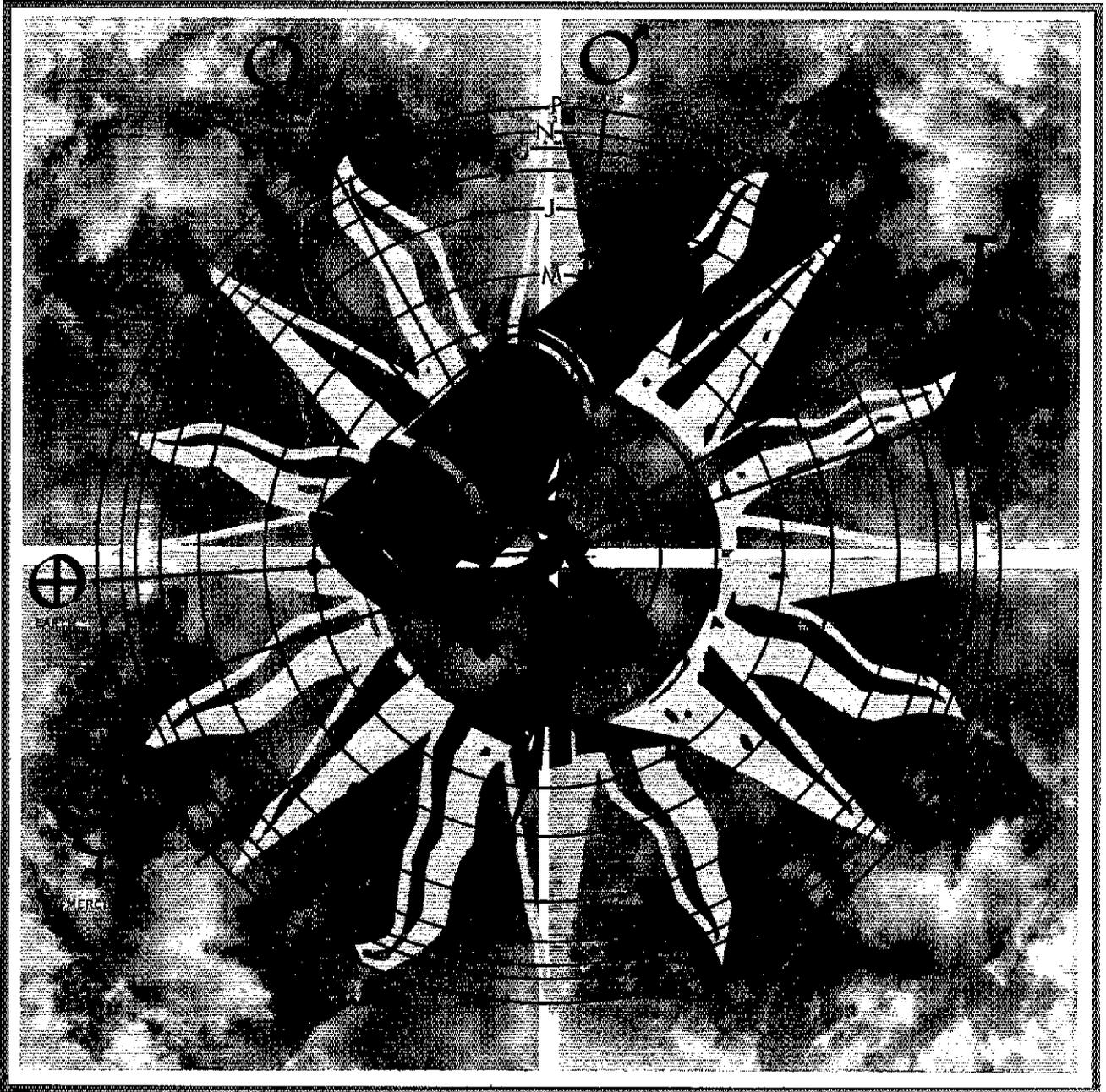


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devoted entirely to Amateur Radio

October 1976 \$1.00

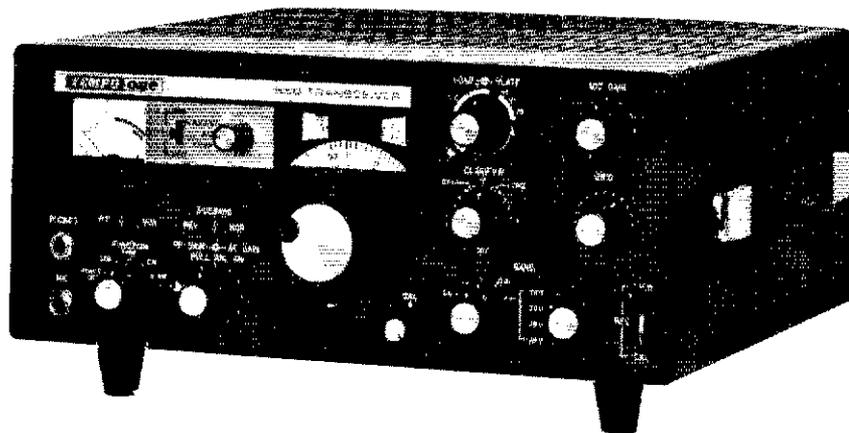


**Radio Astrology – can the planets tell us about radio propagation?**

Page 11



# STILL UNDER \$500



DO YOU KNOW OF ANOTHER FULL POWER, FULLY ASSEMBLED, HF TRANSCEIVER STILL UNDER \$500? WE DON'T!

BUT DON'T LET THE LOW PRICE FOOL YOU. THE TEMPO ONE'S QUALITY AND RELIABILITY HAVE BEEN PROVEN BY THE TENS OF THOUSANDS IN USE BY GENERAL AND ADVANCED CLASS AMATEURS.

AND NOW UNDER THE NEW FCC REGULATIONS THE TEMPO ONE BECOMES THE PERFECT RIG FOR THE NOVICE AND TECHNICIAN CLASS.

Ask any of the thousands of owners about its dependability, look at its features and specifications...and the reasons for its unparalleled popularity will be obvious.

**FREQUENCY RANGE:** All amateur bands 80 through 10 meters,  
**MODES OF OPERATION:** SSB upper and lower sideband, CW and AM.

**SOLID STATE VFO:** Very stable Colpitts circuit

**RECEIVER OFFSET TUNING (CLARIFIER):** Provides  $\pm 5$  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:**  $1/2 \mu\text{v}$  input S/N 10 dB

**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

**SIDE BAND SUPPRESSION:** -50 dB at 1000 CPS

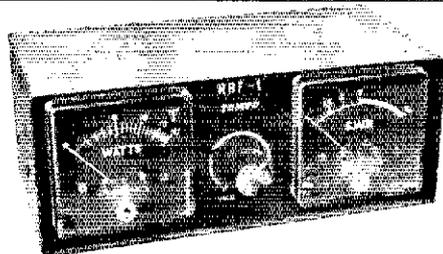
**THIRD ORDER INTERMODULATION PRODUCTS:** -30 dB (PEP)

TEMPO "ONE" TRANSCEIVER \$399.00

AC/ONE POWER SUPPLY \$99.00

DC/1-A POWER SUPPLY 12 volts DC \$120.00

TEMPO VF/ONE External VFO \$109.00



## Tempo RBF-1 Wattmeter

An inexpensive, in-line Wattmeter and SWR bridge for use with any transceiver, transmitter, or amplifier from 1.9 to 150 MHz. Test and tune for maximum output or for monitoring on-the-air performance.

Allows selection of wattmeter scales of 0-200 watts or 0-2000 watts. Insures consistent, efficient transmitter operation.

As with all Tempo equipment, the RBF-1 delivers performance value far beyond its price. Only \$42.95

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Features PTT and LOCK switches. Converts easily to high or low impedance (600 or 50k ohm). Only \$39.00

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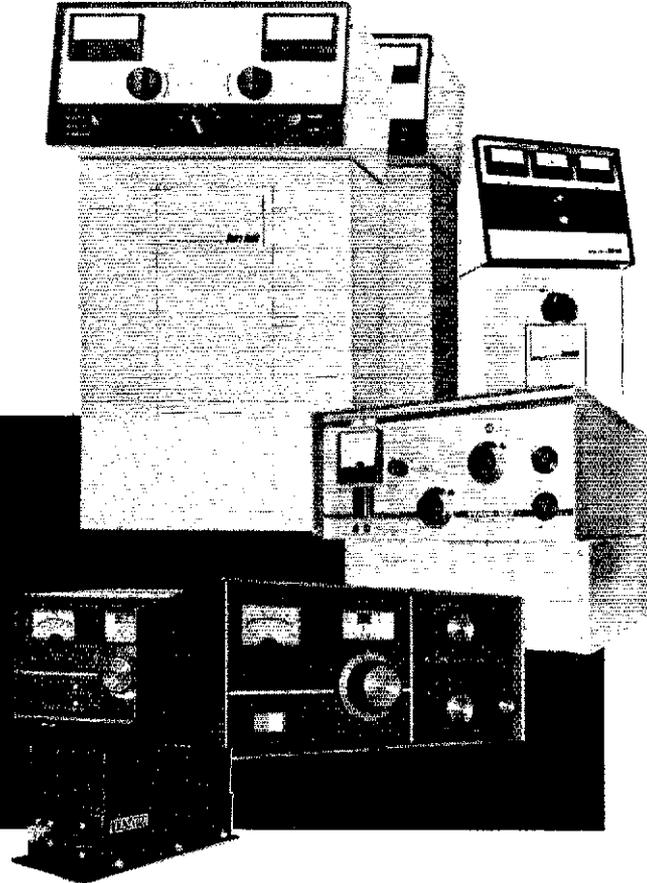
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Butler, Missouri 64730

816/679-3127

# Henry Radio has the amplifier you want

Never before has one company manufactured such a broad line of amateur amplifiers, both vacuum tube and solid state, for HF, VHF and UHF; fixed station and mobile; low power and high power. Take your pick from 20 models...the world's finest line of amateur amplifiers.



## 2K-4... THE "WORKHORSE"

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A high quality linear amplifier designed for commercial and military uses. The 3K-A employs two rugged Eimac 3-500Z grounded grid triodes for superior linearity and provides a conservative three kilowatts PEP input on SSB with efficiencies in the range of 60%. This results in PEP output in excess of 2000 watts. In addition, the 3K-A provides a heavy duty power supply capable of furnishing 2000 watts of continuous duty input for either RTTY or CW with 1200 watts output. Price...\$1395.00

## 4K-ULTRA

The 4K-ULTRA is specifically designed for the most demanding commercial and military operation for SSB, CW, FSK or AM. The amplifier features general coverage operation from 3.0 to 30 MHz. Using the magnificent new Eimac 8877 grounded grid triodes, vacuum tune and load condensers, and a vacuum antenna relay, the 4K-ULTRA represents the last word in rugged, reliable, linear high power RF amplification. 100 watts drive delivers 4000 watts PEP input. This amplifier can be supplied modified for operation on frequencies up to about 100MHz. Price...\$2950.00

## TEMPO 6N2

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built-in blower and RF relative power indicator. Price...\$895.00

## TEMPO 2002

The same fine specs and features as the 6N2, but for 2 meter operation only. ...\$745.00

## TEMPO 2006

Like the 2002, but for 6 meter operation...\$795.00

## TEMPO T-2000 LINEAR AMPLIFIER

The brand new T-2000 linear is the perfect companion for the Tempo ONE. It is compact, reliable, and priced right. Uses two Eimac 8873 grounded grid triodes cooled through a large heat sink. The T-2000 offers a full 2 KW PEP input for SSB operation and provides amateur band coverage from 80-10 meters. Provides a built-in solid state power supply, built-in antenna relay, a relative RF power indicator, and built-in quality to match much more expensive amplifiers. \$795.00

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Solid state power amplifiers for use in most land mobile applications. Increases the range, clarity, reliability and speed of two-way communications. FCC type accepted also.

## TEMPO 100AL10 VHF LINEAR AMPLIFIER

Completely solid state, 144-148 MHz. Power output of 100 watts (nom.) with only 10 watts (nom.) in. Reliable and compact ...\$199.00

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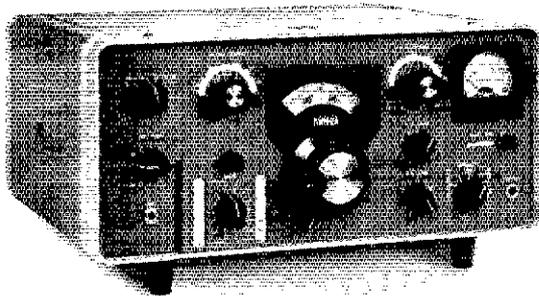
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# Which Collins should you choose now that you've chosen Collins?

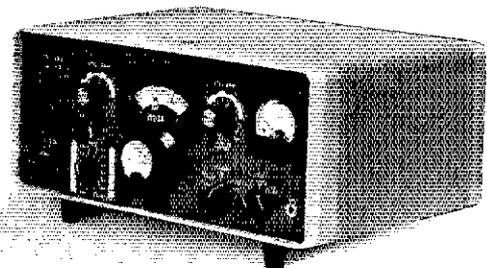
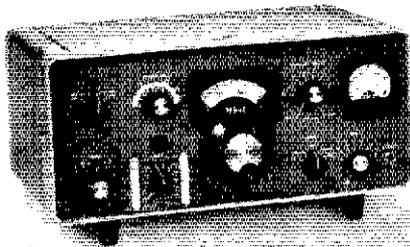
If you work mainly voice, and just dabble in CW, RTTY, or SSTV, build your station around our KWM-2A Transceiver. The unit is compact and lightweight, designed for portable as well as fixed operations.



You're not limited to SSB voice communication, though. The KWM-2A's CW features include break-in and sidetone monitoring circuits. And with the optional Collins 516F-2 Power Supply and external cooling air, you can operate RTTY communications as well.

But if your communications interest is varied and you want maximum voice, CW, RTTY or SSTV capability, we recommend Collins 75S-3C Receiver and 32S-3A Transmitter.

Optional filters, rejection tuning and variable BFO on the receiver, plus features like carrier reinsertion on our transmitter, give you as much control of your equipment as possible. And Collins' S/Line is famous as the cleanest sound around.

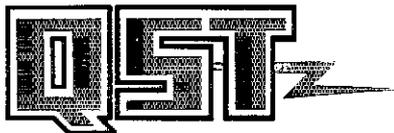


Give your local Collins dealer a call. Or contact Amateur Radio Marketing, Collins Radio Group, Rockwell International, Cedar Rapids, Iowa 52406. Phone: 319/395-4507.



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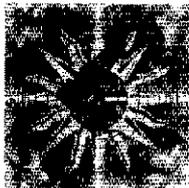
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**THE COVER**

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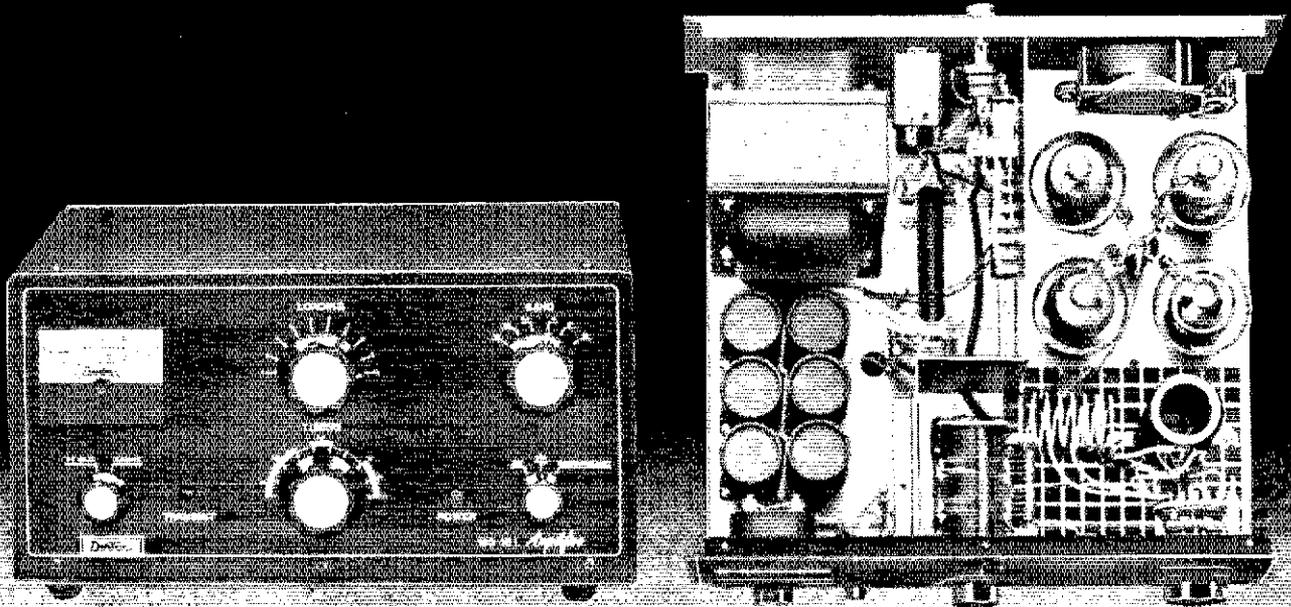
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# Dentron Proudly Reveals the Secret of the New \$499.50 Super Amp



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

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

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

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

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

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

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

**The No-nonsense Amplifier  
at a No-Nonsense Price \$499.50.**

**Dentron**  
Radio Co., Inc.  
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Yes, now ICOM helps you steer clear of all the hassles of channel crystals. The new **IC-22S** is the same surprising radio you've come to know and love as the **IC-22A**, except that it is totally crystal independent. **Zero crystals.** Solid state engineering enables you to program 23 channels of your choice without waiting. Now the ICOM performance you've demanded comes with the convenience you've wanted, with your new **IC-22S**.

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# If you haven't tried the TS-700A ...you haven't experienced the excitement of 2-meters

## TS-700A Specifications

TRANSMIT/RECEIVE FREQUENCY RANGE:  
144-148 MHz  
MODE: SSB, FM, CW, AM  
RF OUTPUT: CW, FM: more than 10W output.  
AM: more than 3W output. SSB: more  
than 20W DC input.  
ANTENNA IMPEDANCE: 50Ω (unbalanced)  
CARRIER SUPPRESSION: Better than 40 dB  
SIDE-BAND SUPPRESSION: Better than 40 dB  
SPURIOUS RADIATION: Less than -60 dB



Experience the excitement  
of 2 meters. There's more than  
just FM repeaters, you know. SSB DX,  
OSCAR Satellite, CW...and do it all with a tunable  
VFO. Do it all with the Kenwood TS-700A.

- 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. Can operate from your car, boat, or as a base station through its built-in power supply
- 4 MHz band coverage (144 to 148 MHz) instead of the usual 2
- Automatically switches transmit frequency 600 KHz for repeater

- operation...reverses, too
- Outstanding frequency stability provided through the use of FET-VFO
- Zero center discriminator meter
- Transmit/Receive capability on 44 channels with 11 crystals
- Complete with microphone and built-in speaker

The TS-700A is available at select Kenwood dealers throughout the U.S. For the name of your nearest dealer, please write.

MAX. FREQUENCY DEVIATION (FM):  $\pm 5$  kHz  
REPEATER FREQUENCY SHIFT WIDTH:  
600 kHz  
TONE BURST TIME: 0.5-1.0 sec.  
MODULATION: Balanced modulation for SSB.  
Variable reactance frequency shift for FM.  
Low power modulation for AM.  
MICROPHONE: Dynamic microphone, 500Ω  
AUDIO FREQUENCY RESPONSE: 400-2600 Hz  
within -9 dB  
RECEIVING SYSTEM: SSB, CW, AM: Single-  
superheterodyne. FM: Double-  
superheterodyne.  
INTERMEDIATE FREQUENCY: SSB, CW, AM:  
10.7 MHz. FM: 1st IF: 10.7 MHz. 2nd IF:  
455 kHz  
RECEIVING SENSITIVITY: SSB, CW: S/N = 10  
dB or better at 0.25μV. 20 dB noise  
quieting = Less than 0.4μV. AM: S/N =  
10 dB or better at 1μV.  
IMAGE RATIO: Better than 60 dB  
IF REJECTION: Better than 60dB  
PASS-BANDWIDTH: SSB, CW, AM: More than  
2.4 kHz at -6 dB. FM: More than 12 kHz at  
-6 dB.  
RECEIVER SELECTIVITY: SSB, CW, AM: Less  
than 4.8 kHz at -60 dB. FM: Less than  
2.4 kHz at -60 dB  
SQUELCH SENSITIVITY: 0.25μV  
AUDIO OUTPUT: More than 2W at 8Ω load  
(10% distortion)  
RECEIVER LOAD IMPEDANCE: 8Ω  
FREQUENCY STABILITY: Within  $\pm 2$  kHz during  
one hour after one minute of warm-up,  
and within 150 Hz during any 30 minute  
period thereafter.  
POWER CONSUMPTION: Transmit mode: 95W  
(AC 120/220V), 4A (DC 13.8V), max.  
Receive mode (no signal): 45W (AC 120/  
220V), 0.8A (DC 13.8V).  
POWER REQUIREMENTS: AC 120/220V,  
50/60 Hz. DC 12-16V (13.8V as reference)  
DIMENSIONS: 278 (W) x 124 (H) x 320 (D) mm  
WEIGHT: 11 kg  
SUGGESTED PRICE: \$700.00

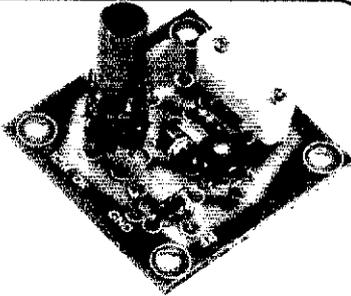
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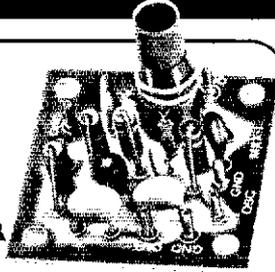
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 OSCILLATORS • RF MIXER • RF AMPLIFIER • POWER AMPLIFIER



### 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.*

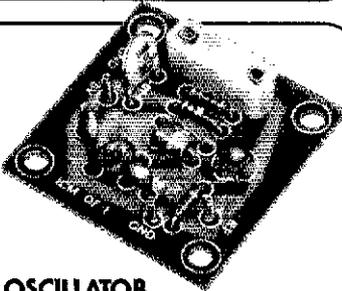
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### PAX-1 TRANSISTOR RF POWER AMP

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

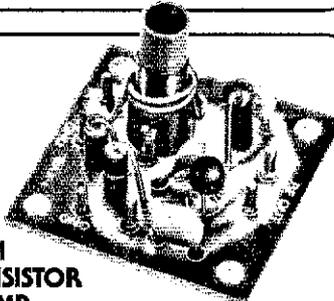
\$4.75 ea.



### OF-1 OSCILLATOR

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

\$3.25 ea.



### SAX-1 TRANSISTOR RF AMP

A small signal amplifier to drive the MXX-1 Mixer. Single tuned input and link output. 3 to 20 MHz, Lo Kit, Cat. No. 035102. 20 to 170 MHz, Hi Kit, Cat. No. 035103.  
*Specify when ordering.*

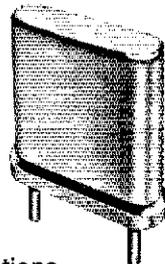
\$4.50 ea.



### BAX-1 BROADBAND AMP

General purpose amplifier which may be used as a tuned or untuned unit in RF and audio applications. 20 Hz to 150 MHz with 6 to 30 db gain. Cat. No. 035107  
*Specify when ordering.*

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.02% Calibration Tolerance  
**EXPERIMENTER CRYSTALS**  
 (HC 6/U Holder)

Cat. No.	Specifications	
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031081	20 to 60 MHz — For use in OX OSC Hi	\$4.95 ea.
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	<i>Specify when ordering</i>	
031310	20 to 60 MHz — For use in OF-1H OSC	\$4.25 ea.
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**Reports Invited:** All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio club reports are also desired by SCMs for inclusion in QST. ARRL Field Organization station appointments are available in areas shown to qualified League members. General or Conditional Class licenses or higher may be appointed ORS, OPS, OO and OBS. Technicians may be appointed OVS, OBS, or VHF PAM. Novices are eligible for ORS - II. SCMs desire application for the leadership posts of SEC, EC, RM and PAM where vacancies exist.

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\*Official appointed to act temporarily in the absence of a regular official.



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.

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## An Investment Program

For those of us who are concerned with where the League and amateur radio are going to be five or ten years from now, these are rather exciting times. The opportunity for improvements in our amateur allocations, the opportunity for growth in the amateur service, the opportunity for a strengthened amateur satellite program — all of these, and others, present quite a challenge.

Growth is important to us. We have made a good case for expanded amateur allocations, based on the worldwide growth of the amateur service. The Training Program is designed to speed the growth and maintain the quality of amateur radio in this country. We have invested heavily in people and training materials to provide the impetus for that training program, and our investment is going to have to be even more extensive before we are finished. Indeed, if at some point we are able to convince the Commission to let amateurs play an even greater role in the examination and licensing procedures, we may have to at least double the size of the existing Club and Training Department. That's going to take money, but it's going to make for a stronger amateur radio.

You've already heard quite a bit about WARC-79. Representatives from all services and governments are going to review and revise the table of frequency allocations, from 10 kHz to 300 gigahertz (and perhaps beyond). Amateurs have made a strong case for expanded allocations, but so have many of the other users of the spectrum. Now it's up to us to actively promote our cause, in national meetings relating to WARC preparation in this country and overseas. For well over a year and a half, the League has been participating extensively in WARC preparatory meetings in Washington, participating in almost all meetings of preparatory groups associated with all services. This has been both expensive and time-consuming, but it has given our preparatory team a background of information about what is going on that is, we believe, invaluable. The League also serves as the headquarters society of the International Amateur Radio Union, and thus has a responsibility for WARC preparatory efforts by amateurs on an international level. We now publish monthly WARC bulletins for the ninety members of the IARU, giving them advice and counsel on how to proceed

with WARC preparation; we are participating in a long series of international meetings with other IARU societies; we are continuing our work in international meetings in Geneva. Here again, this is an expensive undertaking, but essential if amateur radio internationally is to flourish.

The amateur satellite program continues to be one of the more exciting aspects of amateur radio, and it has been one of the important aspects of the development of our case for expanded amateur allocations. Remarkable indeed has been the relative in-expense with which this program has been accomplished, largely because of the selfless contributions of time and materials by a number of dedicated individuals. Yet, as we view an expanded amateur satellite program, there comes the realization that expenses are going to increase.

The League continues to grow, and membership currently is at an all-time high. Because the Headquarters exists primarily to provide a myriad of services to the members of the League, the staff has grown accordingly, and now numbers more than 100. This has created a bit of a space problem, and we've had to convert the museum, the employees' lounge, and some of the storage area into office space. At the July meeting of the Board, the directors authorized the construction of a substantial addition to the present Headquarters.

Where is all the money coming from? Advertisers are going to be asked to share in the cost of this expansion of amateur radio. As various of our publications are revised, their selling prices will be increased in order to take care of the continued inflation and the expanded costs of operating the League. There will be several new titles in the ARRL amateur radio library, and they will provide additional income. The newsstand cover price of *QST* is being increased to \$1.50, effective with the November issue. Will these changes bring in sufficient additional income to take care of all the expenses that face us over the next five years? Probably not.

League membership at nine dollars is a great bargain. For that money you get not only this monthly magazine but also an investment in the future of amateur radio. The time may soon be at hand when you will be asked to invest a little more heavily in the future of amateur radio. — *W1RU*

# League Lines...

It's legal! W7LXE/SU has been authorized by Egypt to handle third party traffic in connection with the UN Sinai field mission forces. Likewise, the FCC has authorized U.S. stations to pass third party traffic with W7LXE/SU, according to 97.114, of course.

On the heels of a 432 MHz Worked All Continents, vhfers have logged another hf-type operating first -- 2-Meter Worked All States. Dick Hart, KØMQS, culminated a 7-year effort by working W7UBI, 1D, via moonbounce on August 2 and K6YNB/KL7, AK, also via EME, on August 17.

The ASCII STA has been extended for all stations using Oscars 6 and 7. It is good through February 6, 1977. AMSAT would appreciate receiving reports of people using ASCII on the satellites to help justify its continued use.

Attention Canadian amateurs. The Canadian Intruder Watch is looking for volunteers who are willing to monitor the amateur bands a few hours each week to report the illegal use of our bands by nonamateurs. The Canadian Intruder Watch will feed reports directly to the Canadian Department of Communications (DOC), and is expected to be a partner to the U.S. Intruder Watch, which feeds reports to the FCC. This will effectively double our "muscle." If you're interested drop Director Hesler a line (his address is on page 8) and let him know approximately how many hours per week you can devote to the program.

For Ford vs Carter, you'll have to wait 'til next month. But League elections in the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern and West Gulf Divisions are on now. Where more than one candidate is nominated for director or vice director in a division, ballots will be sent to voting members (of record on September 10) by October 1. The completed ballot should be returned so as to arrive at ARRL Hq. not later than noon, November 20. IMPORTANT: If ARRL members in your area have ballots, but you don't by November 1, please get in touch with the Membership Services Department at ARRL Hq.

Call in the troops!... to your shack to introduce Boy Scouts to hamming during the worldwide Jamboree-on-the-Air this month. Harry Harchar, W2GND, has reassumed the position of JOTA Coordinator for the U.S., while Walt Maxwell, W2DU, continues as Technical Director and Trustee of K2BSA. Send your reports and QSLs to Harry Harchar, c/o K2BSA, Boy Scouts of America, North Brunswick, NJ 08902. See September QST "Operating Events" for more info.

112 sightless hams are members of the League (12 Life Members among them!). "Out there?," however, are about 600 users of the Library of Congress QST tape recordings, Know of a sightless ham who should be a League member? Full League voting membership, without QST is available for just \$2 a year. Full details on receiving QST on tape are available from the Library, Division for the Blind and Handicapped, Washington, D.C. 20542.

One job of the Membership Services group at headquarters is to assist free-lance writers and members of media staffs with articles on ham radio. These days the personal touch is important -- and to supply this, we need your help. We'd like to hear from men and women who got their first amateur license late in life; from girls and boys who got it early; from anyone who had a funny, exciting or scary experience in ham radio; from members of minority groups and people with unusual occupations. How about clear, sharp, black and white photos or good color slides which tell a story and yet manage to look unposed? K, someone, please.

Publicize ham radio! Help support our WARC-79 preparations! A new bumper sticker is available, bearing the message "Tune in the World with Ham Radio." Available for \$1 from Hq., postpaid, or at the League booth at hamfests and conventions

Novices will no longer have distinctive callsigns. The FCC claims difficulty in processing applications and will only issue permanent-type callsigns beginning this October 1st. Those presently with Novice callsigns will automatically be issued permanent-type callsigns to reflect the change in the near future.

# Radio Astrology

Explanations of some propagation phenomena may be "far-out" indeed.

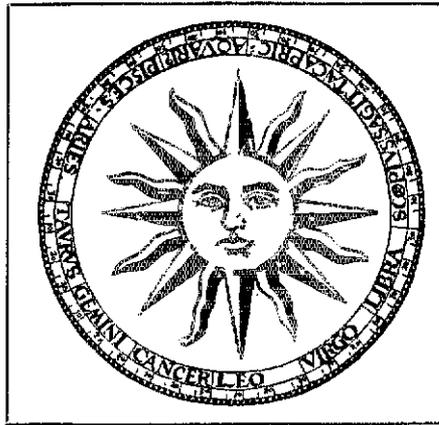
By Edward P. Tilton,\* W1HDQ

*AS-TROL-O-GY -- The divination of supposed influences of the stars upon human affairs and terrestrial events, by their positions and aspects.*

Even Webster seems anything but convinced. Similarly, the idea that the positions of the planets of the solar system affect (trigger, cause?) the formation of sunspots has received less than enthusiastic acceptance by the scientific community. The proposition is far from new, as can be determined by a search of papers in this field in any major library. It antedates any consideration of radio propagation connotations by many years.

The hold the sun has always had on the minds of men, coupled with the ancient art of astrology, would assure conjecture and serious study of planetary influences and solar activity in connection with all manner of human and natural ups and downs. Weather trends, war and peace, tidal history, crop abundance and failure, frequency and severity of earthquakes — these are some of the more obvious cycles that have been plotted against solar activity and/or the positions of the planets, over many years. No less a figure than Herschel attempted to show a correlation between sunspot numbers and the price of wheat on the London market, in 1801 — before the existence of a "sunspot cycle" had been discovered. Though often quoted, his premise was not very solidly based.

Association of planetary configurations with variations in radio propagation across the North Atlantic was shown by Nelson in work that began over 30 years ago.<sup>1</sup> Despite the fact that



use of his planetary position plots in commercial communications scheduling between this country and Europe netted better reliability than the then-new NBS *Propagation Predictions*, his ideas were not widely accepted. Perhaps this was because he did not say why they worked; only that they did, and admittedly at less than 100-percent accuracy.

Sunspots-and-planets theories have suffered at the hands of detractors whenever they have appeared in print, inevitably becoming a favorite letters-to-the-editor theme. K. D. Wood, writing in *Nature*,<sup>2</sup> discussed the effects of the tidal planets, Mercury, Venus, Earth, and Jupiter, on solar tides and sunspots. Oddly, he eliminated the effects of Mercury "because of their very short period of about 3 months, compared with the period of the sunspot cycle, about 11.1 years."

This open invitation to challenge the Wood findings was picked up by Okal and Anderson, in another "Letter To Nature."<sup>3</sup> Putting Mercury into the picture, they suggest that Wood's correlation is "an artifact of the calculation." They take Wood to task for his three-planet solar system, but then go on to "restrict ourselves to Mercury, Venus,

Earth, and Jupiter. Mars, Saturn, and the other outer planets can be shown to have trivial contributions compared to the above planets." In this same reference the authors give the "Jupiter Effect" theory (prediction of disastrous earthquakes and phenomenal sunspot numbers to come in 1982, with a major planet alignment)<sup>4</sup> a going-over. In this confused light, it may be of interest to see what Nelson had to say, and how his methods stack up today.

## The Nelson Theme

The basic Nelson idea was that heliocentric positions of the planets 90° or multiples thereof apart are associated with disturbed propagation across the North Atlantic. He drew this conclusion after examination of years of operator logs from transatlantic communications circuits and plotting the heliocentric longitude for the dates involved. He also studied major disturbances, from records going back to the 1930s. His concluding words are worth repeating here.

"Research conducted at this observatory since 1946 has quite definitely indicated that *sunspots themselves are not the full answer* to the problems that are manifest. There is very strong evidence that other forces are at work. Study of the planets in propagation analysis has netted encouraging results, and shows sufficient promise to warrant further and deeper study." (Italics ours.)

This is a conservative statement of the case, indeed, when his results are compared with those arrived at by more conventional methods, even to this day. Nelson's work and years of amateur radio experience, show that propagation forecasting based on sunspot number and 27-day recurrence data alone "will not cut the mustard." Yet this is how most forecasting is still done.

The ambitious and knowledgeable

<sup>1</sup> Footnotes appear on page 16.

\*Technical Department, ARRL



The author, using the Celestron and solar filter, here wears a brimmed hat to exclude direct sunlight. Instrument to the rear is a 5-inch reflector-type telescope used for projection viewing. Never use any device for direct viewing unless it is equipped with a filter certified as safe.

amateur may be able to do better. We can and should try anything. The "bees can't fly" approach has no place in our picture. With this in mind, we look back at high spots in years of propagation watching, this time keeping an eye on the planets, too. Some of the experience is recent, and here observation of the sun is included. Other dates and times were dredged up from the dim past, when some of Nelson's data from the 1940s jangled our memory bells.

Encouragement to take up this work was given by almost lifelong friend Mel Wilson, W1DEI/W2BOC, who has been at this sort of thing for years. Mel even provided forms for planet plotting without a protractor. See Fig. 4. The only other tools needed were a pencil, a straight-edge, and yearly editions of *The American Ephemeris and Nautical Almanac*. This book can be purchased from the Government Printing Office and some bookstores. Nelson used the same data source in the 1940s. An inexpensive electronic "button box" will speed the simple arithmetical work.

As Nelson did with transatlantic operator logs for the years 1940 through '49, we have plotted planetary configurations for Mercury, Venus, Earth, Mars, Jupiter, and Saturn. The Mercury chore is considerable, as this small close-in planet makes more Nelson

configurations than all the others put together. Instead of plotting everything for years, we looked for periods when there were marked anomalies — mainly relatively high levels of solar activity at times when low activity is the norm, as it is in the current trough between Cycles 20 and 21.

Nelson apparently ignored the moon in all this, which appears logical until you look at the many events that seem to be related to the moon's position. More on this later. Examination of his many planet plots (in reference 1) appear to indicate another possible refinement of Nelson's methods. Where the fast-moving planets (especially Mercury) are involved, his configurations are not exactly 90-degree multiples. There is no way to tell for sure, from his text, but it would appear that he assumed the disturbance effect to be simultaneous with an event on the sun. It is now known that disturbances (high absorption, auroras) result from slow-moving particle radiation that may take several days to reach the earth's atmosphere. When this factor is taken into account the Nelson method looks more convincing.

A key point in Nelson's findings is that Jupiter and Saturn are of major importance. When these, the two largest planets, are in 0, 90, 180, or 270-degree

relationship (he says), the effects of configurations with other planets are greatest. These two move slowly with respect to one another, so the effects of their alignments are long-lasting. When you consider that they were in exact 90-degree configuration in early February, 1976, and not far from this relative position for three months either side, you wonder if this could have anything to do with the occasional anomalous behavior of the sun and the ionosphere in this supposed bottom of Cycle 20.

#### When Predictions Went Wrong

Nelson did not say why certain planetary configurations produced disturbed conditions, but most discussions, including those referenced earlier, have concerned gravitational effects. Looking at the complex machine that is our solar system,<sup>5</sup> we may think of other possible causes and effects as well — magnetic fields, blocking, deflection, and focusing, to name a few. But without straining for explanations, let's look at periods in the last year when we've encountered marked solar and propagation anomalies. Another definition here: "Anomaly — deviation from the common rule."

For about two years now the writer and several associates have been charting WWV propagation information, monitoring various signals and frequencies, and observing conditions on the sun. The last pursuit has gone through several stages of increasingly sophisticated methods and equipment. In general, the labor has confirmed the worth of regular observation and record-keeping for anyone who is really interested in propagation variations. It has also shown that there are times (just as in weather forecasting, and perhaps for similar reasons) when accepted methods do not work. Then the consistent obser-

Direct viewing of the sun, using Celestron 5, fitted with maker's solar filter for eye protection. Dark hood, shutting out direct sunlight, improves visual acuity.



ver feels strongly that he has been missing something he should have seen. Several periods in which propagation surprises occurred are detailed below.

In Fig. 1 the 2800-MHz solar flux, A, and the geomagnetic A-index, B, as broadcast by WWV during November, 1975, are shown in red lines. The same data for periods 27 days before and after are shown in black lines, with the dates displaced so that recurring phenomena line up vertically.

Early in the month we see a recurring disturbance (left side, Fig. 1B). This one had a long history, and the before-and-after peaks line up closely with the major disturbance of Nov. 3. No surprises here. It was in everyone's predictions. Next come several days of moderate or low disturbance. Again, the three A-index curves coincide closely. There was very good propagation in the middle of the three periods, with rising or above-average solar flux and low A-index. Skipping over to the 23rd, we see more good A-index tracking through the balance of the month. Predictions for all these parts of the period made the propagation seems look good. But you, gentle reader, could have done at least as well, with a little practice and use of the "DXer's Crystal Ball."<sup>6</sup>

The interesting part begins with the steep rise in the solar flux, Nov. 13 on. You don't see flux readings rocket up like that every month — and when they do, something more than ordinary 27-day influences are at work. Professional predictions contained no hint of what was to come here. The increased solar activity earlier in November had already brought new life to the 21-MHz band, which began to sound like it had about three years ago. There was even some low-latitude DX activity on 28 MHz. From the 14th on, 15 was open to Europe from most of North America for several hours, and 10 was getting hot too, though for shorter times. Ten-meter skip shortened up to about 1600 miles within this country, and there was 15-meter F-layer propagation between Connecticut and Florida for the first time in two years. Two large and active sunspot groups were visible with the simplest projection methods — but their positions identified them as being of the "old cycle."

What brought Cycle 20 back to life so spectacularly? This writer is not about to say, except to note that there was a total lunar eclipse the night of Nov. 18. It ran over into the 19th, Universal Time. So did the solar flux peak. At 96, it was the second-highest level reached in 1975. The year's average was 21 points lower. Most interesting of all is the way Nov. 18-19 towers over the comparable periods 27 days before and after. It was not predicted — but in retrospect we may feel

that it should have been.

We pay for conditions like that eventually, and the bill for this spree came due Nov. 21. Payment was made by 80- and 40-meter operators in the ARRL Sweepstakes Phone Weekend, despite professional forecasts for above-average propagation for the whole period from the 12th through the 24th. The author was caught in this one too, though he should have known that the rapid flux rise would exact its toll. But for at least a year back there had been no appreciable disturbances in the 27-day-related periods.

Even the WWV forecasters were caught with their K-index trends down. It seemed that they could not believe what geomagnetic-field readings were telling them. Here is the record: "K-index at 1800 Nov. 20 — 3, expected to decrease." It didn't. At 2400, and 0600 next day, same thing. At 1200 the 21st, "4, expected to decrease." They won this one; it did, but not for long. WWV was unreadable in Connecticut by the time the 1800 information was on the air. It was that bad, already, but worse was to come. At 2400 and 0600 on the 22nd, the K-index was "3, expected to decrease." It didn't. The 1200 bulletin gave "5, expected to decrease," but things were going from bad to worse all afternoon. At 1800 the K-index was 6 (only a few times in the whole year had a 6 been given) and expected to de-

crease. It did, eventually, and the worst was over, but the damage had been done to SSers in the latitudes where auroral effects are murder on the lower ham bands.

Some planetary configurations to ponder in connection with November, 1975, follow: Jupiter and Saturn were approaching their 90° configuration, and were about 94° in November. Jupiter and Mercury were in 180° relationship on the 14th. Saturn and Mercury were separated by 90° on the 15th. Jupiter-Venus at 90° on the 23rd, and Saturn-Venus lined up on the same heading the 24th may have been factors in some of the less spectacular bumps in the November curves.

### Keeping Up with the Sun

Until early this year our viewing of the sun was done with the simplest practical projection setups, to determine if such methods are worth the time they take. We feel they are, particularly if you observe regularly, and keep detailed records. Don't let lack of an expensive telescope keep you from it. Like photography with an aim-and-shoot type of camera, there'll come a time when you want something better, but you can learn plenty with the simple approach.

By the end of April, 1976, we'd completed a month using a Celestron 5 telescope, equipped with the maker's

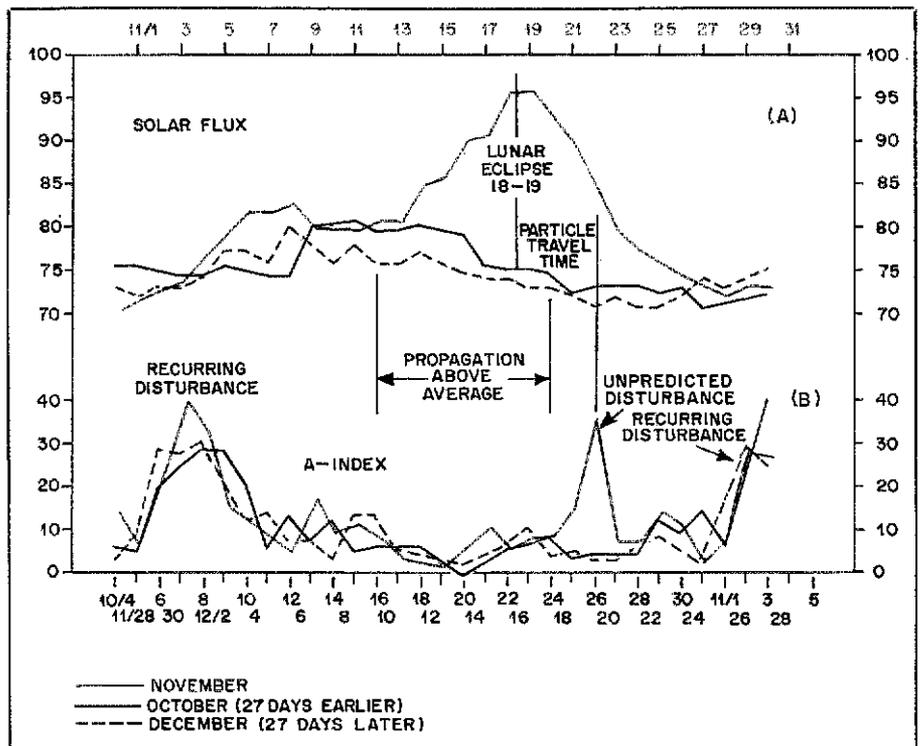


Fig. 1 — Solar-flux and A-index curves for November, 1975 (red lines) with similar data for periods 27 days before and after (black lines). It is apparent that 27-day recurring phenomena play important roles, but there is one major event that has no "history." The curves for the 17th through 19th and 21st through 23rd describe an unpredicted propagation happening of major proportions.

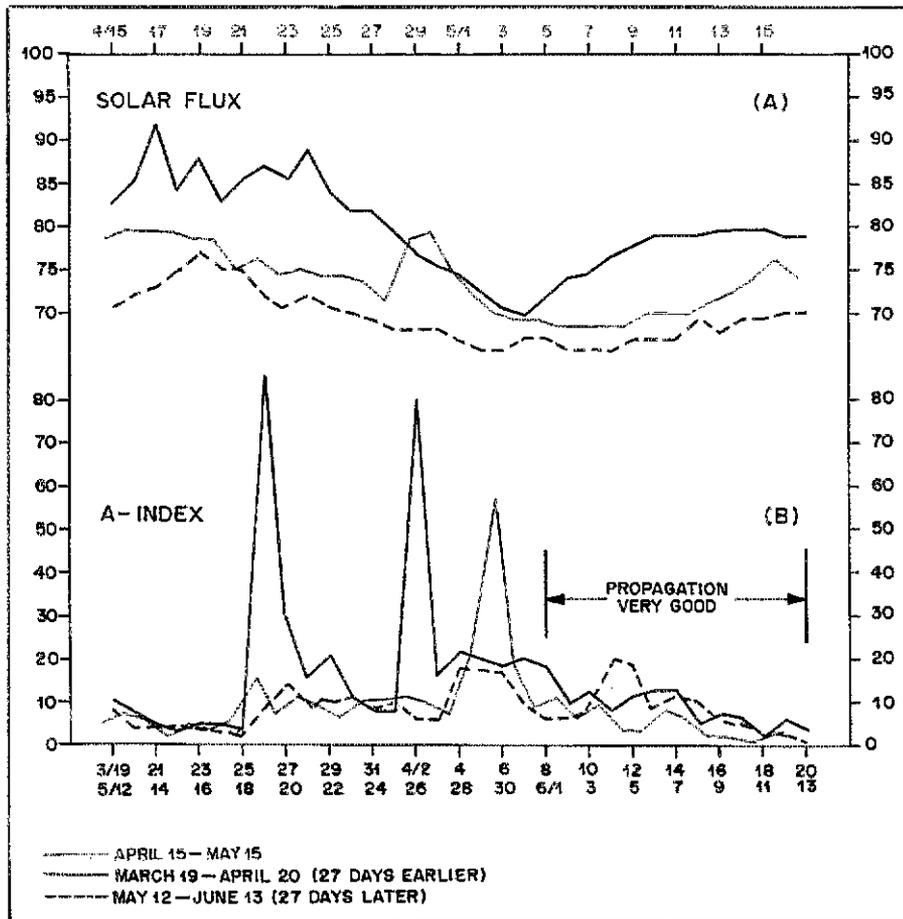


Fig. 2 - The period April 15 through May 15, 1976, red lines, and the preceding and following 27-day-related periods, show several examples of predicted and unpredicted propagation events of major interest.

