 kHz Collins 200 hz filter. Trade for 500 Hz. N1FB 4 Roberts Rd. Enfield CT 06082.

SACRIFICE: New Triton IV digital, 262G PS, 215P mike, original boxes and warranty cards. $880. W5TKZ Rt. 7 Box 149F Tyler, TX 75707.

TV CAMERA: New, mint condition, RCA-TC1000 TV camera. Random interlace video output. In original carton with manual. $200. W1SE, 203-667-2494 7:30 to 5:30 Tues thru Fri.

SELL mint SB220 amplifier want mint Ten Tec, Argonaut, Bill Levy, 914-241-0251.

TIE one on you will be pleasantly surprised. Green Balun Insulator, W1CPI.

DRAKE R4C $430, T4XC $430, L4B $570, C4 $360, MS4 $20, AC4 $80, DC4 $90, TR4 $380, MC4 $50, Johnson 1KW matchbox $150, Magnum 6 $95, Millen Antenna bridge $20, Millen Grid Dip meter $90, B & W Coax Switch $5, Heath SWL Meter $10, CDR antenna rotor $100, Turner Mike $35, Telex earphones $25, All instruction books cabling and coax. W8QQW, Box 4271, Copley, OH 44321 216-666-9203.

SELL: Heathkits: IO-4530 Oscilloscope $250, IP-2711 30V, 3A power supply $180, IO-101 Vectorscope $100, IG-18 audio Generator $80. Towner, N9HT, 534 Lucile, Elgin, IL 312-695-9030.

HEATHKITS built. 20 years experience. Write for details. K4TO, 1207 Monte Sano, Huntsville, AL 35801.

FOR SALE: RME6900, Dentron 160XV, Eico 753-752-751-CAL, HW7 w/ps, SR34AC, COM IV — 6M, SB10, Globe Hi-bander, TX-1. All excellent condx, with manuals. Send offers to — Joseph Bedlovies, 30 Ridge St., Milford, CT 06460.

ITC Multi-2000, $420. Bearcat 101, $220, Excellent. Karl Thurber, General Delivery, PSC no. 2, Maxwell AFB, AL 36112.

FOR SALE: Johnson Ranger, good condition. Best offer W7JKA, Doersam Box 284, Glenbrook, NV 89413.

WANTED: Drake 2C receiver and accessories. Paul Binstock, W0DXG, 525 Harriet Ave., St. Paul, MN 55112, 612-484-3268.

DRAKE 2-NT cw transmitter for sale. Mint condition with QRP switch in rear (5 watts). I'll ship free in USA for $100. Lee Nelson Box 53952 Lafayette, LA 70505.

WANTED: SB-220 or Alpha linear. Good or better cond. FL area, or must ship. WA4GIJ 305-655-2773.

SIGNAL/ONE CX7B $1595; CX7A $1295, immaculate, warranty. Demo Alpha-77(D)(5), Payne Radio, K4ID, 615-384-2224.

HEATHKIT DX-60 $75 — HG10B VFO $55 — Hallicrafter S85 $65 Q Multiplier $15. All excellent. K2CSA 201-349-4152.

STOP LOOKING for a good deal on amateur radio equipment — you've found it here — at your amateur radio headquarters in the heart of the Midwest. We are *factory-authorized dealers* for Kenwood, Drake, Tempo, Ten-Tec, Collins, ICOM, Atlas, Regency, Swan, Midland, Alpha, Standard, Dentron, Hy-Gain, Mosley, Cushcraft, and CDE, plus accessories. Thousands of thrifty hams from coast to coast already know us and we invite you to join them by writing or calling us today for our low quote and trying our personal and friendly Hoosier service. Hoosier Electronics, P. O. Box 2001, Terre Haute, IN 47802. 812-238-1456.

QUAD kits from $16.25 to $30. Send s.a.s.e. for information. WAC, 404 Sanders Rd. SW, Huntsville, AL 35802.

MOTOROLA HT-200 — case, nicads, 28-88 $125 also 6 freq. deck for HT-220 $50 Mike Ray 309 E. Houston, no. 207, Dayton, TX 77535.

COLLINS for sale. KWM-2A, round, mint, 30,000 series serial, $1,200. Round 516-F2 supply with SWM-2A above, $120. Round 312-B4 $185. CP-1 crystal pack $125. 75S-3B, wing with 200 Hz filter $675, 312-B4, Wing $165. 30L-1, round $500 — K6RLY 916-961-4031 days, 916-961-4603 eves.

SELL: Collins S-Line, 10 months old, mint, package deal only includes 32S-3A, 75S-3C, 516F-2, 200Hz and 500Hz filters, $4400. Also Round Emblem S-Line, clean, excellent condition, seven years old, includes 32S-3, 75S-3B and 516F-2, $1800. KLM 40 meter beam, never used, still in shipping carton with balun, $450. Drake L-4B Amplifier, $550. Mitlen solid state dipper, $95. DX Engineering Speech Processor for 32S-3, $65, John Comella, 27241 Markbarry Drive, Euclid, OH 44132. 216-261-4546.

NOVICE needs Heath HG 10B VFO in good condition. S. F. Goodman, 9 Larchmont Crescent, Newport News, VA 23606, 804-596-7461.

WANTED 5X-146 S-meter. T. E. Coates, W3HHB, 14303 Barkwood Drive, Rockville, MD 20853.

GOTHAM Quad, like new $27. W9AUV La Grange IL 312-246-3452.

SELL Eico 720 transmitter 10-80 mtrs 90 watts mint $70 or best offer. Trade Heath 8 channel R/C system on 72 MHz 2 frequencies for ham equipment. WD4DKZ, Terry Rapp, 936 Mtn. Crk. Rd., 4-259 Chattanooga TN 37405.

WANTED: Surplus command receiver and transmitter for 80 meters unmodified and good condition only. George Bailey 600 West Kiehl, N.L.R. AR 72116.

R-4C, FL-6000, FL-1500, FL-500, FL-250, 4-NB noise blanker, 12 xtals and MS-4 speaker $650. T-4XC, AC-4 matching network with Waters 384 dummy load $130. SB-610 monitor scope $100, SB-620 scanalyzer $120. SB-630 station console $75., SB-650 freq. disp. $150. Astatic T-UG8 transistorized stand with Astatic 77L dynamic cardioid microphone $75. Brown CTL-A paddle and key $25. Everything above mint $1750. Ralph Conner, WA3OBW, 149 Gladstone St., Phila. PA 19148 Phone 215-HO 2-9293.

W5NW and N5ZZ need KL7 on 160 meters for WAS any skeds will be appreciated, N5ZZ, 301 Sundown El Paso, TX 79912.

QSTs for sale. 1917 five issues, 1919 five issues, 1920 eight issues, 1921 to date complete all in binders. Also many duplicates. CQ Magazines 1945 through 1968 complete years all in binders. Make offer for complete lot. A. Spiro W2AO 163 Bedford Center Rd., Bedford Hills, NY 10507.

NAME Badges: 2 lines $1.50, 3 lines $2.. Tom Baustert W2MEO, 6664Q Bishopp Road, Rome NY 13440.

YAESU FT-221 2m Multi-mode transceiver, $475. Mark, KØLG, 1344 Scrub Oak Circle, Boulder CO 80303. 303-494-0710.