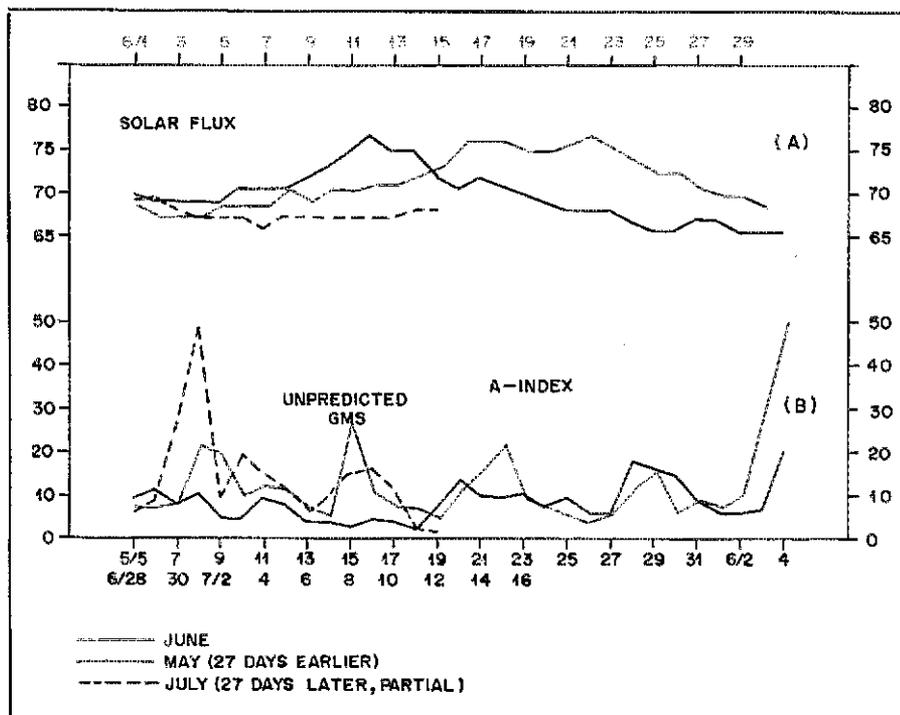


Fig. 3 - Flux and A-index curves for June, 1976, and related periods before and after show several minor propagation variations not entirely explained by 27-day recurrence phenomena. July data were incomplete at the time of preparation of this chart.

solar filter to permit direct viewing. It became apparent at once that this device was going to show us things we'd not have caught before. The central portions of the curves of Fig. 2 record our first real success in this line. There are two striking anomalies immediately apparent, both missed by the forecasters who rely wholly on recurring phenomena. The curves show the last half of one month and the first half of the following one, to get two events on one chart. We will be concerned with the red-line data first, covering April 15 through May 15, 1976, but concentrating on April 27 through May 3, initially.

On April 2 we had our first view of a large and active spot group, using the Celestron. It was three days from the west limb. Three other active areas, one representing Cycle 21, were identified before "C<sub>1</sub>" came around the east limb again, on April 21, our first well-documented recurrence. Our old friend turned out to be a disappointment at first, moving placidly across the solar disk without causing much excitement, seemingly in its declining phase.

Then, on the afternoon of April 28, a tail started to grow on a dark area at the center of the spot group. Next morning, clouds prevented early viewing, but we got a look just before noon, and found that an almost incredible change had taken place. Old C<sub>1</sub> was now three separate spots, each with its own penumbra, and there were about 12 smaller spots in between and around them.

Note that the solar flux curve, Fig. 2A, shows a 7-point rise April 28, that has no preceding or following 27-day counterpart. Then, on the A-index curve, Fig. 2B, 4 days later, we have a bolt-out-of-the-blue disturbance. Punch line for those who don't read astronomy magazines: There was an annular eclipse of the sun over Europe at 0900 April 29! Interesting coincidence No. 2: Jupiter was in 180° alignment with the sun-moon-earth lineup at that time, and still only 4° inside its 90° relationship with Saturn. If you want to go really far-out, Pluto, Uranus, and Saturn were involved in other Nelson configurations. Take your choice of explanations - but this was a major propagation anomaly, centered on an eclipse of the sun, and associated with a 180-degree alignment of the earth and Jupiter, in classic Nelson style.

How about the solar flux "mountain range" in Fig. 2A, upper left? March, 1976, is the most disturbed month in our records to date. In the portion shown, there are Nelson configurations between Saturn and Mercury, 3/15; Jupiter-Mercury, 3/16; Mars-Mercury, 3/17; Saturn-Venus, 3/18; Jupiter-Venus, 3/20; Mars-Venus, 3/25 - and

Jupiter and Saturn were close to 90° apart the whole month. Note the two huge A-index peaks March 26 and April 2, following the two highest solar-flux peaks at the appropriate times — but having only the vaguest suggestion of 27-day recurring events in April or May.

Our final chart, Fig. 3, shows two relatively minor June events, much less spectacular, but perhaps no less revealing, because our notice of these was triggered by what we saw on the sun. Except for an A-index peak at the end of the month, Fig. 3B (no explanation of this, yet), June was relatively quiet. There was little to be seen on the sun, but the several active areas we'd identified previously were discernible as they came around again, mostly much reduced in size and visible activity from previous appearances.

On the afternoon of June 8, growing activity was seen in the western quadrant of the sun. There had been no visible activity in this area, for the several days it had been in view previously. Good eyes were needed to see it now, but we have several such pairs at Headquarters, notably those of W1SL and W1YNC. Tom and Tony agreed that something was happening; that there were up to four small spots, and changing fine-detail threads around and between them. The solar flux had been at 66 (the minimum) June 2-3-4, and 67 the next three days. It rose two points in the next 24 hours, reaching 69 on the early part of the 9th, but then dropping back a notch in the afternoon. This little bump doesn't look like much in the June line of Fig. 3A, but the A-index peak of June 11 may be more significant. Our guess is that we saw the activity which was responsible for the particle emission producing this. The disturbance was strong enough so that Boulder called it a "minor geomagnetic storm," giving its time-spread as 0000 to 1200 UT, the 11th. It was not predicted by anybody, but those of us who saw that burst of activity were pretty sure trouble was coming.

The other event of interest in June is represented by the plateau in the solar flux curve, June 16-17-18. This is centered on a 180° alignment of the earth, the sun, and Venus (superior conjunction of Venus) on June 17. Note that the solar flux rose steadily before the conjunction, and then held at 75 from the day before through the day after. It then dropped back a little, only to rise to the month's high, 76, on the 21st.

Our old friend, recurring area C<sub>1</sub>, was a star performer in this event. Barely visible as it came around the east limb June 15, it expanded markedly in the next three days. By the 18th, sharp eyes could see at least 18 spots, spread over 2 to 3 days' travel time, as the sun rotates — in the eastern quadrant of the

sun, which Nelson credits as being the region most likely to affect the earth's ionosphere.

A final solar feature for June should bring joy to hungry DXers. As C<sub>1</sub> (now losing steam) passed over toward the west limb, new activity began to show on the east limb, far down the disk from the solar equator. This last is significant, as Cycle 20 activity follows the equatorial line closely, and Cycle 21 spots are far removed from it. The new arrival, dubbed C<sub>7</sub> on our records, was clearly the largest and most visible activity center of the new cycle yet seen by the writer and cohorts. More important, it was the first Cycle 21 group to last more than 4 days in our sights. It was a well-developed spot, with up to three small followers clearly visible. And it was still essentially the same in appearance on July 2, when it passed over the west limb, after twelve days in sight. We credit it with having contributed to the high solar flux reading of the month, 76, on June 22, at the time of its greatest visible activity.

#### And Now Some Old Stuff

Many of the examples cited by Nelson in the 1940s were famous days

in vhf history, it turns out. This writer was striving to document propagation "firsts" in the new *QST* vhf column back then, so we checked back to see what we were saying about some of the major disturbed days in Nelson's records. His first was March 24, 1940. In *QST* for May, "On The Ultra-Highs," as the vhf column was first known, devoted three pages to the aurora events of "the last week of March, 1940 . . . probably the most pronounced aurora in the history of uhf communication." But we beat Nelson to it by one month, recounting the fact that February 24 was an aurora date, too, and calling attention to use of the "28-day cycle" in anticipating the March recurrence. Nelson's information shows Mercury and Jupiter in 180-degree configuration March 23, Venus-Mercury 90° March 25, and Saturn-Mercury 180° March 26-7. Perhaps this explains, after 36 years, why that famous March, 1940, aurora ran on and on, for the better part of a week!

A disturbance of September 19, 1941, associated with multiple configurations by Nelson is described by the writer in November, 1940, *QST* as remarkable for its auroral effects ex-

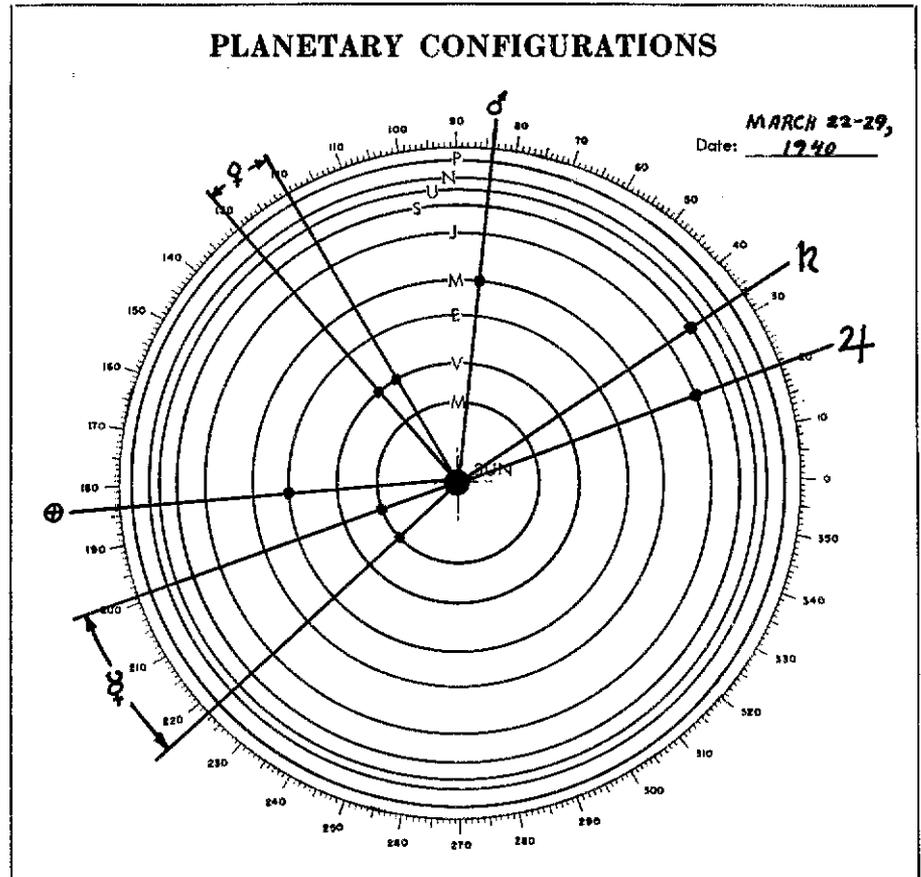


Fig. 4 — Planet plot for the first vhf aurora ever mentioned in *QST*, also chosen as an example by Nelson.<sup>1</sup> Symbols, clockwise from lower left, are for Mercury, Earth, Venus, Mars, Saturn and Jupiter. Movement in the one-week period is shown for Mercury and Venus only. Worksheet by W2BOC.

tending down to at least 36° latitude in eastern USA.

Some of the first auroral contacts ever made on 144 MHz came on April 12, 1949, coincident with multiple configurations of Mercury, Venus, and Jupiter. We score one on Nelson, here. He didn't mention the moon, but "The World Above 50 Mc." *does*. The moon was eclipsed the night of April 12, and we took editorial note of the fact in reporting widespread 2- and 6-meter auroral activity in June, 1949, *QST*.

One more eclipse narrative, and we're done. Without associating it in any way with *high* solar radiation, Nelson excerpts information from a Covington paper that describes use of an eclipse to determine where solar noise is coming from.<sup>7</sup> When we saw Covington's date our memory cells really began to spin. There was heavy cloud cover that day in New England, so we paid the eclipse little notice. But we had no trouble remembering what happened the next day. G6DH and W1HDQ had

been making daily crossband checks, 28-50 MHz, for more than a month by then, with no signals heard on the higher frequency. It was just before noon, November 24, 1946, that the frantic voice of G6DH was heard coming back on 10 meters — "I'm hearing you on 50 megacycles — I'm hearing you on 50 megacycles!" The first transatlantic vhf QSO in history had begun. Though we checked daily for months thereafter, it was not until the fall of 1947 that the muf hit 50 MHz across the North Atlantic again!

The writer takes this opportunity to acknowledge the debt all propagation watchers owe Mel Wilson, W2BOC. Jack Power, W2AXU, provided invaluable assistance in many ways, and has kept weekly 50-MHz skeds for over a year to facilitate exchange of information. Tom McMullen, W1SL, Brian Machesney, WA1LR and Tony Dorbeck, W1YNC, have helped to spot faint signs of solar activity for us, time and again. Jerry Hall, K1PLP, kindly made his 5-inch

reflector telescope available for months of daily observation of the sun. The work that led to this article is clearly no one-man job. QST

#### Footnotes

- <sup>1</sup> Nelson, "Shortwave Radio Propagation Correlation with Planetary Positions," *RCA Review*, March, 1951. Also of interest, by the same author, with Arzinger and Hallborg, "Sunspots and Radio Weather," *RCA Review*, June, 1948.
- <sup>2</sup> Wood, "Sunspots and Planets," *Nature*, Vol. 240 (November, 1972).
- <sup>3</sup> Okal and Anderson, "On the Planetary Theory of Sunspots," *Nature*, Vol. 253 (February, 1974).
- <sup>4</sup> Gribbin and Plagemann, *The Jupiter Effect*, Walker and Co., 1975.
- <sup>5</sup> A recent and very useful source of solar system information is the September, 1975, issue of *Scientific American*. The complete issue is now available in book form from W. H. Freeman and Co., San Francisco.
- <sup>6</sup> Tilton, "The DXer's Crystal Ball," *QST*, June, August, and September, 1975. Similar information in *The Radio Amateur's Handbook*, chapter 19, 1976 and 1977 editions.
- <sup>7</sup> Covington, "Microwave Solar Noise Observations During the Partial Eclipse of Nov. 23, 1946," *Nature*, Vol. 159 (March, 1947).

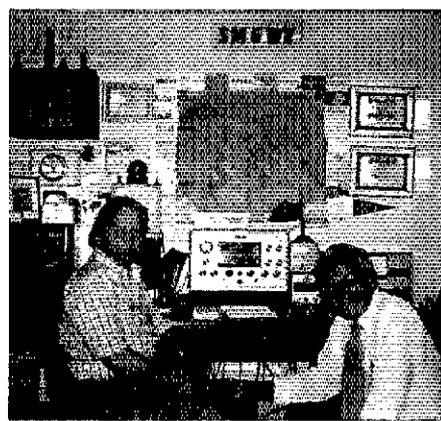
## Silent Keys

It is with deep regret that we record the passing of these amateurs:

W1ADM, Carl Scheffy, Mansfield, MA  
 Ex-W1BBP, Frederick L. Ceruti, Ft. Lauderdale, FL  
 W1BWB, Bertram Hanscom, Kennebunk, ME  
 K1YSD, Robert A. Manning, West Rye, NH  
 WB2BCY, Irving Smith, Colts Neck, NJ  
 W2B1, Enoch F. Hoffman, Barrington, NJ  
 WA2ELP, Ralph W. Decker, Towaco, NJ  
 K2EY, Allen R. Oeser, Magnolia, NJ  
 W2GBA, Herbert B. Pearson, Ridgewood, NJ  
 K2MOO, Archibald S. Cooke, Brooklyn, NY  
 W2MQE, Lester F. Eckhoff, Keansburg, NJ  
 Ex-3AWR, Carroll M. Meigs, Washington, DC  
 K3DDM, Eugene P. Hoofring, Vandergrift, PA  
 W3EML, William P. Overbeck, Roslyn, PA  
 W3GIY, John O. Sweisford, Pottstown, PA  
 W3J1Y, Harold Wolfe, Baltimore, MD  
 W3L1K, Fernley B. Phillips, Sharon, PA  
 W3PO, Stanley B. Fall, Odessa, DE  
 WB4AHR, Leonard M. Ballard, Lake Panasoffkee, FL  
 W4A1Y, George A. Howland, Heflin, AL  
 WA4AYU, Francis R. Day, Madeira Beach, FL  
 W4CDZ, Thomas N. Bail, Jr., Birmingham, AL  
 W4CTS, Marvin J. Mulhern, Winston Salem, NC  
 W4DRI, William B. Fox, Chattanooga, TN  
 W4FIQ, Kenneth Aitken, Tavares, FL  
 W4GHT, Col. L. D. Sharp, Arlington, VA  
 WA4GRX, George E. Wood, Melbourne, FL  
 WA4H1B, Roof L. Barger, Hickory, NC  
 WA4LH, Hubert A. McKibben, Venice, FL  
 K4L1Q, Raymond F. Elrod, Sr., Easley, SC  
 K4J1N, Robert W. Ratz, Falls Church, VA  
 K4MN, Ray Seale, Naples, FL  
 W4OVW, Jesse E. Morgan, Clinchco, VA  
 WA4QVK, Frank B. Silberstein, Bloomington, IN  
 W4RHC, John H. Bardon, Bluemont, VA  
 WB4SEL, Norwood "Buck" Lowman, Columbia, SC  
 K4UKA, Philip Wall, Pompono Beach, FL  
 W4ZAG, Rexford L. Peters, Tampa, FL  
 W5BJF, Claude E. "Pete" Smith, Adair, OK  
 W5IKX, Paul R. Egbert, Lufkin, TX  
 K5MNQ, Fiorentino "Frank" Perez, Hitchcock, TX  
 K6AOE, Roger L. R. Bloomingkemper, Gardena, CA  
 WA6DMX, Issac H. Kriebel, Santa Maria, CA

W6DON, Archie R. Ellis, Stanton, CA  
 W6EAP, Marvin F. Bleck, Chino, CA  
 WA6EQH, Ralph A. Trout, Redwood City, CA  
 K6GOQ, Ralph E. Lockard, Jr., Gardena, CA  
 W6IRR, Dwight D. Summy, Sr., Chico, CA  
 K6RAO, C. B. Graham, Corte Madera, CA  
 W6RDN, W. C. Cottrell, Walnut Creek, CA  
 WB6SQQ, Alice E. Williams, El Cajon, CA  
 W6TBO, Frank A. Ackerson, San Diego, CA  
 W6UTB, Price Swinney, North Hollywood, CA  
 W7COZ, Leslie J. Cowan, Hammond, OR  
 K7IAO, Richard E. Kelley, Bremerton, WA  
 W7REO, C. Roy Edwards, Winslow, AZ  
 WA7ZMJ, Raymond W. Smith, Phoenix, AZ  
 WA8BNW, James W. Farley, West Carrollton, OH  
 WB8EVE, Louis E. Gilson, Farmington, MI  
 WB8GRE, George A. Hatfield, Chillicothe, OH  
 K8GYO, David G. Smith, Cleveland, OH  
 W8IMK, Malcolm R. Mitchell, Cincinnati, OH  
 W8IYN, Martin H. Hadel, Detroit, MI  
 W8KDO, Ralph A. Weil, Campbell, OH  
 K8LUI, Robert W. Osborne, Sr., Cincinnati, OH  
 K8MHP, Thomas J. Weber, Marietta, OH  
 WB8NKH, Stanley F. Sobczak, Detroit, MI  
 W8WXU, Howard A. Spiller, Kent, OH  
 K8YMT, William H. Pierce, Rocky River, OH  
 W9AD, Brooks H. Short, Anderson, IN  
 Ex-9DNI, Robert E. Bartlett, Ashland, OH  
 W9DWE, Iven H. Kendall, Elgin, IL  
 W9FWH, Donald L. Holt, Syracuse, IN  
 W9GGP, Charles E. Manning, Indianapolis, IN  
 WB9JOE, Robert S. Senecal, Palos Hills, IL  
 W9JZD, Radcliff H. Myers, Brodhead, WI  
 W9THH, Milton W. Kerlin, Cudahy, WI  
 W9ZRF, Clifford F. Esmiol, Sr., Tucson, AZ  
 VE1AGL, Merrill R. Peters, Annapolis, NS  
 VE1AQN, James A. Sewart, Halifax, NS  
 VE1ATL, Monica M. MacDonald, Lochaber, NS  
 VE1NS, R. A. "Mac" McKenzie, St. Andrews, NB  
 DL3BT, Herbert Trommel, Hannover, Germany  
 Ex-4HH, Jack Brickett, Moose Jaw, SK

## Strays



An international radio friendship begun in the 1930s and continued ever since with regular QSOs on 20 meters gets the personal touch occasionally as SM5WE and W1AKY/W1SM visit at Eiven's QTH in Motala, Sweden. This is the third such get-together for the pair.



JABAA, Takeo Hama, first Asian to qualify for the Bicentennial WAS Award (in fact, the first non-W/VE/KH6/KL7!).

# An Inexpensive Sweep-Frequency Generator

Planning to align that i-f strip? Here's a dandy piece of test equipment to help you.

By W. C. Smith,\* K6DYX

A sweep-frequency generator can be indispensable when adjusting tuned circuits, aligning i-f strips and checking filter characteristics. I have wanted one for a long time, and had even thought of modifying an ancient piece of gear to meet my needs. When a voltage-controlled multivibrator (VCM) on a chip (IC) capable of operation up to 30 MHz caught my eye, the problem seemed easy to solve. The Motorola MC4024 is a 14-pin dual in-line device containing two separate VCMs with an output buffer for each. The frequency of oscillation is determined primarily by a single externally connected capacitor. The frequency range is variable over a range of 3 to 1 or 3-1/2 to 1 by application of a control voltage to one pin, positive with respect to ground. Supply voltage is 4-1/2 to 5 volts and the device sells for less than three dollars.

\*67 Cuesta Vista Dr., Monterey, CA 93940

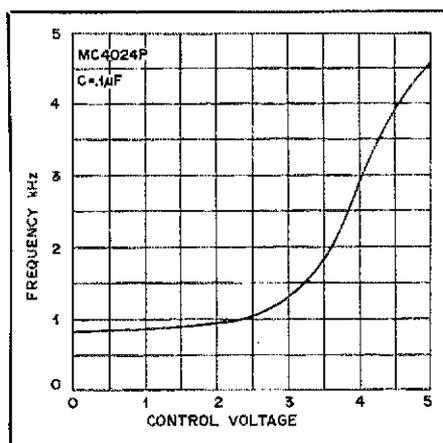
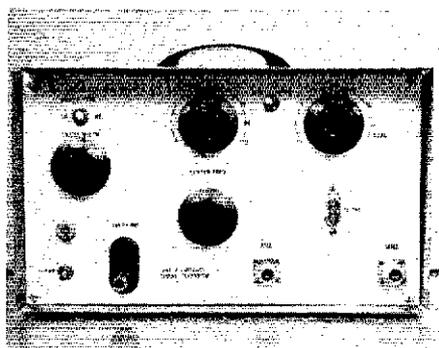


Fig. 1 — Frequency vs. control voltage for the MC4024P.



The author's completed sweep generator.

Preliminary tests confirmed the manufacturer's data with respect to frequency vs. control voltage linearity, which isn't good except over a limited range (Fig. 1). From 3-1/2 to 5 volts of control, the curve is almost exponential like the voltage of a charging capacitor. If operation is restricted to this range, and an exponential sweep voltage is employed, acceptable linearity should result. The output impedance of the buffer is approximately 100 ohms and the output waveform is a square wave of about four volts pk-pk at lower frequencies, becoming triangular in the higher frequency ranges. Harmonic richness of the output should be kept in mind when using the device as a test signal generator, for one could be tuning to the 2nd or 3rd harmonic. At the same time one might find it convenient to be able to use a harmonic in the vhf range, beyond the fundamental frequency capability of the chip.

## Circuit Description

The circuit of Fig. 2 was assembled on a single, homemade pc board, the

power supply being separate. It seems unnecessary to show a template of the layout since the circuit is so simple. No spacing or location of parts is critical for satisfactory operation. A programmable unijunction transistor, Q1, is used to generate the sweep signal. The sweep frequency is primarily a function of the anode resistor and a capacitor. A 25-k $\Omega$  Trimpot controls the gate voltage and therefore the amplitude of the sweep. A switch on the front panel allows a choice of one of two sweep frequencies, 100 Hz or 1 kHz in this case. One could omit the switch and have only one sweep frequency if desired, in which case something in the order of 1 kHz is recommended. After buffering by an emitter follower, the saw-toothed signal is applied to the noninverting input of a 741 op-amp which has a gain of 10. Another on-the-board 25-k $\Omega$  Trimpot is used to adjust the average or dc level at the sweep output to zero. The sweep excursion is then exponential from about -1 to +1 volt. In application, this

Table 1

CAPACITANCE	FREQUENCY RANGE
C1 0.4 $\mu$ F	0.5 — 1 kHz
C2 0.2 $\mu$ F	1 — 2 kHz
C3 0.1 $\mu$ F	2 — 4 kHz
C4 .05 $\mu$ F	4 — 8 kHz
C5 .025 $\mu$ F	8 — 16 kHz
C6 .0125 $\mu$ F	16 — 32 kHz
C7 .0062 $\mu$ F	32 — 64 kHz
C8 .0033 $\mu$ F	64 — 130 kHz
C9 .00125 $\mu$ F	0.15 — 0.3 MHz
C10 620 pF	0.3 — 0.6 MHz
C11 300 pF	0.6 — 1.2 MHz
C12 150 pF	1.2 — 2.4 MHz
C13 75 pF	2.4 — 5 MHz
C14 33 pF	5 — 10 MHz
C15 15 pF	10 — 20 MHz

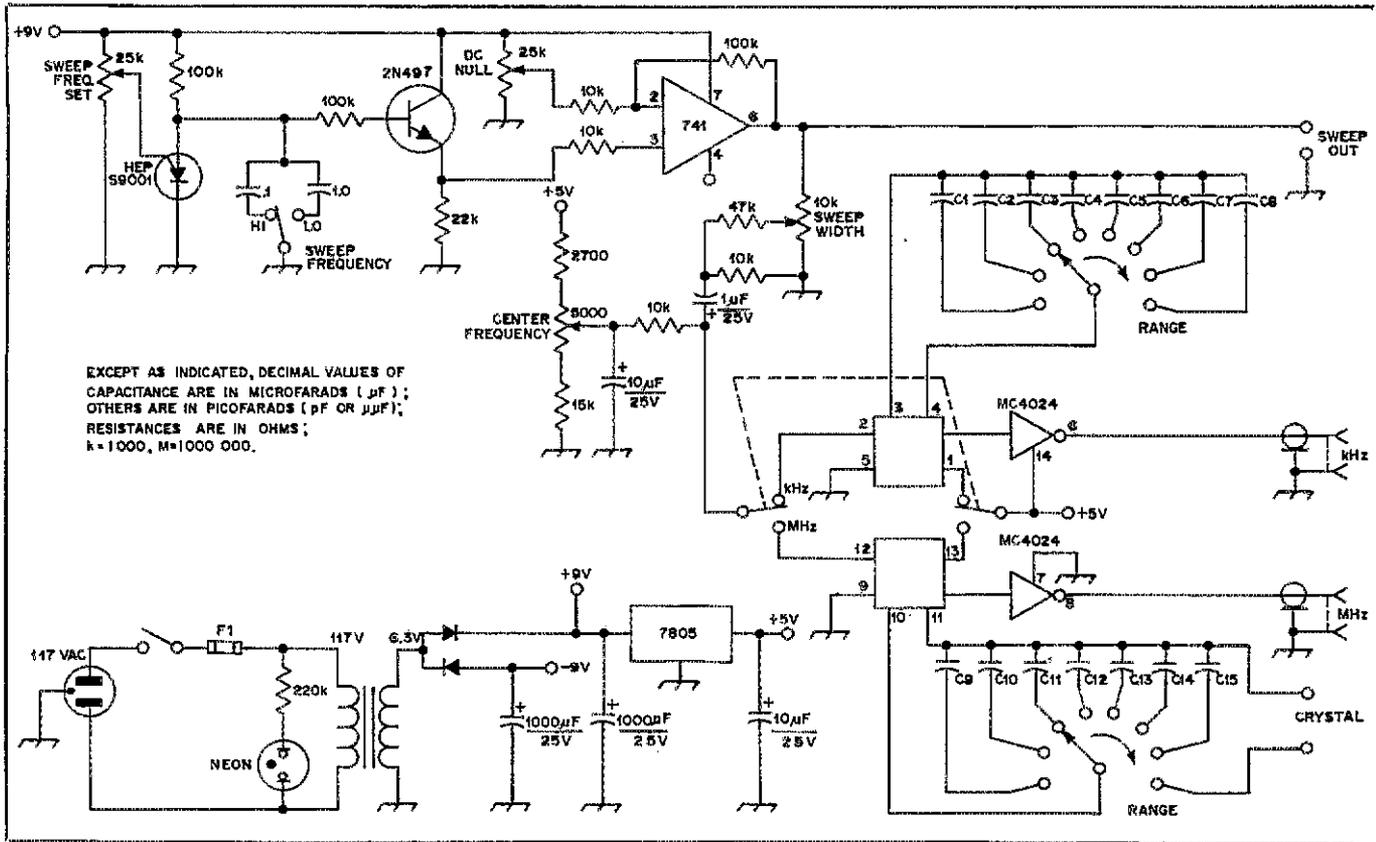


Fig. 2 — Schematic diagram of the sweep generator. All resistors are 1/2-watt composition unless otherwise noted. The input and output connectors can be selected to suit the needs of the builder.

CR1, CR2 — Silicon, 1 A, 50 PIV.  
 R1, R2 — Linear taper composition control.  
 R3, R4 — Linear taper, pc-board mounted

control.  
 S1 — Toggle, spdt.  
 S2 — Toggle, dpdt.  
 S3, S4 — Rotary phenolic, 1 pole, 8 positions.

T1 — Filament, 6.3 V at 1 A.  
 U1 — Motorola MC4024P, voltage-controlled multivibrator.

signal is to be applied to the horizontal input of an oscilloscope.

It is advisable to ac couple the sweep signal to the voltage-controlled multivibrator. This permits independent operation of the SWEEP WIDTH and CENTER FREQUENCY front-panel controls. To this end, the 2-volt pk-pk sweep signal is further attenuated by approximately 6 to 1 and fed through a 1- $\mu\text{F}$  capacitor to a 10-k $\Omega$  resistor and to the control pin of the VCM. A smaller capacitor might be used if the sweep frequency is well over 100 Hz.

The other end of the 10-k $\Omega$  resistor is connected to the CENTER FREQUENCY control and the sweeping signal is bypassed to ground by a 10- $\mu\text{F}$  capacitor. The 2700- $\Omega$  and 15-k $\Omega$  resistors, associated with the 5000- $\Omega$  potentiometer used for CENTER FREQUENCY control on the front panel, allow adjustment of the dc control voltage between about 3.3 and 4.4 volts, which is over the relatively linear range of the control curve (Fig. 1).

Frequency-determining capacitors are connected to pins 3 and 4 or 10 and

11 of the MC4024 chip. A variety of arrangements is possible and what one chooses may depend upon the "goodies" (like wafer switches) in the junk box.

If desired, only one of the VCMs may be used if a selector switch with a sufficient number of positions is available. The number of positions required on the selector switch depends, of course, on the frequency ranges desired. One might, for instance, choose only two capacitors — one for frequencies around 455 kHz and another for fre-

Fig. 3 — Fm discriminator characteristics.

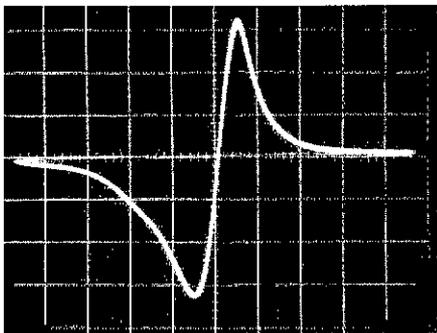


Fig. 4 — 455-kHz i-f transformer passband.

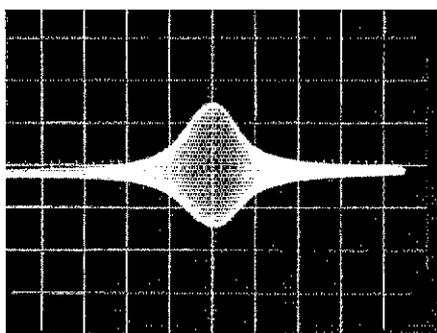
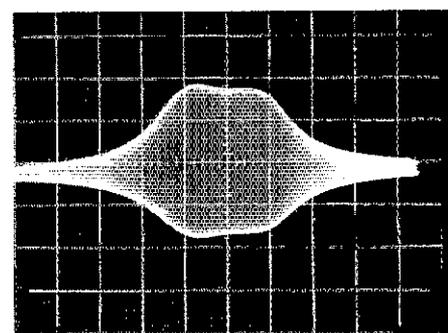
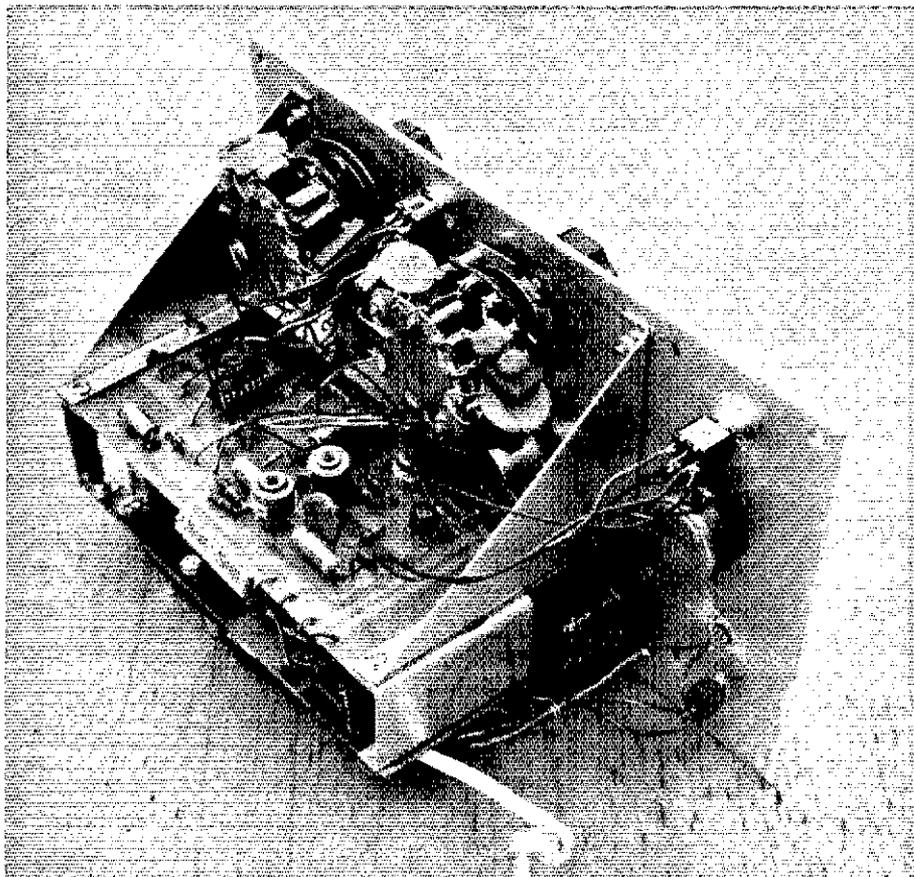


Fig. 5 — 455-kHz i-f transformer passband with the primary and secondary detuned.





Here is the interior view of the completed unit.

frequencies around 10.7 MHz, the standard a-m and fm intermediate frequencies. I had a couple of 8-position wafer switches. As a result, I came up with the capacitor selection and the corresponding frequency ranges shown in Table 1. The manufacturer gives, for the capacitor selection, the following formulas.

$$C(\text{control}) = \frac{500\mu\text{F}}{f(\text{max})} \quad \mu\text{F} \text{ or}$$

$$C(\text{control}) = \frac{100\mu\text{F}}{f(\text{min})} \quad \mu\text{F}$$

However, for operation in the range of control voltages chosen, the relationships are

$$C(\text{control}) = \frac{400\mu\text{F}}{f(\text{max})} \quad \mu\text{F} \text{ or}$$

$$C(\text{control}) = \frac{200\mu\text{F}}{f(\text{min})} \quad \mu\text{F}$$

One switch position is reserved for connection to a crystal socket mounted on the front panel, into which I can plug reference crystals of my choice. When capacitors are used, the short-time frequency stability of the device is quite good but, of course, it is temperature-dependent.

#### Application

In use, the SWEEP OUTPUT jack is connected to the horizontal input of an

oscilloscope, the vertical input of which is connected to the output of the device or circuit under test. The swept-frequency output may have to be attenuated greatly to avoid overloading when fed to the input of the test circuit. Remember, this device has a very low source impedance and the 4-volt pk-pk output signal is much greater than that of most signal generators. After these simple connections one may turn the SWEEP WIDTH to zero. Then, with the wafer switch in the appropriate range position, use the CENTER FREQUENCY control to vary the frequency for peak response from the output of the test circuit (as observed on the oscilloscope). Then, by increasing the SWEEP WIDTH, the response or passband of the circuit under test may be observed on the scope over a frequency band amounting to approximately 1/3 of the range being used.

Examples of results obtainable with this sweep generator are shown. Fig. 3 is the so-called "S" curve of the discriminator of my fm receiver, centered at 10.7 MHz. Figs. 4 and 5 show the passband of a single 455-kHz i-f transformer. Fig. 5 was obtained by tuning the primary and secondary of the i-f transformer to slightly different frequencies.

**QST**

## Feedback

□ The board layout for the power supply described in August, 1976 *QST* (That's a Big 12 Volts) is actually the top of the board view, rather than the foil side mentioned in the caption.

□ In Hints and Kinks, *QST* for June, 1976, p. 39, a NASA Tech Brief, describing a "Survey of Man-Made Electrical Noise Affecting Radio Broadcasting," was given the number 69-10665. The correct number should be 69-10308. Tech Brief 69-10665 describes pc-board material. Thanks to W3ABC and W00VI for straightening out the "kink."

□ The vhf frequency standard, described by W3DVX in April Hints and Kinks (VHF Frequency Standard Is Inexpensive and Battery Operated), has two errors in the schematic diagram. As drawn, the oscillator will have no feedback and cannot oscillate. The wire from pin 1 of U1, shown connected to pin 4 of U1, should instead connect to pins 5 and 6. The positive supply voltage should connect to pin 14 of U1, and pin 7 of U1 should be grounded, opposite to what is shown in the diagram.

□ The circuit diagram for "A CW Monitor for the Swan 270," which appeared in Hints and Kinks, *QST* for August, 1976, page 44, should show a connection between pins 4 and 8 of the NE555. Without this connection, the circuit will not oscillate. Thanks to WA7NUY for calling the error to our attention.

## Strays



Still time left: If you want an amateur radio Bicentennial memento to add to your wall-paper, you still have time to qualify for this certificate commemorating 1976. Just work the original 13 states and send an s.a.s.e. and log sheets to The Kearny Amateur Radio Club, 759 Kearny Ave., Kearny, NJ 07032.

# Sync the Deskfax

Receiving FAX artwork that's improperly framed? Here's a modification to help you get the picture.

By Marciano Righini,\* I4MY and Guido Emiliani,\*\* I4GU

Since they first became available on the surplus market several years ago, Western Union Deskfax machines have been used by many hams to send and receive drawings and photographs over the air. The Deskfax machine converts the picture information to an audio tone of varying amplitude which may be used to amplitude or frequency modulate a transmitter. For receiving, these audio signals are converted to dc levels which are passed through a wire stylus onto sensitized paper. The current flowing through the paper causes the paper to darken in proportion to the amount of current. The paper is scanned a line at a time, and the resulting image is a reproduction of the original drawing or photo. At this time, FCC authorizes facsimile using amplitude modulation (A4) on 50.1 MHz and above, and frequency modulation (F4) on 220 MHz and above. Modification of Deskfax machines for amateur use was covered by W7QCV in an earlier article.<sup>1</sup>

A problem Deskfax users face is the synchronization of the drum angles so the received picture is centered on the receiving blank. A circuit proposed by W7QCV required a constant input level for receiving. The modification to be described is relatively immune to input signal level variations which might cause a loss of sync.

## Circuit Operation

The phase contact, which opens once each turn of the drum is used to synchronize the drum angles of both sending and receiving machines. When S1 is switched to SYNC, the audio

signal generated by the sending machine is short-circuited by the phase contact for most of the revolution time, except for the short period when the contact is opened by the cam. During that period a sync signal is sent to the receiving machine. On the receiving machine the sync signal can be obtained from the stylus connection, rectified and fed to the grid of the 6C4 (Fig. 1). The tube conducts, relay LR is activated, and the circuit of the GRAY MOTOR is temporarily opened. This results in a slowing down of the drum.

The cathode of the 6C4 is connected to ground through the phase contact, which means the tube is ready to conduct for most of the time of the drum revolution, but it will actually conduct only when a sync signal gets to its grid. Following a series of sync

signals (5-10 seconds), there will be a moment when the cams of both machines will lift the phase contacts at the same time. Under this condition the 6C4 will not conduct because its cathode is not grounded. The drum angles of the two machines are now synchronized. If the two operators have placed the papers on the drums with the edges coinciding with the pointers marked on the rim of the drum, the received picture will be centered on the paper.

## Circuit Details

The sync circuit (Fig. 1) requires a power supply which delivers 6.3 V for the filament and a negative voltage for the grid of the 6C4. A separate filament transformer is required for the sync tube to avoid exceeding the heater-cathode breakdown voltage. The incom-

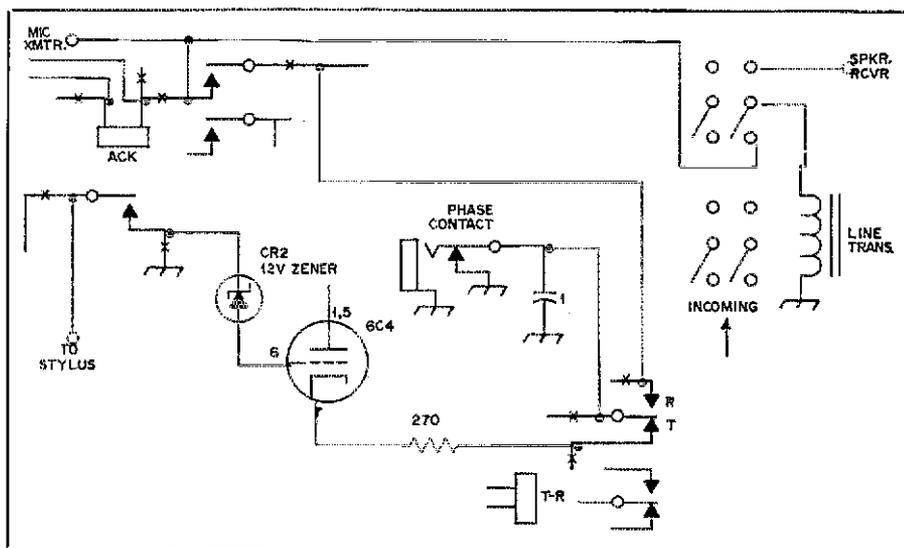


Fig. 1 - Modifications to add the synchronizing circuit to the Deskfax machine. Portions of the original circuit are shown in black and additions are in red.

\*Via Colombo Lofli 8, 48100 Ravenna, Italy  
\*\*Via Fiorelli Bandiera 18, 48018 Faenza, Italy

<sup>1</sup> King, "Conversion of Telefax Transceivers to Amateur Service," *QST*, May 1972, p. 23.

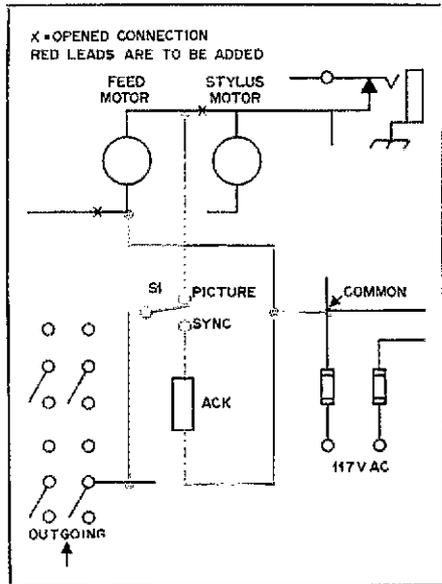


Fig. 2 - Changes to the wiring of S1 and the ACK coil.

ing signal from the stylus is rectified by means of CR1 and fed to the grid of the 6C4 by CR2.

A push button short-circuiting the line carrying audio to the transmitter tells the receiving operator that scanning of the picture is about to begin. The following procedure is suggested: The sending operator should push the but-

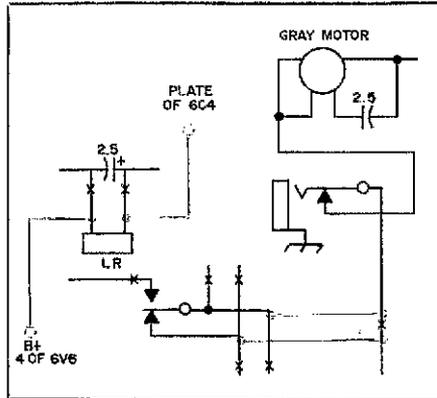


Fig. 3 - Changes to the wiring of relay LR and one section of the TR switch.

ton for 5 seconds; when the receiving operator does not hear the synchronizing signals any longer, he should switch S1 to PICTURE. The sending operator should switch S1 to PICTURE immediately after releasing the push button, thus the scanning of the picture will take place almost on the same line at both ends.

The wiring harness of the Deskfax is rather intricate and it is not easy to locate the components whose circuits are to be modified. Fig. 1 contains all the modifications, and Figs. 2, 3 and 4 are useful guides through the spider's web woven beneath a Deskfax chassis.

457

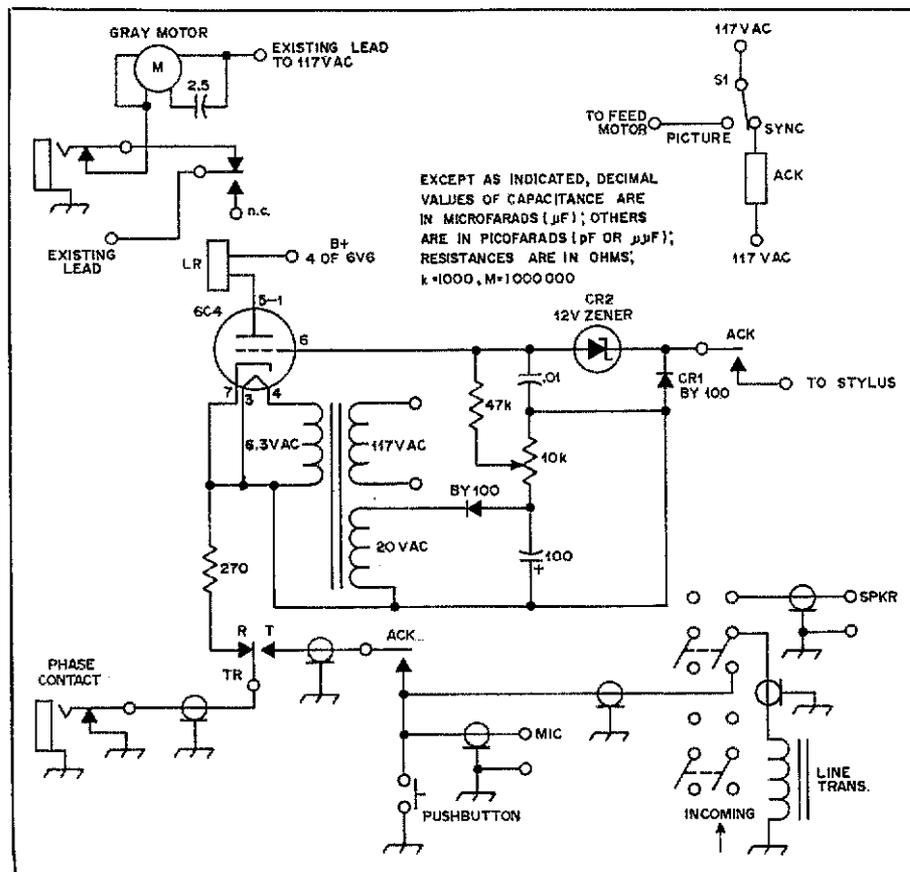


Fig. 4 - The complete synchronizing circuit.

# Strays

## CALL FOR AMATEUR PAPERS

A session entitled "New Technology in Amateur Radio" will be held at the National Telecommunications Conference, December 5-7, 1977, at the Marriott Hotel in Los Angeles. This annual conference is sponsored by the Institute of Electrical and Electronics Engineers. Amateurs are invited to submit original papers in any of these or related areas: Voice transmission (ssb, fm, speech processing, etc.); cw transmission; video transmission (slow scan, ATV, etc.); digital data transmission and applications; uhf and microwave technology; amateur communication satellites; antenna design; filtering (active, digital, etc.); microprocessor applications; propagation; amateur radio standards (harmonics, key clicks, stability, RFI, TVI, etc.).

As the title implies, this session emphasizes recent advances in amateur radio technology, as well as proposals for future technological growth. You should submit five (5) clear copies in English of the proposed paper, plus a one-page summary. These submissions should be mailed to arrive by May 1, 1977. Send papers and inquiries to: Dr. William J. Weber, III, W6HNQ, Jet Propulsion Laboratory, M.S. 161-228, 4800 Oak Grove Drive, Pasadena, CA 91103.



ARRL President Harry J. Dannels, W2TUK, addresses the crowd during the joint Radio Club de Puerto Rico/ARRL West Indies Convention held earlier this year at the Copamarina Hotel in Guanica, PR. To the right is the Governor of Puerto Rico, the Hon. Rafael Hernandez-Colon, who attended the main activity. To the left is the new RCPR president, Ramon Delgado, KP4BBK, and outgoing President Roberto Morales, KP4AOC.

Speaking to the group, the governor praised amateur radio communications in times of emergency and urged all hams to "go beyond the mere signal exchange and weather report" and become "true exponents of the goodwill of their respective countries." (KP4RK photo)

# Learning to Work with Integrated Circuits

**Part 8:** Here it is, gang . . . the final touches to turn your digital voltmeter into a full-fledged precision frequency counter! From the subaudio range through 6 meters, for ac or dc volts, or direct current, whatever is your bag, now you can measure it.†

By Jerry Hall,\* K1PLP and Charles Watts,\*\* WA6GVC/1

Now you can *really* wrap up your voltmeter/frequency counter, for here is the information you've been awaiting — the concluding part of this series which

\*Associate Technical Editor, *QST*

\*\*Editorial Assistant, *QST*

†Parts 1 through 7 appeared in *QST* for January through July, 1976.

gives the final bits of construction data. At the completion of the building efforts described in the first seven parts of this series you had a dandy digital voltmeter, but it wasn't much good at counting external unknown frequencies. To do that it needs a wave-shaping circuit in the front end. And if you

want to count radio frequencies, as opposed to counting just audio signals, you'll want to incorporate a crystal-controlled time base in place of one using the power-line frequency. The information needed to incorporate these circuits is contained in the paragraphs which follow.

## Preamplifier and Wave-Shaping Circuit

The purpose of the preamplifier and wave-shaper circuit is to *interface* the analog world with the digital circuitry of the counter section, making them work together properly. This circuit is shown in Fig. 28. The shaper will accept a signal of almost any type of wave form and convert it to a train of pulses, one pulse for each cycle of the input wave.

Fig. 29 shows the circuit-board layout and parts placement. As you can see by the accompanying photograph, the resistors are mounted on end. This was done partly to save space in the board area, but also to reduce stray coupling to circuit foils, thereby giving a slight improvement in high-frequency response over mounting them against the board. There's another difference in construction over that for previous boards, too — no IC socket. In previous parts of this series we were working with low frequencies or with switched dc levels, and the use of sockets for ICs was stressed primarily as an aid to troubleshooting. Here, however, a socket adds to the circuit capacitance and tends to reduce the maximum frequency capability. (Of course, you may use a socket if you wish, and you probably would notice little or no dif-

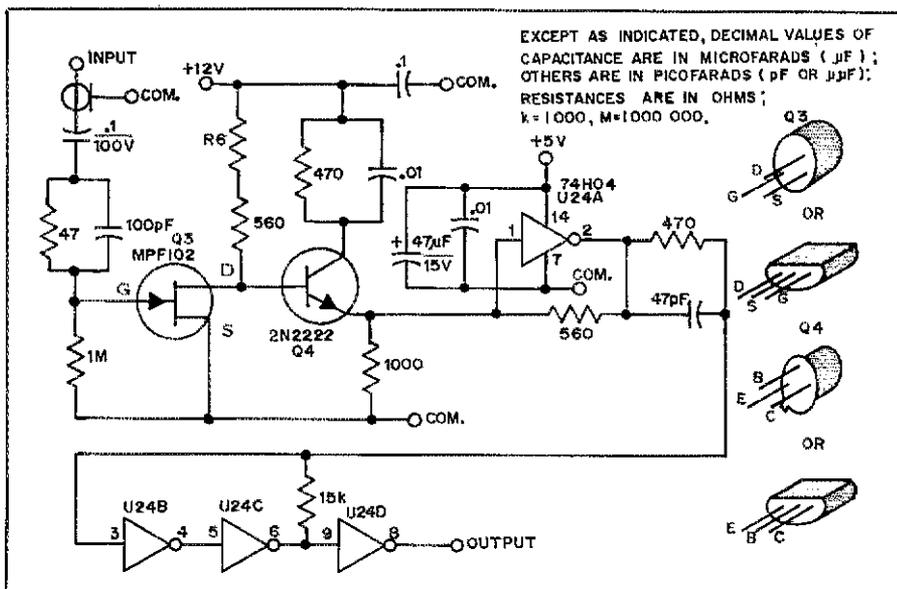


Fig. 28 — Circuit diagram for input wave shaper. No connections are made to pin numbers not shown on the IC. The 47- and .01-µF capacitors shown between pins 7 and 14 of the IC must be mounted directly at the IC. If the circuit-board pattern of Fig. 29 is used, mount these capacitors on the foil side of the board, arching the leads so they do not contact other IC pins. The 47-µF capacitor is electrolytic or tantalum; all others may be disk ceramic. Resistors are 1/2-watt composition.

Q3 — Silicon n-channel JFET vhf/uhf amplifier, Motorola MPF102 or 2N5486 or equivalent

Q4 — Silicon npn vhf/uhf oscillator-amplifier transistor, 2N2222A, Motorola MPS3563 or Motorola HEP720 or

equivalent.

R6 — Selected value in the range of 420 to 1000 ohms; see text.

U24 — High-speed-series TTL IC, hex inverter, type 74H04 (two sections unused).



Why didn't we use a pc-mount pot instead of going to all this trouble to install R6? Well, let us answer your question with a question. How good a resistance do you think a pc-mount pot is at 60 MHz?

### A Crystal-Controlled Time Base

You'll recall in Part 4 of this series we mentioned that the power company isn't any WWV, and that the short-term accuracy of the line frequency left something to be desired. An illustration in connection with Fig. 10 of Part 4 led to the conclusion that at 21 MHz, using the power-line frequency as your reference, your counting measurements could be off by as much as 21 kHz. Fig. 30 shows a circuit that can be used to replace the 60-Hz clock board to get away from errors like this.

The circuit uses two sections of a quad 2-input NAND gate as a 6-MHz oscillator. A third section is used as an inverter, providing buffering. We must be truthful and say we didn't originate this circuit — it appeared in this same form in *QST* for February, 1974,<sup>1,2</sup> but was chosen for its simplicity and reliability. "Why a 6-meg rock?" you ask. "Why not .5, or 1 MHz, or even 100 kHz?" Stability, for the main reason — economy, for another. Consider that a general-purpose 100-kHz crystal (.05-percent temperature accuracy) costs you roughly \$15 if you order it from a crystal manufacturer, whereas a high-accuracy crystal (.0005-percent temperature accuracy) for 6 MHz is less than \$12. Since the circuit of Fig. 30 includes provision for precise adjustment of the frequency of oscillation, we're not so much concerned with crystal calibration accuracy, but a saving of three bucks on one component for the DVM/counter is nothing to sneeze at, especially when we gain by a factor of ten in stability at the same time. Of course if you already have a 5-MHz rock on hand and want to use it, by all means do so. The circuit of Fig. 30 can be used if a "50-Hz modification" is made at U31. The modification is the same as that for U8, as described in Part 7 under the heading, "Conversion of the 60-Hz Clock Board for Operation at 50 Hz." No other changes need be made to the circuit of Fig. 30 for use of a 5-MHz crystal.

The output of U25, the crystal oscillator, is applied to the first 74LS90 in a string of five. Each 74LS90 is wired to provide divide-by-ten operation for a total division of 10<sup>5</sup>. The output signal from the fifth 74LS90 is a train of 60-Hz pulses, the same as from the 60-Hz clock board described in an earlier part. The difference is that, here, the 60 Hz is crystal controlled. When S3 is switched to the position shown on the diagram, this 60-Hz signal is fed to the

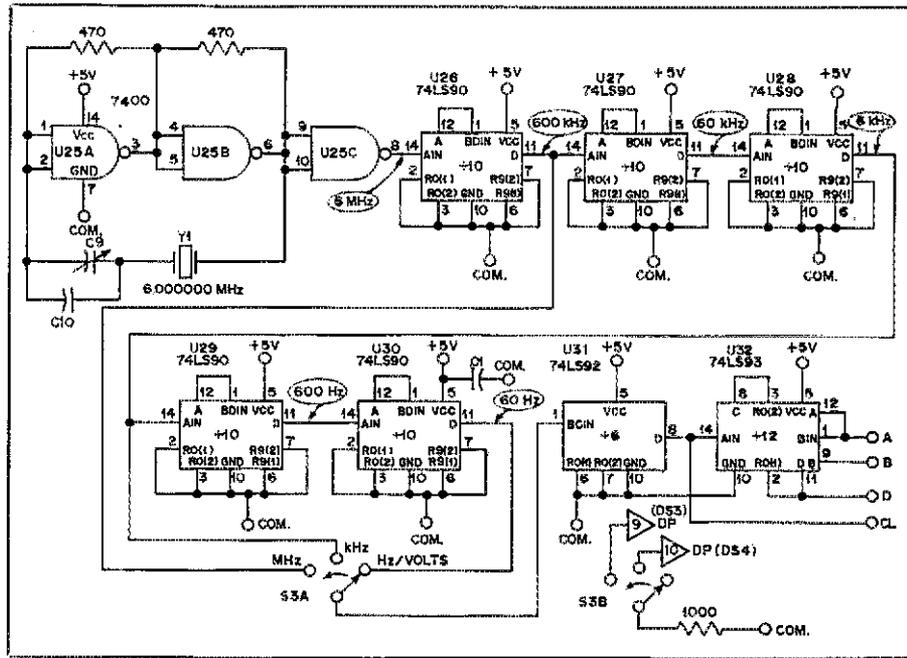


Fig. 30 — Circuit diagram for the crystal time base. No connections are made to pin numbers not shown on the ICs, except as "tie points" (see text). Resistances are in ohms. Outputs A, B, D, and CL are connected to the gating circuit (Fig. 15, Part 5), replacing those which came from the 60-Hz line-frequency clock board. The connections to S3B are from S2C (see Fig. 26, Part 7). Connection "9" is made to the 10-V terminal of S2B (DS3), and connection "10" to the 100-V terminal (DS4).

- C9 — Air variable, 1.4-9.2 pF, Johnson 189-503-5 or Erie 543-000 or equiv.
- C10 — 27 pF, or as required to place correct frequency adjustment in the range of C9. Use N1500 or N2200 (negative temperature coefficient) ceramic capacitor for optimum circuit stability.
- S3 — 2-pole 3-position rotary; phenolic wafer material suitable.
- U25 — Quad 2-input TTL NAND gate, type 7400; S, LS, or H versions may not be suitable (one section unused).
- U26-U30, incl. — TTL decade divider IC, type 74LS90 or equiv.
- U31 — TTL divide-by-12 counter, type 74LS92 for low-power consumption, type 7492 suitable.
- U32 — TTL 4-bit binary counter, type 74LS93 for low-power consumption, type 7493 suitable.
- Y1 — 6.000000-MHz high-accuracy crystal (32-pF load capacitance may be specified when ordering). A lower cost general-purpose crystal is suitable but will exhibit less temperature stability.

input of U31, a 74LS92. This is a low-current high-speed version of the 7492 used in the original clock circuit. Actually U31 and U32 are in the same circuit configuration as that of U8 and U9 on the earlier 60-Hz clock board, and you can simply remove those ICs and use them in this circuit. The 74LS devices are shown in the schematic diagram because they draw less current from the power supply of the DVM/counter.

### Measuring Frequencies

Depending on the position of S3, the frequency will be displayed on the readouts of the frequency counter in megahertz, kilohertz, or hertz. When S1 and S2 are switched for measuring frequency, the B section of S3 switches the decimal point to the appropriate position for the measurement mode. The switching scheme shown in Fig. 30 gives us the equivalent of an 8-digit display, even though we have only four readout devices. "How can that be?"

you ask. Easy! We just switch the display to read either the first four digits or else the last four digits of an 8-digit number. The center position of the switch lets us read the center four digits, to resolve any uncertainty in the other two readings.

An example? Sure! Assume that we want to measure the frequency from a 15-meter transmitter. We don't know the exact frequency yet, but for purposes of this example let's say it is 21,367,428 Hz. This frequency is the same as 21,367.428 kHz, or 21.367428 MHz, right? First let's place the time-base switch in the Hz position, the position shown for S3 on the diagram. We couple the counter probe to pick up a sufficient sample of the transmitter output for a stable display reading. In the hertz mode the count gate is open for one second, so every one of those 21-million odd cycles passes through the first counter stage. The action of the counting section of our instrument has been described in detail in earlier parts

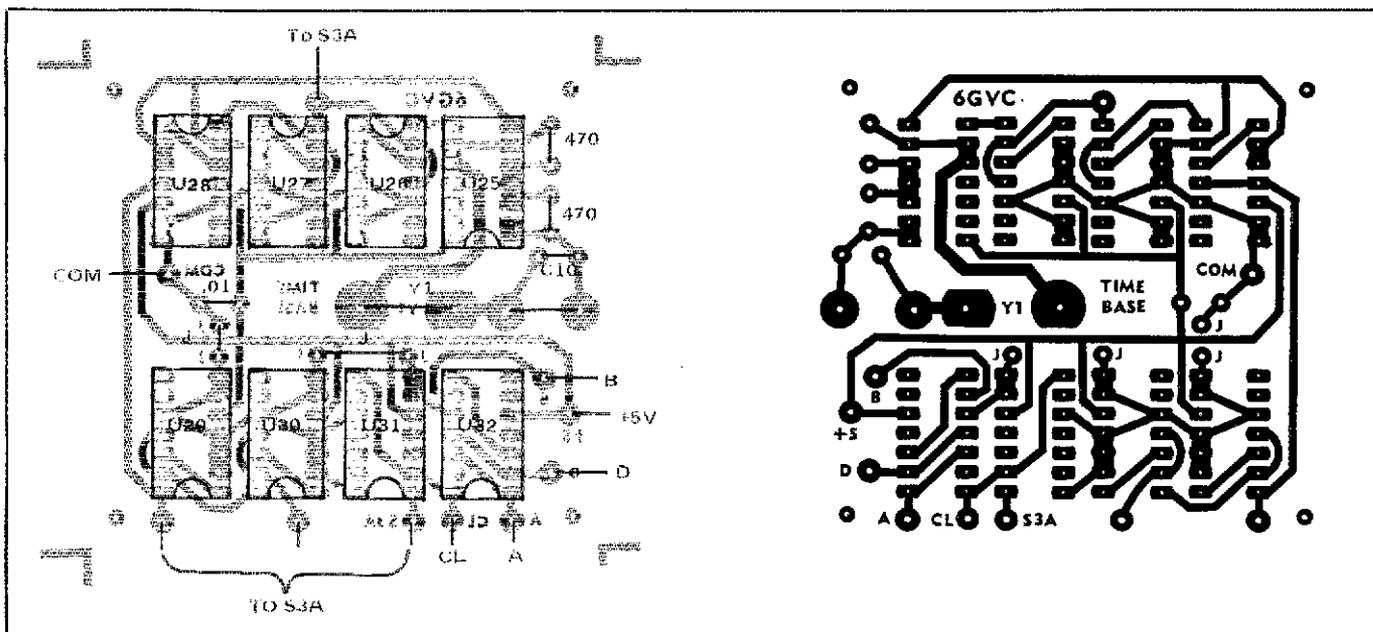


Fig. 31 — Etching pattern (solid black) and parts-placement guide for the crystal time base. The pattern is shown from the foil side of the board at actual size, with black representing copper. All parts are mounted on the nonfoil side. Decimal values represent capacitance in  $\mu\text{F}$ ; whole-number values with no units represent

resistances. J = wire jumper. Pins 4 and 13 of the 74LS90s and pin 2 of the 7492 are not connected internally. This layout uses these pins as "tie points" to avoid the need for running additional jumper wires on the board.

of this series, but what happens in this particular case is that the display will end up reading 7428 (no decimal point illuminated). The digits of the first numbers in our frequency, 2136, would appear to the left of the 7428 if we had an 8-digit display, but in this case they merely overflow out of our counter and are not indicated. So we jot down the value 7428 as part of our frequency information.

Next we switch S3 to measure kilohertz, and the decimal point now illuminates to the right of the third digit. In our time-base section, switching S3 has replaced the previous 60-Hz input to U31 with a 6-kHz input, a frequency 100-times greater. The action of U31 and U32 is essentially the same as before except now things happen 100 times as fast. In other words, the count gate is now opened for only  $1/100$  second. And  $1/100$  of the total frequency passes through the first counter stage — 213,674 pulses. As before, the left-most digits overflow, leaving us with a reading on the display of 3674 — 3674 with the decimal point illuminated. This is the kilohertz portion of our total frequency. The right-hand two digits, 74, are the same as the left-hand two in the earlier reading, except because the counter has an inherent  $\pm 1$  count accuracy, the 4 will probably bobble between 3 and 5 and be difficult to read. This is why the two-digit overlap is provided. We add this reading to that obtained earlier by appending the left-hand two digits, and now we have

367.428 kHz as a portion of our total frequency.

For reading the final part of the frequency we switch S3 to measure megahertz, and the decimal point now illuminates to the right of the second digit. The input frequency to U31 is now 600 kHz, again 100 times greater than before. The count gate is open for only  $1/10,000$  second, so  $1/10,000$  of the total frequency passes through the first counter stage — 2136 pulses. With the decimal point illuminated our display indicates 21.36 MHz, probably with some bobble in the fourth digit. By appending the left two digits to our previous information we now have the complete frequency readout, 21.367428 Hz. Note that this readout indicates the frequency to the nearest hertz.

The procedure as we've described it here may seem complicated, but only because we've tried to give you an insight into what is taking place in the circuit when you switch S3. To make a frequency measurement along these lines actually requires only a fraction of the time it takes to read these paragraphs. Just remember that in the hertz position you'll be reading the right-hand four digits of an 8-digit number, and the left-hand four in the megahertz position. The center position is available to clarify any questionable digits caused by bobble. Of course, because of leading-zero blanking, zeros at the left for any reading will not be illuminated. If you weren't interested in knowing the frequency to the nearest hertz, you could

just read it as 21.36 MHz.

Fig. 31 is the etching pattern for a circuit board for the crystal time base section. If you compare the pattern against the schematic diagram, you'll see that some of the IC pins are wired up on the circuit board but are not shown on the diagram. "Oh, no!" you exclaim. "Those guys pulled another boner." No we didn't! Honest! We followed the suggestion of Bob Shriner, WA0UZO, to use as "tie points" IC pins which are not connected internally. Conductors in the foil pattern can be routed across these "tie points" to other parts of the circuit, thereby eliminating the occasional need for a jumper wire to get from point A to point B on the board. Circuit operation is not affected by these connections.

#### Adjusting the Crystal-Oscillator Frequency

It is sometimes easy to confuse oscillator accuracy with oscillator stability. *Accuracy* means how close our oscillator is to being precisely 6.000000 MHz in frequency. *Stability* means how close it stays to that frequency once it is set there. With C9 we can adjust the frequency so it is right on the nose, but if the frequency was unstable it wouldn't stay there long. The result is that our counter accuracy would not be constant. At one time it could be pretty good, but some time later, maybe in the cool of the evening, it might be lousy. This is why we're interested in stability in our oscillator.

Accuracy is obtained by adjustment of C9, using an external frequency reference. The common method is to zero beat a harmonic of one of the frequencies in the system against the received carrier of WWV. The accuracy of the 6-MHz oscillator may be adjusted by beating the 25th harmonic of the 600-kHz signal against the 15-MHz carrier of WWV. To do this, enough energy can be picked up from the time-base section by dangling an unshielded test lead near U26. Connect the opposite end of the lead to the receiver, in parallel with the regular antenna lead, if necessary, to get a strong enough WWV signal. You can't hear an exact zero beat of the two while you adjust C9, but you can set the frequency within a fraction of a hertz by watching pulsations of the S meter or listening to pulsations of signal strength as you approach zero beat. By very carefully adjusting C9, you can find a setting where the pulsations are a couple or three seconds apart.

There's another method which is a bit more direct and more accurate. This method involves "measuring" the frequency of the color-burst oscillator in a color TV set when it is receiving a network-originated program. Each of the three major U.S. television networks uses a rubidium atomic standard to generate the frequency of 3.579545

MHz with an accuracy of much better than one Hz. Just couple the input of the counter to the oscillator in the TV set and tweak C9 for a consistent reading of 9545 with the instrument in the hertz position.

### Would You Believe . . .

Somewhere along the way in constructing the power supply for the digital voltmeter/frequency counter, we picked up incorrect basing information for Q1. This is the pass transistor in the 12-V regulator section. In the sketch in Fig. 1, Part 1, the emitter and base leads are shown reversed from their correct identification and, as shown in the photo of Fig. 2, Q1 is installed backwards. (The parts callout of Fig. 2 shows the correct connections.) If you haven't noted the Feedback information in the August 1976 issue of *QST* and made a correction already, remove Q1 from the board, turn it 180 degrees, and reinstall it. This will allow U1, the regulator IC, to operate at a much cooler temperature.

Another point bears mention. In Fig. 26, Part 7 of this series, is shown the ac rectifier circuit. In the accompanying text we failed to mention that when you measure ac voltages, the display will indicate rms values. The circuit design was based on a 60-Hz sine-wave input.

And that brings to a close this

particular series on integrated circuits. When the idea for this project was conceived we hoped it would be one which would appeal to a large number of *QST* readers. Judging from early responses, it seems as if there was a measure of success in this regard. Too, we have tried to present the information in an easy-going style, still giving sufficient detail for an understanding of the basic techniques. It has been a challenge, believe us, for it is so easy for writers to fall prey to saying words in dull, text-book style. If you've built this project, we'd appreciate receiving a postcard from you telling us about it. Or if you feel you learned something from the series but did not go to the expense and trouble of doing any constructing, we'd like to know that, too. Chances are we won't be able to acknowledge every card or letter personally, but you can bet that your comments will guide the members of the Headquarters staff in planning any future series of articles which may develop.

**QST**

### Footnotes

1. See Recent Equipment, "HUA Electronics Frequency Counter Model 1BC-1a," *QST*, April 1972, p. 60.
2. "A TTL Crystal Oscillator," *QST*, February 1974, p. 34.

# Strays



Today's library houses much more than rows of books. Movies, craft classes, lectures and the like have made the modern library a center of community activity.

As part of this new adventure in library activity, the Fairfax County Public Library recently sponsored Amateur Radio Week at its main branch. Special event station NA4FAX was set up on the second floor of the library by the project coordinators WA4LWB and WA4ERJ. A video tape on the OSCAR program was shown along with K5DZF/4's presentation of a slow-scan television setup. An amateur radio bibliography, ARRL materials, and a list of area clubs offering licensing classes were free for the taking by the 200 visitors to the station. Publicity for the event was garnered via radio, newspapers, and the 17 branches of the Fairfax County Public Library system.

I would like to get in touch with . . .

pedal steel guitar players for a pedal steelers' net on 7053, Mondays, at 2200 EST. Tom Lopez, AD2GMF.



This demonstration by the Victoria Repeater Group, VE7EZ, is typical of the hundreds of exhibits which clubs arrange annually to inform the public of what amateur radio is. Manning the display booth in the photo to the upper left are Geoff Russell, VE7DGX; Norman Addeley, VE7DCB and Audrey Russell, VE7DMQ. At busier moments the mood is not as relaxed as passersby at the Victoria Hobby Show stop to inspect, query and participate.

The display was intended to convey the diversity of activity and equipment in amateur radio. The background collage depicted activity and a collection of rigs showed the range of equipment available. The "hottest" attraction was a teleprinter which held visitors' eyes spellbound until the typed message from a closed tape was completed. The booth attracted hundreds of interested viewers.

# The Clock with a New Twist

Build this clock and wind up with a neat station accessory.

By Charles Carroll,\* W1GQO and Edward Kalin,\*\* WA1JZC

The rush to solid-state and digital design is indeed being felt in the amateur quarter. One of the more interesting items to appear on the market is the National Semiconductor MA1002 series of clock modules. Exclusive of the power transformer and controlling switches, the entire clock is contained on a single pc board. A clock for less than 20 dollars? One that has a digital readout? Surely, it contains an MA1002!

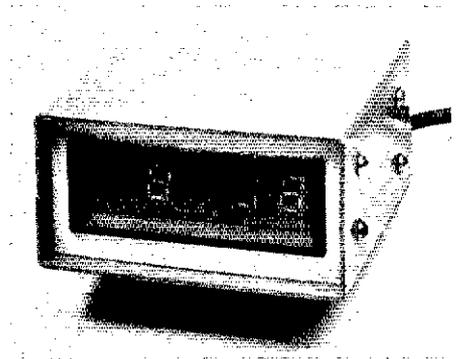
## MA1002

The MA1002 module is a miniaturized clock that contains its own LED display. The four, 0.5-inch-high numerals are visible on the front of the 1-3/8 × 3 × 1-inch (HWD) pc board. The discrete components are mounted on the same pc board. There are eight versions of the MA1002. The builder will have to select the appropriate model according to the format (12 or 24 hour), line frequency (50 or 60 Hz) and alarm tone or clock-radio features. The more subtle features are: Alarm, snooze time, variable brightness, and a loss-of-power indicator. In addition to the normal hours and minutes display, it is possible to display seconds, alarm time and sleep time, just by the flip of a switch. In case you're worrying about the display bothering that high-performance receiver, the numerals are a direct, nonmultiplexed drive. If it is desired to control external devices with the clock, the module provides a positive current source that can turn on an

npn transistor when the alarm is activated.

## Construction

Fig. 1 shows the simplicity of the clock. All that needs to be provided is low voltage ac and the control switches. Acquisition of the transformer appeared to be a stumbling block. It was not possible to find a manufacturer that produced a single transformer capable of supplying the required voltages. It appeared that the project was destined for failure. Who wants a small, interesting clock powered by two big transformers? At that point it was decided to employ an old technique — rewind a transformer.



A Radio Shack transformer (273-1480) was selected as the patient. Its original secondary was rated at 25.2

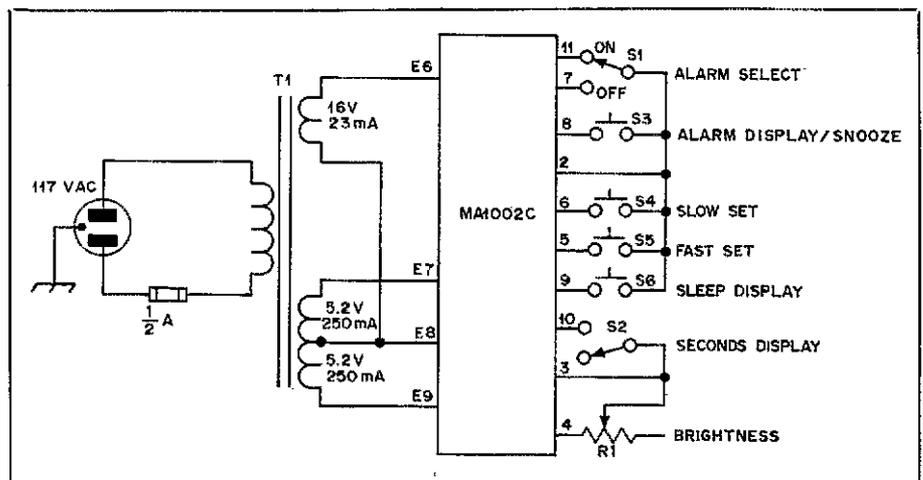


Fig. 1 — Schematic diagram of the clock.

R1 — Potentiometer, 10 kΩ to 50 kΩ, miniature, linear taper.  
S1, S2 — Toggle, spdt miniature.

S3, S4, S5, S6 — Normally open momentary push button.  
T1 — See text.

\*41 Hawthorne St., New Britain, CT 06053  
\*\*Laboratory Assistant, QST

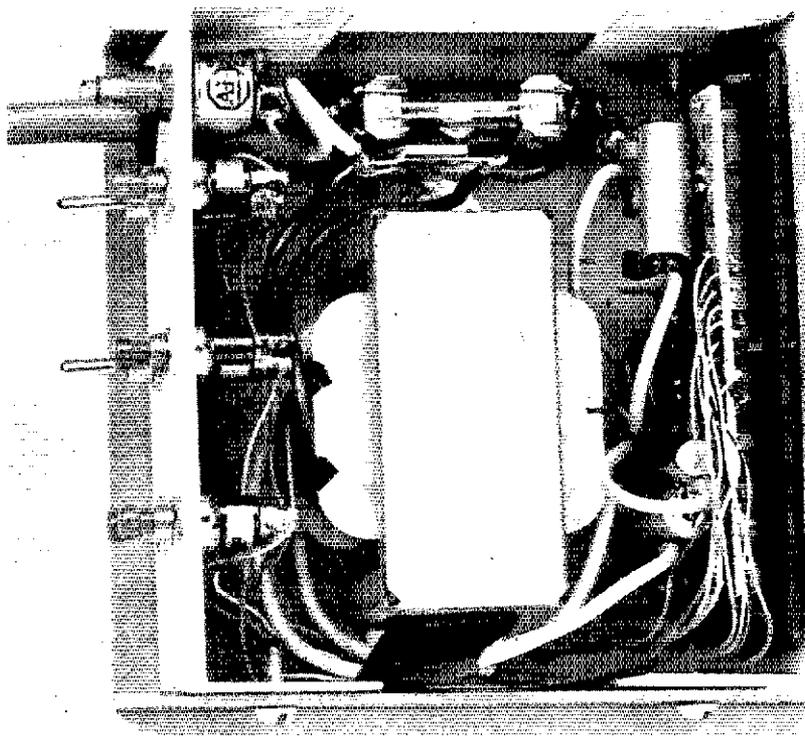
V, 1.2 amperes. The power available from that secondary indicated there was enough *iron* in the transformer to handle the two new secondaries. The rewinding process is neither long nor difficult. The basic procedure consists of removing a known winding and then winding new secondaries, using the turns ratio obtained from the original winding. A review of the transformer-rewinding process can be found in the Beginner and Novice column of *QST*, February, 1970 or in the power supply chapters of recent editions of the *Handbook*.

The selected transformer provided an unexpected bonus: It was not difficult to disassemble. It is necessary first to remove the outer metal casing. Using a knife, the *I* and *E* laminations were separated and removed from the center of the windings. The secondary winding was removed, keeping a count of the number of turns. That count produced the number for the new secondaries, 7.18 turns per volt. After trying an experimental winding the final ratio became 6 turns per volt. The new windings were 106 turns of No. 30 enameled wire and 72 turns of No. 24 enameled wire. Under load they produced 16.0 V ac and 10.9 V ac, respectively. The voltages are well within the maximum allowable limit for the module. When winding the secondary with the center tap, care should be used to ensure that the turns are equal on either side of the tap. The packaging of the clock is left entirely to the builder. The enclosure shown in the photographs was built by WA1JZC.

### Odds and Ends

Operation consists of turning the clock on and setting the time. When power is first applied the display will flash, indicating there has been a loss of power. This can be cleared by momentarily depressing either the slow or fast set switches. The fast and slow set switches can then be used to set the correct time. A complete summarization of the switch operation can be found in Table 1 and the MA1002 data sheet, available from National Semiconductor.

The complete clock can be built for less than 20 dollars. The *new twist* may take a few hours to complete, but this project easily fits in as a "weekender."



This top view of the digital clock reveals the simplicity of its construction. The MA1002 module is mounted upright, flush with the inside of the Digibazel (Nobex Components, 1027 California Dr., Box 4365, Burlingame, CA 94010). The modified transformer occupies most of the interior of the homemade box, and the rear panel supports the control switches and the display-brightness potentiometer.

Table 1

#### MA1002 Control Functions

SELECTED DISPLAY MODE	CONTROL INPUT	CONTROL FUNCTION
Time	Slow	Minutes Advance at 2 Hz Rate
	Fast	Minutes Advance at 60 Hz Rate
	Both	Minutes Advance at 60 Hz Rate
Alarm/Snooze	Slow	Alarm Minutes Advance at 2 Hz Rate
	Fast	Alarm Minutes Advance at 60 Hz Rate
	Both	Alarm Resets to 12 00 AM (12 hour format)
	Both	Alarm Resets to 00 00 (24 hour format)
Seconds	Slow	Input to Entire Time Counter is Inhibited (Hold)
	Fast	Seconds and 10s of Seconds Reset to Zero Without a Carry to Minutes
	Both	Time Resets to 12 00 00 AM (12 hour format)
	Both	Time Resets to 00 00 00 (24 hour format)
	Both	Time Resets to 00 00 00 (24 hour format)
Sleep	Slow	Subtracts Count at 2 Hz
	Fast	Subtracts Count at 60 Hz
	Both	Subtracts Count at 60 Hz

\*When setting time sleep minutes will decrement at rate of time counter, until the sleep counter reaches 00 minutes (sleep counter will not recycle).

## Strays

I would like to get in touch with . . .

□ other hams who are practicing dentists. Ray Barnum, D.M.D., WA4MFT, Lula Rd., Homer, GA 30547.

□ radio amateurs who work at Volkswagen dealerships. Bruce M. Balog, WA1FVZ, 698 Cove Rd., Stamford, CT 06902.

□ amateurs who are maintaining and

servicing Jensen-Healeys or other sports cars using the Lotus series 907 engine. Kenneth J. Slusher, WB2YLP, 86-10 34th Ave., Apt. 513, Jackson Heights, NY 11372.

# 1/4-Kilowatt Amplifier

250 watts = 2 pints for the Novice. Here's one way to take advantage of the new power limits.

By Jay Rusgrove, \*WA1LNQ

**M**ore power — at long last. Since the Novice class license was created back in the early 50s the maximum allowable transmitter input-power has been 75 watts for that class licensee. As of July this year that level was raised to 250 watts input. This applies not only to Novice class licensees but to all FCC licensed amateurs using the Novice band segments.

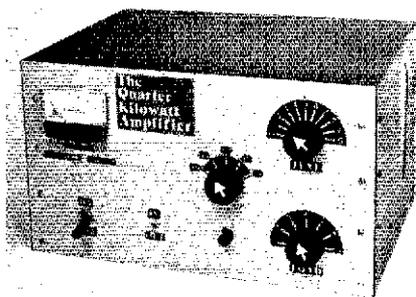
The calculated power increase in dB that this change will afford the Novice is 5.23 dB. While that may not seem like a very large increase, it can make a substantial difference during marginal and weak signal conditions. The 5.23-dB number was calculated as follows:

$$\text{dB} = 10 \log \frac{P_1}{P_2} = 10 \log \frac{250}{75} = 5.23 \text{ dB}$$

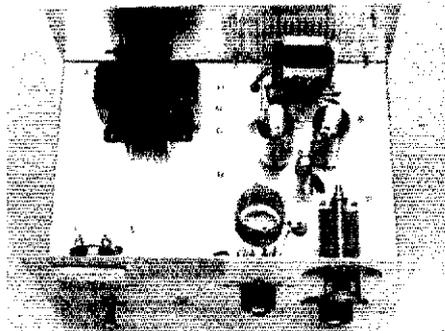
As can be seen from the equations, power input (not output) was used to calculate the dB increase. Actually, either figures could be used, assuming that the output stages for a 75-watt and 250-watt transmitter are running at the same efficiency. In that case, the ratio of P1/P2 output power would be the same as the ratio of P1/P2 input. Since the ratios are the same, the dB increase is likewise the same.

Many novices own transmitters that are not capable of running at 75 watts input. This amplifier was designed primarily with this in mind. However, it is entirely usable with a 75-watt rig. Approximately 25 watts of power are required to drive the amplifier to 165-watts output on 80 meters. Figuring the dB increase for these levels gives an increase of 8.2 dB — nothing to sneeze at! Less than 25 watts can be

\*Novice Editor, ARRL



used to drive the amplifier, but there will be a corresponding drop in output power. If a 75-watt transmitter is used to drive the amplifier, the transmitter output should be reduced to a level just sufficient to drive the amplifier to its full power input. This can usually be accomplished by lowering the drive to



This is an inside view of the amplifier. C1 is located at the lower right. C2 is mounted below the chassis and is connected to L1 using a feedthrough insulator.

the transmitter output stage and reloading.

## The Circuit

The main ingredient in this amplifier is a pair of 6KD6 television-sweep tubes. Although the tubes are rated at 33 watts of plate dissipation, they can handle temporary overloads of at least 100 watts without sustaining permanent damage. These tubes were chosen over 811s or 572Bs because they can often be "liberated" from old television sets or can be purchased new from most TV service shops. Ever ask your local TV serviceman for an 811 or 572B?

VR1, an 11-volt Zener diode, provides cathode bias for the tubes and establishes the operation as Class B. That class of amplifier requires less driving power than does a Class C stage for the same power output. It is easier to reduce the output from a transmitter that has more than enough power to drive the amplifier than it is to boost the output from a transmitter that provides insufficient drive. Class B operation was chosen for that reason.

The power supply uses a TV set transformer that has three secondaries: 600 volts, 6.3 volts and 5.0 volts. The 600-volt winding supplies the full-wave bridge rectifier with ac energy. Dc output from the rectifier assembly is filtered by means of three 330- $\mu$ F capacitors. The 47-k $\Omega$  resistors across each of the capacitors equalize the voltages across the capacitors and drain the charge when the power supply is turned off. Equalizing resistors are used across each of the diodes to ensure that the reverse voltage will divide equally between the two diodes in each leg. The capacitors across each diode offer spike protection. Each 6KD6 draws 2.85 am-

peres of filament current. Both filaments are connected in parallel across the 6.3-volt transformer winding. The 5-volt winding is connected in series with the 6.3-volt winding; the total (11.3 volts) is rectified, filtered and used to power the relay.

A 0-50 mA meter is used to measure the plate voltage and current. The meter reads 0-1000 in the plate-volts position. A .26-ohm shunt is placed in the high voltage lead to facilitate metering of the plate current. One should be careful if working near the meter with the power

on, as full plate potential will be present between each of the meter leads and ground. *Caution: Turn off and unplug the amplifier before making any changes or adjustments.*

### Construction

Perhaps the best way to classify this amplifier would be to call it a "junkertype" amplifier. Every attempt was made to keep the amplifier as simple and easy to build as possible. The only critical values are those for the amplifier plate-tank circuitry. Reasonable parts

substitutions elsewhere in the circuit should have little or no effect on the performance of the amplifier. For example, if 330- $\mu$ F filter capacitors are not available 250- or 300- $\mu$ F units could be substituted. They should be rated at 450 volts or greater to provide a margin of safety. If a .001- $\mu$ F plate-blocking capacitor is not on hand and a .005- $\mu$ F unit is, use it. Often, builders attempt to match parts exactly to the type specified in a schematic or parts list. A few projects are this critical in nature, but the majority, including this one, are not.

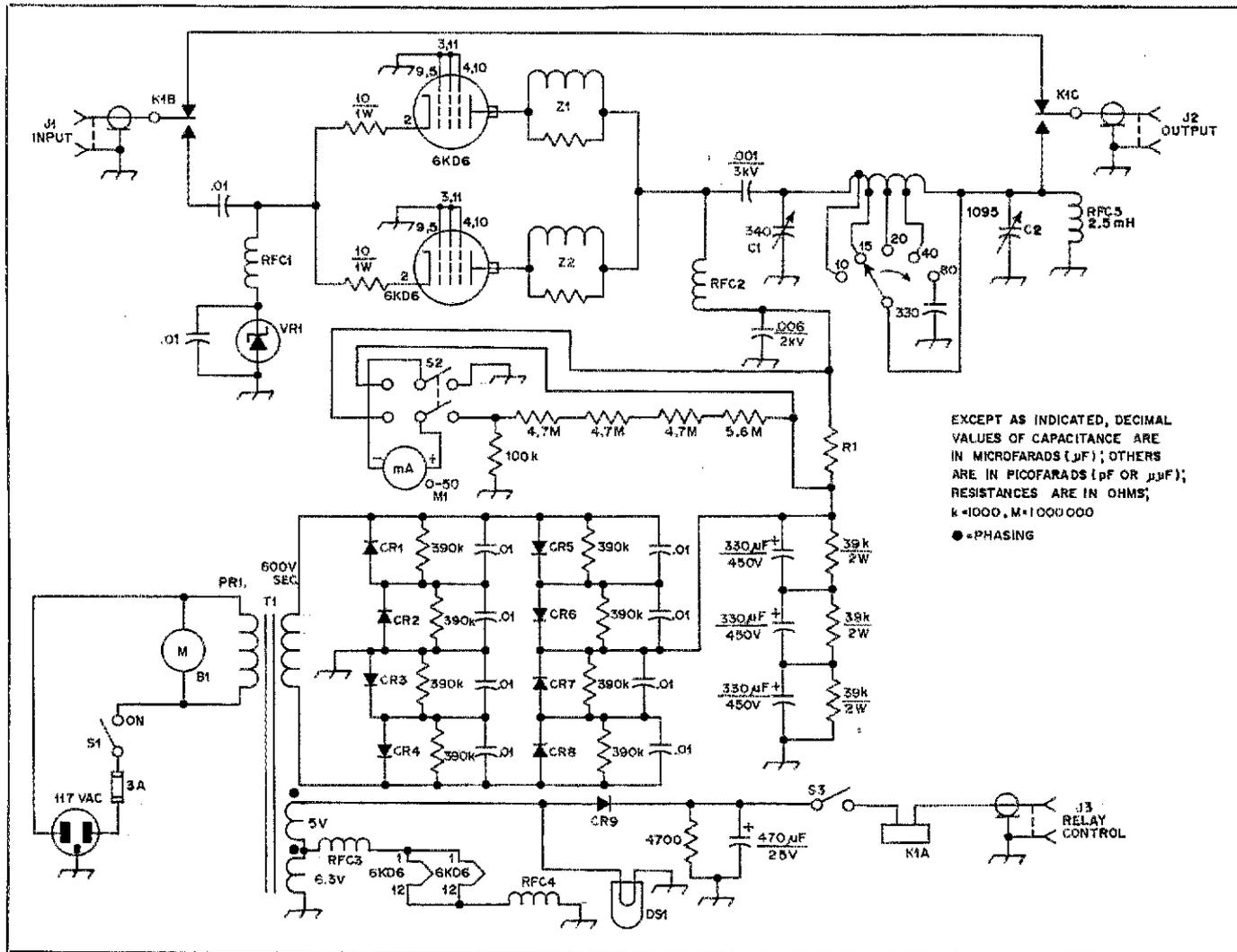


Fig. 1 - Shown here is the schematic diagram of the 1/4-Kilowatt Amplifier. Resistors are the 1/2-watt composition type unless otherwise specified. Fixed-value capacitors are disc ceramic unless otherwise noted. Polarized capacitors are electrolytic.

B1 - 117-V ac blower.