THE VIDEO AMATEUR is a new publication of, by and for the video enthusiast. Look to us for service tips, modifications, bargains on video gear and a wide exchange of products and information. Send for a free copy to P. O. Box 250, Coyote, CA 95013.

COLLINS 75S1 mint condition $325 MPI $79. Mobile bracket $45. 516E1 $120 KLM Multi 2000 $485. Wanted HT37 HT32B Ranger HA 410 G28 Also Novice VFO and crystals. Crystal pack for SB401. John Gadstys W2FNT 18 Hillcrest Ter. Linden NJ 07036 201-486-6917.

BALUNS: Only three W2AU, 4:1 type. New, in original boxes, $10, postage paid. W1SE, 283 Tremont Street, Newington, CT 06111.

2 MTR. Xtals $3.95 plus $.50 postage per order. Write for prices on ICOM, Dentron, Nye Viking, Hy-Gain, Cushcraft, Hustler. Omaha Amateur Center 5347 No. 30th Street Omaha, NE 68111 402-453-3344.

MOTOROLA Pagers, I, Pagecom, excellent condition Hi-band WA9III 1700E Jackson Springfield, IL 62703.

WIDE BAND preamp probe. Increase the sensitivity of counters or oscilloscopes 10 times. Measure low level rf without connection to circuit. 10-500 MHz $49.95 to order call toll free 1-800-828-7422, Davis Electronics, 636 Sheridan Dr., Tonawanda, NY 14150.

WANTED: Used correspondence course on radio communications. F. Cuillo, Box 145, Wassaic, NY 12592.

DRAKE AA-22 two mtr amplifier 25 watt, $95, K4HEM, 305-791-7481.

WANTED: New/factory rebuilt VFO unit for R390A receiver, R. Bennett 1913 Connie Lou Drive, Las Cruces NM 88001.

ROBOT sstv camera model 80 Robot sstv monitor model 70 Dumont Oscilloscope Type 304 a modified for a fast scan monitor All for $525. WB2LTS 516-643-2412.

SELL: Gonset III 2 meter with Palomar FM convertor also HA5 VFO best offer, WA2UGG J. Boritz 1560 Unionport Road, Bronx NY 10462.

SELL: 75, 15, and 20 meter New-Tronics 1kw super Hustler resonators, reconditioned new by factory. K1SEO 186 Sherman Ave., New Haven, CT 06511. 1-203-777-7371.

QST

I would like to join the mainstream of Amateur Radio. Here is my $12 ($13.50 for Canada, $14.50 elsewhere, including a postal surcharge) for one year's membership in the U.S.: $23 for 2 years, $33 for 3 years, $43 for 4 years and $53 for 5 years. Additional family memberships at the same U.S. or Canadian address, without additional QSTs, $2 per year.

My Name..... Call.....

Street.....

City..... State/Province..... Zip/PC.....

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MUST sell mint condition Kenwood TS-520, VFO 520, SP520, Heathkit SB-220, SB-614, scope, HD-15 phone patch, HM102 Wattmeter, Vomax SBP-3 speech processor, Autex Research QF-1 audio filter, electro-voice 664 mike and stand, best offer — all less than 6 months old. Will sell complete, or part. Call 201-627-6805 after 6 PM WB2AYP.

COMPLETE station. 75A-4, KWS-1, late serials, SB-610 monitorscope, SB-620 scanalyzer, SB-630 station control, matching speaker, all integrated. Excellent working condition. Demonstrate. Best over $1000. Will not separate. Your pickup. W8BPB 313-885-6591 evenings.

TEKTRONIX Model 535A scope with CA dual trace and manual. Good condition. $350. W8QW 305-334-8496.

WANT pre-1923 Marconi, DeForest, Grebe, Paragon, Murdock, Amrad, and similar gear and parts, spark gear, loose couplers, crystal sets. Advise condition & price. Mike White, 118 Countryview Drive, Naperville, IL 60540.

AWARD. If you have proof of contacts with all ten USA call districts you can get an award suitable for framing. Special operating achievements added on request. Data sheet available from W6LS, 2814 Empire, Burbank CA 91504.

KENWOOD TS-520, $450. Clegg FM-27B, $230. Collins 75S3C/2Xtals, $1200. Drake R4C/stals, $405. 2B/2AQ, $180; TR3/AC3 Calibrator NG, $350; TR4C/AC4/MS4/NB, $500. Galaxy 2mk2/AC/DC, $250. Heathkit HW7, $75; HW7/AC/CW, $120; HW12/AC, $75; HW 16 HG10B, $150; SB303/AM/CW SB600, $275; SB313/AM/CW/SB600, $285; SB102/AC/CW/SB600, $410; SB104, unbuilt, $550; SB644, unbuilt, $105. Tempo-one/AC repairable, $300. Ten-Tec PM3A, $80. Beacon Communications, 879 Beacon Street, Boston MA 02215, 617-267-1975.

WANTED: HG-10 V.F.O. Must be in good condition. Name price. WA4TKG 904-246-8173.

FOR SALE: 51-J-4, 3MFs, civilian model, see to believe like new, $1100, no ship; Murch UT-2000, never used in transmitting, ovfer; Squires — Sanders SS-1R, SS-IV, SS-IS, spkr., $450+, no ship; Hallicrafters SX-73, not-surplus, cleaner than most, no ship, offer. RAK P. O. Box 1304 S. Pasadena CA 91030.

COLLINS S-Line. 75S3B (round emblem) with 500 Hz filter, 32S3 (winged) with 516F2 (round). Immaculate. $1500. K1TN, 203-267-8288.

COLLINS F455 FA-05 CW filter for 75S3B. W8FAW/N4KG. 206-539-6805.

ELIMINATE QRM and QRN problems with our superior cw and ssb filters. Also speech compressors, power supplies, and multiband antennas. Dynamic Electronics, Box 896, Hartselle, AL 35640 205-773-2758.

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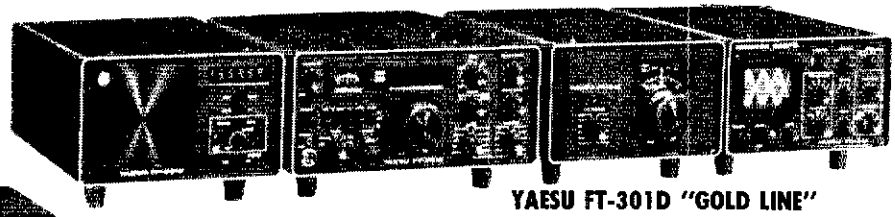
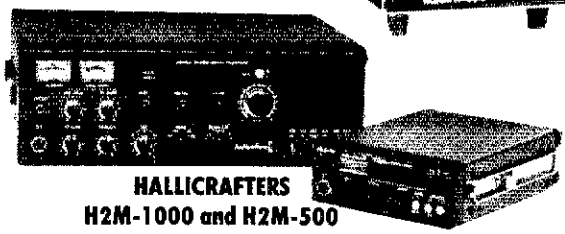


YAESU FT-301D "GOLD LINE"