C1 - Variable capacitor, 340 pF maximum (Millen 19335 or equiv.).

C2 - Variable capacitor, 1095 pF maximum (surplus 3-section 365-pF variable).

CR1-CR8, incl. - Silicon diodes, 1000 volt, 2 ampere.

CR9 - Silicon diode, 50 volt, 1 ampere.

DS1 - Pilot lamp assembly, 12 volt.

J1, J2 - Coaxial connector, SO-239.

J3 - Connector, phono type.

K1 - Dpdt relay, 12-volt field, 2-ampere contacts.

L1 - 18 turns B & W 3022 coil. The entire coil is used for 80-meter operation and is tapped for the other bands as follows: 7-1/2 turns for 40 meters; 13-1/2 turns for 20 meters; 14-1/2 turns for 15 meters; 15-1/2 turns for 10 meters. Turns are measured from C2 end of coil.

M1 - Panel meter, 0-50 milliamperes. (Calectro DI-910 or equiv.).

R1 - Meter shunt, 1 foot No. 24 enam. wire wound on a large ohmic value 2-watt composition resistor.

RFC1 - 20 turns No. 24 enam. wire on an

Amidon FT-82-72 core.

RFC2, RFC5 - Rf choke, 2.5 millihenry, 500 milliampere.

RFC3, RFC4 - 15 turns No. 14 enam. wire on an Amidon FT-82-72 core.

S1 - Spst toggle switch, 4 ampere.

S2 - Dpdt toggle switch, low current type.

S3 - Spst toggle switch, low current type.

T1 - Television transformer (see text).

VR1 - Zener diode, 11 volt, 50 watt.

Z1, Z2 - 5 turns No. 18 enam. wire on a 47-ohm 1-watt resistor.

Table 1

Typical input/output power relationships for various input levels. These measurements were performed in the 80-meter band.

POWER INPUT (WATTS)	POWER OUTPUT (WATTS)
2	10
5	25
10	60
15	90
20	130
25	165

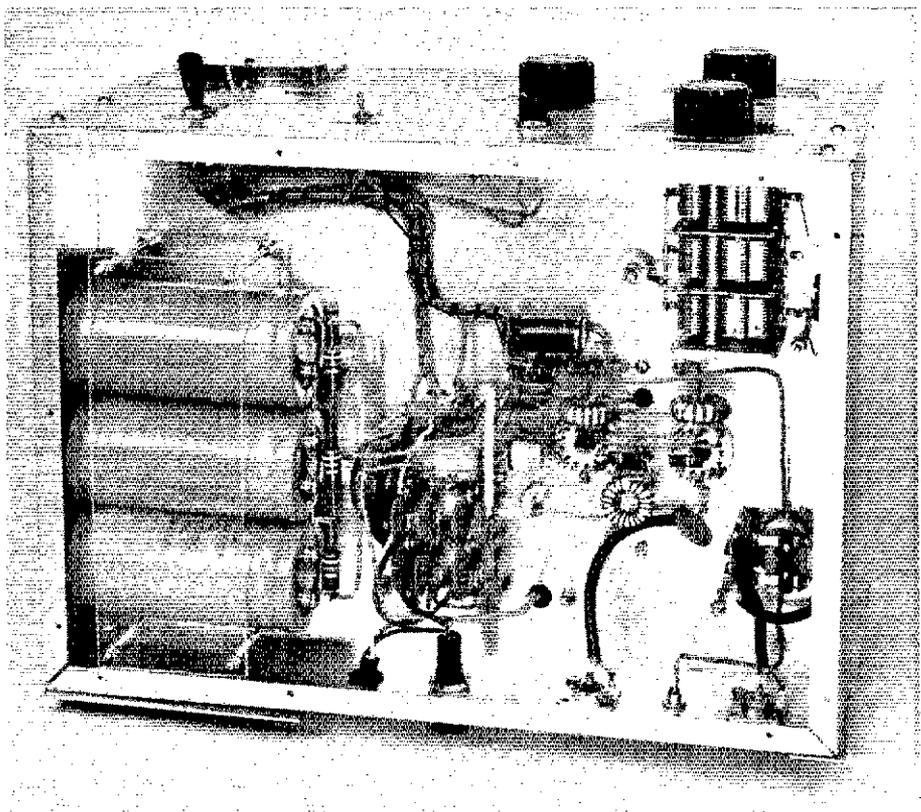
The transformer used in this amplifier was garnered from an old TV set. Any hefty transformer with a high-voltage secondary between 550 and 700 volts should be adequate. Most of these transformers will have multiple low-voltage secondaries suitable for the tube filaments and relay requirements.

The chassis used to house the amplifier happened to be on hand and measures 3 X 10 X 14 inches. No doubt the amplifier could be constructed on a smaller chassis. The beginner is cautioned not to attempt to squeeze too much in too small a space.

The front, rear, side and top panels are constructed from sheet aluminum and help to keep the amplifier "rf tight." Any air flow openings are "screened" with perforated aluminum stock. The front-panel meter opening is shielded by means of an aluminum enclosure (a small Minibox would serve quite nicely). The on-off power switch, pilot light, meter switch, band switch, tuning and loading controls and amplifier in-out switch are all located on the front panel. On the rear panel are the amplifier input and output connections, relay control jack and the fuse holder. As can be seen from the photograph, a fan is located near the tube envelopes to keep them cool during operation.

### Setup and Operation

Attach the output of the transmitter to the amplifier input connection. Then, join the output of the amplifier to a 50-ohm non-inductive dummy load. Connect the relay control line to the transmitter or external antenna-relay contacts. Then plug in the line cord and



Underneath the chassis. Parts placement is not especially critical. Tie-point terminals are used to support the point-to-point wiring.

turn the power switch to the ON position. With the meter switch in the PLATE VOLTS position, the reading on the meter should be approximately 425, which corresponds to 850 volts. If the power transformer used has a high-voltage secondary other than 600 volts the reading will vary accordingly. If no plate voltage is indicated by the meter, check your wiring for possible errors or defective components. Next, place the meter in the PLATE CURRENT position, the band switch to the 80-meter band, and apply a small amount of drive to the amplifier — enough to make the meter read 50 mA. With the plate-tank loading control fully meshed, quickly adjust the plate tuning capacitor for a dip in plate current. Apply more drive (enough to make the meter read 100 mA), advance the loading control approximately an eighth turn and re-

adjust the plate tuning control for a dip in plate current. Continue this procedure until the plate current maximum dip is approximately 300 mA. The final value of plate current at which the amplifier should be run depends on what the plate voltage is under load. In our case this value was 800 volts. Therefore, the amount of current corresponding to 250 watts input is approximately 310 mA. ( $I = P/E$ ,  $I = 250/800$ ,  $I = 312.5$  mA.) The same tune-up procedure should be followed for each of the other bands. The amplifier efficiency on 80 through 20 meters is approximately 65 percent, dropping to 60 percent on 15 meters. On 10 meters efficiency is slightly less than 50 percent. Poor efficiency on the higher bands is caused primarily by the high-output capacitance characteristics of sweep tubes. QST

## Strays

On August 3, 1976, K8KIM answered a CQ on 40 meters from W2CFU and a QSO began. Of course, there is nothing unusual about that. But after chatting awhile, K8KTM mentioned that the call sounded vaguely familiar and that he might have W2CFU's QSL

card in his file cabinet. W2CFU thought not. K8KTM checked and came up with a QSL card from W2CFU dated September, 1935, when K8KTM was an SWL. The card bore a one-cent stamp. W2CFU was flabbergasted; so was K8KTM.

Take heart QSL collectors: Nineteen years — that's what it took, but it finally made it to the QTH of Joseph Schwartz in Flushing, NY. The QSL confirmed the then KN2VGV's contact with KN2YJP. In Joe's words, "I say to all hams, do not give up hope receiving your QSL. Some day it will arrive." But he added, "I wonder if I hold the record for receiving a card so late?"

# Meet the Microprocessor

**Part 3:** So you're thinking about building your own micro-computer. How to go . . . kit or assembled? 4-bit or 8-bit, or maybe 16? What additional equipment will you need? Will it be expensive?†

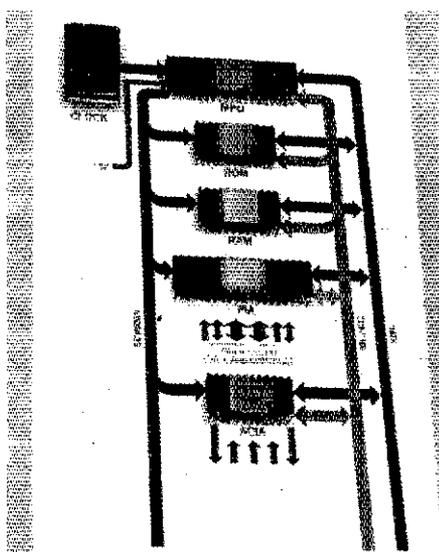
By William L. Thomas,\* WB6FGR/9 and Stephen E. Belter,\*\* WN9SGP

If you were to set out to build your own microcomputer, you'd want to know several things about the subject before you started to work. After all, it's not quite as simple a job as following a cookbook recipe. There are many kinds of microcomputer systems, and it'll be up to you to decide which system is best for your particular needs or desires. This series of articles has been written to give you some basic information on the subject.

In the first two parts of this series, we covered the basics of microprocessors — how they work and how they are programmed. More detailed information on these subjects may be found in any of several books and manuals now available, or through experience (or both). At this point, it seems appropriate to discuss some typical microcomputer applications for amateur radio. We will look briefly at two of them, a repeater control system and an adaptive Morse-code decoder. Since both of these applications can be quite complicated, only simple examples will be illustrated. As an aid in our discussion, we will make use of a handy tool called a *state-transition diagram*. It provides a convenient method for showing the relationship between the different tasks the computer will be programmed to perform.

## Repeater Control System

Repeater control systems can be quite versatile when built with a microprocessor. However, since a full description of such a system would be beyond the scope of this article, a simple system



This representation shows some of the special-purpose ICs available for micro-computer systems. The microprocessor IC (MPU) is shown at the top. The arrows show the flow of information in the machine, this one being based on Motorola's M6800 system. (Motorola Semiconductor Products photo)

having only an i-d-er and timer will be discussed. The state-transition diagram in Fig. 8 shows our *states* represented by the four blocks, STANDBY, REPEAT, I-D & REPEAT and TIME-OUT. These four states represent the major functions that our repeater program will perform. The *events* that determine the order of performing any series of tasks are symbolized by arrows pointing from one state to another.

As an example, consider what this repeater will do if a very short duration signal occurs at the receiver input after more than four minutes have elapsed since the last i-d. Before receiving the

signal, the repeater will be in the STANDBY state. The microcomputer will have the transmitter turned off and will be waiting for the squelch on the receiver to be broken. When this happens, the repeater will go from the STANDBY state to the I-D & REPEAT state where a Morse i-d will be transmitted. When the i-d is finished, no signal is present at the receiver and the control system goes back to the STANDBY state. If someone had started transmitting continuously while in the I-D & REPEAT state, their signal would have been retransmitted; and at the end of the i-d, the control system would cause the repeater to go to the REPEAT state. The other possibilities can be considered in a similar manner. Note that it is impossible to get caught permanently in any state since there are arrows (events) pointing both in and out of each state.

In order for the microprocessor to sense the receiver squelch and the reset push button, there must be interfaces to translate the voltage levels to 1s and 0s. Similarly, there must be interfaces to translate the 1s and 0s from the central processing unit (CPU) to control the transmitter and tone generator for the i-d-er. For each of the states in the state-transition diagram, we could flow-chart the operation of program.

The Purdue Amateur Radio Club recently converted their repeater, WR9ACZ, to autopatch with microprocessor control. In addition to controlling the i-d and time-out functions, the microprocessor also handles the autopatch access code, audio switching, and Touch-Tone to dial-pulse conversion. When a Touch-Tone command is recognized, the microprocessor responds with an R in Morse code, then performs the requested function. The microprocessor also recognizes when the uni-

†Parts 1 and 2 appeared in *QST* for August and September, 1976.

\*315 N. Maple Ave., Apt. I-G, Oak Park, IL 60302

\*\*465-1/2 Vine St., West Lafayette, IN 47906

versal emergency number, 911, is entered and automatically dials the local Crime Alert telephone number. The program was written by Howard Cunningham, WA9VRU, for a Motorola MC6800 microprocessor and uses approximately 800 eight-bit words of program storage and 100 words of data storage.

There is no limit to what could be done, with a little imagination. For example, when the repeater is timed-out the microcomputer could play Taps on its Touch-Tone pad before shutting down the transmitter, or Reveille each morning at 7 A.M. (subject, of course, to FCC rules).

### Adaptive Morse-Code Decoder

The authors' first experience with amateur-radio-oriented microprocessor projects was an adaptive Morse-code decoder. This system could decode hand- or machine-sent Morse code in the range of 1/2 to 130 wpm without any external speed adjustments. The system was implemented on an Intel 4004 which was the first widely available microprocessor. Our inspiration for this project was an article in *QST*<sup>2</sup> which presented an *algorithm* (set of rules to follow) similar to these:

- 1) If the new element (dot or dash) is at least twice as long as the immediately preceding one, the new element is a dash.
- 2) If the new element is less than half as long as the immediately preceding one, the new element is a dot.
- 3) If the new element is more than half as long but less than twice as long as the immediately preceding one, the new element is the same as the preceding one.
- 4) If a key-up interval occurs which has a length equal to or greater than 3/4 the length of the last dash, a letter has been completed.
- 5) If a key-up interval occurs which has a length equal to or greater than 1-1/2 times the length of the last dash, a word has been completed (a space is generated).

While the basis for this algorithm is more than five years old, we have yet to find a simpler technique that will work as well with hand-sent code.

A simplified version of our state-transition diagram for this system is shown in Fig. 9. Each of the above-mentioned steps is accomplished by this machine (note the interchangeability of the words, *system* and *machine*). For example, assume the system is currently in the DASH state. If the key goes down (event 1), the program goes to the DOWN state and performs the indicated task. Now, if the key goes up before 0.5 "DOWN"TIME, corresponding to the element stored during the DASH state, a

Footnotes appear on page 35.

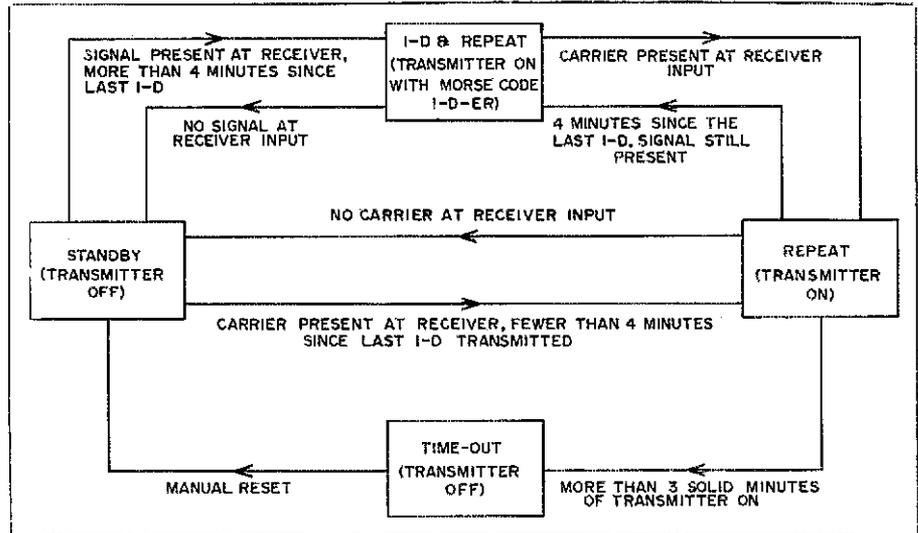


Fig. 8 — State-transition diagram for a simple repeater control system with a Morse-code identifier and timer to turn off the transmitter.

dot has occurred by rule 2, and the machine goes to the DOT state (event 1/). On the other hand, if the key is still down after the element time has elapsed (event 2 occurs), the decoder goes to the WAIT state. When the key goes up (event 1/), a dash has been detected, either by rule 1 or 3, and the decoder goes to the DASH state. In a similar manner, the remaining rules can be traced as paths on the state-transition diagram.

As was the case with the previous examples, much of the work performed by the system has been taken for granted. Some of these tasks are: (1) decoding the stored dots and dashes, (2) keeping track of the DOT, DASH and LETTER-SPACE elapse times, (3) displaying the decoded characters, and (4) connecting the key to the system! Once again, these details could easily generate an entire series of articles.<sup>3</sup>

Both the previous examples could be run on the same microprocessor system. All that would be required is loading the proper program in the microprocessor's memory and changing the connections to the devices being controlled.

### Choosing a Microprocessor

Assuming that your interest has been aroused, let's discuss some microcomputer-selection criteria. The main characteristics which distinguish one microprocessor from another are number of bits in the accumulator, speed, instruction set, and support material. Each of these characteristics is stressed in the manufacturer's literature and should be weighed by the hobbyist and engineer when choosing a microprocessor family.

Currently, microprocessors are available in 4-, 8-, 12- and 16-bit accumulator (ACC) sizes. The popular 4-bit microprocessors are the Intel 4004 and

4040. The most popular 8-bit machines are the Intel 8008 and 8080, the Motorola MC6800, and MOS Technology's 6502. These microprocessors are second-sourced (alternately supplied) by numerous other manufacturers. The 12- and 16-bit microprocessors have not yet appeared to be very popular with hobbyists.

The above is by no means a complete list of the available microprocessors, but represents the popular experimenter series at the present time. There are many other semiconductor manufacturers making microprocessors (see Table 7), some with four or more different models. There are also the so-called *bit-slice* microprocessors which can be used to build machines with any even number of bits between two and

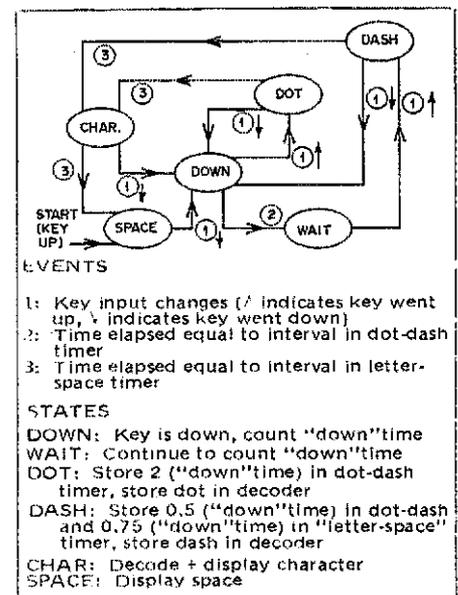


Fig. 9 — State-transition diagram for a Morse-code decoder.

64 in the ACC.

Most control applications can be handled easily by a four-bit processor. Other data and communications applications are easier with eight or more bits in the accumulator. Memory costs rise with the number of bits used, however, so most hobbyists use eight-bit microcomputers.

The question of speed is not easy to categorize on a general basis. For most microcomputers the basic unit of time is the cycle, which varies from about 1  $\mu$ s to 20  $\mu$ s for the above-mentioned chips. However, the actual time required to perform an instruction such as JUMP or ADD will vary from one microprocessor to another. For the 8080, a jump takes three cycles (approximately 5  $\mu$ s). The most popular 8-bit machines (8080, 6800 and 6502) are all manufactured with NMOS technology and hence have comparable instruction execution times.

Most microprocessors have fairly similar instruction sets; for example, they all have JUMP, SHIFT and ADD instructions. However, the number and power of the instructions (capability to perform various tasks) can greatly affect the amount of program memory needed to store a program and the time required to execute it. The most obvious differences in the instruction sets will occur in the ways memory can be addressed, how input/output transfer is performed, the ease with which two numbers may be compared, and the types of tests which can be made for conditional jumps. Other differences may include the kinds of Boolean operations allowed (AND, OR, EXCLUSIVE-OR, complement and the like) and special instructions for decimal arithmetic.

Ideally, one should try programming each of the microprocessors under consideration with some simple task. Compare the resulting programs for number of words of program and data memory

used, the time needed to execute it, and the difficulty involved in writing the program. A test program of this type is called a *benchmark* and should be typical of the kinds of programs you plan to write. One common benchmark program for microcomputers is a multi-digit decimal addition routine.

Support material supplied by microprocessor manufacturers for use with their products can encompass quite a variety of items, including special-purpose ICs, system documentation and software packages. A company which has a large amount of support material available has made quite an investment in developing this material and will probably continue to support their microprocessor with new material in the future.

Some of the special-purpose components available for microcomputer systems include memory, clock generators, timers, and input/output interfaces. These chips greatly reduce the wiring complexity involved in building a system. Some of the newer input/output ICs have a feature where their pins may be either inputs or outputs; you control which function from your program!

Documentation is a very necessary part of a microprocessor system. A microprocessor is a very versatile tool which cannot be adequately described in a few words. Look for examples of hardware configurations and software techniques in the manufacturers' manuals. Beware of the company with only a dozen-page data sheet. The better microprocessors have books the size of the Sears catalog describing the components in detail, how to program them, and dozens of hardware and software examples.

Software is perhaps the sleeping giant of the microprocessor story at the present. A microprocessor is designed to be programmed, and the user will find the job more appealing if some of the commonly needed routines (such as a multiply routine) are supplied by the manufacturer. If you plan to have a large system eventually, you will also want an assembler which will run on your machine.

There are other things which may affect which microcomputer is best for your application. Can you easily interface it to the equipment it may control? Over what temperature range is it designed to operate? How many voltages are required and how much power does it pull?

One version of RCA's COSMAC microprocessor is rated to operate from  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  with an unregulated power supply between 3 and 15 volts. It pulls less than 3 or 4 mA. Many other microprocessors require several power supplies and dissipate more than 1/2

watt. The Purdue repeater formerly only pulled 300 mA with the receiver squelched. The new microprocessor control and autopatch requires as much as 3 amperes! This would have a disastrous effect on the former standby power source, a 12-volt car battery.

You now know what a microprocessor is, how it can be programmed what it can be used for, and how to select one. The obvious question is, "How complicated must a microcomputer system be so that an amateur can experiment with it on projects he is interested in?"

### A Minimal Microcomputer System

A minimal system is shown in block diagram form in Fig. 10. The layout is based around six major devices. There are the microcomputer, a keyboard, a display or printer, additional memory, a permanent program-storage device, and special-purpose devices. Actually, a system with only a microcomputer, a keyboard, and a display device would be sufficient for very small-scale computer experimentation. In such a case, the keyboard and display devices are often combined into a single front panel consisting of switches used for data entry and computer control, with indicator lights displaying the computer status. This money-saving solution may enable the hobbyist to check out the basic operation of the microcomputer but is not satisfactory for normal experimentation which will require a separate keyboard and display.

The microcomputer should include the CPU board (microprocessor, system controller, clock, data and address buffers), some memory for program development, a power supply (with several amperes of reserve capacity), and a monitor program in ROM, or read-only memory. Most microcomputer memories which allow for both reading and writing of data (called RAM for random-access memory) will "forget" everything stored in them if the power is ever turned off. A ROM always retains its data, even after months without power.

If the monitor program is kept in ROM, it will be available whenever the microcomputer system is turned on and will allow simple operations such as entering a program to be performed immediately. A microcomputer without a permanently built-in program of this sort will quickly become frustrating for the user. Remember, a computer is useless without software to direct its operation.

The keyboard and display or printer are often available as integral units, although they will still appear as separate devices to the computer. This area of hardware development is receiving much attention from manufacturers as

Table 7

Partial list of microprocessor manufacturers. Other companies such as Hewlett-Packard also make microcomputers for use in their own equipment.

AMD (Advanced Micro Devices, Inc.)  
AMI (American Microsystems, Inc.)  
Fairchild Semiconductor  
General Instruments  
Intel Corp.  
Intersil  
Monolithic Memories  
Mostek Corp.  
MOS Technology  
Motorola Semiconductor  
National Semiconductor  
NEC (Nippon Electric Company, Ltd.)  
Panafacom, Ltd.  
RCA  
Rockwell International  
Signetics Corp.  
TI (Texas Instruments)  
Western Digital Corp.

Table 8

Partial list of electronics manufacturers of interest to microprocessor experimenters.

COMPANY/ADDRESS	KEY
Cramer Electronics, 85 Wells Ave., Newton, MA 02159	1, 3
Cromémco, One First St., Los Altos, CA 94022	3
E & L Instruments, Inc., 61 First St., Derby, CT 06418	1
EBKA Industries, Inc., 6920 Melrose Lane, Oklahoma City, OK 73127	1, 2
Electronics Product Assoc., 1157 Vega St., San Diego, CA 92110	4
Godbout Electronics, Box 2355, Oakland Airport, CA 94614	2
IMSAI (IMS Associates, Inc.) 1922 Republic Ave., San Leandro, CA 94577	3, 4
Intelligent Systems Corp., 4376 Ridge Gate Dr., Duluth, GA 30136	1, 2
Martin Research, 3336 Commercial Ave., Northbrook, IL 60062	3
Microcomputer Associates, Inc., 111 Main St., Los Altos, CA 94022	1, 2
MIT'S, 6328 Linn, N.E., Albuquerque, NM 87108	1, 2
MOS Technology, Inc., 950 Rittenhouse Rd., Norristown, PA 19401	3, 4
National Multiplex, 3474 Rand Ave., Box 288, South Plainfield, NJ 07080	2, 4
Ohio Scientific Instruments, P.O. Box 374, Hudson, OH 44236	3
PCM, P.O. Box 215, San Ramon, CA 94583	1, 3
Polymorphic Systems, P.O. Box 2207, Goleta, CA 93018	4
Processor Technology, 2465 Fourth St., Berkeley, CA 94710	3
Pro Log Corporation, 2411 Garden Rd., Monterey, CA 93940	3, 4
Scelbi Computer Consulting, Inc., 1322 Rear Boston Post Rd., Milford, CT 06460	4
SWTPC (Southwest Technical Products Corp.) Box 32040, San Antonio, TX 78284	1, 3
Sphere Corporation, 791 South 500 West, Bountiful, UT 84010	4
Suntronix Company, 360 Merrimack St., Lawrence, MA 01843	1, 2
Systems Research, Inc., P.O. Box 151280, Salt Lake City, UT 84115	3, 4
Wave Mate, 1015 West 190th St., Gardena, CA 90248	3
Western Data Systems, 3650 Charles St., Suite Z, Santa Clara, CA 95050	2, 3

- Key
- 1: Manufacture microcomputer kits.
  - 2: Manufacture microcomputers (assembled).
  - 3: Manufacture associated equipment (keyboards, displays, tape recorders, etc.).
  - 4: Offer microcomputer software.

they attempt to develop low-cost dependable devices. For the present, teleprinters and video display devices are most popular. Some of the manufacturers listed in Table 8 also have these products.

Additional memory is a must if anything but the simplest application program is to be run on your system. The number of words in a memory is usually expressed using the symbol, k. A 1-k memory normally means 1024<sub>10</sub> words, although sometimes people will use the convention that 1 k = 1000<sub>10</sub>. Hence, one computer manufacturer will claim that you can address 65-k words (k = 1000<sub>10</sub>) with his microcomputer,

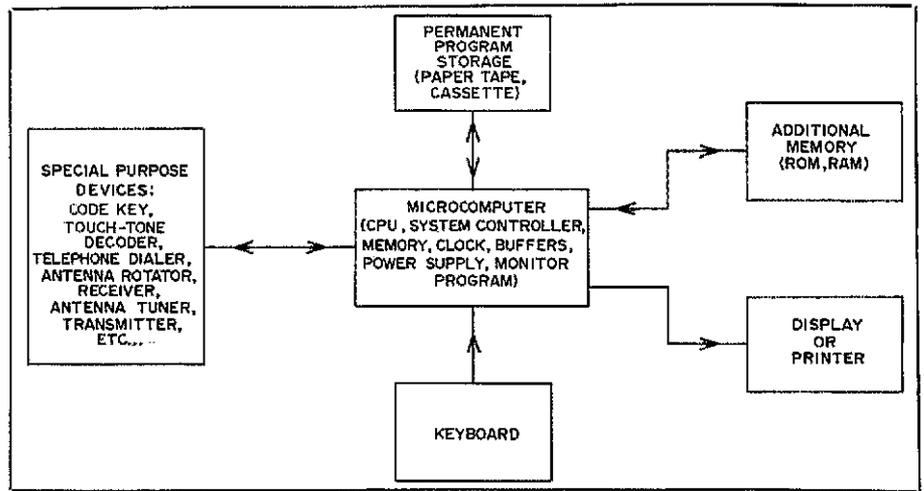


Fig. 10 — Block diagram showing the essential parts of a minimal microcomputer system.

while another manufacturer will say 64 k (k = 1024<sub>10</sub>). In reality, they both mean the same number, 65536 words decimal (base ten). If that isn't confusing enough, some people who work in octal numbers (base eight) will call 1000<sub>8</sub> = 1 k = 512<sub>10</sub>.

Many complex applications can be run in less than 1-k (k = 1024) words of program memory. The adaptive Morse-code program only took 1/2 k. Other larger programs, such as assemblers or BASIC will require at least 4 k and as much as 16 k of 8-bit words.

An important part of every microcomputer system is a permanent program storage device. The paper-tape reader/punch is very popular at the present but will most likely be replaced by cassette tape (audio frequency) storage systems. Standards for storing (recording) and retrieving (playing back) programs are being set up by the hobbyist industry. Permanent program storage is necessary so that programs can be saved and used later without the necessity of reentering the entire program by hand, a time-consuming and error-prone process.

Last, but certainly not least, is the field of special-purpose devices. This is the area where most of the variation between final uses for a microcomputer will occur. The possibilities of microcomputer application are limited only by the scope of experimenters' imaginations. Certainly, many of the devices to be interfaced with computers have yet to be defined and may come out of amateur-radio-related projects.

### Where to Go from Here?

Now that you have discovered the basics of microprocessor systems, what is your next step? The major question is, "How can you get started with your own system?" There are a multitude of manufacturers who will be more than eager to sell you anything from a bag of

parts to a completed system. Table 8 is a list of manufacturers that offer products aimed toward the hobbyist. This is not complete since new suppliers are springing up overnight. However, with the products they offer, a reasonable system can be assembled for around the same price as a new five-band transceiver. While this is being written, there is at least one kit including an 8-bit microcomputer, display, and keyboard for \$150!

The option of building a system from scratch or buying a kit should be considered carefully. Kit manufacturers have volume buying power which allows them to offer a kit for less than the cost of the individual parts. However, if you must roll your own, the usual guidelines for digital circuit construction should be followed closely. In particular, extra attention should be focused on power-supply distribution and decoupling.

For further information, check into the books, magazines, and newsletters published on microcomputers. If you live near a big city, there may be a computer store or at the very least a hobbyist computer club in the vicinity. Many of its members will probably be fellow hams.

As a final note, it has been predicted that 100,000 or more computers will find their way into the home in the next year or two. Most of these will belong to experimenters, a large number of them amateurs. Their uses in the shack will be many and varied. At the very least, you can be sure that if you are interested in such applications, there will be someone with similar interests nearby.

QST

### Footnotes

<sup>1</sup> Petit, "The Morse-A-Verter," *QST* for January, 1971.

<sup>2</sup> For example see Riley, "A Morse Code to Alphanumeric Converter and Display" in three parts, *QST* for October, November and December, 1975.

# A Low-Cost Touch-Tone Encoder

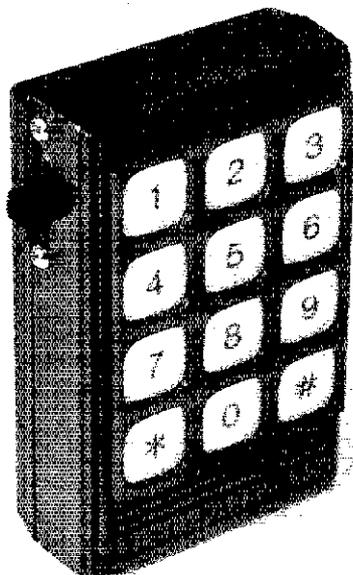
One or two evenings plus twenty bucks in parts equals one acoustically coupled Touch-Tone encoder — hard to beat!

By Chet Gorski,\* K1MYQ

You may or may not be an autopatch nut, but one thing for sure, in the event of an emergency it is nice to have the capabilities to access and use an autopatch. I bought a nice new rig but didn't want to tear into it and void the guarantee — at least not yet. How to install a Touch-Tone encoder — that was the question! Maybe the answer was not to install it directly in the transceiver but to build a separate unit and acoustically couple it. That's what I did.

Motorola recently introduced a new IC, the MP14410P, which is described in Volume 5, Series A of Motorola's *Semiconductor Data Library*. The IC is unique because it contains all gating,

\*Stonehouse Road, Amston, CT 06231



The completed encoder is shown here. The Touch-Tone pad is just the right size to fit on the average small transistor radio case.

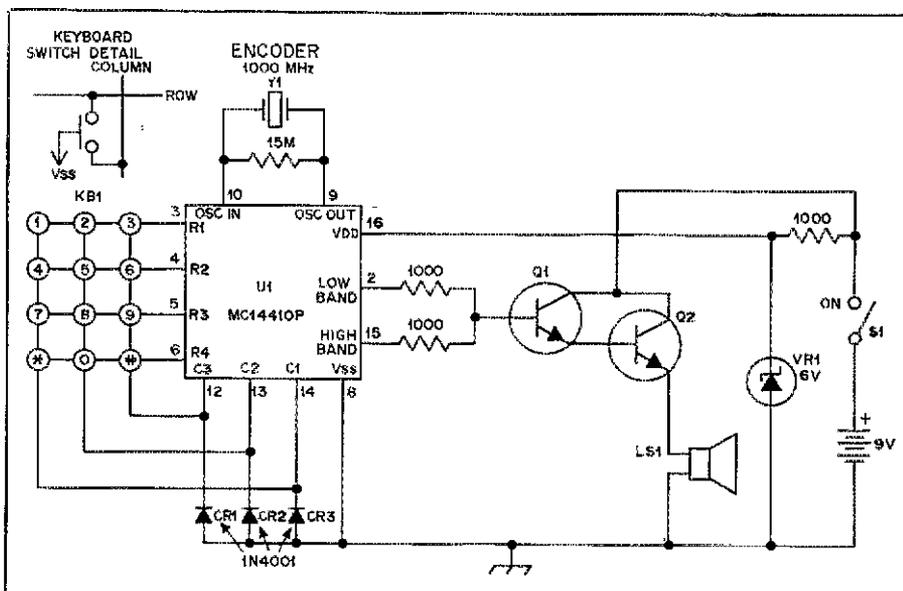


Fig. 1 — Circuit diagram of the low-cost encoder. All resistors are 1/4-watt. KB1 — Keyboard (Polypaks No. 92CU3149). Y1 — 1.000 MHz (Mariann Labs No. ML18P, Sherold Crystal No. HC-6). Q1, Q2 — 2N3643 or equiv. U1 — Motorola MC14410P.

dividing, decoding and driving circuitry in one package. Also included in the package are all the components necessary for a crystal, *L-C* or external oscillator input. Incidentally, we take no credit for the circuit in Fig. 1; it is right from the book. By using the MP14410P it is possible to generate all the required tones for the typical autopatch.

## Circuit Details

Fig. 1 shows the circuit details. The heart of the encoder is the IC and while I use a 12-switch keyboard, four row and three column inputs, the chip will accept a four-by-four switchboard. The MC14410P is designed to accept digital inputs in a 2-of-8 code format and to

digitally synthesize the high- and low-band sine waves specified by the telephone tone-dialing systems. The chip doesn't have adequate output to drive a speaker so two transistors, Q1 and Q2, are connected in a compound series mode to drive an 8-ohm speaker. Operating from a nine-volt battery, total current drain is 35 mA idling, and slightly over 100 mA when driving the speaker to full audio capability.

## Construction Details

If it is not already obvious from the photographs, the encoder was constructed in a transistor radio case. There are plenty of "burnt-out" radios around and they make good housings for projects such as this. I was able to use the

speaker. Also, the case was chosen because it met my "shirt-pocket" size requirement. Garage and tag sales are good sources of transistor radios.

All the components were assembled on Vectorbord, and all the wiring for the IC is to a socket, rather than directly to the chip. Although the IC has internal protection against high static voltages or electric fields, it is advisable that the chip not be removed from the conductive foam "shipper" until it is ready for use.

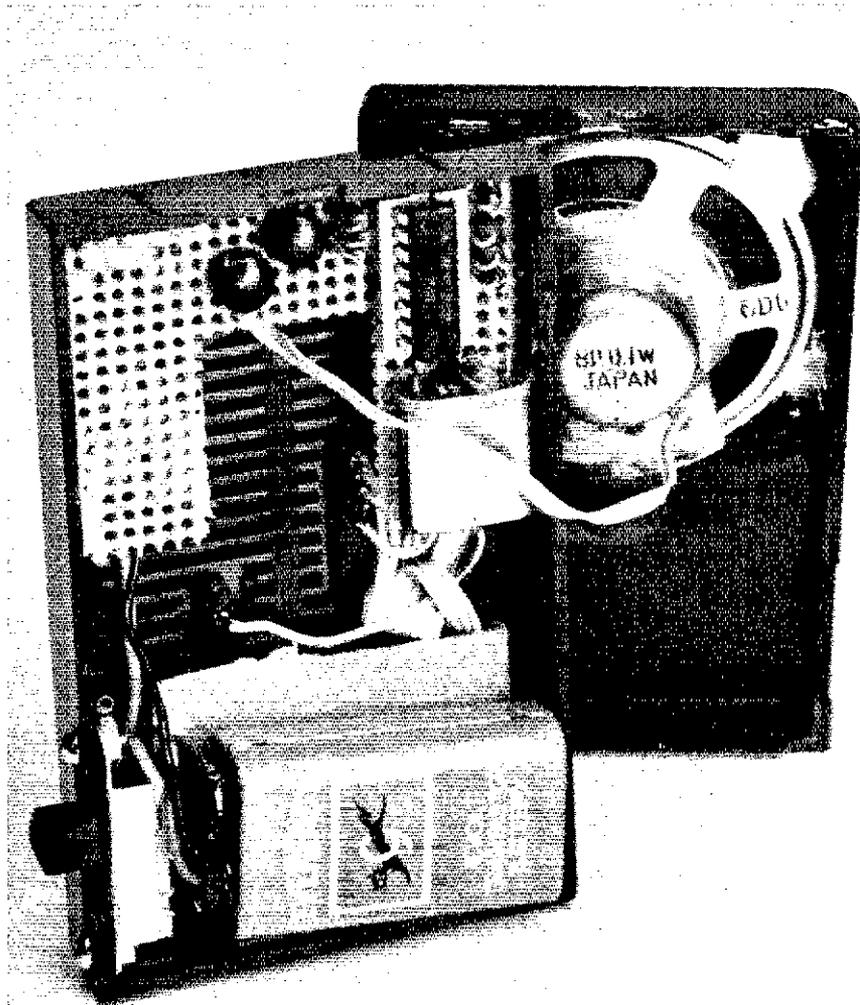
The speaker in the radio was moved to the back of the case (some holes were made in the back for audio to escape) because the flat front of the radio was needed to mount the keyboard. Also, with the speaker mounted by itself, only two leads are required from the encoder board to the speaker. (The encoder board is mounted on the keyboard side and there is less chance of breaking leads when changing batteries.) I used RTV bathtub caulk to mount the circuit board and speaker in the radio case. This method has been used successfully on other projects.

#### Alignment and Operation

Because all major wiring is done inside the chip, and a crystal is used as the frequency-determining element, there is no tweaking necessary. If no tones are heard when a key is depressed, check all the connections.

The encoder has worked successfully with all the local machines on the first try. With any reasonable signal into the repeater, it is a simple matter to hold the encoder to the mic and set up the autopatch.

**QST**



This view shows the inside of the encoder. The IC and transistors are mounted on a piece of Vectorbord at one end of the case.

## Strays



□ What's the "average" ham? One who meets these parameters, of course: Correct title of address is vital in order to communicate and full allowance must be made for lib of any kind. The "average" ham can be he, him, his, it, her, she, Mrs., Ms., or Mz, so after mixing and sifting well, it came Hzs, not to be confused with Hertzessess.

Hzs is from 11 to 73 years old, gender to suit your own taste, and runs from 1/2 milliwatts to 4 kilowatts, depending on state of legal residence or contrariness of landlord.

Equipment can be homebrew in three coffee cans or a Novice ticket and \$4,327.49 worth of gear with manual on how to plug into 110-volt ac outlets.

Antennas range from a single bedspring (insulated, if water bed) to seven poles 229 feet high with full-wave beams for nine bands.

Operation is 99-percent cw and the rest for that other stuff, or vice versa. A Hzs limits coverage to one band only until wanting to see who is on from 160 meters to 1200 HMHz.

A Hzs is considered a well-rounded op if possessing a Rag Chewers dipolma but may also have 239 bits of wallpaper, including one for having 239 bits of wallpaper.

But a Hzs cannot consider Hzself a Hzs until accepting this nonsense for what it is — nonsense. (K6JSS, Harry Blomquist)

#### STOLEN EQUIPMENT

□ Gladding 25, Serial No. 96960208 taken from auto in Detroit, MI. Sean T. O'Callaghan, K8BVY, 42037 Brentwood, Plymouth, MI 48170.

□ Drake ML-2, Serial No. 11466, stolen on June 17. James R. Johns, WB2FHS, 24 Fairview Dr., Middletown, NJ 07748. Phone 201-842-8403.

□ Taken in burglary of home in Hickory, NC, over July 4 period. Heath SB-301 and SB-401, SB-220, Serial No. 128-123106 plus all associated station and test equipment. H. L. Parrish, K4YR, RFD 10 Box 470, Hickory, NC 28601 or Catawba County Sheriff's Dept.

# Product Review

## Hewlett-Packard HP-25 Programmable Scientific Calculator

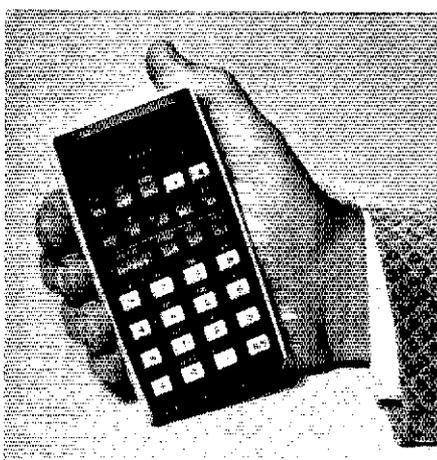
The word *calculator* hardly seems to fit this little hand-held instrument, for in its programming capability are included features which just a few years ago could be performed only by an electronic computer. The HP-25 is the first of its type to become available for less than \$150, and for this reason it is becoming a very popular instrument among amateurs and engineers alike. It truly is a different class of calculator among the low-priced programmables.

Thirty keys are contained on the calculator keyboard, but two prefix keys allow most others to perform three different functions. The net result is the equivalent of more than six-dozen keys, including those which control the display and the program functions. The logic of the calculator is Reverse Polish Notation (RPN), using a 4-level stack. What this means is that there are four "working" registers, each capable of containing independent values — either initial entries or the results of intermediate calculations. It is this feature which permits the solution of problems like

$$(2 \times 3) + (4 \times 5) + \frac{(8 - 6)}{7}$$

without the need to key in parentheses, to use an auxiliary storage register, or to jot down intermediate results on scratch paper. By working in "chain" fashion the example can be extended indefinitely.

In addition to the four stack registers the calculator contains eight storage registers, the contents of which can be stored and recalled at will. "Storage register arithmetic" may also be performed, meaning the contents of any register may be changed by adding, subtracting, multiplying, or dividing by another value without the need to recall the initial register content. The content of any register may be "dumped" simply by storing a new value. The calculator has yet another register, deemed LAST  $x$ . In this register is saved the value which was displayed before the last mathematical operation was performed. In some applications this register can be used as a separate storage register. This register also makes it easy to recover from mistakes. Say you accidentally divided one number by another when you meant to subtract. Rather than begin the problem again from scratch, you can simply recall LAST  $x$ , multiply (which



Shown here is the Hewlett-Packard HP-25. The two prefix keys at the upper right (f and g) allow most of the others to perform three different functions.

nullifies the erroneous division), and you're back to where you were earlier, before making the mistake.

The HP-25 has a basic 10-digit display, and all calculations are done in ten significant figures. The machine offers great flexibility in what it shows you, however. Three display modes are available — fixed point, scientific, and engineering. When first turned on, the calculator assumes a fixed-point display of two decimal digits, such as you'd use for working with dollars and cents. Any calculations which result in more than two decimal digits (such as  $20 \div 3$ ) are automatically rounded in the display (6.67), but ten significant digits (6.66666667) are still carried in the calculating registers. The fixed-point display can be set to show from 0 to 9 decimal digits (up to a total of 10 digits in the display). In scientific notation each value is shown with a single digit to the left of the decimal point followed by (as controlled by the user) up to seven decimal digits, followed by a 2-digit power of 10 (with minus sign, if appropriate). Engineering notation is similar except that a "floating" decimal position is used and the powers of 10 are always multiples of three. As controlled by the user, from three to eight significant digits may be dis-

played in engineering notation, but either 1, 2, or 3 digits will always appear to the left of the decimal point. As in the fixed-point display, values shown are automatically rounded in the scientific and engineering notations. If fixed-point notation is being used and the result of a calculation is too large or too small to be seen with a fixed decimal point, the display for that value will automatically switch to scientific notation. And no matter what the display mode, numbers with powers-of-10 exponents may be keyed directly into the instrument.

The HP-25 will handle numbers in value up to  $9.9999999 \times 10^{99}$ . Overflow (a calculation resulting in a value greater than this maximum) is indicated by a display of all nines. If storage-register arithmetic is being performed and overflow results in a register, the letters *OF* appear in the display. There is no such thing as underflow with the HP-25 (exceeding a particular negative-value exponent of 10), for a zero is automatically substituted in place of values less than  $1 \times 10^{-99}$ . Of course it almost goes without saying that the HP-25 has a pi key and handles squares, square roots, reciprocals, exponents, and log and trig functions, as well as functions using the base  $e$ . But it can perform those trig functions using either degrees, radians, or grads directly (400 grads = 360 degrees). And it has a handful of other useful capabilities too — things like taking an absolute value, truncating, converting from hours, minutes and seconds (or degrees, minutes and seconds) to decimal hours (degrees) and back, converting from polar to rectangular coordinates and back, and performing statistical functions (summations, standard deviation, arithmetic mean, and the like). Combinations of these manipulations make it easy to do things like vector summations, often used as the basis for calculating antenna patterns. Oh yes, another rather unique feature: Invalid operations such as dividing by zero result in the word *Error* appearing in the display.