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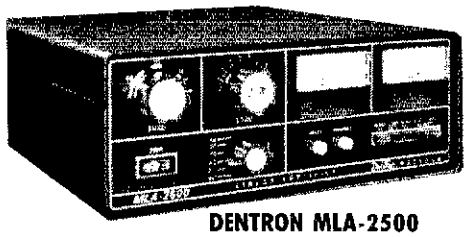

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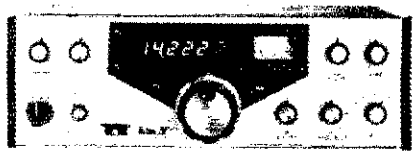
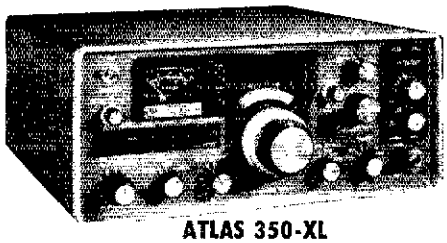


TEN-TEC TRITON IV



ATLAS 350-XL

DEAR OM:
There are TWO IMPORTANT FACTORS in any purchase of ham radio gear — the PRODUCT and the DEALER — or, in otherwords, WHAT you buy and WHERE or from whom you buy it. Hence, at BURGHARDT AMATEUR CENTER, we stock & sell AND Guarantee & S-E-R-V-I-C-E only TOP-QUALITY/BRAND-NAME merchandise plus we carry a COMPLETE LINE of operating aids & accessories to fill virtually every ham need. BUT, it's not so much WHAT we sell, rather HOW we sell it that's worth your consideration.

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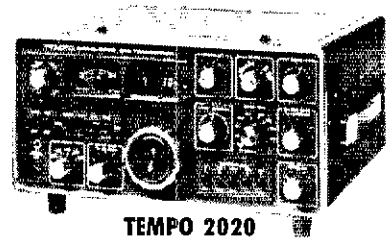
When it comes to FAST DELIVERY, HONEST DEALING and COURTEOUS/DEPENDABLE S-E-R-V-I-C-E, we don't just advertise it — WE GIVE IT!! Ham radio is our ONLY business, and as such, we don't pretend to be "Big Operators" or "Wheeler-Dealers" but choose instead to offer FRIENDSHIP and PERSONAL S-E-R-V-I-C-E plus RELIABILITY to those who realize there is MORE to a "GOOD DEAL" than just the "lowest price" available. In the final analysis, the "REPUTATION" of the DEALER standing behind your purchase is worth as much or MORE than the quality of the product itself.

SERVICE?? NO PROBLEM! It's OUR Policy.
In short, we S-E-R-V-I-C-E WHAT WE SELL as well as those we sell to, and we firmly believe that there is NO SUBSTITUTE for the kind of "GOOD" S-E-R-V-I-C-E that we are READY, WILLING and ABLE to provide you with. Sure, it may cost you a little more "NOW" — but, when you deal with us, it will SAVE YOU a lot of time, a lot of trouble and a lot of hassles in the long run. **WE'RE FOR REAL — THERE'S NO DOUBT ABOUT IT!**

DRAKE TR-4CW

KENWOOD TS-520S



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TS-520S

AND DG-5 DIGITAL FREQUENCY DISPLAY

FULL COVERAGE TRANSCEIVER

The 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-506 transverter, your TS-520S can cover 160 meters to 6 meters on SSB and CW.

DIGITAL DISPLAY DG-5 (option)

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

OUTSTANDING RECEIVER SENSITIVITY AND MINIMUM CROSS MODULATION

The TS-520S incorporates a 3SK35 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

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

VERNIER TUNING FOR FINAL PLATE CONTROL

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

FINAL AMPLIFIER

The TS-520S is completely solid state except for the driver (12B-Y7A) and the final tubes. Rather than subsitute 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.

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

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

A special jack on the rear panel of the TS-520S provides receiver signals to an external receiver for increased station versitility. A switch on the rear panel determines the signal path . . . the receiver in the TS-820 or any external receiver.

VFO-520 — NEW REMOTE VFO

The VFO-520 remote VFO matches the styling of the TS-520S and provides 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 (optional) allows for mobile operation of the TS-520S.

PHONE PATCH CONNECTION

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 easilly 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.

TS-520 Specifications

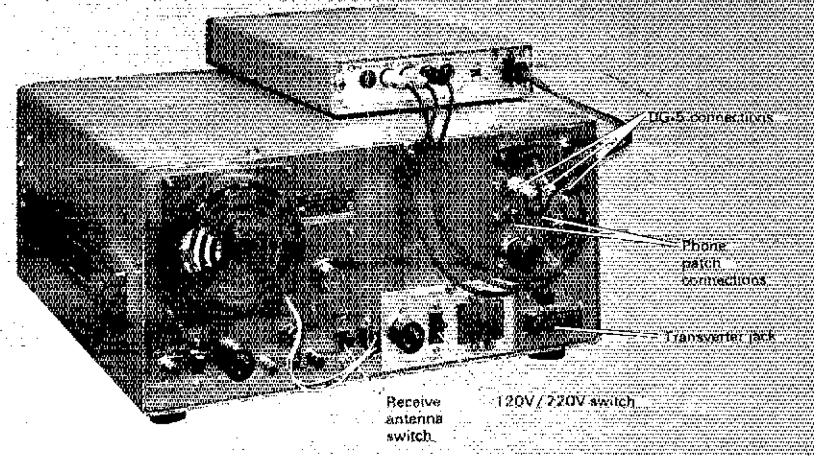
Amateur Bands: 160-10 meters plus WWV (receive only)
Modes: USB, LSB, CW
Antenna Impedance: 50-75 Ohms
Frequency Stability: Within ± 1 kHz during one hour after one minute of warm-up, and within 100 Hz during any 30 minute period thereafter
Tubes & Semiconductors:
- Tubes: 3 (S2001A x 2, 12BY7A)
- Transistors: 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)



The luxury of digital readout is available on the TS-520S by connecting the 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 dash-board 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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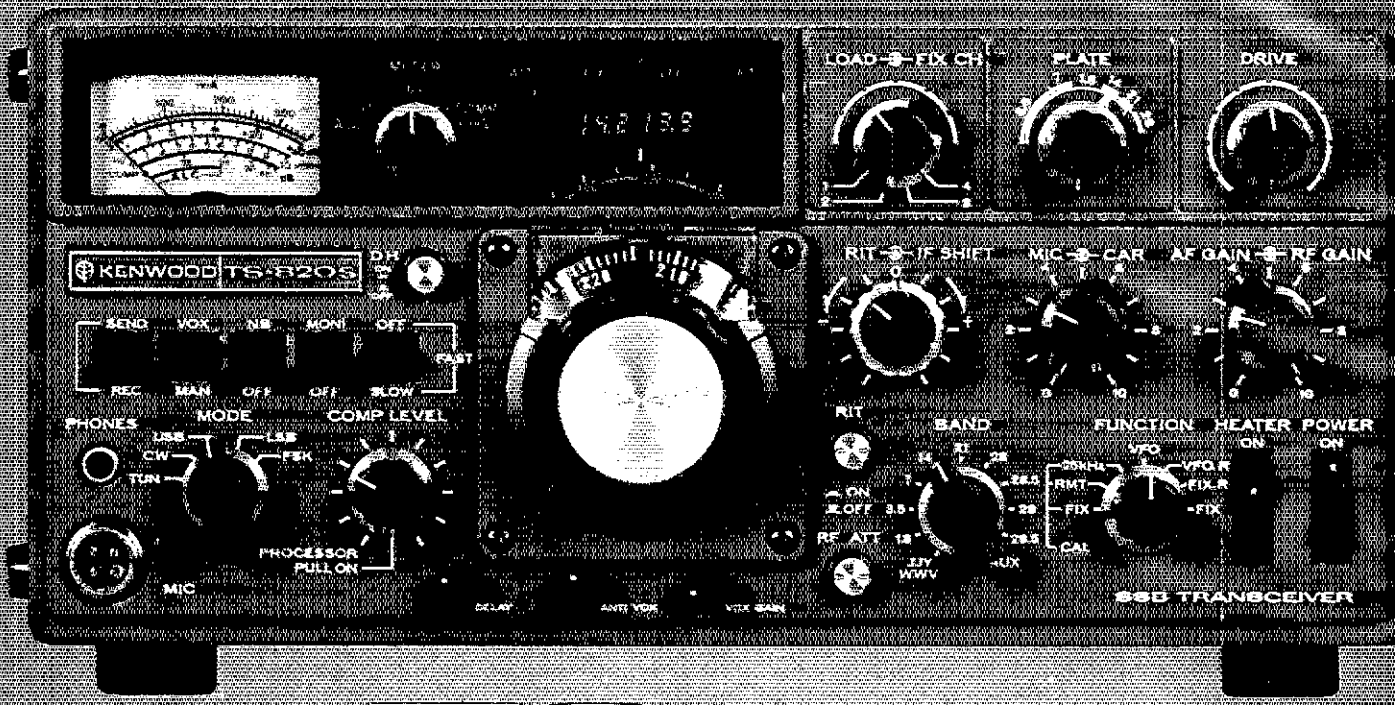


TS-820S

WITH DIGITAL FREQUENCY DISPLAY

We told you that the TS-820 would be 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. 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.*

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

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.

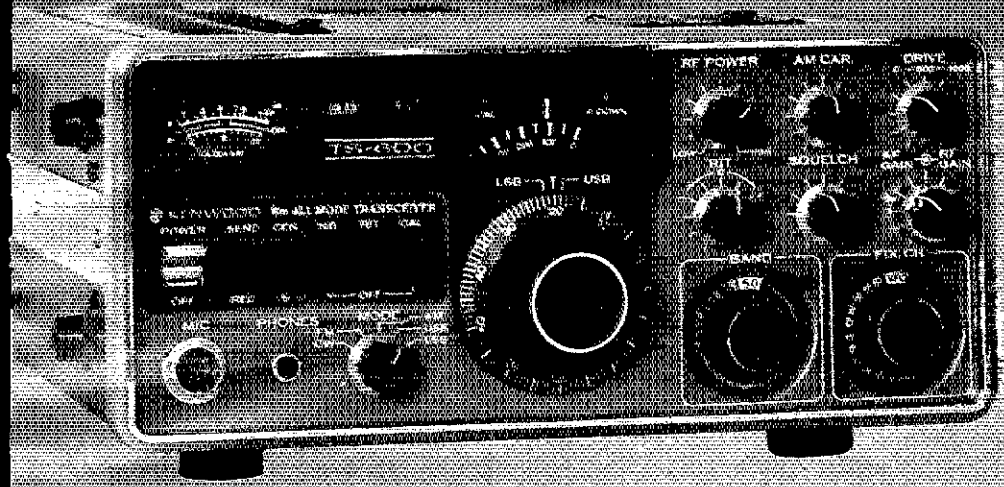
DIGITAL READOUT • The digital counter display is employed as an integral part of the VFO readout system. Counter mixes the carrier VFO, and first heterodyne frequencies to give *exact* frequency. Figures the frequency down to 10 Hz and digital display reads out to 100 Hz. Both receive and transmit frequencies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

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.

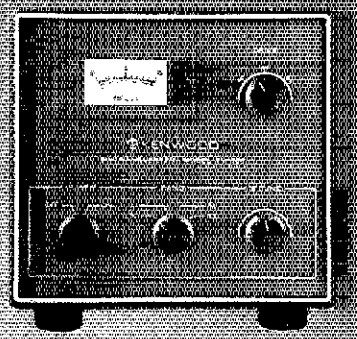
*The TS-820 and DG-1 are still available separately

TS-600



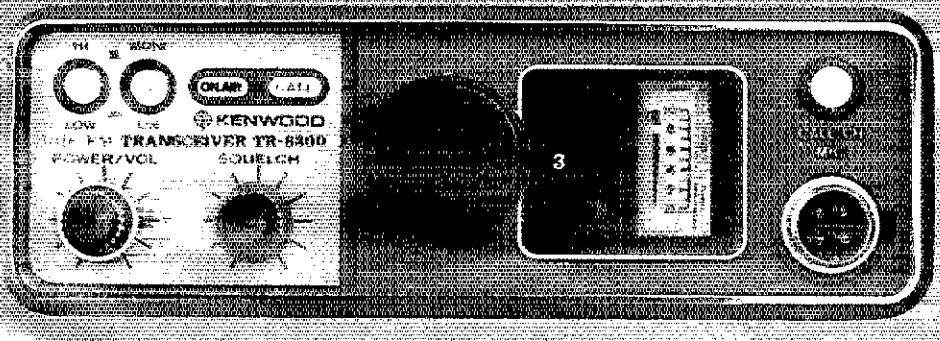
Experience the excitement of 6 meters. The TS-600 all mode transceiver lets you experience the fun of 6 meter band openings.

This 10 watt, solid state rig covers 50.0-54.0 MHz. The VFO tunes the band in 1 MHz segments. It also has provisions for fixed frequency operation on NETS or to listen for beacons. State of the art features such as an effective noise blanker and the RIT (Receiver Incremental Tuning) circuit make the TS-600 another Kenwood "Pacesetter".



TV-506

An easy way to get on the 6 meter band with your TS-520/520S, TS-820/820S and most other transceivers. Simply plug it in and you're on . . . full band coverage with 10 watts output on SSB and CW.



TR-8300

Experience the luxury of 450 MHz at an economical price.

The TR-8300 offers high quality and superb performance as a result of many years of improving VHF/UHF design techniques. The transceiver is capable of F_3 emission on 23 crystal-controlled channels (3 supplied). The transmitter output is 10 watts.

The TR-8300 incorporates a 5 section helical resonator and a two-pole crystal filter in the IF section of the receiver for improved intermodulation characteristics. Receiver sensitivity, spurious response, and temperature characteristics are excellent.