### Programming

Features like RPN, storage register arithmetic and the LAST  $x$  register, along with the diversity of manipulations available in the HP-25, offer a significant saving in the number of steps needed to program a sequence of functions. The instrument is 49-step programmable. But unlike most of its pre-

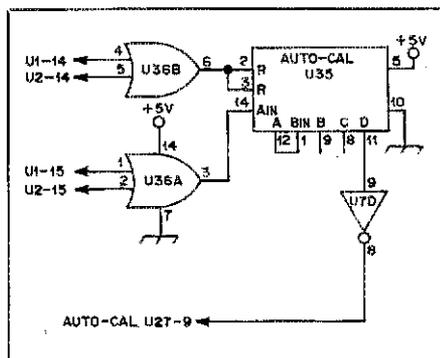


# Hints and Kinks

## AUTO-RECALIBRATION FOR CW DECODER

I have built two cw decoders from the original article by Thomas Riley, WA1BYM. They drive Burroughs self-scan displays and the following Auto-Cal circuit. Under live and test conditions both units are able to resynchronize using the Auto-Cal from 6, to in excess of 100 wpm from a single clock.

The loss of system lock or change in received speed can cause various out-of-sync conditions: Up/down counter too small or large resulting in all Ts or Es, or character-spacing loss resulting in C = TETE. The decoding of all Ts or Es, or any combination of both, will increment the binary counter, U35, until a count of eight. This will cause an automatic Recal through U7D. Any dot/dash pattern that is decoded and shifted into the dot/dash registers will reset the counter through U36B. — *Thomas W. Hart, WN5OHM*



## INSTALLING GROUND RODS

Rather than the awkward method of driving an 8-foot ground rod with a sledgehammer while standing on a stepladder, a much easier method exists. Using a hand trowel, scoop out a hole about 3 or 4 inches deep, and 5 inches in diameter. Pour water into the hole, filling it. Insert the tip of the rod in the center of the hole and push downward until resistance builds up. Raise the rod a few inches and then push down again. Each downward thrust will sink the rod a few more inches and, as the rod is raised, a small amount of water will go to the bottom of the hole. Be sure to limit each downward thrust to a few inches. — *George Goldstone, W8AP*

## INSTALLATION AND SELECTION OF FILTERS FOR THE TS-520

The Kenwood manual suggests removing the i-f board to install the accessory cw filter. This job is difficult because of a cable harness obstructing the mounting screws and also the numerous connections to the board. The filter

is installed easily by removing the mounting plate for the bias and VOX controls on the side of the TS-520. After removing the three screws that hold the plate, there is ample lead length to allow access to the foil side of the i-f board.

A separate spst switch, or the channel-select switch, can be used to choose filters in the cw position. This is done by switching the brown lead from the ssb terminal to the original ssb terminal or to the cw terminal on the i-f board. The ssb filter remains automatically selected in the upper or lower sideband position. — *B. J. Owens, WA5QAL*

## CROWBAR MODIFICATION FOR REGULATED POWER SUPPLIES

After the pass transistor in my regulated power supply shorted and I had to send the TR-22C back to the factory, I decided to incorporate the crowbar circuit described in Vol. 9 of *Hints and Kinks*. To simplify the circuit and eliminate the potentiometer shown in the original crowbar, I used a Zener diode with a voltage rating just slightly higher than the highest voltage available from the power supply. Since my supply wouldn't go higher than 14 volts, I used a 15-volt Zener

diode as shown. In my simple supply it could be tested by shorting the pass transistor from collector to emitter. This worked so well that a switch was installed where the crowbar could be tested at any time by plugging in a voltmeter and operating the switch.

I worried a little about whether the jack contacts could carry the 10 amps this supply would furnish. Apparently they will. Before the switch was installed, I "tested" the crowbar when I had forgotten to plug in the voltmeter. The crowbar blew the fuse, and the jack survived. The switch eliminates the possibility of this happening again. — *L. E. Harrington, W4LM*

## REMOTE CONTROL FOR THE HEATH HW-202 TRANSCEIVER

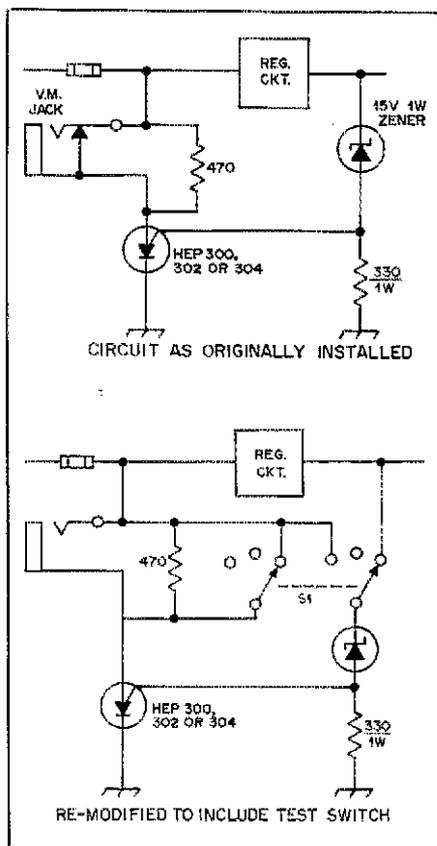
My Heath HW-202 transceiver, installed under the right front seat, was stolen from the locked car while it was parked in front of the house. I had been considering the idea of a more convenient control lead to be located in the dashboard, and placing the transceiver out of reach. Hence this project for trunk-mounting the new mobile rig.

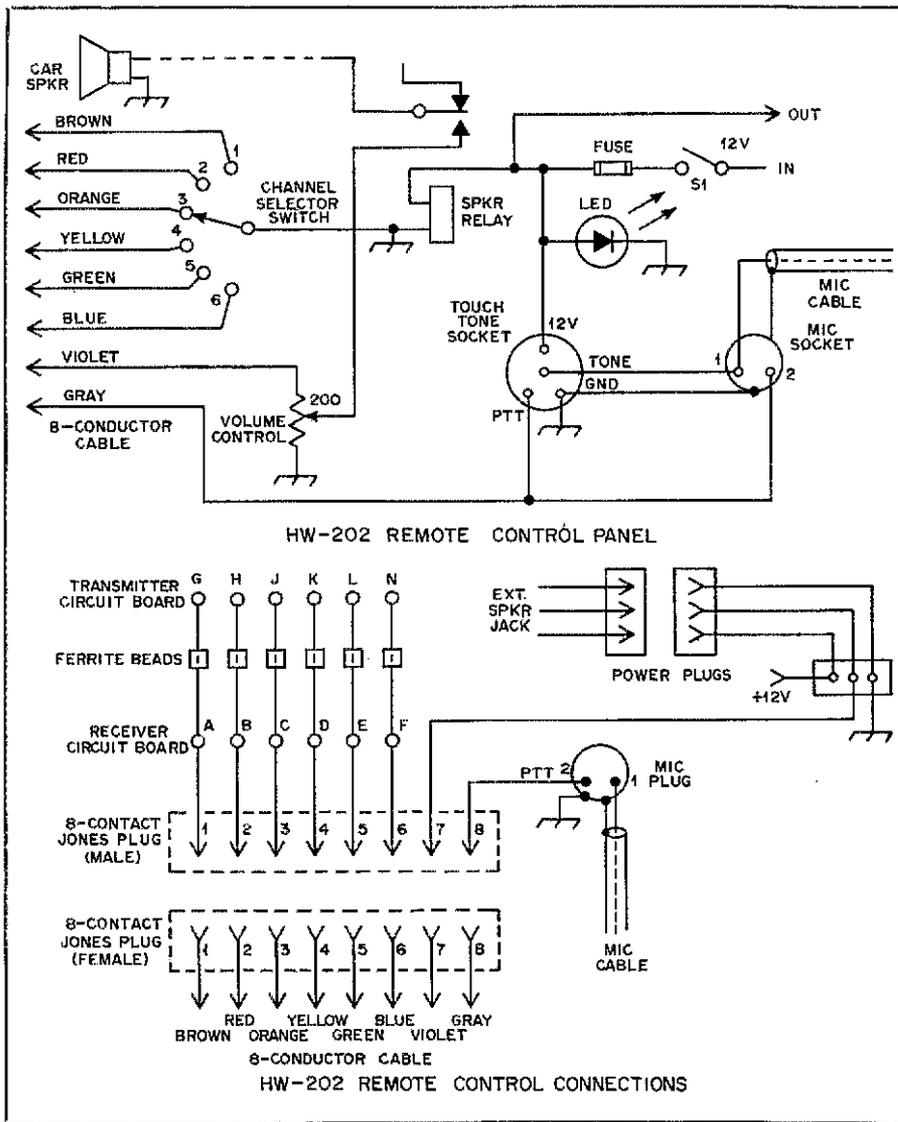
Channel selection is accomplished in the HW-202 by grounding a diode through a resistor associated with a crystal oscillator, in each of the six transmit and receive channels. The transmit and receive channels can be switched independently on the front panel, but I found this feature more of a nuisance than advantage while operating mobile. The squelch control is another feature I found dispensable, once it is set to quiet an idle channel. A volume control is necessary but this function can be done remotely in the speaker circuit.

The essential items in the dashboard panel are: A six-position selector switch, speaker relay, fuse holder, sockets for Touch-Tone and microphone plugs, indicator light and volume control. The on/off switch could be included but I found a better spot which was reserved for a nonexistent "optional accessory" switch. The 4-conductor Touch-Tone socket and plug, 8-conductor cable and LED pilot light were selected from the Lafayette catalog. The speaker relay was bought from Radio Shack and the microphone plug and socket are Heathkit parts. Others are junk-box items.

Except for the 12-volt power cable, for which I bought a small roll of no. 12 stranded automobile primary wire, the wires carry little current, and resistance is not significant. I found it necessary to run a separate shielded microphone cable. The parts are mounted in a 3-1/3 x 4-inch panel which fits in place of the ashtray.

Remote-control connections in the transceiver require no irreversible modification. The unit is assembled and checked out in accordance with the assembly manual. There are six harness wires from the transmitter board and six from the receiver board con-





connected to the selector switches. They have pc-board connectors. These are lifted and carefully taped out of the way. New wires, terminated in pc-board connectors, are installed and brought out to the 8-contact Jones plug as shown in the diagram. Note the ferrite beads at the transmitter board. I do not have a tone burst encoder so I brought out a six-wire cable through one of the four holes for that unit in the chassis. If the encoder were installed, another access hole would have to be made. A third pair of contacts is inserted in the power connector housings. These provide connection to a phono plug at the external speaker socket.

The transceiver is mounted in the supplied gimbal bracket. This is fastened sideways (by means of self-tapping screws) to the wall at the front of the trunk compartment near the top. I cut new slots in the bracket to limit motion of the case. With this installation the HW-202 is easily removable, although it is necessary to climb into the trunk to unplug it. For operation in the house I use a test lead to ground one of the Jones plug contacts for channel selection. For mobile operation the squelch is set to quiet an idle channel, and the volume is adjusted for a weak signal with the dashboard volume control wide open.

Incidentally, I found that the 5/8-wave-length whip makes an excellent antenna for the car broadcast receiver. The broadcast antenna cable was transferred to a relay box to share the whip. Turning on the HW-202 switches the antenna. This makes the broadcast antenna surplus. — *Erwin Aymar, W3SU*

### ALUMINUM TOWERS — SOME THINGS TO WATCH FOR!

Nine years ago I became the owner of my first tower and beam — a self-supporting spire, topped by a new tribander. It was 48 feet tall and set in concrete. It was made of aluminum (no painting or other maintenance problems)! Sounds wonderful, doesn't it?

Last fall, I noticed some extra flexing at the middle joint, 24 feet up. Early winter weather in Michigan was not conducive to thoughts of taking down and repairing the tower. Also, it had been up nearly nine years and a few more months wouldn't make it much worse, or so I thought!

In late March the condition was much more obvious. The tower had taken on a "dog

leg" at the middle joint and watching it in the brisk March breezes scared me. A tower-lowering party was organized and once the system was horizontal in the back yard, considerable damage was evident. The bolt holes in one leg were elongated beyond drilling out to a larger size, and on one of the opposing legs metal fatigue had cracked the material nearly three quarters of the way through. Also, we found two frost-splits in one leg. How could a hollow aluminum tower leg get frost-splits at 30 feet above ground? Don, WB8NUS, found the answer by pushing a length of electrical cord through the leg and finding several spiders' nests had been formed inside the leg. These had trapped the moisture which entered at the joints above this section and a hard freeze had done the rest.

Upon removing the bolts which held the two sections together at the joint where the elongation had occurred, the bolts were found to have been etched away from an original diameter of 3/8-inch to approximately 3/16-inch at the center. We removed all the bolts from the tower and found this reduction in diameter to be quite common, evidently due to electrolysis of the dissimilar metals.

The frost damage and crack were repaired by heli-arc welding and the two sections where the elongation had taken place were aligned and welded together. All the other original bolt holes were drilled out undersize, and new galvanized 7/16-inch bolts were driven in, replacing all the original ones. The coax runs on the tower were checked with the technique using a dummy load at the far end and a wattmeter at each end. The rotator and beams were reconditioned (using rust-resistant paint on the original plated fittings) and a hearty crew once again erected my "sky hooks."

If you have had a tower up for several years, please don't take it for granted that everything is still in good shape just because it withstood Mother Nature's last onslaught. Give your tower a good general inspection at least twice a year, preferably during a stiff wind with a pair of binoculars. If it is aluminum remove a bolt or two and check for deterioration. This would also be a good time to check the ground connections, making sure the ground clamps are in good condition and tight on the cable which ties the tower leg to the ground rod.

Aluminum ground conductors are not permitted within 18 inches of the earth (according to the National Electrical Code) and a few wraps of cable around a tower leg or a ground rod do not constitute a good electrical connection. — *H. J. Bell, WA8LAY*

### FISHING FOR A PLACE TO STORE YOUR MOBILE ANTENNA?

Here is an idea for those hams who wish they had a place to store their mobile antennas when parked in a lot, or some other area that is not safe for any type of radio equipment (theft). If the antenna in use cannot be stored in the trunk of the car because of the size of the antenna, simply install fishing-pole racks on the inside of the car just above the level of the door tops. When not in use, the antenna can be dismantled and installed in the racks, out of sight. — *Henry G. Eveland, WB2SXD/2*

# OSCAR Medical Data

Cross-country relays of medical data via OSCARs presage their use in disaster relief — after the launch of the Phase III satellite.

By Joel P. Kleinman\*

**W**hen the long-dormant volcano in southwest Ecuador erupted without warning after a thousand years, the small village nestled at its base was ravaged by a steaming mass of molten lava. Only the swift action of HC3EP, who contacted the Red Cross in nearby Quito, saved the lives of those who survived.

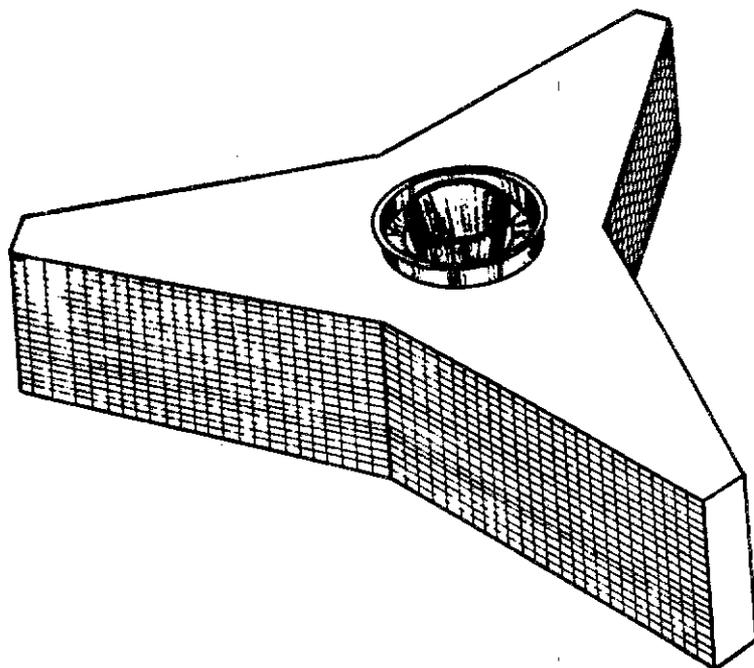
Almost immediately after medical technicians arrived at the scene, the vital body signs of the most seriously injured were monitored, coded and transmitted via portable equipment through OSCAR 9 to the Mayo Clinic in Rochester, MN. There, specialists trained for emergency diagnosis interpreted the waveforms and radioed back coded instructions that prescribed personal care for each of the victims. It was later determined that several hundred lives were saved by the OSCAR Medical Emergency Network (OMEN).

The above scenario was, of course, just that — a fictitious account of a future disaster; but it could happen. Several U.S. amateurs are working on their own to perfect a means of transmitting medical data via satellite, the first stage of an "OSCAR Medical Emergency Network."

## Pioneering Work

Widespread use of the OSCAR satellites for disaster relief will have to wait for the Phase III satellite, now in the early planning stages. But the pioneering work of Dave Nelson, K7RGE, Steve Kimber, W7VEW and others has laid the groundwork — and at the same time made construction of OSCAR-Phase III even more essential.

Relaying medical data via telephone and radio from remote areas is not a



Thanks to its elliptical orbit which will take it nearly 40,000 km into space, the Phase III OSCAR (dubbed "OSCAR 9" in the article) will enable amateurs to relay medical data or other information over thousands of miles for up to 15 hours at a time. Scheduled launch is early in the 1980s.

new concept. In fact, many hospitals are presently equipped to receive EKG (electrocardiogram) data from ambulances. The advantages of using an orbiting satellite for this purpose are impressive: Its range (up to 5,000 miles), speed (186,000 miles per second) and accessibility to remote areas, regardless of local conditions.

Use of the OSCAR satellites for transmitting EKG data began during the summer of 1975, when Steve Kimber of Lander, WY, arranged a test with W6ELT, Santa Ana, CA. Negating the effects of the Doppler shift with a subcarrier detector he designed, Steve received an excellent waveform via OSCAR-6 orbit 12485. A local physician had no difficulty interpreting the data.

Working independently, K7RGE, of Tucson, AZ, used a demodulator circuit of his own design to run a similar test. After taping the data using instrumenta-

tion and audio grade tape recorders, the tapes were mailed to W6ELT for transmission via OSCARs 6 and 7.

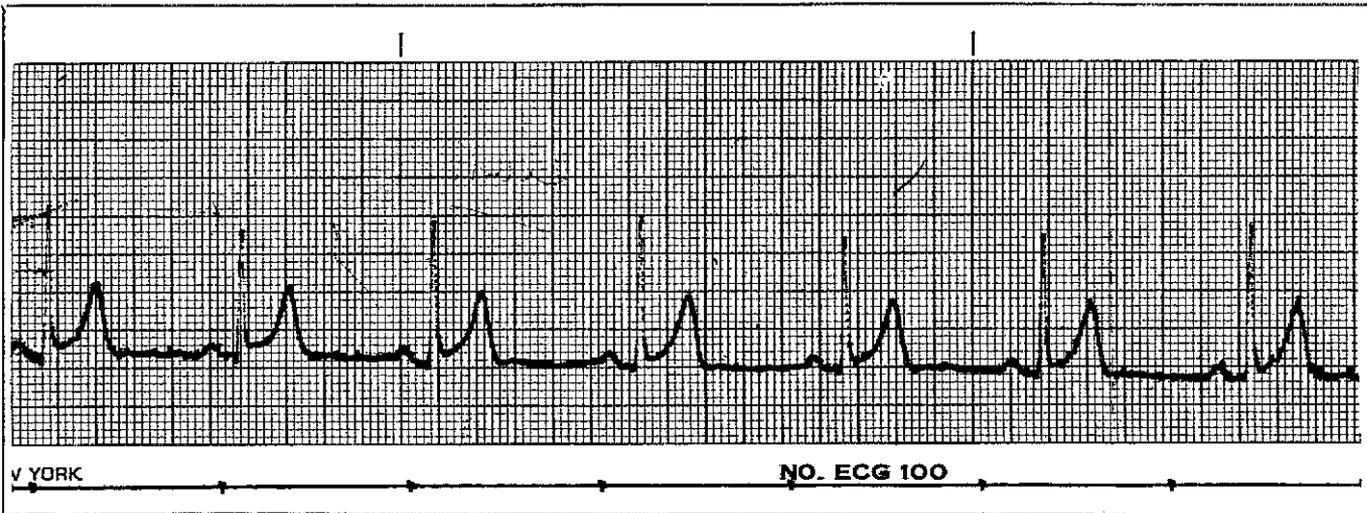
Dave experimented with two methods, analog and digital. Under the "analog FM" system, the EKG data modulate a voltage-controlled oscillator, which produces the modulated audio carrier to be transmitted. The received signal is decoded using a phase locked loop. Its output is displayed on a strip chart recorder, commonly used for EKGs.

Although successful, the data were subject to the usual bugaboos of satellite communication — noise and Doppler degradation.

## Digital System Eliminates Doppler

To avoid these problems, Dave designed an audio frequency-shift key oscillator and high-speed demodulator combination that successfully eliminated both irregularities. He used com-

\*OSCAR Educational Program Asst., ARRL



A few seconds of an electrocardiogram relayed from W2GN's mobile OSCAR station near Albany, NY, to the National Institutes of

Health, Bethesda, MD, via OSCAR 7 Mode B on June 2, 1976. The gradual lowering of the "baseline" is due to Doppler shift.

mercial analog-to-digital and digital-to-analog converters. With the assistance of AMSAT, he received FCC clearance to use an eight-level digital code. EKG data relayed in this manner via OSCAR 7 Mode B were of excellent quality.

The first cross-country transmission occurred late last year when K3YGG, the National Institutes of Health club station at Bethesda, MD, received W6ELT's recorded data via both OSCAR satellites. Dave Nelson's de-

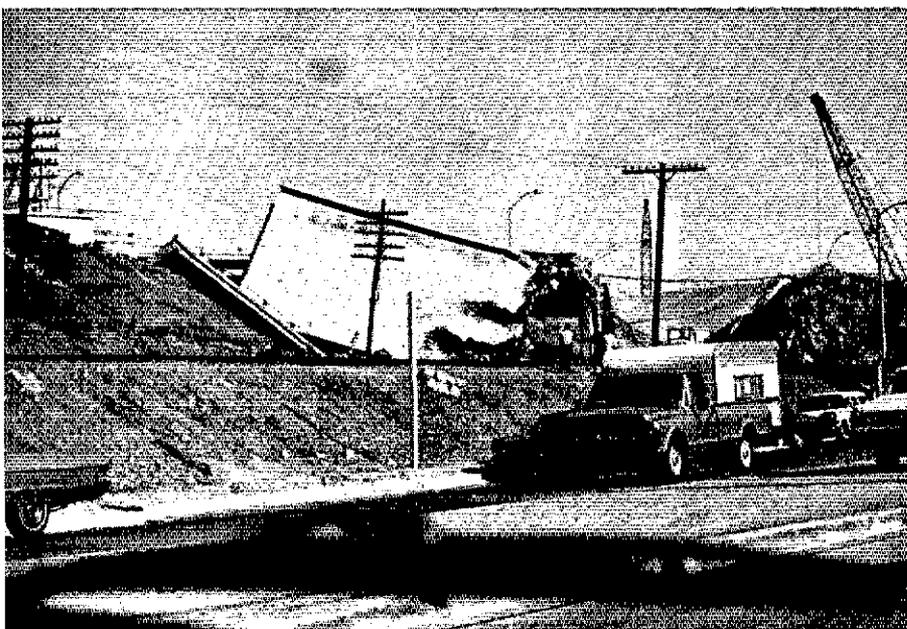
modulator circuit performed perfectly, as the data "closely resembled the original waveform," according to Dr. William Hook, W3QBC, an NIH microbiologist who manned the receiver.

Further tests, equally effective, were run this past June between W2GN's mobile OSCAR station near Albany, NY and the NIH station.

The practical applications of transmitting vital medical information through communications satellites such

as OSCARs 6 and 7 are just beginning to be explored. Since an EKG has a relatively high bandwidth, Dave Nelson foresees little difficulty in relaying other body signals with lesser bandwidths. The federal government has expressed a keen interest in this area, and expanded uses of satellites for relaying medical data following emergencies and disasters will undoubtedly be forthcoming.

The Phase III OSCAR, now scheduled for launch in the early 1980s, will be ideal for such purposes, as its elliptical orbit will make it available for up to 15 hours at a time. For now, dedicated individuals are making the satellites work for all of us.



This buckled stretch of Interstate 5 near Los Angeles underscores the fact that disasters can strike anywhere, at any time. The February, 1971, earthquake that produced this scene also heavily damaged a veterans hospital.



Operating out of ambulances, vital medical data could be transmitted via OSCAR to medical personnel specializing in certain types of injuries. This photo shows W3BTX during a recent March of Dimes Walk-A-Thon in Blair Co., PA.

## Strays

I would like to get in touch with . . .

□ hams who are broadcast announcers

or reporters. Lyle Rockefeller, WB0MDI, 409 Locust Dr., Colorado Springs, CO 80907.

□ mobilers with new ideas on public service. Dave Doler, WA3YAY, 6324

Mershon St., Philadelphia, PA 19149.

□ anyone interested in starting a teen net on 80, 40 or 20 meters. Russell Grisamer, WB8RKE, Rte. 3, Box 488, Edwardsburg, MI 49112.

# A West Coast VHF DXpedition

Mountaintopper makes multi-mode rigs fun.

By William A. Tynan,\* W3KMV

**P**ack Rats beware — the West Coast bunch is catching up in the vhf standings box. Within a 250-mile radius of the Philadelphia-based club are most of the 13 original colonies and half of the call districts, but the California crowd's DX standard is to simply work opposite ends of their 800-mile long by 200-mile wide state. Now, they have had even more excitement after a proliferation of modern multi-mode transceivers combined with a mountaintopping expedition to the neighboring call district for some different DX work.

On April 4, 1976, Wayne Overbeck, K6YNB, and his XYL, Donna, WB6IDK, embarked to Nevada and Utah to succeed in contacting nearly 200 California stations on all bands through 432 MHz. For many of them it was their first out-of-state QSO on 144 MHz and above.

## To the Mountains in Style

For his vhf expeditions, K6YNB uses a camper with a 40-foot crank-up tower on the rear deck.<sup>1</sup> He has constructed his portable station so that he can dismantle the entire setup in about an hour and drive on.

Drive on is what Wayne did, setting up at three different sites during his four-day trip. The operation started from a point on Nevada Highway 27 near Mt. Rose, adjacent to Lake Tahoe. From this location much of the San Francisco Bay area, the Sacramento Valley, and the San Joaquin Valley are workable despite the obstacle posed by the High Sierras. The Cabover Kilowatt next went 300 miles southeast to lower Mt. Potosi, Nevada, 30 miles from Las Vegas and 250 miles from Los Angeles. On the last day he proceeded more than 100 miles northwest to Utah Pass on old Highway 91 near St. George, Utah.

He has operated his portable station from all of these sites before; twice from the Mt. Rose area, five times from Mt. Potosi, and three times at Utah Pass. But this trip produced more contacts

\*P. O. Box 117, Burtonsville, MD 20730

<sup>1</sup>Overbeck, "The Cabover Kilowatt," *QST*, August, 1971.

above 144 MHz than ever before, thanks to the recent boom in 2-meter ssb activity.

## A Frenzy of Activity

About 100 different California stations worked Nevada on 2 meters alone during K6YNB/7's Mt. Rose and Mt. Potosi operations. At times, 20-meter-like pileups confronted Wayne when tropo conditions peaked. While he was running high power on all bands through 70 cm, numerous low-power signals made it over the mountains to Utah and Nevada. Perhaps something of a record was set during the Mt. Potosi operation when K6QEH and K6YWQ, both located in the Los Angeles basin behind mountains that range up to 10,000 feet, reduced their power outputs to less than 10 milliwatts and still had Q5 ssb signals in Nevada on 2 meters.

The path across California and Nevada to southwestern Utah is a more difficult one. Nevertheless, 34 California stations, all located in the populous metropolitan areas along the coast, worked K6YNB/Utah on 50 through 432 MHz. When the tropospheric ducting was at its best, one Long Beach station, WA6CDL, worked Utah on two-meter ssb with two-watts output.

## For Newcomers, Too

Many newcomers to vhf ssb, running the new multi-mode transceivers as well as transverters, got their first taste of 2-meter DXing as a result of K6YNB's expedition. Probably none was happier about it than WA6OWM of Redondo Beach, an hf DX Century Clubber who made his 2-meter ssb debut on Sunday, April 4, with 10 watts and a homemade beam up 19 feet. His log now shows three western states in his first three days on the band.

Another well-known hf operator who got a taste of vhf DXing, western style, was K6UA (formerly W6 Very Strong Signal), whose three watts by no means produced a very strong signal in Nevada, but who made the grade nonetheless. Some may recall that K6UA/4

in Virginia got another vhf thrill last summer when he got in on the fantastic 2-meter sporadic-E opening of July 20.

## West Coast Differences

California vhfers tend to view their state as two halves — north and south — QSOs between each are considered DX work. This north-south dichotomy was evident in K6YNB's results from Mt. Rose and Mt. Potosi, Nevada. Only two stations succeeded in working both the northern and southern Nevada mountain locations of K6YNB/7 — K6MYC on 2 meters and WB6VIN on 6 meters.

Perhaps the highlight on the higher bands was W6ABN's 432-MHz QSO with K6YNB/7 at Utah Pass, the first complete QSO between Utah and California on 70 cm since WA6HXW worked K6YNB/7 at the same location in 1972.

Another highlight for K6YNB, at least for himself, was to work his own home station at Oxnard Shores on 222 MHz from both Nevada and Utah. With AD6QPH operating Wayne's home station, WB6IDK/7 took over the portable rig to work K6YNB not portable from both states. The QSO from Utah Pass to Oxnard Shores, on the Ventura coast, was the longest 1-1/4-meter DX worked from Utah since WB6NMT, then living in Dixon near Sacramento, worked K6YNB/7 on his 1972 Utah expedition. That 1972 QSO still stands as the only 1-1/4-meter contact ever made between Utah and northern California.

## The Final Tally

From Mt. Rose, Nevada, K6YNB/7 worked 19 stations on 6 meters; 53 on 2 meters, and 6 on 70 cm. At the Mt. Potosi, Nevada location — 16 stations on 6 meters, 47 stations on 2 meters, 6 on both 1-1/4 meters and 70 cm went into Wayne's log. The Utah Pass operation yielded 8 stations on 6 meters; 22 on 2 meters; 4 on 1-1/4 meters and just a single 70 cm contact, W6ABN.

One of Wayne's comments on his operation was that, generally, 1-1/4-meter signal levels exceeded those on 2 meters from the same area. QST

# Public Relations: An Emergency Coordinator's View

Community and membership alike reap windfall benefits from effective public service and PR planning.

By Charles F. Bino,\* K4CJZ

Where amateur radio is concerned, public service and public relations have more in common than a word. In fact, they're inseparable. On the one hand, emergency services large and small are probably our most dramatic and newsworthy activities so far as the public is concerned. On the other hand, favorable public exposure for amateur radio is one of the best ways to assure our future at international, national and local levels. Good public relations like good public service rarely happen by accident.

According to League guidelines, the appointed Emergency Coordinator can perform a key role in projecting amateur radio to the public. In our case, as Guilford County (NC) AREC, we recognized that performing more efficiently as a public-service group and establishing operational plans required that both the public and public officials be made aware of our capabilities. About a year and a half ago, we began building a new RACES/AREC team because we had only a large group "on paper" which had been inactive for many years. Consequently, the only PR we had for a long time was a rare newspaper article on Field Day. We began by setting up a Civil Preparedness Repeater, WR4ANP. Surplus equipment from the city of Greensboro was transferred to C.P. inventory, was reworked, added to, licensed, and put on 147.12 MHz. By the way, this was set up as an AREC rather than a RACES repeater.

## Shared Functions

This repeater is unique in that it belongs to Civil Preparedness, but is operated and maintained by area hams. In itself, it serves a valuable PR function by enhancing goodwill between area amateurs and the local government. In return for their readiness and main-

tenance of the equipment, the local group can use the repeater in normal "ham" fashion.

Early experience with the repeater led to an experiment in December, 1975, with a-m station WCOG in which our hazard observations were broadcast to COG's audience as bulletins. This "Civil Preparedness Advisory" had been in the planning stages for about four months, with concurrence of FCC on its potential usefulness. It functioned well, after de-bugging, and gave us good PR through promotions by WCOG. Now up for review, the service may be allowed to continue on a larger scale under the Office of Civil Preparedness as part of the Emergency Broadcast System.

## Moving in Other Directions

In January, 1976, the Heart Fund "Radiothon" was another experiment by our AREC in which three local broadcast stations solicited pledges from listeners for relay to Heart Fund Head-



An essential part of emergency planning, mobile operations make possible on-the-spot reports of conditions from pre-set checkpoints.

quarters. About 15 mobile units were dispatched via WR4ANP to collect pledges as they were called in. Operating within guidelines from the FCC, we collected more than 800 of the nearly 1,000 dollars pledged.



A typical scene of an emergency setup manned by volunteer amateur operators throughout the country during crisis situations — hurricanes, floods, tornadoes or icestorms — when normal channels of communication are often inoperative.

\*2401 Deverow Pl., Greensboro, NC 27407



Nature plays no favorites: As vulnerable to nature's fury as any other portion of the community, the ham station may find itself temporarily out of business during a violent storm.

The Simulated Emergency Test in January, our second as a new group, was a success with about 60 participants including members of the High Point and Alamance Clubs, as well as some family and friends. The news department of WFMY-TV (channel 2, Greensboro) was contacted with the result that our group appeared on the January 25, Sunday evening newscast as a major item. The station was kind enough to provide us with a video cassette copy.

#### In the Limelight

During the Guatemalan earthquake, we provided the *Greensboro News and Record* with a list of items needed in the disaster area. The list was received and relayed to us by W4WXZ in Winston-Salem. As a result, two articles appeared in the local newspapers. WGHP-TV (channel 8, High Point) picked up the human-interest story and

televised W4WXZ and K4DQ as participants in the emergency.

The week of February 15 through 21 in Greensboro was another opportunity for public contact. Local engineering societies set up a Bicentennial exhibit in which our ham group was invited to participate through the efforts of W4DGE and other Bell Labs personnel. A display depicted DX, public service, repeaters, awards, and OSCAR communications. The movie, *Ham's Wide World*, was repeatedly shown. Slow-scan TV was another attraction. A 2-meter portable station allowed handling of over 40 messages from visitors to their friends. The display traveled to High Point and Burlington, NC, where their ham clubs also participated as well.

Finally, the Greensboro Public Safety director and the Guilford County Civil Preparedness coordinator re-

quested in January, 1976, that we construct a plan for the use of volunteer communications on a broad scale. We consider the final draft another unique item in that it not only contains amateur groups, as expected, but also the participation of Guilford County citizens band REACT team number 2819. To our knowledge Guilford County AREC is the first amateur group to formally integrate with a REACT team. This plan was recently approved for inclusion in the County Emergency Operations Plan by Mr. E. St. Peter, the C.P. coordinator of Guilford County. Recent meetings between REACT personnel and our group have allowed a new dialogue between previously independent entities. I believe we now understand each other's viewpoints and capabilities a little more clearly. Like us, they are sincerely interested in public service. Although not having our capabilities in spectrum space or equipment, they do service a huge segment of the mobile CB population with directions, road assistance, etc. This new liaison with REACT had an unexpected benefit. Considerable numbers of their group are avidly interested in amateur radio, even to the extent of learning Morse code and taking exams.

#### A Productive Year

This, then, represents "public service/public relations" paying off in a practical way. Our program in Guilford County, as described here, took place in about a year's span. It all began with a letter to Mayor Jim Melvin of Greensboro, wherein the public-service possibilities of amateur repeaters were explained. We were thanked for our interest and referred to the Civil Preparedness coordinator of Greensboro/Guilford County with whom we've enjoyed a mutually beneficial relationship ever since.

Effective "public relations" can work in another way for the emergency coordinator. In our case, the Civil Preparedness Office has also enjoyed a good measure of public "goodwill" through our C.P. repeater and these many projects. But also important was the zeal and enthusiasm generated in our AREC and RACES membership.

OST-

## Strays

I would like to get in touch with . . .

□ other hams employed in the field of bio-medical communications. WA6IFF, Glenn E. Stahl, 14808 Sunset Blvd., Pacific Palisades, CA 90272.

□ operators of stations in Vermont and

Maine for WAS sked. Also anyone with information about NB9EAA. Dave Edmonds, WN4AFP, Rte. 1, Box 363, Williamston, SC 29697.

□ persons having color slides of World's Fairs of the 1930s and who would be

willing to make them available for duplication, particularly slides of the Texas Centennial and Pan-American Expositions held in Dallas, TX, in 1936 and '37 respectively. Robert T. Paige, W5TBC, 2649 Laramie Street, Irving, TX 75062.

# ARRL Repeater Band Plans

Some helpful guidelines to use standard channels for efficient vhf-fm diversity and coordination.

By Lew McCoy,\* W1ICP/WR1ABH

At the July Board of Directors meeting, the Board recommended that the current band plans and the recommendations of VRAC (VHF Repeater Advisory Committee) be published in an early issue of *QST*. This article will cover the current band plans and VRAC

One hundred-kHz input/output separation is used. VRAC recommends that no adjacent channels be allocated in one given area. The repeater band runs from 29,500 to 29,700 kHz. Note that the ARRL plan leaves 29,500 kHz open. OSCAR-6 downlink is 29,450 to 29,550 kHz and OSCAR 7 has its upper limit at 29,500 kHz. We would prefer to keep 29,500 kHz clear of repeater activity for the present so as not to interfere with any OSCAR operations.

channels every 15 kHz. When the ARRL 2-meter band plan was first instituted, there appeared to be more than enough 30-kHz channels available for our needs.

## 50-MHz Band Plan

### 1000-kHz Spacing: 20-kHz Channels

DIRECT	REPEATER INPUT/OUTPUT	RESERVE <sup>1</sup>
	52.03/53.03 52.05/53.05 52.07/53.07	52.09/53.09 52.11/53.11
	52.13/53.13 52.15/53.15 52.17/53.17	52.19/53.19 52.21/53.21
	52.23/53.23 52.25/53.25 52.27/53.27	52.29/53.29 52.31/53.31
	52.33/53.33 52.35/53.35 52.37/53.37	52.39/53.39 52.41/53.41
52.01	52.43/53.43 52.45/53.45 52.47/53.47	52.49 53.51
52.49 52.51 52.525 NDF*	52.55/53.55 52.57/53.57	52.59/53.59 52.61/53.61
52.97 52.99	52.63/53.63 52.65/53.65 52.67/53.67	52.69/53.69 52.71/53.71

<sup>1</sup> The reserve frequencies listed are guard channels for the model radio control frequencies, every 100 kHz from 53.1 through 53.8 MHz. In the event that additional repeater channels are needed, these reserve channels could be allocated. For the present, it is suggested that frequency coordinators do not assign these channels.  
\*National Direct Frequency

## 6-Meter Plan

The six-meter band plan instituted a little over two years ago, has been receiving increasingly greater acceptance. Basically, the plan calls for input/output separation of 1000 kHz with 20-kHz channel spacing. Certain reserve frequencies are listed to provide guard channels for model radio control frequencies. Recent VRAC proposals call for additional direct frequencies and recommend that 52.97, 52.99, and 53.01 MHz be set aside for these purposes.

## 2-Meter Plan

The 600-kHz input/output spacing has become universally standard. In fact, most countries are using 600-kHz spacing. There are a few nonstandard repeater clubs or individuals in the United States who refuse coordination and use oddball frequencies. Such groups should be made aware that continued or increasing disregard of standard frequency coordination can possibly lead to restrictive regulations from FCC. Wherever possible, such nonstandard operation should be stopped before it becomes a national problem. We doubt that the average U.S. or Canadian repeater operator knows that in practically every country *except* the U.S. and Canada, frequency coordination based on 600-kHz separation is a requirement for licensing!

Normal channel spacing on two meters is 30 kHz, with splits or tertiary



recommendations. Also, it should be pointed out that the ARRL band plans appear in the *ARRL Repeater Directory*<sup>1</sup> along with the addresses of all known frequency coordinators.

## 10-Meter Plan

The 10-meter band plan consists of six repeater pairs spaced 15 kHz apart.

INPUTS AND UPLINKS	OUTPUTS AND DOWNLINKS
29.515	29.615
29.530	29.630
29.545	29.645
29.560	29.660
29.575	29.675
29.590	29.690
29.600 Direct (simplex)	

<sup>1</sup> The *ARRL Repeater Directory* is available at no charge. Please send an addressed envelope at least six-by-nine inches with forty-six cents United States postage.

\*Liaison, VRAC

### 146-MHz Band Plan

Repeater Channels		Direct Channels
INPUT	OUTPUT	
146.01	146.61	146.40**
146.04	146.64	146.43**
146.07	146.67	146.46**
146.10	146.70	146.49
146.13	146.73	146.52*
146.16	146.76	146.55
146.19	146.79	146.58
146.22	146.82	147.42
146.25	146.85	147.45
146.28	146.88	147.48
146.31	146.91	147.51
146.34	146.94	147.54
146.37	146.97	147.57
146.40**	147.00	147.60**
146.43**	147.03	147.63**
146.46**	147.06	147.66**
147.60**	147.00	
147.63**	147.03	
147.66**	147.06	
147.69	147.09	
147.72	147.12	
147.75	147.15	
147.78	147.18	
147.81	147.21	
147.84	147.24	
147.87	147.27	
147.90	147.30	
147.93	147.33	
147.96	147.36	
147.99	147.39	

\*National Direct Frequency  
 \*\*Optional in region. Check with frequency coordinator.

Note: Tertiary channels (splits) are 15-kHz apart. If assigned, it is recommended that they be inverted; i.e., 146.625 input, 146.025 output. It is imperative that such channels be coordinated.

However, it became quickly apparent that some areas of the country needed additional channels. For well over a year, all 30-kHz and 15-kHz channels have been assigned and are in use on the northern East Coast and in Southern California. The VRAC was asked to study the use and assignments of tertiary channels and to make a report. Here is that report:

"In Southern California, such tertiary channels commonly operate 'inverted,' that is, transmitter and receiver reversed from the standard for the portion of the band involved. On the East Coast, such repeaters are not inverted. Both groups report success, but the best theoretical chance for technical success can be demonstrated to lie with the California approach.

"The truth is that neither plan can ever really work well without the severest penalties being paid in terms of equipment cost, less-than-perfect performance, and a continual requirement for keen maintenance. Yet, with careful coordination and sufficient path loss between neighboring tertiary-channel users, either system can be made to work well enough to be satisfying.

"The VRAC believes that the League

should not encourage further growth on 2 meters in large metropolitan areas, but should strongly encourage aspiring repeater builders to consider the 220-MHz or 450-MHz bands, thus perhaps forestalling the issue of 2-meter tertiary channels for a time. We further believe that QST space should be used to popularize the idea that 2-meter repeaters are at their best when they serve as community utilities for the benefit of a large number of amateurs rather than as experimental devices or playgrounds for small, closed cliques.

"Although it is a completely unproved notion, it seems that the density of amateur radio operators cannot be sufficiently great anywhere in the country that 27 two-meter repeaters wouldn't be sufficient to serve any legitimate public-service or hobby requirement — especially if they were well situated geographically and carefully coordinated. The pages of QST could serve as a forum for the exploration of this notion.

"But, back to the issue of tertiary channels and what to do about them now. The VRAC recommends that the Board not change the present ARRL 2-meter band plan to show the existence of tertiary channels in the frequency tables, but that a footnote be added explaining what tertiary channels are and recommending that, if they must be employed to serve a local need that cannot be satisfied in any other way, they be established inverted."

It is important to point out that while the recommendation is for inverted splits, there are no strong feelings that any established area using straight-up splits has to convert. Present-day equipment can be used either straight-up or inverted, whether the transceiver is crystal-controlled or makes use of a synthesizer. What is important is that area councils and coordinators make the decisions best suited for their regions.

### 220-MHz Repeater Band Plan

The 220-MHz band plan uses 1600-kHz input/output spacing with 40-kHz channel separation, 20 kHz for splits. VRAC recommends that the League continue to popularize the use of 220 with whatever means are available. More and more repeaters are coming on 220. For example, the current ARRL Repeater Directory shows that there are 31 operating 220-MHz systems in California, 11 in New York, 8 (!) in Connecticut. Results have shown that there is little difference, if any, in area coverage of a 2-meter machine versus a 220 one.

### 450-MHz Band Plan

The 450-MHz band plan calls for input/output spacing of 5 MHz, 50-kHz channel spacing, with 25-kHz splits.

### 450-MHz Band Plan

442.00 — 444.95	Repeater Outputs
445.00 — 446.95	Direct, Aux Links
446.00	National Direct Frequency
447.00 — 449.95	Repeater Inputs

Note: Repeater input/output spacing is 5 MHz, 50-kHz channel spacing. It is suggested that frequency coordinators do not assign 442.00 MHz as an output but start at 442.05 MHz. Because 442.00 is a subband edge, a repeater output on exactly 442.00 MHz could be in violation of the FCC rules if a portion of the signal extended below the center frequency.

While not an "official" ARRL band plan, the Tri-State Repeater Council (TSARC) which covers New York City, Long Island, northern New Jersey and parts of Connecticut has suggested a modified plan to take care of high or low inputs and splits. This plan is discussed in "FM Repeater News," page 71, August, 1976, QST. We solicit your comments.

### Conclusions

It should be emphasized that any band plan can be changed if there is sufficient justification to warrant such a change. In the last 10 years or so, amateur radio has seen a real change in methods of operating take place. Channelized communications in amateur radio were rare until the advent of repeaters. Amateurs have proven that such coordinated operation does work — and work very well indeed. With repeater operation amateurs have been handed probably the best tool we ever had to operate "in the public interest, convenience or necessity." Be sure your system is coordinated with the local coordinator before going on the air — let's keep a good thing going. 

### 220-MHz Band Plan

Repeater Channels		Repeater Channels		Direct Channels
INPUT	OUTPUT	INPUT	OUTPUT	
222.34	223.94	222.90	224.50	223.42
222.38	223.98	222.94	224.54	223.46
222.42	224.02	222.98	224.58	223.50*
222.46	224.06	223.02	224.62	223.54
222.50	224.10	223.06	224.66	223.58
222.54	224.14	223.10	224.70	223.62
222.58	224.18	223.14	224.74	223.66
222.62	224.22	223.18	224.78	223.70
222.66	224.26	223.22	224.82	223.74
222.70	224.30	223.26	224.86	223.78
222.74	224.34	223.30	224.90	223.82
222.78	224.38	223.34	224.94	223.86
222.82	224.42	223.38	224.98	223.90
222.86	224.46			

\*National Direct Frequency

# On Signal Strength Evaluation

The S-meter and the S-scale — is it time for changing the rulebook? Could be!

By Jury A. Belevich,\* UA1IG

**A** QSO without a signal report is a rare thing. And for good reason too — we all like to know how our signal sounds at the other end. Years ago, hams were just as concerned about their signals (if not more so), and a system, the RST (readability, signal strength, tone) system, was conceived to standardize signal reporting.