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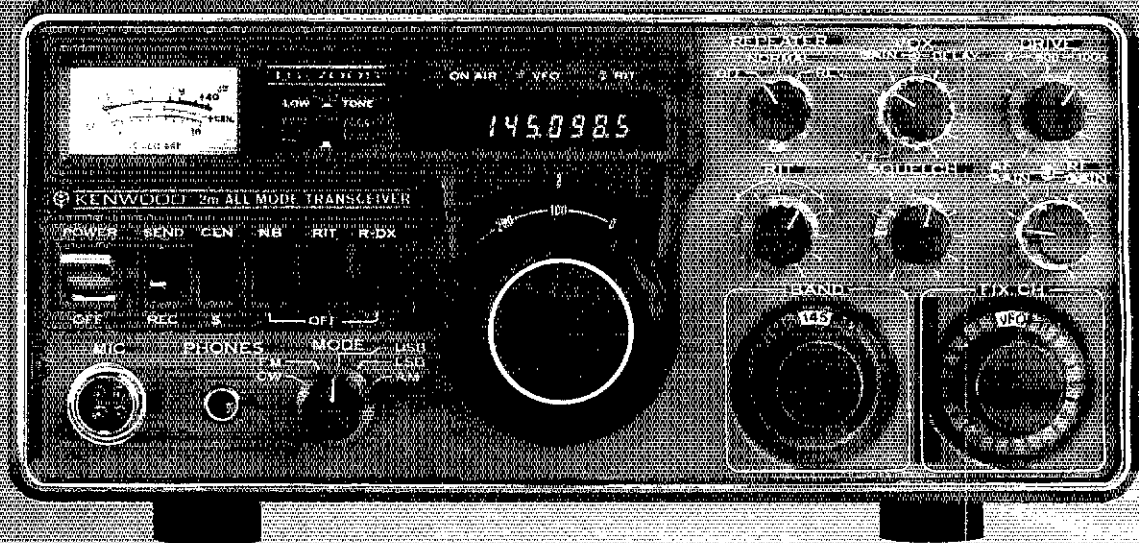
Incredible in amateur radio

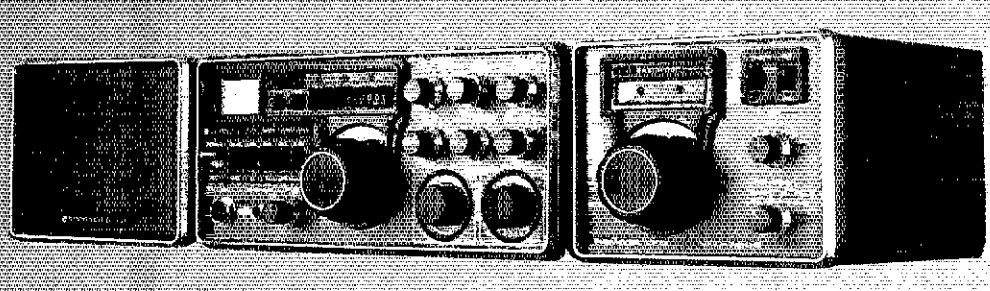
TS-700S

WITH DIGITAL FREQUENCY DISPLAY



Check out the new "built-ins": digital readout, receiver pre-amp, VOX, semi-break in, and CW sidetone! Of course, it's still all mode, 144-148 MHz and VFO controlled.

Features: Digital readout with "Kenwood Blue" digits • High gain receiver pre-amp • 1 watt lower power switch • Built in VOX • Semi-break in on CW • CW sidetone • Operates all modes: SSB (upper & lower), FM, AM and CW • Completely solid state circuitry provides stable, long lasting, trouble-free operation • AC and DC capability (operate from your car, boat, or as a base station through its built-in power supply) • 4 MHz band coverage (144 to 148 MHz) • Automatically switches transmit frequency 600 KHz for repeater operation. Simply dial in your receive frequency and the radio does the rest . . . simplex, repeater, reverse • Or accomplish the same by plugging a single crystal into one of the 11 crystal positions for your favorite channel • Transmit/Receive capability on 44 channels with 11 crystals.



VFO-700S

Handsomely styled and a perfect companion to the TS-700S. This unit provides you with the extra versatility and the luxury of having a second VFO in your shack. Great for split frequency operation and for tuning off frequency to check the band. The function switch on the VFO-700S selects the VFO in use and the appropriate frequency is displayed on the digital readout in the TS-700S. In addition a momentary contact "frequency check" switch allows you to spot check the frequency of the VFO not in use.

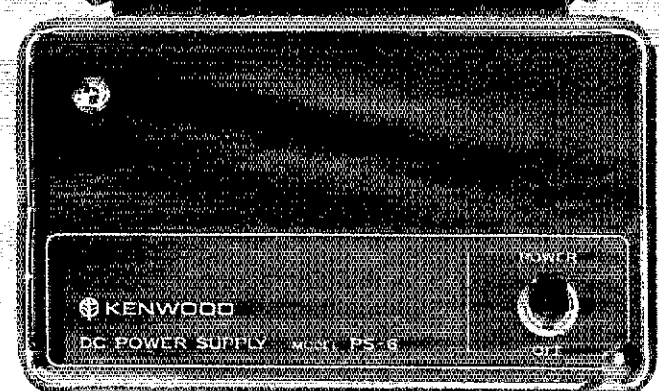
TR-7400A

Features Kenwood's unique Continuous Tone Coded Squelch system, 4 MHz band coverage, 25 watt output and fully synthesized 800 channel operation. This compact package gives you the kind of performance specifications you've always wanted in a 2-meter amateur rig.

Outstanding sensitivity, large-sized helical resonators with High Q to minimize undesirable out-of-band interferance, and give a 2-pole 10.7 MHz monolithic crystal filter combine to give your TR-7400A outstanding receiver performance. Intermodulation characteristics (Better than 66dB), spurious (Better than −60dB), image rejection (Better than −70dB), and a versatile squelch system make the TR-7400A tops in its class.

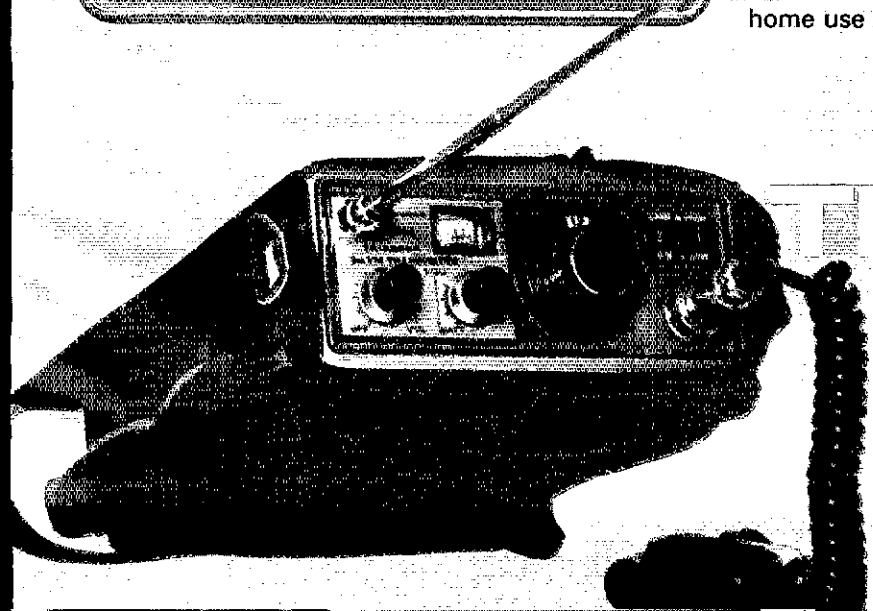
Shown with the PS-8 power supply

(Active filters and Tone Burst Modules optional)



TR-7500

This 100 channel PLL synthesized 146-148 MHz transceiver comes with 88 pre-programmed channels for use on all standard repeater frequencies (as per ARRL Band Plan) and most simplex channels. For added flexibility, there are 6 diode-programmable switch positions. The 15 KHz shift function makes these 6 positions into 12 channels. 10 watt output, ±600 KHz offset and LED digital frequency display are just a few of the many fine features of the TR-7500. The PS-6 is the handsomely styled, matching power supply for the TR-7500. Its 3.5 amp current capacity and built-in speaker make it the perfect companion for home use of the TR-7500.



TR-2200A

The high performance portable 2-meter FM transceiver. 146-148 MHz, 12 channels (6 supplied), 2 watts or 400 mW RF output. Everything you need is included: Ni-Cad battery pack, charger, carrying case and microphone.

KENWOOD

...pacesetter in amateur radio

Kenwood developed the T-599D transmitter and R-599D receiver for the most discriminating amateur.

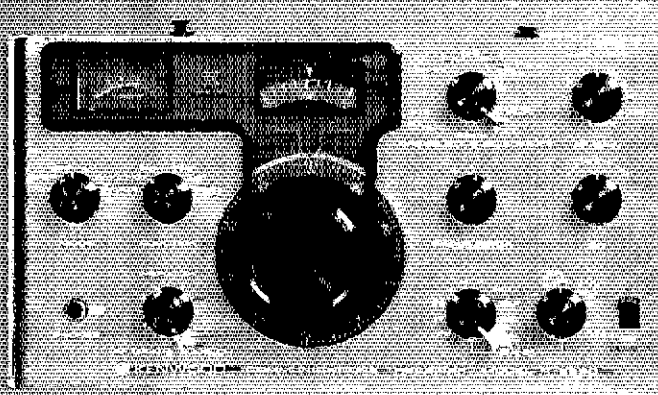
The R-599D is the most complete receiver ever offered. It is entirely solid-state, superbly reliable and compact. It covers the full amateur band, 10 through 160 meters. CW, LSB, USB, AM and FM.

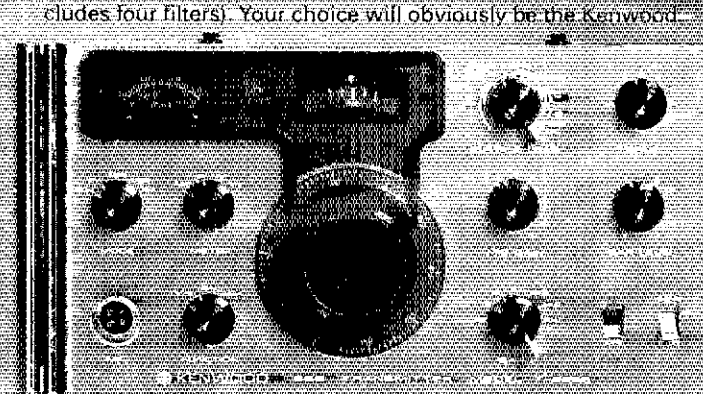
The T-599D is solid-state with the exception of only three tubes, has built-in power supply and full metering. It operates CW, LSB, USB and AM and, of course, is a perfect match to the R-599D receiver.

If you have never considered the advantages of operating a receiver/transmitter combination ... maybe you should.

Because of the larger number of controls and dual VFOs the combination offers flexibility impossible to duplicate with a transceiver.

Compare the specs of the R-599D and the T-599D with any other brand. Remember, the R-599D is all solid state (and includes four filters). Your choice will obviously be the Kenwood.

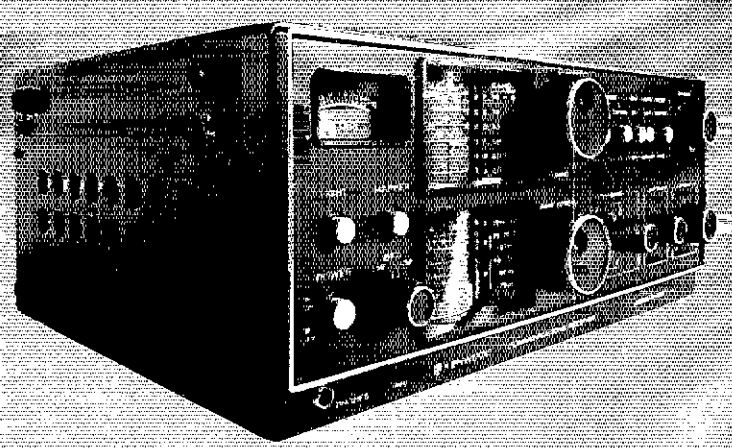


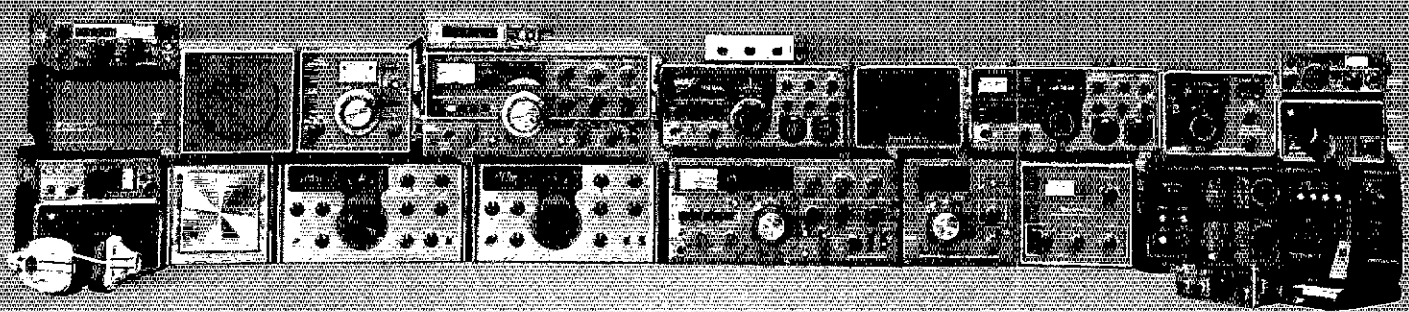


R-599D T-599D

R-300

Dependable operation, superior specifications and excellent features make the R-300 an unexcelled value for the shortwave listener. It offers full band coverage with a frequency range of 17.0 KHz to 30.0 MHz • Receives AM, SSB and CW • Features large, easy to read drum dials with fast smooth dial action • Band spread is calibrated for the 10 foreign broadcast bands, easily tuned with the use of a built-in 500 KHz calibrator • Automatic noise limiter • 3-way power supply system (AC/Batteries/External DC) take it anyplace • Automatically switches to battery power in the event of AC power failure.