## Is the RST System Outdated?

But through the years, the S-scale of the RST system has shown its age. The S-scale shown in Table 1, which spreads the estimation of signal strength over a very wide scale, may have been convenient when radio reception had only natural (cosmic and atmospheric) disturbances. Today, however, man-made and interstation (adjacent-channel) interference prevails. The S-scale is almost inaccurate as a result of this interference, because the difference between two adjacent reading points on the scale is so small. What is the difference, for instance, between an S4 and an S5 signal?

**Table 1**  
**SIGNAL STRENGTH**

1. Faint signals, barely perceptible.
2. Very weak signals.
3. Weak signals.
4. Fair signals.
5. Fairly good signals.
6. Good signals.
7. Moderately strong signals.
8. Strong signals.
9. Extremely strong signals.

When estimating signal strength based on the current S-scale, differentiation between S2 (very weak) and S3 (weak) signals is difficult, if not impossible.

## Better Signal Estimates with Modified S-System

We'll obtain more precision in signal estimation if we substitute instead a simplified S-system and the following S-scale. Some intermediate S-meanings

**Table 2**  
**S-SCALE**

1. Very weak signal; impossible reception.
2. Weak signal; reception with strained attention.
3. Satisfactory signal; reception without particular strain.
4. Good signal; reception without strain.
5. Loud signal; loudspeaker reception.

have been removed from this scale so that it is simpler to estimate the signal strength more accurately.

It isn't long before most amateurs learn the great difference between estimating signal strength by ear and doing so with the help of a receiver's S-meter. This difference is caused by calibration variations and various S-meter amplifier tube characteristics.

**Table 3**

S	1	2	3	4	5	6	7	8	9
Input (μV)	0.4	0.8	1.6	3.1	6.2	12.5	25	50	100

For example, the S-meters on two receivers which have different sensitivity levels must be calibrated. It is recommended to estimate the S9 signal with an input signal strength of 100 microvolts when the S-units are spaced at 6-dB intervals. The calibration is made by the voltage applied to the input terminals of a receiver, as shown in Table 3.

With this method of calibration, S-meter scale graduation marks on a receiver with 1-microvolt sensitivity and a second receiver with 50 microvolts will proceed from S3 to S8 (Fig. 1A and B), because these signal strengths correspond to sensitivity of the receivers. With the same input signals (for instance, 100 microvolts) applied to the receivers, the S-meters will indicate the same signal strength (S9) because they are calibrated in the same way.

## S-Meter Calibration Problems

There is a problem, though. When estimating signals by ear, an operator will determine S6-S7 in the first receiver and not more than S1-S2 in the second. This method of S-meter calibration allows for measurement of the signal level, but it doesn't reflect real conditions of communication, which depend not only on signal strength but also on the state of a receiver (and its quality too).

\*a/box 20, Leningrad, M-244, 196244, USSR

**Table 4**

S-SCALE CORPORATIONS		1	2	3	4	5	6	7	8	9
National Radio Co., Hallicrafters	mV	0.2	0.4	0.8	1.6	3.1	6.2	12.5	25	50
Swan Electronics Co., Collins Radio Co.	mV	0.4	0.8	1.6	3.1	6.2	12.5	25	50	100
R. L. Drake Co.	mV	0.5	0.9	1.6	2.8	5.0	9.0	16	28	50

Often, a receiver has an S-meter amplifier tube with deteriorated characteristics. This causes understated S-meter readings, such as "RS-51" or "RS-52." This is full readability on a faint signal.

Another problem with measuring signal strength is that receiver manufacturers use various methods of S-meter calibration. For example:

1) The National Radio Co., Hallicrafters. The use of 50-mV input signal to determine the S9 point. Each S-unit equals 6 dB.

2) Swan Electronics Corp., Collins Radio Co. The standard for S-meters is 100 mV through a 6-dB pad for S9.

3) The R. L. Drake Co. The standard is 50 mV through a 50-dB pad for S9.

**Suggested Solution**

There is another method of S-meter calibration which this writer considers more correct. First, the zero level of the input signal is determined, the level

which corresponds to the receiver noise level (it may also be called maximum or critical sensitivity level). In acoustics, this level is considered the "audibility threshold level." From acoustics, we know that normal speech exceeds the audibility threshold by 60-70 dB. Thus, we adjust a receiver's S-scale so that the maximum signal strength exceeds the receiver noise level by 60 dB. If we consider the maximum signal strength to correspond to S5 (Table 2), each S-unit will be equal to 12 dB. As receiver sensitivity contains the condition of necessary signal-over-noise excess to provide normal reception (usually 10-20 dB), this value conforms well to the concept of receiver sensitivity.

With this method of S-meter calibration, an aural estimation of a signal is the same as the S-meter reading. If the S-meter measures the value of the i-f voltage at the output of the receiver, the S-meter readings will remain accurate despite receiver deterioration (such as in the case of aging tubes). There will still

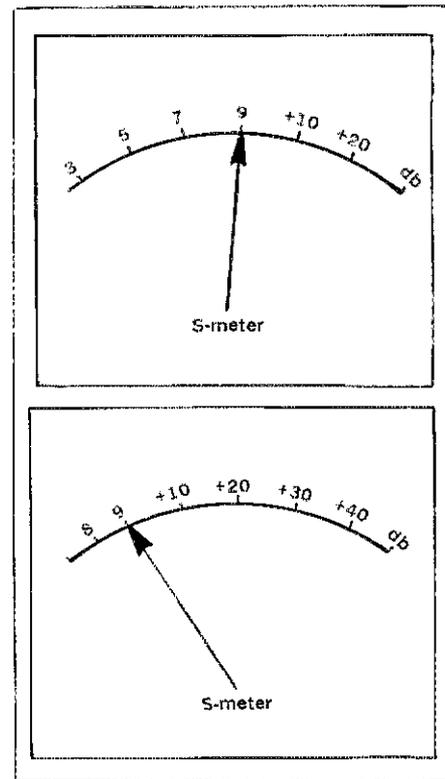


Fig. 1 — At A, S-meter scale for the first receiver. At B, S-meter scale for the second receiver.

be some dependence of the S-meter sensitivity on its amplifier tube if the S-meter measures the agc voltage. **QST**

**Strays** 

I would like to get in touch with . . .

- other 6th to 8th graders to exchange cassette tapes for code practice and discussion of radio electronics. Rick Faith, P.O. Box 5934, Southgate, FL 33579.
- drivers or owners of "T-series" MG cars of the 1952 vintage. WA6IFF, Glenn E. Stahl, 14808 Sunset Blvd., Pacific Palisades, CA 90272.
- fellow hams with information on how to operate the SB2-LA Linear Amplifier by SBE or a copy of the operator's manual thereof. Oscar M. Ocampo, M.D., EL3A, Vanply of Liberia, Inc., P.O. Box 2075, Monrovia, Liberia.
- anyone interested in working a-m with me or an a-m net. Richard Schmidt, 1290 H3E, Mountain Home, Idaho 83647.
- any Chinese amateur living in the U.S., Canada or elsewhere in the world. Chuck Nam Lau, VE3ZWW, 266 Maria Street, Toronto, Ontario, Canada M6P 1W4.



A return to the classroom: Armed with 250 pieces of ARRL literature, WA2PCY demonstrated amateur radio to grades two through six at PS 173 in New York City. Students from each grade visited the classroom setup where after chatting awhile, an actual contact or two was made. "To the kids it was almost something out of Flash Gordon," comments Ron who views his visit as doing his thing to put back into public education some of the extras cut out in the budget crunch. School Principal Herman Bogdan termed the program "wonderful" and "fascinating" for teacher and student alike. For WA2PCY, his success garnered him an invitation to run an amateur radio club for a select number of children.

# DX QSLs, QSLs, QSLs

Now, coming and going, they're easier for ARRL members.

By R. L. White,\* W1CW

**"T**NX QSO OM - PSE QSL VIA BUREAU . . ."

"I've done it! I've finally worked some real DX! And will I QSL? You better believe it, especially for a country all they way across the ocean. But 'via Buro'? We landed men on the moon and a vehicle on Mars and this guy thinks we're still using animals to carry the mail?"

"Anyway, I'll send him a card direct with an envelope made out to me with a stamp on the envelope, just as I do when I work a new state. If I tell him he's my very first QSO with his country, that should get to him and he's sure to QSL. Let me see now, I'll need to borrow a foreign *Callbook*; my U.S. one won't help much. And I guess my putting a U.S. stamp on the s.a.s.e. won't do him any good either. Maybe I could send him a dollar bill, but I heard that some foreign countries come down hard when they find someone with foreign money. Sure don't want to get him in trouble; he might not QSL. Got it! I'll send him some International Reply Coupons. According to the fine print on them, each one can be exchanged for the postage required to mail a first-class letter to almost any country in the world.

"The *Callbook* has a listing of the number of IRCs needed to equal what an airmail reply for my card will cost him. But wait just a doggone minute. I heard a fellow on the air just the other day saying that he'd gone to the post office to get some IRCs and they now cost 42¢ each! Let me see now, two IRCs, two envelopes, my airmail postage to send him my card and the IRCs and envelope . . . that's over \$1 for a single QSL! I'll go broke before I get halfway to making my DXCC. There just has to be a cheaper way. . . ."

Don't go broke. There is indeed a cheaper way, and the DX station said it: via the QSL bureau.

## A Hobby in Themselves

To some amateur operators QSL cards are a hobby in themselves. The

colors, the pictures, the handwriting and the names of countries stir the mind to visions of faraway places and recollections of past contacts. Some people can blow their minds and trip out just going through a batch of QSLs. Then there are those to whom a QSL is a means to an end, the achievement of a goal or an award.

There are some amateur operators who "brag" about never having sent out any QSLs but who claim to have received enough QSLs to make DXCC. The percentages don't favor that happening. For an amateur in the U.S. or Canada, who wants to get QSLs (for whatever reason), that amateur should be prepared to send QSLs.

But, the filling out of QSLs, finding addresses, addressing envelopes, stuffing envelopes and mailing become unpleasant chores that take time that could be

spent in operating. Operating is the name of the game. Thus, in order to support the objective of keeping amateurs on the air, the membership of ARRL has expressed an interest in reducing the work (and cost) of sending DX QSL cards and the ARRL Board of Directors, at its July, 1976, meeting, directed the general manager to implement an overseas distribution system, to be operational by January 1, 1977. The object: To allow an ARRL member to send DX cards with a minimum of cost and work on behalf of the individual member. In compliance with the Board's directive, the ARRL-Membership Overseas QSL Service will be operational starting November 1, 1976.

## Here's How It Works

Each month, every member of the ARRL (except family and sightless

Table 1

Countries for which the ARRL-Membership Overseas QSL Service may be used.

Algeria	Fiji Islands	Kenya	Philippine Islands
Antarctica	Finland	Korea	Poland
Argentina	France	Kuwait	Portugal
Austral/	French Oceania	Liberia	Puerto Rico
French Antarctic Lands	German Democratic	Liechtenstein	Rhodesia
Australia	Republic	Luxembourg	Romania
Austria	Germany, Federal	Madeira Islands	Rwanda
Azores	Republic of	Malagasy Republic	Samoa (American)
Bahama Islands	Ghana	Malawi	Senegal
Bahrain	Gibraltar	Malaysia	Seychelles
Barbados	Great Britain	Maldives	Singapore
Belgium	(or British	Malta	South Africa
Bermuda	Commonwealth)	Mariana Islands	Spain
Bolivia	Greece	Marshall Islands	Sri Lanka
Brazil	Greenland	Mauritius	St. Vincent
Bulgaria	Guam	Mexico	Surinam
Burundi	Guantanamo Bay	Midway Islands	Sweden
Canada	Guatemala	Monaco	Switzerland
Canal Zone	Haiti	Mongolia	Syria
Cape Verde Islands	Honduras	Morocco	Tanzania
Chile	Hong Kong	Mozambique	Thailand
Colombia	Hungary	Netherlands	Trinidad and Tobago
Cook Islands	Iceland	Netherlands Antilles	Uganda
Costa Rica	India	New Zealand	Uruguay
Cuba	Iran	Nicaragua	U.S.S.R.
Cyprus	Ireland	Nigeria	Vatican
Czechoslovakia	Israel	Norway	Venezuela
Denmark	Italy	Oman	Virgin Islands
Dominican Republic	Ivory Coast	Pakistan	Western Samoa
Ecuador	Jamaica	Panama	Yugoslavia
El Salvador	Japan	Papua New Guinea	Zaire
Ethiopia	Johnston Island	Paraguay	Zambia
Faroe Islands	Jordan	Peru	

\*Manager, ARRL QSL Bureau

members) is mailed a copy of *QST*. The address label on the wrapper of *QST* is the member's "ticket" for use of the Overseas QSL Service. Twelve times per year, an ARRL member may send as many QSL cards as he wants for amateurs overseas in the countries shown in Table 1. With each mailing the member must include the address label from an October, 1976 (or later), issue of *QST* and \$1 (check or money order). QSLs must be presorted by prefix. Nothing but the cards, address label and \$1 may be included in the package. Wrap the package securely and address it to ARRL-Membership Overseas QSL Service, 225 Main Street, Newington, CT 06111.

"Family" members of ARRL, to

whom only one copy of *QST* is sent, may send cards in the same package but must include \$1 for each member sending cards and indicate that the *QST* address label includes a "family membership."

Sightless members, who do not receive a copy of *QST*, need only include \$1 with a note indicating that the cards are from a sightless member. Associate (unlicensed) members may use the Overseas QSL Service to send SWL reports to overseas *amateur* stations in the countries shown in Table 1. No cards will be sent to individual QSL managers.

A once-per-week mailing will be made to the countries listed in Table 1. Headquarters sincerely hopes that this Membership Service will be fully used

by the membership. Keep us busy, serving you.

#### DX QSLs Via ARRL to DX

1. Consult Table 1 for countries to which cards will be sent by the ARRL QSL Service.
2. Arrange QSLs alphabetically by prefix (F, G, HA, HI, I, JA and so on).
3. Detach your mailing label from a *QST* wrapper after October, 1976.
4. Write a check for \$1, wrap the bundle securely, and mail to:

ARRL-Membership Overseas QSL Service  
225 Main Street  
Newington, CT 06111.

5. Associate, blind and family members should refer to the text for special provisions.

## The Flip Side

Free! S.a.s.e.s to a bureau can bring any amateur his DX cards.

*The preceding article detailed information on the ARRL's new Overseas QSL Service, a part of the system to allow for "outgoing" QSLs. But that's just half of the service. The other portion concerns "incoming" QSLs, or the ARRL DX Bureau System — a free service for all U.S. and Canadian amateurs. Not a new service, this established part of the system dates back some 40 years. (ARRL membership is not required to make use of this bureau system.)*

Any QSL bureau is essentially a central clearinghouse for QSL cards. The concept of the bureau is predicated on the principle that the user must be willing to trade a substantially slower method of transporting QSLs for a greatly reduced cost of QSLing. It is axiomatic that QSLs sent via any bureau system will *not* move quickly. QSLs sent via the bureaus will take a minimum of a few months and can take up to years, simply because a number of factors are involved. All of these additives contribute to the length of time it takes to move a QSL from point A to point B. Anyone wanting a QSL in as short a time as possible should *not* use the bureau system. The person wanting a QSL in a hurry should expect to pay the full price for that. And that price today is EXPENSIVE.

The following is a step-by-step account of how the ARRL DX QSL Bureau System works. It should make apparent both the number of steps involved and the dedicated volunteers

who see to it that the required steps are taken care of.

#### Here's What Happens

Many, if not most, countries have outgoing QSL bureaus operating in much the same manner as the new ARRL-Membership Overseas QSL Service. The member sends his cards to his outgoing bureau. This bureau then sorts, packages and ships, invariably by surface mail, to the appropriate countries. There are three steps here. *First step*, the DX station, who will most likely wait until he accumulates a quantity of his outgoing cards before he sends them to his outgoing bureau. A possible delay of from a week to a month or more. *Second step*, the DX stations outgoing bureau. Depending on how soon the bureau sorts, packages and mails, this can be another delay. Cards that have come to ARRL headquarters for transshipment to U.S. and Canadian area bureaus have been observed to be for contacts made as much as two years before they even reached Headquarters. Many are for contacts a year old and very few are for less than three to four months old. *Third step*, the transportation of the cards. At best, cards sent from Europe to the U.S. will take at least three weeks, more often four weeks and as much as six weeks. Obviously, there can be a considerable delay from the time the contact is made until the time the card arrives in the country it is intended for.

Within the U.S. and Canada, the ARRL DX QSL Bureau System is made

up of 22 call area bureaus. Most of the cards from DX bureaus go directly to the individual bureaus. A few DX bureaus do send their cards to Headquarters where they are sorted and transshipped to the appropriate bureaus (another delay of from two to four weeks).

At the individual bureaus, the incoming cards are sorted by the first letter of the suffix. This sorting divides the work load into portions that can be handled by a single individual. In the call areas with a high-density amateur population, one individual may be assigned the responsibility of handling from one to three letters of the alpha-



Last year, the more than 250 volunteers in the bureau system donated more than 1500 hours of their time each month, handling the more than 4,000,000 cards which arrived from overseas. An understanding of the system and a few simple rules can greatly aid these workers and help every user of the system receive his cards in the shortest possible time. These workers appreciate patience and understanding plus often-deserved compliments.

## The ARRL DX QSL Bureau System

W1, K1, WA1, WN1\* — Hampden County Radio Association, Box 216, Forest Park Station, Springfield, MA 01108.  
W2, K2, WA2, WB2, WN2\* — North Jersey DX Assn., P. O. Box 8160, Haledon, NJ 07508.  
W3, K3, WA3, WB3, WN3\* — Jesse Bieberman, W3KT, RD 1, Box 66, Valley Hill Rd., Malvern, PA 19355.  
W4, K4 — National Capitol DX Assn., Box DX, Boyce, VA 22620.  
WA4, WB4, WN4 — Sterling Park Amateur Radio Club, P. O. Box 599, Sterling Park, VA 22170.  
W5, K5, WA5, WB5, WN5\* — ARRL W5 QSL Bureau, Box 1690, Sherman, TX 75090.  
W6, K6, WA6, WB6, WN6\* — ARRL W6 QSL Bureau, 2814 Empire Avenue, Burbank, CA 91504.  
W7, K7, WA7, WN7 — Willamette Valley DX Club, Inc., P. O. Box 555, Portland, OR 97207.  
W8, K8, WA8, WB8, WN8 — Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, OH 43215.  
W9, K9, WA9, WB9, WN9 — Northern Illinois DX Assn., Box 519, Elmhurst, IL 60126.  
W0, K0, WA0, WB0, WN0 — W0 QSL Bureau, Ak-Sar-Ben Radio Club, P. O. Box 291, Omaha, NE 68101.  
KP4, WP4\* — Radio Club de Puerto Rico,

P. O. Box 1061, San Juan, PR 00902.  
KV4 — Graciano Berlarlo, P. O. Box 572, Christiansted, St. Croix, VI 00820.  
KZ5\* — KZ5 QSL Bureau, KZ5OD, Box 407, Balboa, CZ.  
KH6, WH6\* — John H. Oka, KH6DQ, P. O. Box 101, Aiea, Oahu, HI 96701.  
KL7, WL7 — Alaska QSL Bureau, Star Route, Box 2401, Wasilla, AK 99687.  
VE1\* — L. J. Fader, VE1FQ, P. O. Box 663, Halifax, NS.  
VE2 — A. G. Daemen, VE2IJ, 2960 Douglas Avenue, Montreal, Quebec H3R 2E3.  
VE3 — The Ontario Trilliums, P. O. Box 157, Downsview, ON M3M 3A3.  
VE4 — D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg, MB R3N 0E8.  
VE5\* — A. Lloyd Jones, VE5JI, 2328 Grant Road, Regina, SK S4S 5E3.  
VE6\* — D. C. Davidson, VE6TK, 1108 Trafford Dr., N.W., Calgary 47, AB.  
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, NF.  
SWL — Leroy Waite, 39 Hannum St., Ballston Spa, NY 12020.  
\*These bureaus sell envelopes or postage credits. Send an s.a.s.e. to the bureau for further information.

## DOs

- Do keep self-addressed 5 x 7" envelopes on file at your bureau, with your call in the upper left corner, and affix at least one unit of first-class postage.
- Do send the bureau enough postage to cover envelopes on file and enough to take care of possible postage rate increases.
- Do respond quickly to any bureau request for envelopes, stamps or money. Unclaimed card backlogs are the bureau's biggest problem.
- Do notify the bureau of your permanent call as you upgrade from Novice.
- Do include an s.a.s.e. with any information request to the bureau.
- Do notify the bureau if you *don't* want your cards.
- Do be appreciative of the fine efforts of these volunteers.

## DON'Ts

- Don't expect DX cards to arrive for several months after the QSO. Overseas delivery is very slow. Many cards coming from overseas bureaus are over a year old.
- Don't send your outgoing DX cards to this bureau (see "first portion of this article").
- Don't send envelopes to your "portable" bureau. For example, WA1SQB/2 sends envelopes to the W1 bureau, *not* the W2 bureau.

bet, for example cards for calls whose suffix starts with the letters A, B, C.

## Claiming Your QSLs

That is all very interesting, you might say, but how does one get his cards from the ARRL DX QSL System? All that is really required is to send a 5 x 7-inch self-addressed, stamped envelope to the bureau serving your district. Addresses for the U.S. and Canadian bureaus are being shown every other month in *QST*, usually on a page closely following "How's DX?," but this month the listing will appear with this article.

These envelopes should have your call sign printed neatly in the upper left corner of the envelope to assist the sorter of your cards. Note that some bureaus will sell envelopes or postage credits as well as handling s.a.s.e.s; here the bureau will provide the proper-size envelope and affix appropriate postage upon prepayment of a certain fee. The exact arrangement of your area bureau can be obtained by sending your bureau an s.a.s.e. with your inquiry.

Since many of the DX stations use the bureau system, this area bureau can be very important to someone who works DX. But, it is a complex volunteer arrangement requiring good cooperation from the part of the DXers to function properly.

## Hampering Smooth Operation

For example, one of the major problems each of the U.S. and Canadian district bureaus face is unclaimed cards.

There are some people who work significant amounts of DX and who simply do not want the DX QSL cards that are received at the bureaus. They do not send envelopes to the bureau and the cards for them begin to pile up. Quickly this mass of unclaimed cards builds up and soon makes the job of sorting the cards for those DXers who do want their cards more difficult. But those unwanted cards cannot be simply discarded. Perhaps they belong to an amateur temporarily overseas, or ill. The standing instructions to the bureaus are to hold unclaimed cards for at least one year before destroying them. DXers can help the bureaus perform their function by making sure they keep the proper amount of postage credit or s.a.s.e.s on file with the bureau at all times.

Another frequent problem that impairs bureau operation is improper envelopes. The 5 x 7 envelope is a standard-size envelope that will carry most any QSL card that comes to the bureau. These envelopes will fit into special sorting bins. The bureaus have reported some strange and rather odd envelopes having been sent to them: A 16 x 20-inch envelope with only 13¢ postage on it! The envelope alone weighed more than one ounce. Or a 3 x 5-inch envelope, the size used to send thank-you notes, with 50¢ postage on the envelope. Even if the cards were folded, the envelope would never have held enough cards to warrant 50¢ postage!

A preferred way to send envelopes to the bureau is to affix 13¢ and clip

## DX QSLs Via ARRL from DX

1. Write your call in the upper left corner of 5 x 7-inch self-addressed stamped envelopes.
2. Consult the ARRL DX QSL Bureau list for the one that handles your prefix.
3. Send them an ample supply of these s.a.s.e.s and extra postage.
4. Cards for a portable operation will go to the home district (W1CW/6 would receive his cards through the first district bureau).
5. Notify the bureau of any changes (WN1XYZ upgrades to WA1XYZ).

extra postage to the envelope. Then if you receive more than 1 oz. of cards, they can all be put into the single envelope and the proper extra postage affixed.

Our now more frequently changing postage rates can be a problem for the bureaus. Envelopes on file, with the postage affixed to them, will not have the correct postage on them when the rates change. It helps ensure good delivery of the cards to keep the proper postage on each envelope. If the rates do go up, send the bureau the extra postage when you send in the next batch of envelopes. But better still, keep some extra postage on file with the bureau.

Good cooperation between the DXer and the bureau is important to ensure a smooth flow of cards through the bureau. Keep in mind that the people who work in the area bureaus are volunteers. They are doing something for you, not the other way around, and they are doing it at no charge to you. 

# Amateur Radio in Action

An exhibit of amateur radio equipment and operation at CB shows, shopping malls and other public places is a top-notch PR tool. Here's all you need to know to get one going.

By Charles J. Harris,\* WB2CHO

**A**re the CBers getting all the press coverage in your town? Do the media and general public show frequent confusion about "ham radio" and CB? Are you holding a license class and looking for students? Do you want to contribute to the future of amateur radio?

These are but a few of the reasons for holding a public exhibit of amateur radio in your town. An exhibit is one of the most effective means of gaining public exposure for amateur radio — and also serves as a fine recruiting tool for license classes.

\*Club and Training Manager, ARRL

**Where?** Anywhere people gather is a good place for an amateur radio exhibit. Shopping malls, county fairs, hobby shows, parades and schools are a few suggestions. One of the best places is at a CB gathering. Coffee Breaks, shows, conventions and jamborees all attract large numbers of potential hams and often receive good publicity in the media.

**When?** A question certain to be asked at the exhibit will be, "When is the next license class?" Scheduling the exhibit around the start of the license class, or vice versa, increases its value as a recruiting tool.

**Who?** It's not hard to find amateurs to talk about their favorite activity. The local club or repeater group is often a good source of hams eager to answer questions about amateur radio. Asking someone directly to "volunteer" is more effective than a general request for assistance. You should line up about twice as many people as needed to take care of unforeseen cancellations.

**Why?** The benefits to amateur radio, the local radio club and the radio license class are obvious. What's in it for the mall or CB fair? Amateur radio exhibits are drawing cards for the shopping mall. The exhibit and attendant publicity will actually serve to attract people to the mall to view the display. And people is what retail stores adore. You may also try appealing to the sense of civic duty and community relations of the mall management.

CB fairs often look for seminars and talks of general interest, to add "class" to the show. Seminars on CB rules and regs are popular, as is the *Moving Up to Amateur Radio* film and discussion. In exchange for your providing this service, the fair or other CB gathering is bound to look favorably on your offer of an exhibit.

**Promotion.** Proper publicity is the key to a successful demonstration. The League provides sample news releases for the media as well as posters which can be placed in schools, radio stores, etc., to attract visitors to the setup. And if the display will be running for more than a single day, the local media can often be talked into running a feature story on the group, which is much better than a simple paragraph about the demonstration. The ARRL's free exhibit and publicity packages provide the pertinent background information for these efforts.

Once you have arranged for the display and started the promotional ball



An attention-getting highlight of the Wellesley Amateur Radio Society's display at the Natick Mall, Natick, MA, was handling traffic for passersby. (WA1RGA photo)

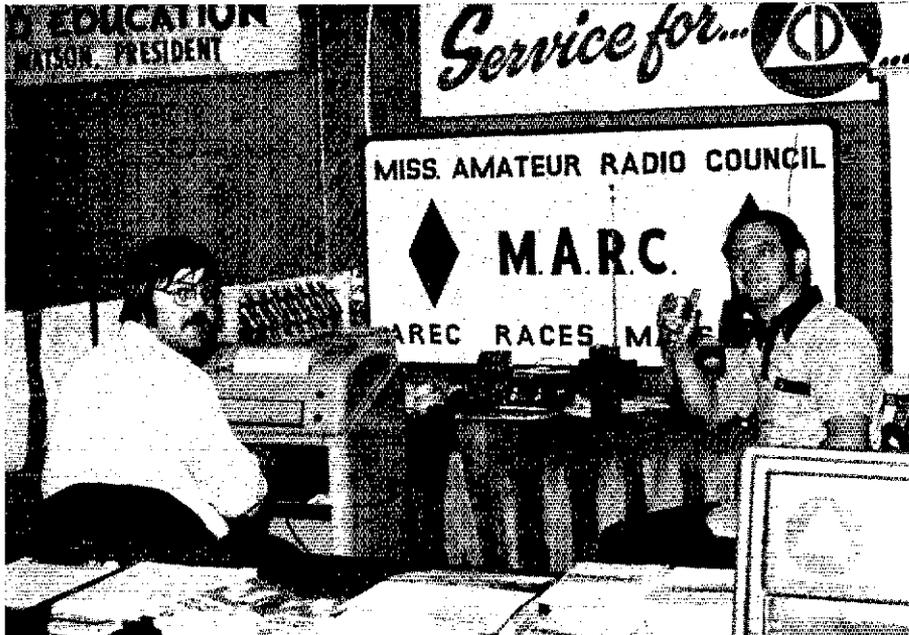
rolling, you are ready to decide the exact form of the display. This may be predetermined by the purpose of the exhibit. If the prime use is recruiting, a simple exhibit with emphasis on Novice operation is appropriate. If the main purpose is to impress town officials with the flexibility of emergency communications via amateur radio, a more elaborate demonstration is in order.

In any case, there are several important points to keep in mind when planning any amateur radio exhibit or demonstration. Amateur radio has been the victim of a great deal of poor press (much of it self-inflicted). The general public seems convinced that amateur radio is a hobby for rich electrical engineers. It appears too difficult, too complicated and too expensive for the average individual.

To counter this misconception, simplicity is vital. Avoid expensive, elaborate and complicated setups, such as SSTV, OSCAR stations, RTTY, etc. The display should be living-room-table type: Neat, uncluttered, attractive. Lots of dangling wires are ugly, potentially dangerous and have a very negative effect on would-be hams.

On the subject of things to do or to avoid, another caution is in order. The people manning the booth or table should be careful of what they say about amateur radio, particularly to prospective hams. Again, a special effort should be made to present amateur radio as fun, exciting, remarkably easy to get started in and not really that expensive.

Finally, CB should not be derided. A large proportion of potential hams now



The Mississippi State Fair was the scene of this booth, manned by Roger, WB5IRR, at the teletype, and Dave, K5RSI.

hold CB licenses or at least operate in the 11-meter region. Ham radio should be pushed as an *addition* to CB, not as a *replacement* for it. Hams who also hold CB licenses make the best salesmen.

*What?* Given these ideas and suggestions, what is the best setup for a standard booth? A couple of 6 to 8-foot tables (neatly draped), a few chairs and a display board behind or beside the tables are excellent.

Vhf-fm gear with autopatch is the best choice for an actual station setup. A synthesized rig is particularly impressive, as the general public can quickly grasp the concept of 400 channels. And making telephone calls from a remote location is a tremendous selling point. The value of autopatch is easily understood by everyone. The audio from the rig should be fed to a good quality speaker, so that everyone can hear and understand the transmissions. Most built-in speakers are inadequate for this purpose.

Another item for the table should be a code-practice oscillator and key. With a table of the code handy, the visitors can be encouraged to send their names in Morse code, to show how easy it is to master that dreaded code! Be careful not to allow the potential hams to walk away with a copy of the printed code, however. (See "Morse Decoded," September, 1976, *QST*.)

A final item for use by the visitors is a ham-band receiver. Encourage the visitor to the booth to tune around 75 or 20 meters, and point out the locations of the stations he can hear. Tuning down to the cw part of the band demonstrates that hams still use that mode of communication. Most visitors

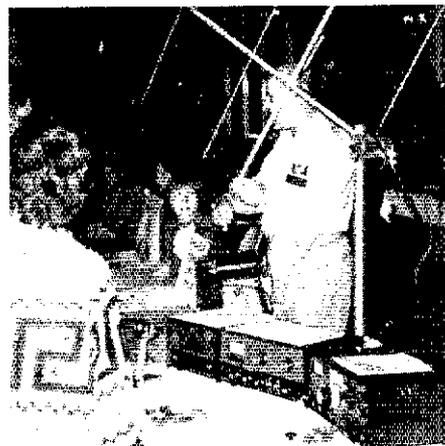
will have a little difficulty properly tuning an ssb signal (many hams still do) — an offer of assistance here can be the starting point of a friendly discussion on amateur radio.

This makes for an effective, functional display with a minimum of effort. If conditions warrant, a more elaborate setup is possible, bearing in mind the above cautions. An exhibit at a fair might contain a message center and hf transceiver for local traffic nets, for example.

For display purposes, the League will provide a copy of the U.S. call area map from the *Tune in the World* beginner's package, as well as a set of sample certificates. Place QSL cards



A catchy poster worked well for the Mecklenburg, NC, ARS.



An AMSAT display was just a part of an exhibit entitled "This is Ham Radio," a cooperative effort on the part of several ham clubs in the Tidewater, VA, area. W4JNY explains what OSCAR's all about to a few of the 5,000 passersby at the Military Circle Mall.

around the map, with string going from the QSL card to an appropriately placed pin in the map. The same can be done with the ARRL World Map and DX QSLs.

The rest of the display is remarkably simple to put together. Some heavy cardboard, colored paper and scissors can do an appealing job, with help from the League's notes on how to make signs and displays, which is included in our exhibit package.

Also included in the package are the handouts to explain the difference between amateur radio and CB, and to tell how to get started in amateur radio. All the individual club has to provide is a copy of the information sheet about the next license class, or the next several license classes, in the local area.

In some cases the promotional package, *Moving Up to Amateur Radio*, can be tied in with the exhibit. If there is an appropriate room available to give



Another view of the AMSAT exhibit. The tape recorder played back OSCAR QSOs which were prerecorded for the display. The equipment was lent by WA4MMP.

the presentation near the booth, great! Even if the show cannot be put on at the exhibit, information on the time

and place of the film/talk on amateur radio can be distributed there. *Moving Up to Amateur Radio* is a prime recruiting tool, and the exhibit makes a good promotional device for the presentation.

*Follow-through.* Many clubs have been invited back to repeat their displays and exhibits. An important ingredient in this is proper follow-through. Letters (or even certificates) of appreciation to the fair or mall managers can help, as well as mentioning the sponsoring agency in any news releases and promotional efforts. Finally, proper policing of the exhibit and a good cleanup will help win friends for amateur radio.

Interest in amateur radio is at an all-time high. So is confusion about amateur radio — what it is, how to get started, etc. An amateur radio exhibit can be your contribution to the future of amateur radio. Try it; you'll like it!

QST

# Strays



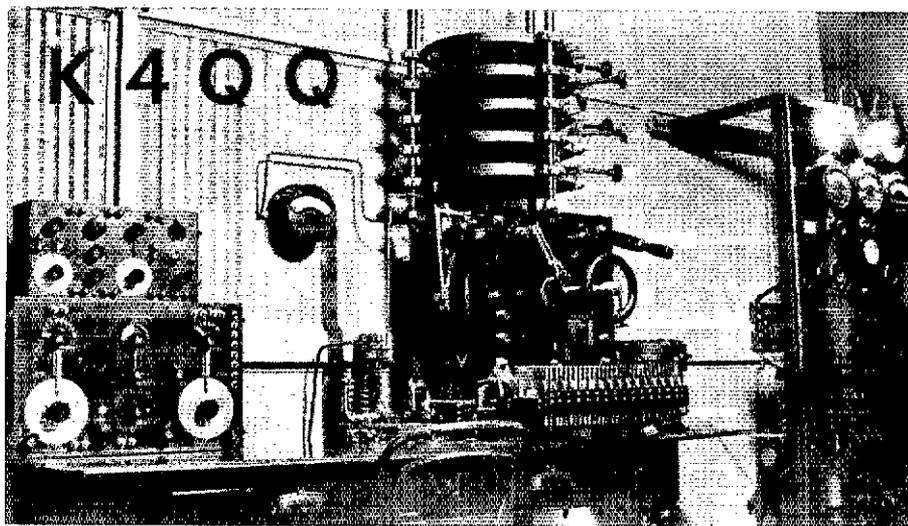
I would like to get in touch with . . .

□ other amateurs interested in speaking foreign languages on the air, especially French and Greek. Gabriel Gargiulo, WA1GFJ, 160 Elm Street, North Haven, CT 06473.

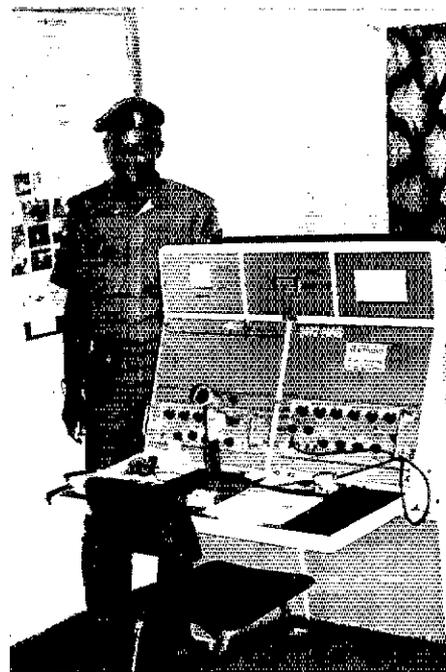
□ anyone working with flood control, canal history, or project development of river corridor systems. Terry D. Wright, WB8UPO, 210 Ridge Avenue, Troy, Ohio 45373.

□ any ham related to astronomer Forest Ray Moulton (1872-1952). Also any KL7, KH6 interested in a sked for Bicentennial WAS. Tom Moulton, AA2BAW, RDI Box 674, Newton, NJ 07860.

□ old-time U.S. Navy and Royal Navy radio operators who manned the gun boats and other ships on the Yangtze River long ago. John H. Geyer, W1DH/WA1UPQ, 172-K Homestead Street, Manchester, CT 06040.



This Navy Standard 2-kW spark transmitter was one of the early 1930 shipboard rigs of Luke Herndon, K4QQ. A brass pounder in the merchant marine for many years, he recently swallowed the anchor and will be brass pounding on the ham rig in his Richard, VA, QTH.



Even without the aid of electronics, 5N2NAS has a big, booming voice to accompany his tall, 6'2" frame. This Nigerian ham known to his friends as "Kuntle" can be found regularly on 10, 15 and 20 meters between 1800 and 2200 hours Zulu from his QTH, Apapa, Lagos, Nigeria.

Even though his family and military duties as warrant officer in the Nigerian Army Signal Corps keep him busy, he recently assisted the Boy Scouts by operating an amateur radio station for them in Jos, Nigeria, at their International Jamboree. Currently, he is trying to promote SSTV for the Black Arts Festival to be held in Lagos early in 1977.

# Tiera Luna para Colombia

Moonbounce work demands that all gear operate perfectly. This holds even more so when the operation is a portable expedition to another continent. The Pack Rats did it!

By James M. Morris,\* KH6HQG

*Pelicans swoop the shoreline as twilight approaches. An environmental engineer, a pharmacist, a motorcycle mechanic, and others occupy a beach house. They could be enjoying a cool drink after another warm summer day at the resort. Instead, they are celebrating, with their own special brew, the success of an effort that brought them together in that isolated spot — the first moonbounce expedition to South America — HK1TL.*

*Last month we reported that Allen Katz, K2UYH, completed the first Worked All Continents on 432 MHz and moonbounce by working that last continent, so obviously another station had to be on the other end of the two-way circuit. It was the Mt. Airy VHF Club, of which Al is a member, that mounted the expedition to provide South America's first 432-MHz operation. From the club's home in Philadelphia, Pennsylvania, five of the club's 82 members journeyed to Barranquilla, Colombia, for successful contact with 16 different EME (earth-moon-earth) stations and approximately 75 OSCAR Mode B stations, as well as to make new ties and stimulate amateur radio interest with the people there. Individuals and organizations in both the United States and Colombia contributed vast quantities of time and funds to make the operation a success.*

In 1956, a group of Philadelphia amateurs organized to actively promote serious vhf/uhf work. To characterize their aversion to commercially built equipment they adopted the nickname of "Pack Rats." Instead, they always

favor experimentation with home-built gear. An inspection of any member's garage or shack will reveal a wealth of parts and surplus gear acquired by trading. Over the ensuing years they have designed and built converters, receivers, transmitters, amplifiers and antennas for virtually all amateur vhf bands.

Their activity takes different forms. During the ARRL January VHF Sweepstakes plus the June and September QSO Parties, they put their latest creations to the real test. Consistently, they have topped the competition. Any active club, of course, operates a net. The Pack Rats have not one, but five nets every Monday evening on all bands from 50 MHz through 1296 MHz, and the ATVers (amateur television) conduct yet another net on Friday nights.

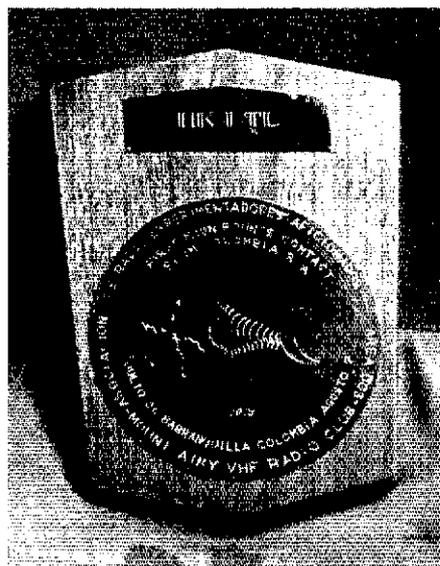
Their real pride and joy, however, is the W3CCX/3 moonbounce system lo-

cated in Revere, about 25 miles north of Philadelphia. On the farm owned by Pack Rat member Walt Bohlman, K3BPP, the club station is one of the most successful on the air, particularly after the addition of a 20-foot stressed parabolic dish in the 1972-73 winter. After they made their first complete contact with the Stanford Research Institute group, WA6LET, they celebrated with a cup of Red Zinger tea, a Pack Rat success trademark ever since. At the monthly meetings a report would be given about the latest activity. More and more new stations were noted from various states, countries and continents — except South America.

## Opportunity!

Early this year, a Colombian amateur, Bolhmar Aguilar, HK1AMW, moved into the same neighborhood as Elliott Weisman, K3JJZ, a director for the Mt. Airy VHF Club. Naturally, Bolhmar noticed the vhf antennas. Although his primary interest was high frequency, a classic ham chat followed, sparking the idea of operating moonbounce on his relative's property back in Colombia. The idea was discussed with Bolhmar's brother in Baltimore, Maryland, Socrates Martinez, HK1CWB/WB3AFY, and "they thought it would be a great thing for the country."

Immediately, Elliott presented the Colombians' operating site offer to the club's board of directors. They liked it and appointed him as coordinator. The red tape began. To make an official request from the Colombian government, all correspondence must be on official paper carrying a tax stamp. Price from the consulate: \$2 per sheet. Besides designing the request letter to detail all the operating and technical



\*Editorial Assistant, QST

requirements, an additional task was to translate it into Spanish.

Several letter exchanges followed and to avoid paying duties upon entry, a list of the equipment had to be provided. Back to the consulate for more paper. A problem arose because they were still in the process of assembling the station. Obviously, a whole new station had to be put together since they wanted W3CCX to work the expedition. That was resolved.

Soon after the work started, the planning committee became aware that another coordinator would be needed in Colombia, so Socrates suggested Dr. Atenogenes Blanco, HK1BYM. He enlisted the aid of the Barranquilla Area 2 Radio Club who later provided invaluable service to the expedition.

### Logistics and Red Tape

"We gave the guys building the stuff the outside dimensions and told them, 'that's how big you can make the thing.'"

Once more the Pack Rat philosophy prevailed. Tony Souza, W3HMU, built a complete 432-MHz kilowatt amplifier from scrounged parts, save for a \$1.25 part. Even the 8938 final tube came from the endless junk box. Other primary pieces of equipment that were produced specially for the expedition included a power supply by Bill Olson, W3HQT, and the exciter by Walt Bohlsman. That used a 4X150 to a 4CX250 driver.

The most outstanding engineering feat had to be the antenna. Their 20-foot dish could not very well be taken down or even duplicated for air freight shipment. Instead, Walt, who designs antennas by profession, devised a system using 16, K2RIW-style 13-element Yagis so that everything could fit into six-foot crates. Besides the necessary azimuth and elevation rotation, the antenna had a third axis for polarization compensation.

Indeed, the moon itself had a large influence on the actual scheduling. Between perigee and apogee each month the path loss for the EME path varies by 2 dB — enough to mask a signal or bring it out of the noise. Other factors to consider were proximity to the sun and optimum window time for the other stations around the world. Cor Maas, VE7BBG, coordinated those schedules. Only after those considerations could they think about their convenience. They selected the last weekend in July.

More logistics problems crept in during the meantime. Shortly before the scheduled departure for the main group, Socrates' XYL, Rose Alva Martinez, went home to Colombia early to purchase the airline tickets. Although Aerocondor had given a discount, inflation crept in. Sheila Nassar, HK1CWD, however, made up the dif-



The Pack Rats moonbounce team gather with their Area 2 Radio Club hosts underneath the 208-element antenna for 432 MHz. It actually measured one dB of gain better than their 20-foot dish at the home station in Revere, PA.

ference. The customs paperwork had not been entirely settled, so Dr. Blanco made a trip to Bogota, capital of the country, for further negotiations.

### To Colombia

At last, all was loaded for the trip down. At Miami International another friend stepped into the picture. Russ Wicker, W4ZXI and a fellow moonbouncer, works there and made arrangements for the equipment to get on the same flight as the crew.

All did travel on the same flight. A couple of boxes had some damage, but that was the least of their worries. After two-and-one-half hours with customs officials, the gear was cleared only after Dr. Blanco posted a \$3000 bond assuring that all the equipment would be removed from the country after the specified stay.

Many of the crew had been working with the Atlantic Division convention to give a seminar on July 25, the same day of their departure. When they did arrive in Barranquilla the following day, they had a long press conference with the local media. The actual site was located in the town of Santa Veronica, about an hour-and-a-half ride from Barranquilla, with the local civil defense providing a truck and driver for the 1368 pounds of equipment plus crew.

### On the Air

On Tuesday, July 27, they set up the 20-meter link and the first message from W3KKN, their liaison back home, was that they had received permission from AMSAT to operate Mode B on Wednesday. Originally, they had not planned to take any OSCAR gear, but the organization had been alerted and provided the gear.

The first OSCAR and Mode B contacts were made that Wednesday while setting up the moonbounce station.

At last the big day, July 29, came. "When we patched everything together and plugged it in the first time — it

worked!" Bill Olson said of that first day. At near-vertical elevations the antenna had wind-loading problems and so the first schedule with K2UYH was missed as was the one with F9FT. Finally, during the 1800 UTC schedule a two-way was completed with K2UYH followed by W3CCX.

Another conference was held that evening with the Area 2 Radio Club, potential amateurs and c.d. officials. The Pack Rats showed *Ham's Wide World*, slides of their outings and gave more talks until midnight. Then, the hosts celebrated past 2 A.M. Nevertheless, the crew made the hour-and-a-half trip back to Santa Veronica for a couple of hours sleep before a 6 A.M. OSCAR pass.