Fine equipment that belongs in every well equipped station

TRANSCEIVERS

820 Series

TS-820S	TS-820 with Digital Installed
TS-820	10-160 M Deluxe Transceiver
DG-1	Digital Frequency Display for TS-820
VFO-820	Deluxe Remote VFO for for TS-820/820S
CW-820	500 Hz CW Filter for TS-820/820S
DS-1A	DC-DC Converter for 520/820 Series

520 Series

TS-520S	160-10 M Transceiver
DG-5	Digital Frequency Display for TS-520 Series
VFO-520	Remote VFO for TS-520 and TS-520S
SP-520	External Speaker for 520/820 Series
CW-520	500 Hz CW Filter for TS-520/520S
DK-520	Digital Adaptor Kit for TS-520

599D Series

R-599D	160-10 M Solid State Receiver
T-599D	80-10 M Matching Transmitter
S-599	External Speaker for 599D Series
CC-29A	2 Meter Converter for R-599D
CC-69	6 Meter Converter for R-599D
FM-599A	FM Filter for R-599D

SHORT WAVE LISTENING

R-300 General Coverage SWL Receiver

VHF LINES

TS-600	6 M All Mode Transceiver
TS-700S	2 M All Mode Digital Transceiver
VFO-700S	Remote VFO for TS-700S
SP-70	Matching Speaker for TS-600/700 Series
TR-2200A	2 M Portable FM Transceiver
TR-7400A	2 M Synthesized Deluxe FM Transceiver
TR-7500	100 Channel Synthesized 2 M FM Transceiver
TR-8300	70 CM FM Transceiver (450 MHz)
TV-506	6 M Transverter for 520/820/599 Series

POPULAR STATION ACCESSORIES

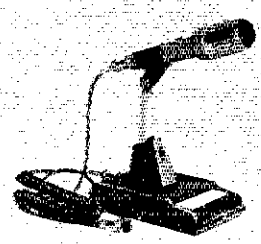
HS-4	Headphone Set
MB-1A	Mounting Bracket for TR-2200A
MC-50	Desk Microphone
PS-5	Power Supply for TR-8300
PS-6	Power Supply for TR-7500
PS-8	Power Supply for TR-7400A
VOX-3	VOX for TS-600/700A

Trio-Kenwood stocks a complete line of replacement parts, accessories, and manuals for all Kenwood models.

MORE ACCESSORIES:

Description	Model #	For use with
Rubber Helical Antenna	RA-1	TR-2200A
Telescoping Whip Antenna	T90-0082-05	TR-2200A
Ni-Cad Battery Pack (set)	PB-15	TR-2200A
4 Pin Mic. Connector	E07-0403-05	All Models
Active Filter Elements	See Service Manual	TR-7400A
Tone Burst Modules	See Service Manual	TS-700A; TR-7400A
AC Cables	Specify Model	All Models
DC Cables	Specify Model	All Models

The Kenwood HS-4 headphone set adds versatility to any Kenwood station. For extended periods of wear, the HS-4 is comfortably padded and is completely adjustable. The frequency response of the HS-4 is tailored specifically for amateur communication use. (300 to 3000 Hz, 8 ohms).



The MC-50 dynamic microphone has been designed expressly for amateur radio operation as a splendid addition to any Kenwood shack. Complete with PTT and LOCK switches, and a microphone plug for instant hook-up to any Kenwood rig. Easily converted to high or low impedance. (600 or 50k ohm).

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1111 WEST WALNUT/COMPTON, CA 90220

KENWOOD
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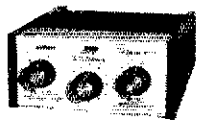


$69.95

MFJ-16010 ST Super Antenna Tuner

This NEW MFJ Super Antenna Tuner matches everything from 160 thru 10 Meters: dipoles, inverted vees, long wires, verticals, mobile whips, beams, balance lines, coax lines. Up to 200 watts RF OUTPUT. Built-in balun, too!

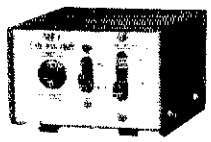
• Operate all bands with one antenna • Works with all solid state and tube rigs • Ultra compact, 5 x 2 x 6 inches • Uses toroid cores

$39.95

MFJ-16010 Antenna Tuner

Now you can operate all bands — 160 thru 10 Meters — with a single random wire and run your full transceiver power output — up to 200 watts RF power OUTPUT.

• Small enough to carry in your hip pocket, 2-3/16 x 3-1/4 x 4 inches • Matches low and high impedance by interchanging input and output • SO-239 coaxial connectors • 12 position tapped inductor. Stacked toroid cores • At 1.8 MHz tuner matches 25 to 200 ohms.



$29.95

CWF-2BX Super CW Filter

This MFJ Super CW Filter gives you 80 Hz bandwidth, and extremely steep skirts with no ringing for razor sharp selectivity that lets you pull signals out of heavy QRM. Plugs between receiver and phones or connect between audio stage for speaker operation.

• Selectable BW, 80, 110, 180 Hz • 60 dB down one octave from center frequency of 750 Hz for 80 Hz BW • Reduces noises 15 dB • 9 V battery • 2-3/16 x 3-1/4 x 4 inches • CWF-2PC, wired PC board, $19.95.

$69.95

MFJ-8043 IC Deluxe Electronic Keyer

This NEW MFJ Deluxe Keyer gives you more features per dollar than any other keyer available.

• Uses Curtis-8043 keyer chip • Sends iambic, automatic, semi-automatic, manual • Use squeeze, single lever, or straight key • Dot memory, self-completing dots and dashes, jam proof spacing, instant start • RF proof • Solid state keying ±300 V max • Weight, tone, volume, speed controls • Uses 4 C-cells; external power jack • 6 x 6 x 2 inches • Sidetone and speaker • Optional squeeze key $29.95

$54.95

CMOS-8043 Electronic Keyer

State of the art design uses CURTIS-8043 Keyer-on-a-chip.

• Built-in Key • Dot memory • Iambic operation with external squeeze key • 8 to 50 WPM • Sidetone and speaker • Speed, volume, tone, weight controls • Ultra reliable solid state keying ±300 volts max. • 4 position switch for TUNE, OFF, ON, SIDETONE OFF • Uses 4 penlight cells • 2-3/16 x 3-1/4 x 4 inches

$59.95

LSP-520BX II Log Speech Processor

Up to 400% more RF power. Plugs between your microphone and transmitter.

• Gives your audio punch power to slice through QRM • 30 dB IC log amp and 3 active filters • RF protected • 9 V battery • Two Mic jacks: ¼" phone jacks, uncommitted 4 pin jack • Output cable • 2-1/8 x 3-5/8 x 5-9/16 inches • LSP-520BX, in standard MFJ enclosure, electronically identical, $49.95

$29.95

SBF-2BX SSB Filter

Dramatically improves readability.

• Optimizes your audio to reduce sideband splatter, remove low and high pitched QRM, hiss, static crashes, background noise, 60 and 120 Hz hum • Reduces fatique during contest, DX, and ragchewing • Plugs between phones and receiver or connect between audio stage for speaker operation • Selectable bandwidth IC active audio filter • Uses 9 volt battery • 2-3/16 x 3-1/4 x 4 inches

$29.95

MFJ-200BX Frequency Standard

Provides strong, precise markers every 100, 50, or 25 KHz well into VHF region.

• Exclusive circuitry suppresses all unwanted markers • Markers are **gated** for positive identification. CMOS IC's with transistor output. • No direct connection necessary • Uses 9 volt battery • Adjustable trimmer for zero beating to WWV • Switch selects 100, 50, 25 KHz or OFF • 2-3/16 x 3-1/4 x 4 inches

$49.95

MFJ-1030BX Receiver Preselector

Clearly copy weak unreadable signals (increases signal 3 to 5 "S" units).

• More than 20 dB low noise gain • Separate input and output tuning controls give maximum gain and RF selectivity to significantly reject out-of-band signals and reduce image responses • Dual gate MOS FET for low noise, strong signal handling abilities • Completely stable • Optimized for 10 thru 30 MHz • 9 V battery • 2-1/8 x 3-5/8 x 5-9/16 inches

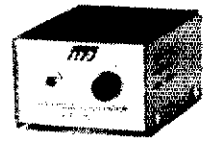
$29.95

MFJ-40T QRP Transmitter

Work the world with 5 watts on 40 Meter CW.

• No tuning • Matches 50 ohm load • Clean output with low harmonic content • Power amplifier transistor protected against burnout • Switch selects 3 crystals or VFO input • 12 VDC • 2-3/16 x 3-1/4 x 4 inches

MFJ-40V, Companion VFO $29.95
MFJ-12DC, IC Regulated Power Supply, 1 amp, 12 VDC $29.95



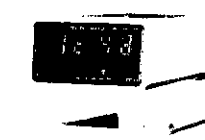
$17.95

CPO-555 Code Oscillator

For the Newcomer to learn the Morse code.
For the Old Timer to polish his fist.
For the Code Instructor to teach his classes.

• Send crisp clear code with plenty of volume for classroom use • Self contained speaker, volume, tone controls, aluminum cabinet • 9 V battery • Top quality U.S. construction • Uses 555 IC timer • 2-3/16 x 3-1/4 x 4 inches

TK-555, Optional Telegraph Key $1.95



$19.95

C-500 Digital Alarm Clock

This digital alarm clock is also an ID Timer. Assembled, too!

• Gives ID buzz every 9 minutes automatically, or after tapping ID/doze button • Pressing ID/doze button displays seconds • Large .63 inch digits • Easily zeros to WWV • AM and PM LED indicators • Power out indicator • Fast set, slow set buttons • 110 VAC, 60 Hz • 3-1/8 x 3-3/4 x 3-3/8 inches • One year warranty by Fairchild

Order any product from MFJ and try it. If not delighted, return within 30 days for a prompt refund (less shipping).

Order today. Money back if not delighted. One year unconditional guarantee. Add $2.00 shipping/handling.

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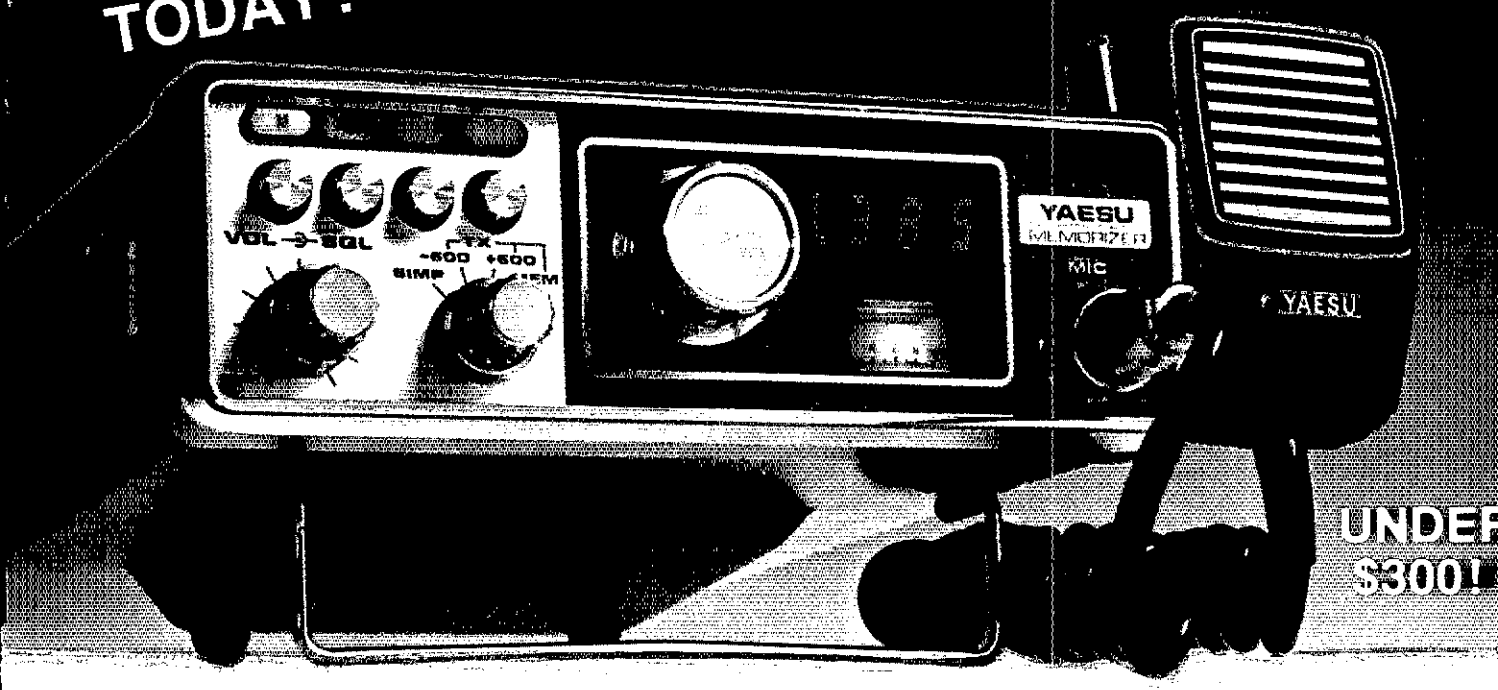
Years Ahead With Yaesu!

Introducing . . .

THE ALL-NEW YAESU FT-227R 144-148 MHZ 800 CHANNEL "MEMORIZER"!

1980's RADIO TODAY!



Compare These Features And You'll Know What We Mean When We Say "Years Ahead With Yaesu"

■ one knob channel selection using optical sensing to select 800 channels ■ memory circuit that allows instant return to any frequency selected between 144-148 MHz ■ large 4 digit LED frequency readout ■ fully synthesized frequency control, using PLL techniques in 5 KHz steps ■ built-in tone burst, plus optional tone squelch encoder/decoder ■ spurious well below minus 60dB requirement—superior cross modulation, overload and image rejection ■ standard 600 KHz offsets plus any split within the band using the memory circuit ■ automatic final protection, PLL "unlock" protection and busy channel indicator ■ selectable 10 watt/1 watt output

See this sensational new two meter transceiver at your YAESU DEALER now!

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Eastern Service Ctr., 613 Redna Terrace
Cincinnati, OH 45215

YAESU
The radio.

TS-700S

WITH DIGITAL FREQUENCY DISPLAY

... INCLUDES RECEIVER PRE-AMP, VOX, SEMI-BREAK IN, CW SIDETONE AND, OF COURSE, ALL OF THE FINE, TIME-PROVEN CHARACTERISTICS OF THE ORIGINAL TS-700A. IT'S STILL ALL MODE, 144-148 MHz AND THE NEW VFO-700S GIVES YOU ADDED FLEXIBILITY.

THE TS-700S/VFO-700S, KENWOOD'S BRIGHT NEW APPROACH TO THE 2-METER BAND.

KENWOOD

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