Most of the following days were like that — 12 hours or more of moon schedules and OSCAR passes. A constant problem, however, was power failure. The first major occurrence was Friday afternoon from 2:30 P.M. until 6 P.M. because trees were being trimmed. After it was restored, the voltage measured only 95 volts forcing cancellation of almost all schedules that day. During the remaining days that weekend, power fluctuation continued to be a problem. But always, the Area 2 Radio Club would set out to find the source of the problem and more than once brought in emergency generators. Enough power was usually available to operate the 20-meter liaison. That was one of the prime factors that allowed successful rescheduling over the weekend. Ernie Kenas, W3KKN and his XYL, Bertha, W3TMP, provided that link every day of the operation.

### Reflections

All the way through, cooperation and coordination allowed everything to work out. Among those who helped defray the approximately \$9000 in expenses were Collins Radio, Mt. Airy VHF Club, Northern California DX Foundation and an anonymous Pack Rat member. Another less apparent, but very important person was Rose Alva Martinez who did all the cooking for the crew during their nine-day stay. Before departing, both the Mt. Airy VHF Club and the Barranquilla Area 2 Radio Club reached a mutual understanding that they would not lose contact with each other after the project was over.

Of course, it would have been unrealistic to expect all to have gone perfectly. But, as Weisman said, "It was probably better that we had the problems because I don't think that we would have had as close a relationship with the people down there as if we didn't have any problems." Thus, radio amateurs have once again demonstrated that their unique form of international goodwill can cross all boundaries to create a common success.

## W2TUK to Wiley : Novice Power Harmful

*"All other things being equal, the likelihood of a beginning amateur encountering RFI increases as the power output of his transmitter increases. Therefore, by raising the power level for Novice operators, the Commission is increasing the number of new amateur operators who will encounter this difficult and frustrating problem early in their careers. . ."*

Amateurs everywhere have rejoiced in the First Report and Order in Docket 20282 which in general restructures amateur radio along progressive and helpful lines. (See "One Shoe Drops . . ." page 48, August 1976 *QST*, or send a stamped self-addressed envelope to ARRL hq. for a copy of the FCC text, mentioning Docket 20282. Additional interpretive material is in "Washington Mailbox," September *QST*.)

The one area regarded as harmful is that of the increase in power for Novices from 75 watts to 250 watts and parallel decrease to that level for all other amateurs using the Novice frequencies. The letter to follow, from ARRL President Harry J. Dannels, W2TUK, to Richard E. Wiley, chairman of the Federal Communications Commission, sets forth the reasoning for ARRL's unhappiness with the new power levels. It reflects concerns expressed at the June meeting of the ARRL Executive Committee ("Moved and Seconded," August *QST*).

"In its First Report and Order in Docket 20282, the Commission has taken several progressive steps which brighten the future of the Amateur Radio Service. The League unhesitatingly endorses such changes as Novice privileges for Technicians, the elimination of the one-year mandatory lapse between Novice licenses, the granting of element credit to present licensees who took examinations by mail in good faith, and the administering of Technician exams at Commission-supervised exam points. Indeed, these actions put into effect some of the key proposals contained in the League's filing in Docket 20282. That

filing was based on the results of the most extensive survey of radio amateurs' attitudes and opinions ever conducted.

"However, in one significant area the Report and Order is not only inconsistent with the League's survey results, but is also at odds with the Commission's stated policy of deregulation. The League wishes to state its opposition to the increase in the transmitter input power permitted to a Novice operator, from 75 to 250 watts, and to the decrease in power imposed upon General, Advanced, and Extra Class operators in the Novice segments.

"Of the 56,000 ARRL members who responded to the League's survey, only 32 percent felt that the proposed power level for Novices of 250 watts was "about right." Of the remainder, 64 percent felt it was either too high or much too high, and only 1 percent believed that it was too low. Even among Novice licensees, the group most affected by the proposed change, the pattern was much the same: 45 percent agreed with the 250-watt level, 51 percent felt it was too high, and only 3 percent felt it was too low. Clearly, the distribution of opinion on the issue is skewed in favor of a power level substantially lower than 250 watts for Novices.

"In the matter of reducing the power permitted to other licensees operating in the Novice bands, the League has long encouraged amateurs to use the minimum power necessary to maintain the desired communications, as required by Section 97.67(b) of the Commission's Rules. The Commission has produced no evidence of abuse of this rule by higher-class licensees operating in the Novice bands. Furthermore, the League is aware of no such abuses, and further contends that the vast majority of amateurs with General or higher-class licenses who operate in the Novice bands do so in an effort to aid and encourage the beginners and to give them a positive example of operating techniques and

ethics. The overwhelming number of these amateurs voluntarily limit their power input. To require that they do something which they are already voluntarily doing flies in the face of the Commission's declared intention to deregulate its radio services wherever possible. It also constitutes a loss of privileges for presently licensed amateurs, something which the Commission indicated was not a part of the present proceeding. Further, there was no hint that such action was contemplated in the Notice of Proposed Rulemaking in Docket 20282 released December 16, 1974.

"Radio amateurs throughout the country are encountering electromagnetic compatibility (EMC) problems at an accelerating rate. These problems usually take the form of radio-frequency interference (RFI) to improperly shielded audio devices from properly operating transmitters. Unfortunately, while the technical problem is clearly with the audio device, the public relations problem falls squarely on the shoulders of the individual amateurs. All other things being equal, the likelihood of a beginning amateur encountering RFI increases as the power output of his transmitter increases. Therefore, by raising the power level for Novice operators, the Commission is increasing the number of new amateur operators who will encounter this difficult and frustrating problem early in their careers, perhaps before they have accumulated enough experience to deal with it. The League views this development with considerable dismay.

"Any delay in the enactment of the other features of the First Report and Order in Docket 20282 would not be in the best interests of the Amateur Radio Service. For this reason, the League is not petitioning formally for reconsideration at this time. However, the League strongly urges the Commission to minimize the harmful effects of the changes in power level discussed above, possibly in its further consideration of Docket 20282."

### WICUT NEW AGM/BUSINESS

Laird Campbell, WICUT, for the past four years advertising manager for ARRL and *QST*, has been promoted to the new post of assistant general manager for business operations. He'll be in charge of the Advertising, Editorial/Production, Circulation and Administrative Services Departments. We'd tell you more about Laird if we hadn't just done so in the July "Behind the Diamond" presentation, page 67. Needless to say, he'll be busy in the next few months!

The new position complements the one we announced in September *QST*, wherein Dave Sumner, K1ZND, oversees the Communica-

tions, Membership Services, Clubs & Training and Technical Departments as assistant general manager, membership operations.

### FCC MOVES TOWARD METRIC

On July 28, 1976, the Federal Communications Commission adopted a program for converting to the use of metric units. This program will facilitate development and use of a single system of units in the FCC rules. The program will be in accord with the objectives of both the House of Representatives Bill (HR 254) and the Senate Bill (S 100).

The program involves a gradual two-stage conversion to metric unit usage. Metric units

will appear — in all new and amended rules — with the U.S. equivalent stated in parentheses [example: 2 meters (6.56 feet)]. This program is intended to allow for a smooth transition into metric unit usage. (From a *Federal Register* announcement)

### BEHIND THE DIAMOND

This month we take you right to the top of the diamond, to the man who has been at the helm of the good ship *ARRL* for the past 21 months, and whose leadership has proven invaluable during this time of revolutionary changes in amateur radio brought about partly by restructuring and partly by the huge increase in public awareness of radio owing to

\*Manager, Membership Services



the CB explosion. We're talking about *Richard L. Baldwin, W1RU*, general manager and secretary of the League. Dick is a demanding individual, but is as demanding of himself as he is of others. At times one has the urge to snap to attention when speaking with him, but beneath that gruff exterior there beats a heart of mush. Dick still won't admit that it was he who sent the gals at the office flowers during National Secretary Week!

Although he was born in Florida, Dick considers himself a native of Connecticut, where he grew up. He is a graduate of Bates College in Lewiston, Maine, but his education was interrupted in his sophomore year when he joined the Navy. He served during World War II for five years, and saw action with the Pacific Fleet. After the war he completed his studies at Bates, and also received a master's degree in physics from Boston University. His interest in the Navy never diminished, and he is currently a Commander in the United States Naval Reserve.

Dick first came to the League in 1948 as assistant secretary. Four years later he left to become a sales engineer for Motorola, covering upper New England. In 1956 he returned to the League as managing editor for *QST*, and this time he was here to stay. He became assistant general manager in 1963, and general manager in 1975 upon the retirement of John Huntoon, *W1RW*. As assistant general manager he became interested in international amateur radio matters. He founded the ARRL Intruder Watch in 1964 to defend amateur frequencies against illegal encroachment by other services. He has also traveled extensively in support of international preparations for the 1979 World Administrative Radio Conference (WARC-79), at which frequency assignments for all radio services for the remainder of the century will be determined. Dick believes that the greatest challenge

facing amateur radio today is preparation for WARC-79. He is optimistic that amateur radio will succeed at the conference, *provided* we prepare now. Under his guidance, we are preparing now (and have been for quite some time).

Dick's amateur radio career began in 1934 when he became *W1KE*. He holds certificates for DXCC, WAS, WAC, and is a member of the A-1 Operator Club. When he's not at the office or speaking on behalf of the League at conventions, he relaxes by sailing his 35-foot ketch *Endurance*. In his words, he is a "nut about sailing," and will take off for the sea in rain or shine. In good weather his wife, Phyllis, accompanies him. They live in Simsbury, CT, and also have a vacation home at Owls Head, Maine. Dick loves the state of Maine as much as he loves sailing, but contrary to rumor, there are no plans to move League hq. there in the immediate future. — *K1FHN*



Chuck Scholten, *W9BZU*, (center) of Manitowoc, Wisconsin has been a member of ARRL for fifty years. ARRL Central Division Director Phil Haller, *W9HPG*, made it official at the division convention in Milwaukee. ARRL President Harry J. Dannals, *W2TUK*, (seated) beams approval of the proceedings. (*K9PKQ photo*)

### IGNITION-NOISE COMMENTS

In December 1975, FCC issued a Notice of Inquiry, Docket 20654, seeking information on radio-frequency interference generated by the ignition systems of motor vehicles. The deadlines for comments and reply comments have been extended at least twice and now stand at December 18, 1976 and February 18, 1977, respectively.

Meantime, responding to an earlier deadline, ARRL has already filed its comments in the docket. Extracts follow:

" . . . The amateur radio operators in the United States and Canada are vitally affected by interference generated in the ignition systems of vehicles, whether they be automotive, marine or aviation. A most substantial number of amateurs operate from their personal automobiles on frequencies between 3.5 and 450 MHz . . .

"Interference from ignitions always has been a serious problem, not only to amateurs operating mobile from their vehicles, but also to those operating from their homes. . . . Numerous articles describing interference suppression techniques have appeared in the League's publications, including its monthly journal *QST* . . .

"Even though amateurs have been able to reduce ignition noise in their own vehicles to an acceptable level in most instances, the



September *QST* started off with a guest editorial by Armin H. Meyer, *W3ACE*, former ambassador to Japan, Iran, and Lebanon. We thought you might like to see a picture of Hank, which *K9PKQ* took at last year's *W9DXCC* bash.

noise radiated from other vehicles is most disruptive . . .

"Even though the instant notice is limited to suppression of ignition interference, attention should be directed as well to other sources of automotive noise, such as alternators, regulators, instruments (e.g., heat and fuel-level indicators), and accessories (e.g., turn indicators, heater and air conditioner fan motors, and electric windshield wipers). There can be both direct radiation of noise, and conducted noise on the power circuits. . . .

"The principal suggestion the League has to offer at this time is that any standards adopted include the entire spectrum from a low of 535 kHz to 1,000 MHz. Such a high upper limit is necessary to accommodate the recently authorized mobile services above 900 MHz. . . ."



Public interest in amateur radio is growing all over. Here's a ham exhibit put on in Alaska by ARRL Section Communications Manager Roy Davie, *KL7CUK*, as part of an "Electronic Flea Market," sponsored by the Anchorage Amateur Radio Club in a shopping center. A thousand people came close enough to read the signs during the two-day show, *KL7CUK* reports, and he recommends clubs everywhere try this sort of PR.

# Coming Conventions

October 1-3  
Dakota Division, St. Paul, MN

October 2-3  
Tennessee State, Memphis, TN

October 8-10  
Midwest Division, Omaha, NE

October 30-31  
Louisiana State, Metairie, LA

November 6-7  
South Florida Section, Clearwater, FL

November 13-14  
Hudson Division, McAfee, NJ

## SOUTH FLORIDA SECTION CONVENTION

November 6-7, 1976, Clearwater, Florida

The Florida Gulf Coast Amateur Radio Council is sponsoring the first full amateur radio convention in the state of Florida on November 6-7, 1976. The South Florida Section Convention will be held at the Sheraton Sand Key Hotel on the gulf, in Clearwater Beach. Complete family entertainment is the order of the day, with tours to the area attractions, including Disney World and Busch Gardens, plus all hotel facilities available such as beach, golf, etc. For the amateur, there will be first-class technical sessions on RTTY, TV, fm, antennas, compressors and computers. Lots of exhibitors and surprises. Scheduled forums: ARRL, QCWA, AWA, AREC and MARS, with John Johnston, K3BNS, chairing the FCC Forum.

FCC exams will be given at the hotel on Saturday. To reserve your exam spot, FCC Form 610 and \$4 must be sent, in advance, to FCC, Zak Street, Tampa, FL 33602.

This is all climaxed with a gala banquet on Saturday evening, with ARRL President Harry J. Dannals, W2TUK, highlighting the festivities, plus a "Special Feature" unearthed from Lew McCoy, W1ICP.

Advance bonus registration tickets \$3; banquet \$9 (500 person limit). For further information contact FGCARC Convention, P.

O. Box 157, Clearwater, FL 33517. Special convention hotel rates in effect.

## HUDSON DIVISION CONVENTION

November 13-14, 1976, McAfee, New Jersey

The magnificent Playboy Resort and Country Club at Great Gorge coupled with a total amateur program promises to yield a convention that will be second to none. The theme of Progress Thru: Education, Technical Knowledge and Public Service is in keeping with the rapidly changing amateur radio scene. A dynamite hotel . . . a sizzling program and a blast of a convention truly means SHANGRI-LA '76.

The Playboy Resort will offer the conventioners a real vacation along with a great program. Six restaurants, offering everything from inexpensive deli food to superb dining in the Penthouse, with free admission to the Playboy Club, will satisfy any wallet and palate. Indoor swimming, sauna, the world's largest whirlpool bath, golf, tennis, riding, free day camp for children over 4 years, babysitting, three-level game room, live Broadway entertainment, discotheque and much more will give the ham and the family a super great time.

Special convention rates will be in effect for up to a week's visit: \$36 for two per night; \$8 per each additional person in the room. Single rooms are \$32 per night. Call 800-621-1116 for reservations.

The manufacturers' exhibit area promises to be a convention highlight. Lots of new gear is on the way, this will be the time to see it. Lots of "Surprises!" Admission to the convention and exhibits is \$3 (\$4 at the door).

A giant indoor Flea Market will give all an opportunity to get goodies and sell "extries." Admission by convention ticket only. Sellers cost: One day \$8, two days \$15, plus convention registration. For table reservations write to P. O. Box 1054, Passaic, NJ 07055.

The Saturday night banquet will be a feast for both taste and hearing. Mr. Jean Shepherd, K2ORS, WOR radio personality and world traveler, will be the guest speaker. Before Jean speaks everyone will be enjoying prime ribs of beef and all the trimmings. Tickets are \$15 each (\$16 at the door).

A full program from ARRL and FCC Forums through OSCAR, microprocessing, YLRL and a consumer forum will be offered.

Virtually every interest will be covered. Ample space to eyeball and ragchew is available throughout the hotel.

License upgrading tests will be given; send form 610, with check or money order made out to FCC, one week in advance, to Paul Mazer, 70-29 Kissena Blvd., Flushing, NY 11367. (Form 610 may be requested from FCC or ARRL hq.)

The Playboy Club is in the northwestern New Jersey mountains, in magnificent, scenic ski country. Talk-in will be on 10/70, 16/76, 34/94 and 52. For tickets and hotel information send a s.a.s.e. to Al Piddington, WA2FAK, 4 Acorn Drive, East Northport, NY 11731, or call 516-261-3285 at night.

The convention is sponsored by the Hudson Amateur Radio Council, Inc., with affiliated clubs and individual Hudson Division amateurs.

## LOUISIANA STATE CONVENTION

October 30-31, 1976, Metairie, Louisiana

The Louisiana State Convention (New Orleans Hamfest-Computerfest), sponsored by the Jefferson Amateur Radio Club, will be held October 30-31 at Archbishop Rummel High School, 1901 Severn Ave., Metairie, LA (New Orleans suburb).

Forums at the fourth annual event will include several on computers by the Crescent City Computer Club and others by or about AMSA1, MARS, emergency communications, RTTY, QRP, Novices/beginners and antennas. FCC exams will be administered by the New Orleans FCC Field Office, Sunday morning on the hamfest site. For further information contact: The Jefferson Amateur Radio Club, Box 10111, Jefferson, LA 70181.

Among the scheduled meetings will be the Louisiana Council of Amateur Radio Clubs, and other amateur radio groups. A Micro-Computer Club banquet will be held at noon on Saturday, with the convention banquet on Saturday night. Non-commercial and other exhibits are being arranged, and the flea market will be open Saturday and Sunday. The program for the ladies will include a tour of the Louisiana Superdome.

Call-in frequencies will be 146.34-94 and 3.95 MHz. Reservations and latest details may be obtained by writing to Dominick "Nick" Tusa, WA5RMC, Chairman, P. O. Box 10111, Jefferson, LA 70181. 

# Hamfest Calendar

Georgia: The Lanierland A.R.C. "Hamnic" is October 17 at the Lake Lanier Islands Dogwood Pavilion. No registration fee. Lanier Islands charge, \$2 entry fee per car. Plenty of room for flea market, picnic and use of island facilities. Talk-in on W4IKR/4, 07/67. Write Paul Watkins, W4FDK, Rte. 11, Box 277, Gainesville, GA 30501.

Indiana: The Marshall County Amateur Radio Club's Swap 'n Shop is Sunday, October 31, at the Plymouth, Indiana National Guard Armory located at 1220 W. Madison St. from 7 A.M. to 4 P.M. Talk-in on 07-67

and 146.94 simplex. Free tables, no charge for setup. Tickets \$2 at the door. Write WA9INM, Rte. 3, Box 526, Plymouth, IN 46563.

Massachusetts: The Sharon Amateur Radio Assn.'s annual auction is Sunday, October 17, 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 direct. Doors open noon. For further info write or call SARA, 15 Gorwin Dr., Sharon, MA 02067. 617-784-3886.

Michigan: The 22nd annual VHF Conference is October 9, at Western Michigan University at I & ET Building in Kalamazoo. 8 A.M., registration and swap 'n shop; 10 A.M., workshops; noon, lunch with the net; 2 P.M., technical session; 4:30 P.M., coffee; 6:30 P.M., dinner and speaker. Write Dr. Glade Wilcox, W9UHF/8, Department of Electrical Engineering, Western Michigan, Kalamazoo, MI 49008.

Michigan: The Monroe County Hamfest is Sunday, October 12, at the Monroe County Fairgrounds, 4 miles west of Monroe. Indoor table sales, games, contests, fun for all. Admission is \$1.50 advance or \$2 at the door. Write M.C.R.C.A., Box 238, Monroe, MI 48161.

Minnesota: October 9 is the annual Southern Minnesota Swapfest. For details write Janet Welch, Sec., Viking Amateur Radio Society, Box 3, Waseca, MN 56093.

New York: The LIMARC area flea market is Sunday, October 10, at the N.Y. Institute of Technology, Rte. 25A/Northern Blvd., Old Westbury, Long Island. Ham, CB, electronics, computers. Talk-in 25/85 & .52. WB2ALW, Hank 516-484-4322.

Ohio: The Northwest Ohio ARC hamfest is in Lima, Sunday, October 10, at the Allen Co. Fairgrounds. Advanced tickets or info write N.O.A.R.C., P.O. Box 211, Lima, OH 45802.



# Correspondence

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

## COMMENDATIONS

□ We would like to commend most sincerely Mr. Louis Huber, W7UU, ham operator out of Seattle, Washington.

Our son, an entry and overall winner in the Victoria B.C. to Maui, Hawaiian Island sailing race, was contacted almost daily by Louis Huber. We were able to visit with our son and to hear of his progress and safety. This is a tremendous comfort to a parent knowing what a challenge the Pacific can give these sailboats.

This was our first experience working thru a ham radio operator and we can certainly say they perform a wonderful service. We wanted to express our appreciation in a material way, but Lou explained that hams are not permitted to accept any remuneration. Therefore, we are writing this letter of commendation to you. — *Paul and Geneva McCullough, Seattle, WA*

□ We should like to express our deepest gratitude and appreciation for the communication networks put at the disposal of the Italian communities in North America and the disaster area in northeastern Italy provided by the amateur radio operators such as:

Corpo Emergenza Radioamatori (Amateur Radio Emergency Corps) of the "Associazione Radiotecnica Italiana" (Italian Radio and Technical Association), and in particular I3PRK — Pierluigi Mansutti, Colloredo di Monte Albano, Udine, Italy.

"Oak Park Amateur Radio Club" and their Special Event Station N8MI and in particular: Bob Epstein, K8HLR; Jerry Selman, K8IDE; Giuseppe Molinaro, I1MOL, C.E.R. — A.R.I., Torino, Italy.

Their contribution was invaluable and their action noble. — *Walter Temelini, Friuli Earthquake Relief Fund, Windsor, Ontario, Canada*

## MORE ON MICROPROCESSORS

□ The article in August *QST* on microprocessors is so timely and excellent that I recommend you publish the next two parts without waiting for the September and October issues. — *Robert M. Booth, Jr., W3PS, Kensington, MD*

□ "Meet the Microprocessor" (Aug., 1976, *QST*) foresees a technology that can teach a budding Novice Morse code and just a little further down the road, terminate the rationalization for the cw requirement in amateur licensing. Someday soon, hams will marvel over the recollection that a man commonly used to copy code in his head, without a CRT display. I've heard that in the good-ole-days school boys could recite *The Iliad* by rote. — *Jay Melvin, Upland, CA*

□ Microprocessor information directed to the amateur is quite proper in a ham publication these days. That initial article in *QST* for August is a good opener. We should all expect to handle many a dreary chore with these little wonders/monsters!

But, hold! Consider the words of a wise old admiral who said that electronics had become a powerful tool in ships, doing the navigating, laying the guns, controlling many a thing. Then, the farseeing man cautioned the readers to consider what would happen when the "black boxes" lost power or had the pip, in other words, failed. That would be the

time to get out sextants, tables, and put the old thinking caps on.

In cars, radio, home devices, the black boxes can fail, too, with the operator then having to know how to do things by the ultimate, by hand. Don't forget how to write just because you have a typewriter! Keep up on tuning the rig by dial-twisting and the fundamental knowledge! Use the basic stuff once in a while but allow yourself the luxury of a microprocessor with peripherals, meantime. — *Temp Nieter, W9YLD, Evanston, IL*

## NEW RULES

□ I am pleased to hear about the new FCC rules. The 250-watt rule will put everyone on an equal basis as far as power is concerned, but I am waiting to see if the rule allowing Technicians to operate on the Novice band will result in more QRM. If this does happen, then I recommend that the FCC give us 25 more kHz in each band. — *Gerrard J. Burrs, WN2FFW, Smyrna, NY*

## RADIO BOYS . . . AND GIRLS

□ I read with great interest and enjoyment J. J. McGrath's article on the Radio Boys series. As a collector and purveyor of rare and out-of-print books I find the Radio Boys adventures most enjoyable. They should not only be collected, but read — what a thrill when the bullies are finally thrashed.

A number of other series are fun reading too. Don't pass up *The Boy Electricians* or *The Radio Girls* series, all of the same vintage.

I would be happy to help beginning collectors with information about these and other enjoyable books from the early days of radio. — *Robert Morgan, K8RBV, Cleveland Heights, OH*

## WE CAN WIN!

□ I strongly disagree with Jaffe's conclusion "You Can't Win!" (My TVI Complaint & the FCC, July, 1976, *QST*): You took the battle to the enemy and beat him! I feel it is time we amateurs took a more aggressive posture toward the TVI/RFI problem for, in fact, it is *not our problem!* ARRL & FCC work has clearly shown that in over 90 percent of the problem cases reported, the fault was NOT the accused amateur or his equipment. So, let's keep our gear clean and legal, and then let the public bring the pressure to bear on the FCC and Congress for RFI/TVI legislation. When the problem becomes so acute that Congress gets the message clearly and forcefully from the public, then and only then will the industry lobby be ignored. In the meanwhile, let's take it to 'em! 73! — *Joe M. Cadwallader, K6ZMW, Goleta, CA*

## NEW HAMS

□ I have been following with interest the articles on the licensing program the League is undertaking. After trying to learn the code on my own off and on for an embarrassing period of time, I finally heard about a class being offered by amateurs through adult education classes in Story City. I now know the value of group instruction to build confidence and provide continuity. With the leadership of your education staff and the support of the membership, this could be one of the greatest times of growth in amateur

radio history. — *Burton Collings, Jr., WN0ULE, Ames, IA*

## CONTESTABLE

□ "CONTESTS" probably do something to further the art of communications via "ham" radio; however there are many in the fraternity, or interested operators who would enjoy having a segment of the bands set aside for communications only.

This would enable those who do not or cannot participate in these "Wireless Olympics" to carry out normal communications without the attendant QRM which "Contests" are prone to provide.

One solution to this problem might be to limit "Contests" to those portions of the bands that are restricted to "General class licenses" only. — *W. S. Potter, W4ZBG, Coral Gables, FL*

□ How about a 6-meter ARRL contest? 160 and 10 meters have more regular activity than 6; it would give Technicians a chance to work a single-band contest (even Novices don't use 10) and it would show 6-meter operators that ARRL hasn't forgotten them. — *Earl Garber, WA3ZRE, Philadelphia, PA*

## MORE IDEAS

□ As the associate professor of Military Science at the University of Washington, I introduced Morse code and Radio Theory as part of the ROTC Leadership Laboratory elective option package. Each quarter, I give approximately two hours of instruction each week using a combination of my own lecture notes, ARRL publications, and U.S. Army Signal Corps training films. This seems to have proven successful since at least seven cadets received their Novice class tickets with many more close. Considering other academic demands upon their time, I consider this quite a feat on their part. — *Maj. Douglass P. Bacon, WA7UJK, Bellevue, WA*

## CORRECTIONS

□ I suggest that technical errors in articles previously published be printed on a separate page, gummed on the back and with perforated edges so that the correction may be inserted in the previous issue, without "messing up" the current issue.

Or, as an alternative, why not do this job once a year, putting all the corrections on one (or more) sheet(s) and carry the corrections each month as you now do? — *Earle M. MacRae, WB6SPB, Newport Beach, CA*

## GIVE IT BACK

□ I am renewing my membership to ARRL with the hope that the League will continue to work for the benefit of all classes of operators' licenses.

Under the guise of "restructuring," privileges in the first 25 kHz of the amateur bands were taken away from the General class licenses several years ago for the benefit of a small majority. This has not worked successfully as can be seen by monitoring the activity of the USA hams in the first 25 kHz of the amateur bands; 90 percent of the stations monitored are from foreign countries which are allowed to use these frequencies. DX contests are meaningless and not fair because 90 percent of the USA hams cannot use the first 25 kHz of the bands.

The FCC has been known to take away commercial assigned frequencies because they were not used enough. This could also happen to the first 25 kHz of the amateur bands. I think it is time to admit that the intent of the restriction has failed and I hope that the League will recommend that these restrictions be removed. — *Cliff Fleury, W1ELR, White River Jct., VT*

QST

# Washington Mailbox

Q. It's getting close to the expiration date of my license. Will the FCC notify me that my license is about to expire?

A. Many people are under the impression that the FCC sends out notices when licenses are due for renewal, but this is not the case. The licensee has sole responsibility for keeping track of the expiration date of his license.

Q. Since it's up to me, how do I go about applying for renewal?

A. All amateur license applications, including renewals, are made on FCC form 610, or 610-B for a club, military recreation, or RACES license (97.47a). They are available from the FCC or ARRL hq. The renewal fee is four dollars, and the fee and application form are sent to the FCC, P. O. Box 1020, Gettysburg, PA 17325.

Q. When can I renew my license?

A. You can renew your license at any time during its term, but you will not receive a license that picks up when your old license leaves off. For example, suppose your license is one year old and expires in 1980. If you were to renew it now you would receive a new license that expires in 1981, not 1985. So it is to your advantage to wait until close to the expiration date of your license before you renew.

Q. But don't the FCC rules state that "applications for renewal of unexpired licenses . . . should be filed not later than 60 days prior to the end of the license term" (97.47a)?

A. Yes, they do. But the rules say "should," not "must." It is highly recommended that you file for renewal not later than 60 days prior to the date your license expires, but, in reality, any application for renewal filed before your license expires will be considered a timely application.

Q. Must I enclose my original license with my renewal application?

A. You may, but it is not required. The FCC will accept a photocopy. If you choose to send FCC your original license, it is recommended that you retain a photocopy for your own records.

Q. May I continue to operate after applying for renewal?

A. Yes, if you apply in a timely fashion; that is, if you apply for renewal before your license expires, you may continue operating, even beyond your license's expiration date. (97.47a)

Q. Even if I sent in my original license with the renewal application?

A. Yes.

Q. Suppose I inadvertently let my license lapse. Can I renew it, or do I have to be reexamined?

A. There is a one-year grace period during which an expired license may be renewed. However, if you apply for renewal after your license has expired, you *cannot* operate until you receive your renewed license. (97.47b)

Q. What if my license expired more than a year ago?

A. I'm afraid you must take another examination to receive a new license.

Q. Will my renewal be processed quicker if I enclose a money order instead of a personal check?

A. No. In fact, we recommend that you always use a personal check when submitting any sort of amateur application — renewal, modification, or otherwise. The reason for this is that your cancelled check serves as a receipt for you. Should your application go astray, there is a transaction number on the back of your cancelled check that allows the FCC to quickly trace the application. If you submit a money order it is much more difficult to trace the application.

Do not think that the FCC gives priority to applications that include a money order instead of a personal check. The remittance is deposited into the U.S. Treasury and the license application continues to be processed. The FCC does not wait for your check to clear the bank before it processes your application.

Q. Can I modify my license — for example, to show a different station location — at the same time I renew it?

A. Yes, and there is no additional fee. Just the four-dollar renewal fee. The fee for a modification without renewal is three dollars.

[Note: Send your FCC questions to Hal Steinman, K1FHN, ARRL, Newington, CT 06111. Questions appearing in this column are typical of those frequently asked of the FCC and other agencies. Answers, prepared at ARRL, have been approved by FCC staff. Interpretations contained herein concur with those of the Amateur and Citizens Division of the FCC. Numbers in parentheses refer to specific sections of the FCC rules.]

QST

## 50 Years Ago

October, 1926

The League announces a new publication, *The Radio Amateur's Handbook*, written by Communications Manager F. E. Handy, 1BDI — 160 pages, \$1 postpaid.

"It would be a very splendid thing if our numerous clubs thruout the country would start free code classes," is the editorial comment presaging one of the vital elements of a growing amateur radio.

There is more to the spectrum than 200 meters and down, so Assistant Technical Editor Clayton describes a receiver with plug-in coils to cover 12 to 20,000 meters.

Canadian 3NI disputes the long-hair theories that aurora has no effect on radio communications, and documents his case with some actual experiences.

Wm. Lang of WBZ says the proper length of a "half-wave" antenna depends a good deal on its configuration if other than a straight line, and lists the varying lengths to correspond with assorted bends and twists when necessary on your property.

(W2ALS has designed himself a portable rig for winter use as well as summer, housed in a ladies' hat box. Frank shows a loop modulation circuit for those so inclined, but doesn't recommend it!

W9ZT (W6AM) and other hams demonstrated facsimile at a trade show in the Twin Cities; 185 meters was attempted but body capacity was too much a problem in tuning, so the circuit was switched to a longer wavelength.

Rufus Turner calls our attention to the "minimum power" regulation and, more important, shows us an easy way to drop input for local work.

C. A. Briggs finds neon tubes most helpful in tuning up a rig.

## 25 Years Ago

October, 1951

Munhall, Pa., denied W3MKK a tower construction permit saying amateur radio was not an accessory use of residential property; League counsel stepped in, and the Supreme Court of the State has now ruled in the amateur's favor. The editorial is careful to point out this is not basically a case of individual legal help, but an intercession to avoid an unfavorable ruling which might affect rights of us all.

The staff has been busy in the lab, as shown by the indefatigable WITS's design of a 75-watt, 3-band rig, all TVI-proofed; W1FTX's screen-grid modulation system for an 813 amplifier to achieve low-cost 'phone; and W1KE's 50-ke. marker for 80 meters, primarily to help the Novice fully comply with in-band FCC rules (crystal control alone is not sufficient).

Top scorers in last year's DX contest are familiar calls — W3LOE, W3BES, W4KFC.

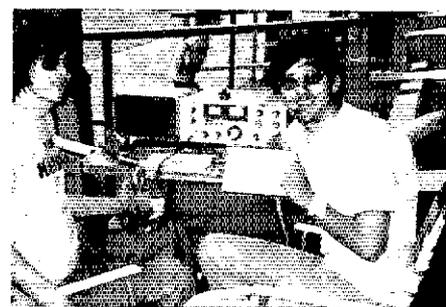
If you're running a kilowatt, WITX's low-pass filter can help keep you out of the neighbor's TV set, with attenuation designed to achieve 83 dB.

For the v.h.f. crew, W8FKC has an interesting tuned-line 832-A amplifier for 144 Mc., with a shorting bar to make it tunable also to 220.

Most of us still don't fully understand all the vagaries of linear amplifiers, but W3ASW's "sugar-coated" theory dissertation helps a good deal.

The Tri-County Radio Assn. (N.J.) set up a civil defense communication project which W2HNY describes as a possible pattern for other communities. — WIRW

## Strays



The month of July across the U.S. saw many Bicentennial celebrations with an amateur radio flair. In Lackawanna, NY, the Southtown Amateur Radio Society operated outside city hall as part of the Lackawanna Bicentennial Celebration. Novice Mike MacDonald, WN2AEC (right) and Greg Tobin, WA2SFT (left) manned the Yaesu rig on 10, 15 and 20 meters. Traffic messages, pamphlets and DX communications caught the interest of the many passersby:

Doing his own thing to celebrate 200 years for the U.S., Wesley Andersen, WB9PMI, made four contacts: one 200 seconds long for 200 years, one 76 seconds long for the year '76, one 13 seconds long for the 13 original colonies and the last one for 4 seconds for the Fourth of July. He notes that the final contact took "some practice and some very, very fast talking." This stunt to commemorate the Bicentennial replaced his original attempt to make 200 contacts on any band. That effort couldn't even total 76, he added.

## ITU Administrative Council Adopts WARC-79 Agenda

At a meeting in Geneva during June and July, the Administrative Council of the International Telecommunication Union adopted an agenda for the general World Administrative Radio Conference scheduled for 1979. Planning for WARC-79 in amateur radio circles has been based upon the assumption that each of the 45 Articles of the ITU Radio Regulations would be subject to revision at this Conference. One effect of the agenda just adopted would be to limit consideration only to those Articles which are applicable to radio services in general, and to preclude consideration of those Articles which deal with but a single service. Thus, while the frequency allocations of the Amateur Radio Service and the other services would be considered in 1979, the rules for amateur stations contained in Article 41 of the Radio Regulations would not.

The Conference is scheduled to convene

on September 24, 1979, for a period of ten weeks. The following items on its agenda have a possible impact on the Amateur Radio Service:

To review and, where necessary, revise the provisions of the Radio Regulations relating to terminology, the allocation of frequency bands and the associated regulations (Articles 1 to 7);

To review and, where necessary, revise the provisions applicable to the coordination, notification and recording of frequency assignments (Articles 9 and 9A) except those articles relating to a single service;

To review and, where necessary, revise the other regulations applicable to services in general (Articles 12 to 20);

To propose to the Administrative Council and to the Plenipotentiary Conference a program for convening future administrative

radio conferences to deal with specific services.

ITU policies are determined by its Plenipotentiary Conferences, which are held on the average of once every six years and at which all ITU members may vote. The last such Conference was held in Torremolinos, Spain, in 1973. Between Plenipotentiary Conferences, the activities of the ITU are governed by an Administrative Council. The present 36 members of the Administrative Council were selected on a regional basis at Torremolinos.

In other actions, the Administrative Council sought to postpone for one year a World Administrative Radio Conference on the Aeronautical Mobile (R) Service which had been originally scheduled for March 1977, owing to financial considerations. The Council adopted a \$24 million budget for ITU activities during 1977.

## YUGOSLAVIA BEGINS LICENSING VISITORS

On January 9, 1976, a new law went into effect which permits the licensing of radio amateurs visiting Yugoslavia from any country which has reciprocity with Yugoslavia or which is known to license Yugoslav amateurs on a courtesy basis. About 30 such licenses were issued during the first half of the year. The visitor signs his own call sign, followed by "portable YU" and the numeral indicating the republic in which he is located. There is a \$5 application fee to cover handling costs. Applications may be sent to: Mirko Mandrino, YU1NQM, Secretary, SRJ, P. O. Box 48, 11001 Beograd, Yugoslavia.

At the moment, U.S. amateurs are not eligible for licensing, because there is as yet no reciprocal agreement between the two countries.

## INDONESIA HOSTS SEANET CONVENTION

The Indonesian Amateur Radio Organization (ORARI) is the host for the Sixth SEANET Convention in Jakarta on the weekend of November 12-14, 1976. In past years this event has been one of the highlights of the amateur radio calendar in Southeast Asia. Special station YB@SEA will be on the air during the affair.

Details may be obtained from the organizing committee at the following address: Jalan Tebet Utara Dalam No6, Jakarta, Indonesia.

## INTERNATIONAL HAMFEST IN GERMANY A GREAT SUCCESS

As announced in this column for April, the Deutscher Amateur Radio Club held its popular "Bodensee-Treffen" exhibition at a new location this year. The weekend of June

25-27 saw 6,500 visitors descend on the city of Friedrichshafen in southern Germany for "Ham Radio 76." Six European countries were represented by 73 different exhibitors displaying amateur products. More than 800 temporary licenses were issued to foreign visitors attending the event.

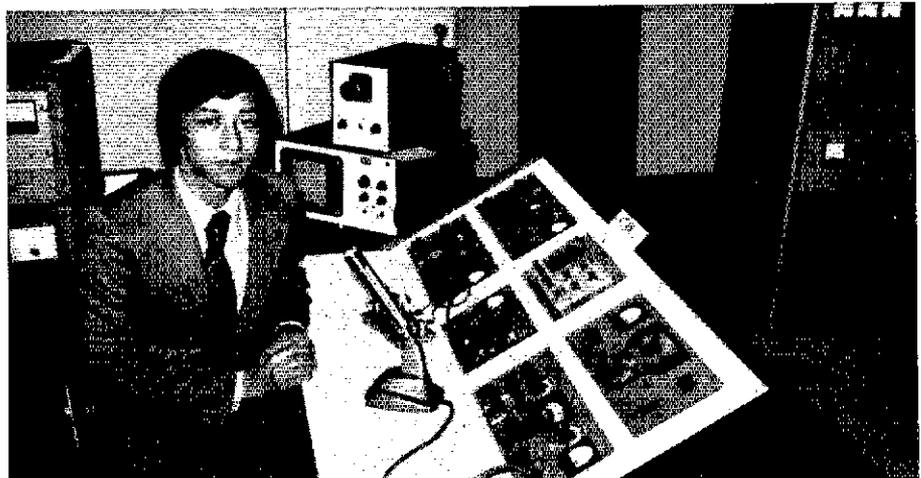
The meeting attracted the presidents of seven European amateur radio societies: Austria, Belgium, France, Great Britain, Italy, Switzerland, and the Federal Republic of Germany. Two more, Luxembourg and the Netherlands, sent deputies. Discussions about the development of amateur radio were held with representatives of the telecommunications administrations of five European countries, who were also in attendance.

Next year's meeting is scheduled for July 8-10, 1977, in the same location. (Report from DL1FL)

## WEST GERMANY ADOPTS NEW TRI-LINGUAL LICENSE FORM

The Deutsche Bundespost, amateur radio licensing authority for the Federal Republic of Germany, has begun using a license document which has its provisions written in three languages: German, French, and English. This is seen as a welcome move toward a license which will receive automatic recognition in other countries - the truly international license which long has been the dream of many.

The next step is to harmonize the amateur radio regulations of the countries of Western Europe with the final aim of an amateur radio license with universal validity in all of those countries. Discussions between the respective telecommunications administrations are continuing with this goal in mind. QST



An early-summer visitor to ARRL/IARU headquarters was Naoki Akiyama, JH1VRQ, External Secretary of the Japan Amateur Radio League, shown here visiting W1AW.

\*Assistant General Manager, ARRL



## Final Powder Puff Derby Flight

Known popularly as the Powder Puff Derby, the All-Woman Transcontinental Air Race has become part of things past. The normal 150-entry limit was relaxed to permit 230 participants, since this 1976 flight was the last of the annual July event. And as in prior Derbies, amateur radio took part in this, the final flight.

K6DLL, Marcia Rast, and newly licensed WA6RAM, Judy Yost, operated from the take-off point at Sacramento, CA, with Judy handling the 2-meter link to Marcia who was operating on both 20 and 40 meters during the three-day period.

This year's race was routed from Sacramento to Wilmington, DE, through Fresno and Riverside, CA, Grand Canyon, AZ, Santa Fe, NM, Lubbock, TX, Oklahoma City, OK, Little Rock, AR, Nashville, TN, Parkersburg, WV, to the terminal point at Wilmington.

Carolyn Currens, W3GTC, radio chairman of the event for the past 19 years, said that she has always wondered if some year they would choose a place where there were no amateurs, and this was the year. The big problem came at Grand Canyon with no operators available. This was solved as only amateur helping amateur would. The Phoenix

Club, so active at K7UGA, loaded a camper with gear and drove the 300 miles to fill in the open spot.

Over the years of Powder Puff Derbies many gals have been active: Betty Gillies, W6QPI, general chairman for 11 years; radio chairman W2JZX, W1DKR, W9JYO; and since 1958, W3GTC who organized communications with the assistance of the many amateurs who manned the stations along the routes. YL News and Views salutes these women who were instrumental in making the communications facet of the "Derby" a success.

## ATLANTIC DIVISION CONVENTION HONORS YLs

Mae Burke, W3CUL, received a plaque as an award for her continuous public service from September 1949 through July 1976 at the Atlantic Division Convention in Philadelphia. Well known in amateur traffic activity, Mae has handled over a million and a half messages with a continuous BPL record. The plaque was presented by Harry Dannals, W2TUK, ARRL president.

Five women - W1YL, W3CUL, W3CDO, WB2YBA and W3WRE - received special commendation by President Dannals for their outstanding performances both as YLs in the amateur activity and as amateur radio operators.

## YL FILM

WB2YBA, Chris Haycock, who is making a YL film featuring the activities of YL opera-

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

tors, needs help. Chris requests that the women amateur radio operators send her suggestions for subject material for the film: Ideas on what the gals are doing individually as well as YL club activities from special installation banquets and amateur radio classes to public service. In fact, whatever your "thing" in amateur radio may be, write Chris so that she may present the total YL story as completely as possible.

## NEW YL HARMONICS EDITOR APPOINTED

Myrtle Cunningham, WA6ISY, 1976 YLRL president, announces the appointment of Marlene Martin, WA3UOC and Nancy Steffee, WA3ZST, as editor and assistant editor respectively, of *YL Harmonics*, the club magazine. Licensed since 1973, Marlene is a prepared childbirth instructor. Both Marlene and Nancy will succeed Carrie Lynch, WA4BVD, with the January 1977 issue of the magazine. WA4BVD, a former YLRL president, has been editor-publisher of *YLH* since 1973.

## YLAP CONTEST CHAIRMAN

The YLAP is always scheduled for October, now portion October 19-20, 1976, with the phone contest November 9-10, 1976. All women amateur radio operators are invited to participate. Novices take note: A special award is given to the YL Novice submitting the highest score.

Reminder to all YLs that the contest logs are to be sent to the permanent address of the YLRL Contest Custodian, Beth Newlin, WA7FFG, 826 W. Prince Road-06, Tucson, AZ 85705.

QST



MINOW Net members attending the 1976 annual meeting: L-r, front row, seated, WA7TLL, WA7RR, WA7GMX, W7NJS, W7HHH; standing, WA7RVA, K7PVG, W7QGP, WA7OII, WA7TPU, K7NKZ, W7WLX, WB6RFE, K7UBC, WA7FRM, WA7UJI. (WA7RR photo)



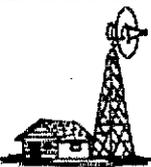
Need a Montana YL for that WAS-YL? Marlene, WN7AXB is active on 40 meters and is looking for six additional states for Bicentennial WAS. WAS already decorates her walls.



Four of the five YLISSB presidents at June convention. L-r. K7UXN, Betty Kuegner; K4ICA, V. Mayree Tallman, YLISSB founder; W2GLB, 1976 President Phyllis Shanks; WA6OET, Jessie Billon. (W7UUE photo)



# The World Above 50 MHz



Conducted By  
William A. Tynan,\* W3KMW

## Let's Get Together

If this past summer hasn't taught us anything else, we've learned that our vhf bands are not local or even regional in nature. We already knew this in the case of 6 meters, but many still consider 2 meters as a relatively moderate-range proposition — about 500 miles under "good" conditions. The many times this past summer that 2-meter signals spanned one thousand miles and more via Es should show us that we cannot depend on regional activity patterns to set our frequencies of operation. How many contacts were missed because people did not know where to look for stations in the area to which the band was open? After completing a cw contact with W4ZXI in Miami during the opening of June 27, this writer went up to 145.3 and snagged WB4FTE in Fort Lauderdale on ssb. Perhaps not too many others knew that the gang in southern Florida hangs out on 145.3, although the info was published in this column. I find from a 6-meter contact with WA4NMX that a group in central Florida uses 145.5 for their ssb activity frequency. I know of others in the sunshine state patiently monitoring 145.025 for some signs of activity. In Texas, the SWOT group keeps 145.1 hot while, in most of the rest of the country, the lion's share of the activity, above 145 MHz, takes place on 145.025, except in California where it's 145.005 and in parts of the Midwest where 145.110 is common.

Why don't we put an end to this "Tower

of Babel" that has grown up for 2-meter activity frequencies and standardize on one nationwide spot for operation above 145 MHz? We certainly can't expect all of the 144 activity to move *en mass* to some frequency above 145 and it probably wouldn't be a good move even if it could be brought about. The habit of using 144.110 for calling and monitoring is quite entrenched in most of the country and works well, as witness the numerous QSOs that took place around this frequency during the Es openings last summer. On the other hand, the number of contacts that took place above 145 were probably not in proportion to the activity which exists there.

If we are all to get together and decide on a frequency, what frequency should it be? There are several factors to consider when choosing such a spot. A very important one is present usage and resulting conflicts that might arise. Another is equipment limitations. A good case in point is that both 145.3 and 145.5, used extensively in Florida, are out of the range of the Echo II which tunes 145.0 to 145.23 as well as 144.0 to 144.23 with the crystals supplied with the unit. It seems unreasonable to expect owners of this rig to buy additional crystals when all of the other rigs are already equipped to work at least 145.0 to 145.2. An exception is the IC 202 which requires an additional crystal to enable operation on any frequency above 145.0. Note that, like Collins hf equipment, the IC 202 tunes in 200-kHz segments, which is also

a factor to be considered. A frequency on top of a common calibrator output appears to have merit. In this way both the calling and the monitoring stations can come closer to being tuned to the right spot, an important consideration with ssb.

Taking all these factors into consideration, the frequency used by the SWOT group (145.1) would seem to be the best choice. Therefore, unless we hear some very strong arguments for another selection, we will begin right now pushing that frequency for a common meeting place for 2-meter work above 145 MHz. If, as is fondly hoped, FCC ever gets around to allowing Technicians to operate below 145, this choice should, of course, be modified to fit the new activity pattern which is certain to evolve.

The higher bands contain some confusion of their own. For example, everyone in California uses 222 MHz while most of the remainder of the country uses 220. On 70 cm, almost everyone interested in weak-signal work uses 432.0. This may have to change as the band becomes more crowded with people using the various pieces of commercial equipment just now becoming available. Currently, the moonbouncers use 432.0 so there is the potential for interference to this important activity from these newcomers. We would like to hear from you, the readers of this column and operators of the vhf and uhf bands, with regard to your recommendation for activity frequencies for the various bands.

## PACK RATS' EME DXPEDITION TO COLOMBIA, SOUTH AMERICA — A GREAT SUCCESS

Members of the Mount Airy Radio Club, known to most as "The Pack Rats," have completed a major effort to further vhf/uhf operation and amateur radio in general. Along with 19 crates of gear, they journeyed to Barranquilla, Colombia, to put South America and HK-land in particular on the 70-cm EME map. They managed to serve as ambassadors to the hams and other area residents by demonstrating what hams can and will do in pursuit of their hobby.

In the process they made 16 EMEers in 8 countries happy with their first South American contacts and thus made WAC on 70 cm a reality for most of these stations. The list of contacts reads like a "Who's Who" of 432-MHz moonbounce. K2UYH became the first to complete WAC on a band higher than 50 MHz. W3CCX, F9FT, ISMSH, PA0SSB, LX1DB, K3PGP, VE7BBG, W1JAA, JA1VDV, K8UQA, W4ZXXI, W1SL, W0YZS, K0TLM and SM5LE were also able to put HK1TL contacts into their 70-cm EME logs. That HK1TL was able to make 16 EME QSOs is a tribute not only to the Pack Rats, who hauled all the equipment to Barranquilla and did the operating, but also to the effort and cooperation of the HK hams who turned out

to help in countless ways.

Assistance of the local gang was particularly important in getting power restored following an outage which threatened to scuttle the entire operation. Especially noteworthy was the work of the Area 2 Radio Club. When not working moonbounce, fighting power failures, being wined and dined by the local hams and their families, HK1TL found time to make about 75 Oscar-7 Mode-B contacts. That particular part of the operation received considerable interest from the Colombian hams. This may well lead to renewed HK activity on the satellites before long.

Equipment at HK1TL included a 1-kW amplifier and 16 K2RIW Yagis. Signals both ways were reported as very good so everything must have been working well as long as the power was on. The local newspapers covered the operation, providing the best kind of publicity for ham radio. Here's to the Pack Rats for a job well done! QSLs should go to HK1TL, P. O. Box 169, Ottsville, PA 18942.

## EME DXPEDITION TO ALASKA

As this is being written in mid-August, the moonbounce jaunt by K6YNB to Alaska is underway. On the way, Wayne stopped in Oregon to provide 2-meter and 70-cm contacts for many state-hungry 6s, including WA6UAM who provided this report. If the K6YNB/KL7 operation pays off, a number of 2-meter operators will be a hard-notch higher on the state ladder. The effort may very well produce the first WAS on 144 MHz as

K0MQS has 49, having just worked W7UBI, Idaho, on EME after months of trying. Wayne's trip, like the HK1TL affair, was sponsored in part by the Northern California DX Foundation. You can bet that the vhf/uhf community appreciates the help extended to these DXpeditions by this group of hf-band DXers.

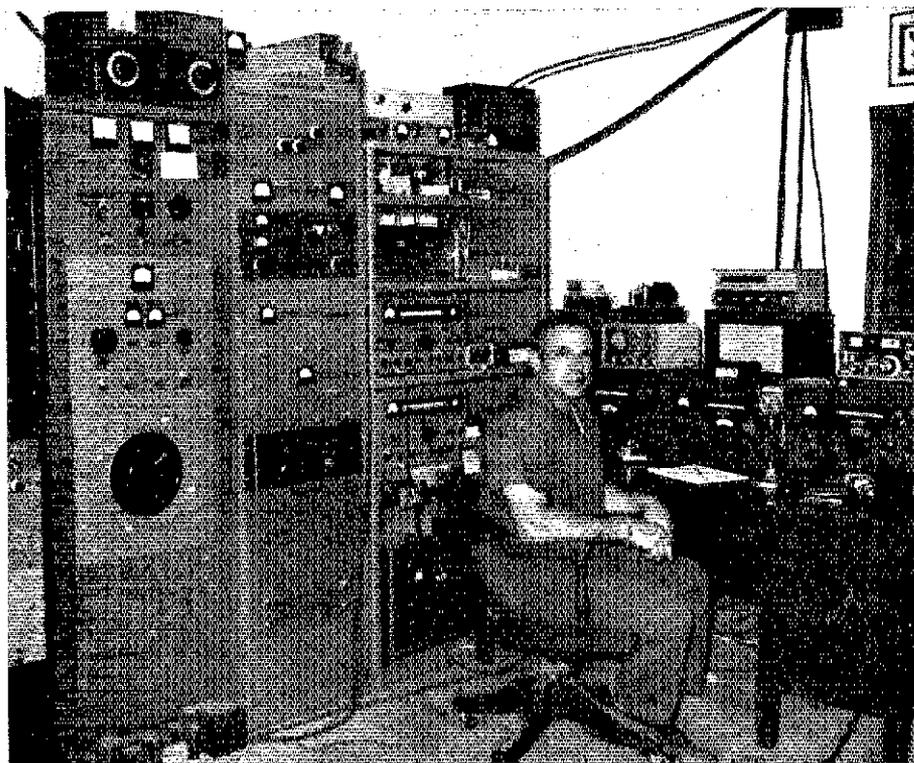
## ON THE BANDS

6 Meters — There seems little doubt that the summer 1976 Es season was a record breaker. The wild days of June, particularly the Sunday of Field Day, were reported last month. After a short rest in early July, the E clouds were at work once again. On the 8th, the California crowd was treated to a KH6 opening with K6DYD, WA6JRA and W6ABN making the grade with KH6IJ. Only a few hours afterward at 2146 UT, KH6IJ heard a cw signal calling him. It turned out to be JA2QBZ who was worked with 579 signals. Then, in quick succession, followed more contacts: JH3KDX (ssb), JA4DJL (ssb), JR2RRK (ssb), JR2HCB (cw then ssb), JA1RJU (cw), JA4KJO (ssb), JA3ETI (ssb), JA1LZK (cw and ssb), JE1RXJ (cw), JA4MBM (ssb), JH1TPG (ssb), and finally at 2207 JA6RJK on cw. Nose accounted for this load of JAs with 50 watts from a Yaesu FTV 650 transverter and a 4-element Yagi. Who can remember a KH6-JA Es opening like that? Another commentary on conditions this year is the large number of states worked by so many stations. Last month we recounted

\*Send reports to Bill Tynan, W3KMW, P. O. Box 117, Burtonsville, MD 20730 or call 301-384-6736 and record your message.

K8NI's feat of working 48 states in 8 hours during Field Day and WASHNK's total of 49 since the season began. Now along comes K6DYD in San Diego. Jerry has done what so many 6-meter enthusiasts have been trying to do for years. He has worked 50 states but he did it in just 6 weeks! Congratulations are in order to both Jerry and the ionosphere for this accomplishment. The number of stations reporting contact with 40 or more states this season is far too numerous to recount. The 50-MHz WAS certificate business at Headquarters has been almost as brisk as for the low bands. The results can be seen in the accompanying box. One proud recipient is VE7AFB, the first station north of the border to gain the coveted award.

Those who follow DX doings are certainly aware of the 711RL operation from Okino Tori-Shima about 1350 miles south of Tokyo. As well as keeping very busy on hf, the gang was active on 6 meters. In the few days they were there they gave the "new country" to over 700 fellow JA 50-MHz enthusiasts. Equipment consisted of an IC 501 and a 5-element Yagi about 30 feet above the water. Our thanks to K7ICW who passed along this information as translated by WB7DKR from the Japanese magazine *CQ Ham Radio* for August. In DX activities a little closer to home, YV5ZZ tells me that, as of August 8, he has worked nearly 300 stations on 6 meters including all U.S. call areas except 6 and 7. He has heard one 6 but his 20 watts couldn't make the grade. Edgar promises to have more power on next year. A familiar call dating back to the 50s from the same part of the world, PZ1AE is back on the band. YV5ZZ has worked him and he too will be looking north next season.



Almost dwarfed by the vast array of his equipment is well-known vhf'er K5CE/W5ORH.

**2 Meters** — It's an unusual summer when E skip provides the principal source of 2-meter news but this has been a very unusual summer. From reports received, it appears that the Es muf reached 144 MHz on May 28; June 4, 18, 27/28 and 29; July 17, 25, 27 (possibly only up to fm bc band), and 29, as well as August 2 and 5. I don't know of any other year in which we have had so much Es on 2 meters. Next to the session of June 27/28 reported last month, the most widespread 2-meter Es opening for 1976 was the one which occurred on July 17. This bash was discovered by W0PS of Grafton, ND, by the simple expedient of turning on an fm portable radio to listen to some music while enjoying a bite of lunch. Clint found the band packed with stations from 88 to 108 MHz. Since this was in sharp contrast to the 3 stations normally heard, he immediately checked 2 but heard nothing. On venting the CQ machine while some phone calls were placed. One call turned up WB5LUA, Dallas, who was not hearing anything. On turning off the machine there was K5MWH in Rogers, AR. A contact resulted at 1650 UTC with S9 signals both ways. This was followed by a quick ssb QSO with K5PKV in Shreveport, LA. On being informed by the 10-year-old jr. op, who had been posted to keep watch on the fm band, that "K98" in El Paso was coming in, Clint turned the beam a little to the west and identified W5LO near Albuquerque. Fred was worked along with his XYL, Lee, WA5MFZ, with signals finally building up to S9. Unfortunately, a phone call to K7NII near Phoenix drew a blank. The path apparently did not extend that far to the west. Having been alerted by the call from W0PS, WB5LUA was eagerly listening but not hearing much until 1740 when a second call, this time from K5MWH, informed him that W7UBI in Boise, ID, had just been contacted. Al got on, worked him for state no. 41, and then worked K7GBZ.

Other stations known to have worked W7UBI are K5WAX, K5WVX and K5BXG of OK and K5UGM/M5 in TX. The same opening was also evident in an fm-repeater contact between WB8FYR using the Cleveland area 28/88 system and WA7DNZ/M7 of Casper, WY, operating a 450-MHz hand-held unit through a 2-meter remote base station. Quite a linkup to say the least.

The West Coast gang has been complaining that they never get in on any 2-meter E skip but their day came July 29. One lucky station was W6DPD in Fresno who hooked up with WB5OMF of Abilene, TX, on 146.52 fm

simplex. Before switching to ssb, he monitored another 52 simplex contact between WB6GTI in nearby Visalia working mobile-to-mobile with several stations in El Paso. The shift to 145.005 ssb brought contacts with SWOT members W5JTA, WB5MEV and WBSNLB of the Dallas/Fort Worth area. From the Texas end of the path, W5JTA SWOT No. 1 reports that he, WB5MEV, WBSNLB, WA5SMA and WB5ACO were all active. Stations contacted included WA6OOC, WB6HDB, and WA6DVX of the L.A. area, as well as W6DPD. K5UGM/M5 in San Antonio was also making ssb contacts with 6-land. W5UWB of Kingsville, TX, 40 miles south of Corpus Christi, who was not so fortunate on the opening to the northeast June 27, was a little luckier on this occasion. Jack came up with a QSO with WA6JRA near L.A. and heard K6QWZ. Another station snagging WA6JRA was W5HFV in Tulsa, OK. Also from Oklahoma, WB5UEB at Martha notes working K6DYD on 146.55 fm simplex, as well as W6TPI and W6YCZ on 52. Rosa informs me that she and her OM, W4NUL/5, are getting back on 2-meter ssb with four, 16-element KLMs. They expect to be active on 145.1 soon.

The opening from Texas and Oklahoma to California, like the one a month earlier to the northeast, will enable SWOT membership to spread by natural processes. Although the organization has extended a few memberships to stations outside the area without having completed QSOs with two SWOT members, W5JTA emphasizes that is not the normal procedure. It was done only in a few exceptional cases in order to spread the membership to other parts of the country. In light of the many good Es openings which have taken place this summer, it appears that this alternate procedure was unnecessary.

Even August produced 2-meter E skip. On the 2nd K1HTV in CT worked W5ST in AR, and WA1OUB, NH, had a near miss with the same station. According to a letter from WB5MPX of Alpine, TX, the 5th produced a repeat of July 29 with an opening from Texas to California. While mobile at lunchtime, Rick had a good QSO with K6OKC on 146.46. Other contacts were managed through various repeaters. Rick also passes along the information that WBSUAO of Pecos, TX, worked K6OKC, K6SLD, K6TOD, K7ZTS/6,

WB6ISF, WB6TSH, WA6NMA, WA6LMN and WA6KOD, all on 52 simplex. Does anyone else have any reports on this particular opening?

**QST**

### 50-MHz WAS

1	W0ZJB	50	W8LPD	99	K6ZX5
2	W0BJV	51	W0ZFW	100	K7MUR
3	W0CIS	52	W6GCG	101	K5EFW
4	W5AIG	53	W2RQV	102	WA6JRA
5	W9ZHL	54	W1DEI	103	WB6WAX
6	W9OCA	55	W1HOY	104	W7FN
7	W6OB	56	W6ANN	105	WB6IMV
8	W0INI	57	W1SJCZ	106	WB6OKK
9	W1HDR	58	W1AEP	107	K7ZOK
10	W5MJD	59	W5LFH	108	WA6OLE
11	W2IDZ	60	W6NLZ	109	W6PO
12	W1LLI	61	W7MAH	110	K6JUJ
13	W0DZM	62	W8ESZ	111	K9BDJ
14	W0HVM	63	W2BYM	112	WA6FP5
15	W0WKB	64	W7ACD	113	K8IBY
16	W0SMJ	65	K6PVH	114	K6QAX
17	W0QGW	66	WA4OB	115	WA6QZC
18	W7ERA	67	K0JJA	116	WA6XKM
19	W3OJU	68	K6RNR	117	K7CIN
20	W6TMI	69	W9QWT	118	WB6NKO
21	K6EDX	70	W6EDC	119	WA7GCZ
22	W5SFV	71	K6VLM	120	WA7ZB5
23	W1HDE	72	K6GOK	121	WA7FLB
24	W9ALU	73	W0EDM	122	WB6HQU
25	W8CMS	74	W9JCI	123	WA6OX
26	W0MVG	75	W0LLU	124	WB6BMB
27	W0CNM	76	W7RT	125	K6QHC
28	W1VNH	77	W7RDY	126	Not issued
29	W0OLY	78	W6KIN	127	WA6BOE
30	W7HEA	79	W6OKR	128	WB6UWY
31	K0JGG	80	K6GMX	129	WA6KLR
32	W7FFE	81	W7DYP	130	K7GWE
33	W0PPP	82	K6ZEE	131	WA7BJU
34	W6WJI	83	K6HCP	132	K7TJO
35	W2MEU	84	K6YIL	133	WB6NRV
36	W1CLS	85	K6GMV	134	W56CNZ
37	W6PUZ	86	K7BAG	135	K5HVC
38	W7ILL	87	W7ZOW	136	WA7ECV
39	W0DDX	88	K7ZPS	137	WA7RTA
40	W0DPO	89	K6EPT	138	VE7AFB
41	K9DXT	90	K7HKU	139	W6GMS
42	W6BAZ	91	W5WA X	140	K5WVX
43	W6ABN	92	WA7FPO	141	W7INX
44	VE3AET	93	WA6HXW	142	W6DPP
45	W9JFP	94	W6NIT	143	WA51X
46	W0GIN	95	K7ICW	144	W6KQS
47	W8WVN	96	K6EJO	145	WA6LJD
48	K9ETD	97	W6NLO	146	WB6VIN
49	W0FKY	98	K7BBO	147	W7GRH

No. 20, 22, 34, 60, 68, 70, 71, 72, 74 and all after 75 are for 50 states.



## Old Ten Never Dies — It Just QSBs

An unexpected feature of the present sunspot minimum, at least for graying DX vets, is the persistent DX performance of 28 MHz. In previous solar lulls ten-meter action inevitably dwindled to crosstown QSOs with limited

sporadic E, aurora and scatter thrown in. Very, very vhf-like.

By no stretch of imagination do conditions in this sizable slice of ham spectrum currently compare with DX days of glory. But

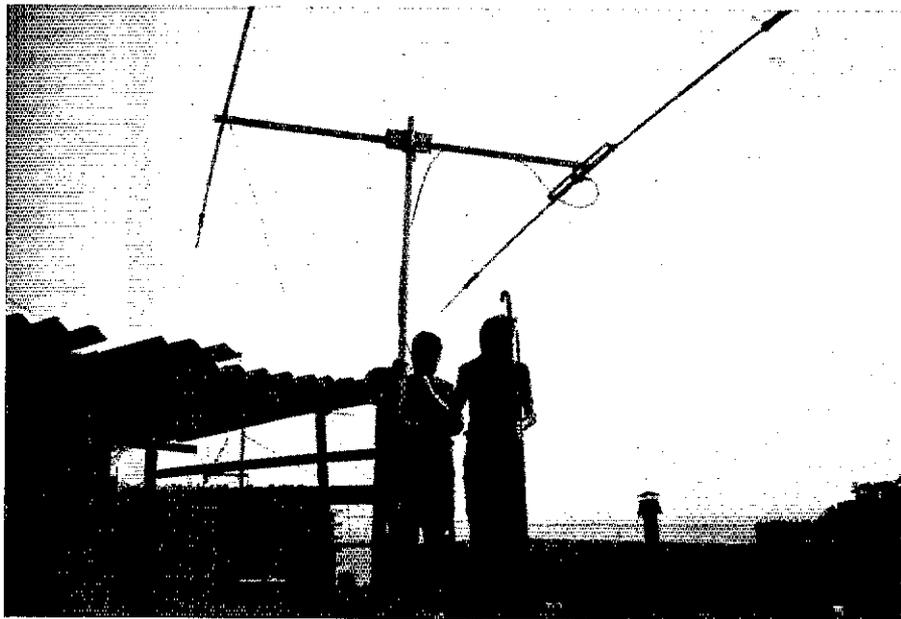
DXers armed with proficient techniques, sufficient diligence and efficient apparatus are crossing the ponds with rewarding consistency. Whenever contests and DXpeditionary splashes come along 28 MHz still manages to crack open more often than not.

Quoting a recent Western Washington DX Club *Totem Tabloid*: "Truly spectacular openings have occurred on 10 this summer that have amateur students of propagation quite puzzled and excited. There have been numerous openings from our Puget Sound area to Japan, even Siberia. Topping it off, QSOs have taken place between 0600 and 0930 UTC. During Field Day, for example, W7FR worked thirty or forty 28-MHz JAs around midnight."

Weird! Ten-meter buffs on the East Coast experience similar nighttime breakthroughs across the Atlantic, we hear, and this year's ARRL DX Test saw 28 MHz providing much more than the sparse handful of north-south country multipliers normally anticipated during deep sunspot dips.

Some sort of scatter, one might surmise, a humdrum commercial high-power technique. No, not according to true-direction beam bearings involved. What gives? Maybe we've been overly obsessed with sunspots ever since their ionospheric influence became so obvious in the early 30s. Other elusive factors may await identification and evaluation. Ham radio's DX diggers are in strategic position to illuminate the mystery. And K2YFE, after working a flock of 28-MHz Europeans in mid-July, agrees that Technician class newcomers to the band will surely find it fascinating.

Keep that 10-meter rf flyin'!



3A0s HK and HL (DL7s RT and SP) check out their Monaco skyhook atop Hotel du Siecle, a QTH recently good for 1350 QSOs. Wolf and Holger solicit suggestions for their next European DXpeditionary target other than desirable but unavailable JX, JW and ZA areas.

### FROM QST's DX MAILBAG

**EUROPE:** Our 1975 Scandinavian Activity Contest saw USA single-operator cw entries finish in this order: WB2CKS, Ws 6DGH 9LKI Q1UB 2KHT, WA0KDI, W6TZD, WB8BTU, WA8EDC, W1OPI, K5ETA, WA2ZWH, K9DAF, KH6IJ, Ws 2ESX 6DQX, WA3DMH, Ws 9NXT 6PZW, WA2EJZ, WB2FVT, W9GSB and WB4WHE/4. Canada's code sequence went Ves 3GCO 7CXE 3EJK 6AVO and 7KE. Top ten key-thumpers worldwide were UA1YR, UB5LAY, UL7QH, OK2BLG, G3SXW, UA9HAX, UR2RJ, 5B4YK, UW6MP and DM3KNF while Scandinavians finished OZs 7HT 1LO, OHs 3YI 6VP, SMSAOE, OH1TN, SMs 6DHU 3VE, OH2BJY and SM0CCE. On the phone front the Yank pecking order goes K3MNT/7, Ws 9DDL 9YRA 4WSF 9NKH 2JGR, WB9EBO, Ws 9LKI 6DGH, K8PYD, WA3DMH, Ws 6DQX 4WU and 1ORP. VE3s GCO and EJK ran 1-2 up north. Worldwide top ten talkers were I2PJA, UB5WE, PA9FIN, F5XC, UR2RJ, DM5JL, OK1AGN, DM4SOG, UWIAE and 5B4TD in that order with Scandinavians

finishing OHs 3YI 2BM 6DX 7RM, SM5CSS, OH1s LA VR, OZ6PI, OJ0MA and OH1LW. Best multiop scores were filed by UKs 4WAC and 9CAE on key and mic respectively. Now how'd you do in last month's '76 SAC test? Not good? Not bad? In either case please inform this year's sponsoring society, SSA of Sweden, of your results. (OH2QV, SRAL) . . . G4AMT, a swift QSLer, does fine on 40 with his KW101, SB200 and 70-foot-high two-element quad. (WB5KJ) . . . While in Europe this summer I enjoyed visiting and operating DK8ON. I encountered Klaus via DB0WH, the Hanover repeater. (WA2ROD) . . . Fine DX on the isle of Moni this season some forty miles from Athens. (SV1IG) . . . Congratulations to W8RSW for working the most IZ9 stations in summer ARI commemorative activity. (IT9RAN) . . . I'm beginning a year in PA-land where my U.S. Extra Class ticket carries no weight. I'm not yet 18, Holland's age minimum for hams. Thus I'd like to make PA0 friends and possible connection with a MARS station in nearby Germany. I can be reached at Kerkstraat 20, Nijmegen, The Netherlands. (WB9JEN) . . . PA0s CDJ and MAB were most hospitable during my recent European work assignment. Delighted to meet other PA0s and ON amateurs as well. (K9YBC) . . . FB hospitality

displayed by I0s ZQ and MVK while I visited Rome. Twenty was less generous, only one USA contact. (K2YFE) . . . W/Ks should be aware that West Germany's challenging DARC DX certifications may be applied for via WA3KWD. (W1UAX) . . . Continental cuttings from the DX press: G3RFX and DJ0EQ made ZB2FX mighty popular in mid-August. . . . 4Js 4A and Q1AP were recent UA doings from Penza and Severnaya Zemlya respectively. . . . Wyoming was the last holdout for Y03AC's Bicentennial WAS. Andy signed YR3AC in August. . . . LAISS represented a 13,000-Scout Jamboree on DX bands in July. . . . Rs 1AR 3FL 3MSK 9NO and others were summertime Russian commemoratives.

**ASIA:** Newly active EP2VW formerly signed CN8FW, VS6AW and XW8CR. Doug should be very available from Tehran primarily near the low cw edges. (K4DAS) . . . YL EP2EA prefers cw on 20 where she likes to catch VE7s near the home QTH. Elizabeth and OM EP2RS soon go QRT for another DX assignment. (KH6CF) . . . Sorry, fellows — I know nothing about the BY5 fately giving my call as QSL manager. (W7VB) . . . We had a special station on the air from the foot of Mount

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

Fuji, site of JARL's All-Japan Hamvention, on the 25th-26th of last month. (JH1VRQ) . . . Worked 500 stations in my first six weeks at Shiraz, mostly 20 cw with an SB102 and dipole. I answer all callers, usually around 14,030 kHz, and have my eye on early DXCC. (EP2LA-W0PEV) . . . Our August 9M0EXP DXpedition transpired from a group of small islands off Malaysia's southeast coast. (MARTS) . . . TAs 11B and 2FK, now residing in Sweden, were visited by FAIHY in May. (W5QFX) . . . Delightful visit to Cyprus this summer where club station 5B4ES is quite active. (K1ZND) . . . Asian oddments from DX literature: G3UKP expects to sign A4XGQ on Masirah for another year, mostly 20 sideband. . . . HM9A was HM11W frolicking on Liancourt Rocks (Tok Do). . . . 4X4FU yearns for a Nevada contact near 14,030 kHz at 0130 UTC or so, and JA8AA's ARRL Bicentennial WAS No. 648 is the first won by a non-W/K/VE.

**AFRICA:** My three-week 24,000-mile journey to D6A, FH8 and FL8 netted some 3500 QSOs. Equipment restrictions necessitated transceive-style operating with thirty watts and poor antennas. I found JAs to be excellent operators but W/Ks hurt themselves with rude procedures and blind calling. (K5QHS) . . . Old-timer ZS4PB's homebuilt towers include a 72-footer that supports inverted-Vs for 160, 80 and 40 meters, and a 64-foot tilt-over job for his 20-15-10-meter TH6DXX. Peter's rf comes from an FT101B and FL2000B with vintage SX28 and Ranger gear in reserve. (W1CKA) . . . African addenda via the vine: After 3200 contacts as ST2SA/Q, WB7ABK tried some Geyser banking as YM0AA before his D6A effort. . . . A2s CED and CJP signed 805s ED and 1P during Botswana's independence observance. In similar circumstances VQ9DF temporarily became VQ91OS. . . . F6FOP/mm, aboard SS *Marion Dufresne*, recently stopped off in FB8X-W-Z territory. . . . DJs 4LW/5A and 8LP/5A broke Libya's annoying QSO shortage this summer. . . . 5H3JR expects to be back in Tanzania from W3FHG early in '77.

**OCEANIA:** My 160-meter contact with ZE7JX just before an Australian sunrise in late June gave him WAC on the band. He was my fifth 1.8-MHz contact. Now for South America! Neighbor VK6HD gives my FTdx400 and loaded vertical keep top-band DX competition. (VK6IZ-W3ZYK) . . . SM6CSB, formerly OA3X, is closing YB9ABX after eighteen months and some three thousand QSOs. Harald found that continuous JA pileups limited QSOs with the States and Europe. He looks forward to his next United Nations assignment. (K3RDT) . . . Sure hate to see the gang disappointed but I know

nothing about the VR6 who identifies me as his QSL manager. (W2UBJ) . . . Your recent mention of W8GZ's QRP triumph of fifty years ago brings back memories of my 1925-26 WAC from the Philippines as pi3AA, No. 9 worldwide. Had a pair of 203As going in the mountains of Luzon. (KH6CZ) . . . I expect a Navy tour of several years on Guam. (K6QHC/KG6) . . . Ex-VR8A should be settled back at ZL2BJU by now. (WB6UJO) . . . K6ESD, roaming the Pacific aboard sailing sloop *Shearwater*, stopped off at Fanning for a few summer weeks as VR3AN. (W7HPI) . . . After two years on Guam with 195/173 countries worked/confirmed I still need three states for WAS. (WA6EVX/KG6) . . . Oceaniagrams via club newshawks: ZK1BA/p, Manihiki in July, may be activated by ZK1BA every six months or so. . . . JR1ATU of A35AF fame enjoyed a summer ZK2AR thing. . . . FW8CO should be good for Wallis into '77. . . . Licensed forty years ago and long a wireless trailblazer in his part of the world, V55PM joined Silent Keys in July.

**NORTH AMERICA:** Must reading for would-be DXpeditioners is *How to Fly*, available from Air Transport Association of America, 1709 New York Ave. NW, Washington, DC 20006; also *Air Travelers Fly-Rights*, Civil Aeronautics Board, Washington, DC 20428. Some surprising info in each and they're freebies. (W5QFX) . . . F6BBB, lately FG0BKZ, FM0BKZ, FM0BKZ/FS7 and various VP2 calls, is a 27-year-old welder very proficient in handcrafts. (WB5KUJ) . . . A QSL from 9Q5DM brings me nervously close to DXCC at 95 confirmed. (WB4WHE) . . . An HW16 and rotary dipole recently got me 1s 1UST 8RFD, KP4DAA, KZ5JSN, VP1MPW, WB5LSU/TI2, WNs 3BKR/HK4 0QFB/HR2, YUs 1BCD 2RTW, YV5BOI and ZP9AY on 15. Now to see if a homebrewed receiver preamp does any better. (WN4EHS) . . . Inquiries to my address are invited concerning the new World-Wide DX Association award of the future, a sheepskin endorsed by W4BPD. (K5CM) . . . A few years ago you publicized DXCC members who had worked other DXCC members in one hundred or more countries, or DXCC-squared. I'm ready to try for DXCC-cubed if you'll get a list together. (VE2WW) . . . ZS6KD was a popular guest at W9EWC this summer. (W9MSJ) . . . An Atlas and inverted-V supplied much DX sport as ZF1BT on Grand Cayman's Seven Mile Beach in late May. (W5UFF) . . . DXers at the Starved Rock Hamfest in June were intrigued by the tunable two-element delta wire loop developed and demonstrated by WB9JYW. . . . Your December '74 "How's" mentioned H.F. Mason, old 7BK of Seattle, with whom I handled traffic in days of spark. Anyone

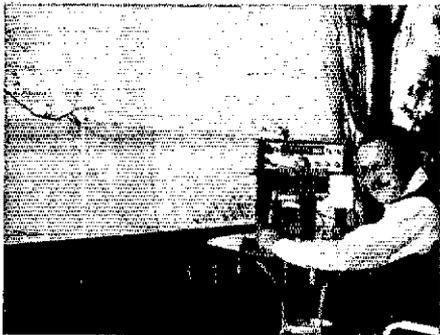


5B4ES radiates steadily from Nicosia, especially Fridays on 21 MHz, under English School Radio Club auspices. That's operator Martin nudging knobs.

know if Howard is still around? (VE7CT) . . . Final recap of our Fernando de Noronha DXpedition as PY0s BXC and PO in February: 6112 QSOs, all cw. I used a Swan 400, groundplane, 2B and old NC300 while Jim had an FTdx401, a three-element Yagi and dipoles for 40/80. That island is a paradise! (PY7PO courtesy W9TKV) . . . HR2GK, closing down in December after years of Honduras hamming, intends to hit this fall's contest season hard. (WB9LHI) . . . From late this month into November WASKCF and I aim for a few kiloQSOs on 10 through 160 as ZF1RE on code and voice. (WA8TFJ) . . . Central Arizona DX Association offers all DXers its new Bicentennial DXCC award, details available from CADXA, 1878 E. Greenway Dr., Tempe, Arizona, 85282. (W. Zimmerman) . . . Not much of a DX hound here but I really got a bang catching Y18KG on 40 cw in June with my 14AVQ. (W1GDB) . . . Nabbed 35 DX stations in my first week as a General on 7 through 21 MHz. (WB9PTX) . . . My three-month FG0CRZ authorization, including RS7 privileges, arrived from Paris three months after application. (W5SJS) . . . TI2WX works plenty of WNs around 21,135 kHz. Glad to have PA0UKW answer my HW16 and low dipole. (WN8YDP) . . . Forty cw supplies most of my DX these days, closely followed by stubborn 15 cw. Eighty also comes through with a few. (WA1UAX) . . . "The Maunder Minimum" in June's *Sky and Telescope* should interest any sunspot-sensitive short-wave enthusiast. (K4KCK) . . . I4CDH/OX radiated from a Umiakako Nuna scientific



IE9CBM was island-hopping Italian-style by I2CBM in June. Bert logged 3495 contacts with 117 countries from historic Ustica island.



WB1RT/HB9 offers beautiful Lake Constance for QTH of the Month consideration. Paul's battery-powered Argonaut knocked off interesting QRP DX on several bands. The flagpole at left served as a convenient antenna mast.

expedition site in August. (DXNS) . . . It's already wildly wintry at VE8MC on Princess Pat Island, 14 degrees from the pole. (WCDXB) . . . WA4SNI on July 25th was a QSO No. 18,000 for my AJ3AA collection. Any close Bicentennial marathon competitors? (KV4AA) . . . We doubt it, Dick. Nice going, OT, and many more future kiloQSOs for the Voice of the Virgins! (W9BRD) . . . For much of the preceding patter "How's DX?" and its readers are very grateful to Canadian DX Association *Long Skip* (VE1AL/3), Columbus Amateur Radio Association *CARAscope* (W8ZCQ), *DX News-Sheet* (G. Watts, 62 Belmore Rd., Norwich, NR7 OPU, England), Japan DX Radio Club *Bulletin* (JR3BHW), Newark News Radio Club *Bulletin* (M. Witkowski, Rt. 6, Box 255, Stevens Point, Wisconsin 54481), Northern California DX Club *Dxer* (VE3DXV/W6), North Florida DX Association *News* (WA4UFW), Southern California DX Club *Bulletin* (WA6KZD), VERON's *DXpress* (PA0TO), West Coast *DX Bulletin* (WA6AUD) and Western Washington *DX Club Totem Tabloid* (WA7ICB). Keep us posted!

## DXCC NOTES

DXCC applications for an "RTTY" and "160" DXCC will be accepted for processing starting November 1, 1976. The "RTTY" and "160" DXCCs will not be endorsed for credits over the 100 mark so it will not be necessary to submit more than a few extra confirmations. The few over the 100 mark should insure that there will be at least 100 creditable confirmations. Confirmations for contacts made November 15, 1945, or after, will be acceptable for both the "RTTY" and "160" DXCCs. ARRL membership is required for DXCC applicants in Canada, the U.S. and possessions, and Puerto Rico. Novices are exempt from this requirement. There is no fee for the applications. However, funds must be sent with the application to provide for the safe return of the applicant's confirmations.

# DX Century Club Awards

Administered by R. L. White, W1CW

The following listings show DXCC Awards issued by Headquarters during the period from July 1, through July 31, 1976.

## New Members

### CW/F

203	136	119	110	PA0FRA	103	K4FYM	100
YU3EJ	WA2KJM	WB5IFY	W6OMM	105	OK1KIR	W4WEG	K1VXG
154	132	114	108	WA1UAC	WB2ZRQ	101	W4BV
WA4UAZ	W1FMK	WA7UQG	G6UW	WA4LOF	W7YS	W21AG	WB2YBK
152	130	113	106	104	102	WB4OZX	WA3VBM
WA9UCE/6	K4KPH	K8DAG	JA7SD	K6YD	DA1QQ	W8ZFW	ZD8TM

### Radiotelephone

171	W5DMM	135	VP2VBH	104	WA4JD1	101	G3XPO
PA0MOD	152	I0RKK	107	K4DLA	102	W4WEG	VP25V
158	Z55MQ	120	YS1EMW	OZ4RP	YS1GDD	100	W6AJY

### CW

129		WB8OBA	PA0CLN	W4LVM
F6CRT		109	103	100
128		WB8JEY	W1JAA	JH3AIU
K6MU		107	102	K2IJ
110		DL1ES	DJ5IO	WB2ZRQ
PA0WRS		106	101	W4BV

## 5BDXCC

#508	#509	#510
WB8FOS	DL3ZA	K4TBN

## Endorsements

In the endorsement listing shown, totals from 120 through the 240 level are given in increments of 20, from 250 through 300 in increments of 10, and above 300 in increments of 5. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

### CW/F

350	W8ARH	K4CEB	W7YQI	W4BAA	VE2YU	WA4GQJ	K9DWK
ON4NC	325	K9YXA	290	W4UPJ	WA3SWI	WA6ETN	VE7BBD
345	SM6AEK	310	DJ4AX	WA4DHO	WA4DCP	160	WA1UAD
W7ADS	VE7CE	DK2BI	W3NV	240	WA4LPX	DL8BL	WA1UEO
340	W9FD	JA2HNP	280	K9BWQ	W0PRY	K1RQF	WB4ASV
K81KB	320	WB2EPG	WA4NRE	W1GVZ	YU3CM	KH6HC	WA9WKA
W5TIZ	PY7APS	WASLES	W5LPO	WA6FIT	200	WA3AXQ	120
W0NVZ	W2MZV	305	260	W8JX	IT9RAN	W4LVM	K3JPW
330	WB2UKP	G5RP	EA2CR	WB9CBY	K1ASJ	W91VB	K5AZ
K6AHV	WA3ATP	K6LQA	WA9TVM	W0BA	K4HLJ	140	K5TSQ
OE1FT	315	300	250	220	WB4QFH	K2DT	VE3HGM
W6RGG	I2SM	K6HTM			180	K5GOE	WB9KLB

### Radiotelephone

340	QZ3V	310	K6HTM	WA8OGR	W4BAA	WA0LGV	W4UW
W7ADS	PY2DYI	HP1JC	WB2VEG	250	200	WB0CGJ	Y51JWD
330	WA3ATP	JA1IBX	W3NV	EA3SA	K9HQM	160	120
W0PGI	W9QLD	W6QOQ	280	W9RXC	W9ABA	VE2YU	K4AEA
325	315	305	WA4NRE	240	180	W3FE	SP9ES
KH6OR	I2SM	DK2BI	W8ALJ	K9BWQ	84DJC	WB4PAB	VP2YBK
320	KV4FZ	270	270	W0BA	HK4DEG	140	WA6ETN
IT9GAI	WB2UKP	290	K2GBC	220	WA7UVU	K1ALP	YV4YG

### CW

160		140	WB6ZUC	120
K2TQC		DL8AN	W9LNM	JA1IBX
		W4KN		W0BW

Correction: The listing shown in the March CW/F Honor Roll for W3LMA should read 319/354.

# Strays

## STOLEN EQUIPMENT

□ Stolen from auto on July 27 in Dallas, TX. Tempo FMV-10W, Serial No. 11170. Vernon M. Kummel, WA5CYU, 3671 South Staples Street, Corpus Christi, TX 78411 or Dallas Police Dept. Report No. 265711H.

□ TR22-C, Serial No. 850278, Swan 350, Serial No. C847975 taken from auto in St. Ann, MO, on June 24. William Wadsworth, W2ZKE, 1150 Staffler Road, Bridgewater, NJ 08807.

□ Stolen August 9, in Englewood Cliffs, NJ. Swan 270 with mic. Dave Stevens, WB2SIN, 4 Parma Dr., Valley Cottage, NY 10989, phone 914-358-3038. Reward offered.

□ Wilson Handie Talkie 1402SM, Serial No. RP 3566 stolen July 6 in South Miami, FL. Reward for return. Barbara Shaw, Rte. 2, Box 17, Keystone Heights, FL 32656. Phone 904-473-3242.

□ Clegg FM-DX, Serial No. 056, taken on Feb. 19 in Boston, MA. Police Report No. 141449314PTH. Kevin D. Murray, WB2ZSD, 100 Vail Road, Parsippany, NJ.

□ EBC Model 144, Serial No. 51002 taken from car on July 14. David Tanner, K2BEA, 117 Schenck Ave., Great Neck, NY 11021.

□ HT220 Touch-Tone, Serial No. 2029. S. Sagal, WA2NAV, or Det. Wagner, Union NJ Police. \$200 reward for return.

□ Regency HR-2A, Serial No. 04-08726, stolen from home on July 25. Lafayette HA-460, Serial No. 12475; Heathkit HW-101, Serial No. 13443; National NCK-3, Serial No. 56-0319. James F. Bartram, W1PDL, 94 Kane Ave., Middletown, RI 02840 or Middletown RI Police Dept.

## Belle Weather

A potential communications emergency faced the East Coast on August ninth and tenth, in the form of Hurricane Belle. The National Weather Service made some very grim predictions and emergency nets went into operation, in many cases continuing for the entire hurricane-warning period. Luckily, the dire predictions weren't realized. By the time Belle reached the New York City area, her strength had waned. Winds were lower than initially projected and less rain fell. The Big Apple and its suburbs, along with New England, were spared what could have been a real disaster. Apparently, Belle lost most of her punch as she crossed Long Island, something that happened to heavyweight boxer Joe Frazier on his recent appearance on the island. Nevertheless, hams were alerted and mobilized to provide emergency communications. In fact, on Monday morning, ARRL hq. staff members called every section emergency coordinator between South Carolina and Maine to advise them that a potential crisis was in the offing. We can say proudly that practically all of the SECs had already activated their emergency plans.

Some residents of Long Island and Connecticut coastal areas were evacuated as a precautionary measure and it was here that AREC and RACES groups provided the vital communications of the affair. Using two-meter repeaters, hams handled communications between various shelters, Red Cross and c.d. headquarters and police, conveying requests for needed supplies and providing status reports. In many cases, WCI call signs were given their first real baptism.

The Long Island and Connecticut areas were hit in the early morning hours of Tuesday, August 10. Flash flooding occurred in some areas and power outages in others, but that was about it. Belle had already lost her hurricane-force winds and was shortly downgraded by the weather service to a tropical storm.

WIAW was manned all night long, transmitting hurricane advisory bulletins (see "Operating News" for emergency schedule), monitoring various emergency nets and gearing up, like the rest of us, for emergency traffic.

Emergency operations were fully activated

in the Northeast. Had Belle managed to ring megalopolis' chimes, amateurs would have been able to provide good communications, mainly because of the trained and tested amateur emergency organizations. Hundreds, if not thousands, of amateurs were monitoring their local repeaters and low-band nets. The 75-meter nets were on standby alert; they provided liaison with vhf, passed along information on developing weather conditions and stood by for any emergency traffic. There was a Red Cross net on 3910 kHz, a frequency surprisingly declared an official emergency frequency by FCC. As it turned out, the Hurricane Belle experience was sort of a SET, but with a kick to it.

If someone was offering odds on which low-band net would prove to be the most efficient, the writer would've plunked down his money on an admitted long shot, namely the New York City-Long Island Phone Net.

Since NLI was directly on Belle's flight plan, the net was continuously in session from early Monday evening to early Tuesday morning. What bears mention is that the NLIPN is *not* a net that magically appears during the excitement and then just as magically disappears when things die down, like a gaggle of reporters stalking the latest vice-presidential hopeful. It would've been a long shot because the NLIPN reportedly has had a "kiddie-corps" image, apparently turning off some older net operators in the past. But then, the NLIPN was the most orderly, efficient net on 75 meters. Why? Because it's that section's National Traffic System phone net, which means its prime movers are experienced net operators. They know what net discipline portends and they took everything in stride.

During this situation, many hams were introduced to their section and local nets for the first time. Hopefully, they'll be back.



Arkansas Section Emergency Coordinator WA5VNV was one of the many hams providing communications following the recent tornado in the town of Cabot. (WB5NFC photo)

## PUBLIC SERVICE DIARY

□ Owensboro, KY — June 6. Twelve amateurs assisted the sheriff and the Owensboro Fire Department at the scene of a drowning. (W4OYI)

□ Chicago, IL — June 13. The CFMC made a fine showing when Chicago and suburbs were besieged by tornadoes and flooding rains one Sunday afternoon. The National Weather Service relied heavily on the group for reports of tornado sightings and for various confirmations. Net operations continued past the emergency, rendering assistance to many stranded motorists. In expressing its appreciation for the 200 amateurs' efforts, the NWS remarked that the CFMC operation was the only way NWS was able to update its info needed to keep the public reliably informed. (WA9NSO)

\*Assistant Communications Manager, ARRL

□ Houston, TX — June 15-16. Numerous government agencies called on Harris Co. amateurs for help after the area had suffered flash floods and the vast Texas Medical Center had lost all power and communications. In addition to providing generators, pumps, fuel and boats, hams helped restore partial power to the hospital, evacuated 112 persons from a nearby school, and used three repeaters to provide vital liaison communications for the police and fire departments. (WA5FCL)

□ Novato, CA — June 24-27. 101-degree temperatures and an encouraging wind spawned fires that destroyed many homes and brought local hams into action. Twenty-five amateurs assisted firemen and Red Cross officials for four days, handling over 200 formal messages. (WA6MGK, EC Marin Co.)

□ San Jose, CA — July 3-4. Members of West Valley ARA, Santa Clara Co. ARA, and Santa Clara Co. VHF Repeater Society provided communications support for the city and Red Cross during their Bicentennial celebration. Support ranged from routine and emergency police traffic to missing children reports. (WA6RXB, SEC SCV)

□ Pinellas Park, FL — July 10. Metropolitan

General Hospital was struck by lightning in the early evening, disabling commercial and emergency power, and all telephones. The WR4ALM crew swung into action, providing intercommunication between the emergency room, intensive care unit, and nurses' stations, as well as for doctors and administrators. In all, 47 amateurs participated until repairs were completed at the hospital. (K4SCL, SCM SFLA)

Mauston, WI - July 19. Upon finding an ill man at the rest area on highways 190-94, W9GDW called for assistance on .94 simplex and was answered by W9NHH, who in turn contacted police and dispatched an ambulance. (W9RCI)

Pacific Ocean - July 20. WESCARS scored another rescue when K6ICV heard HP9XSA/MM calling for immediate medical advice from Los Angeles. A young man aboard the 32-foot yacht *Triad II* had been stricken ill 180 miles southwest of San Diego, bound for Hawaii. U.S. Coast Guard was unable to copy the yacht, so its physician's queries were relayed on 40 meters. Despite heavy seas, cooperation between hams and the Coast Guard resulted in a successful helicopter rescue. (W6NAZ)

Owensboro, KY - July 30. WA4FMY and WA4EWM assisted the c.d. director in providing communications at the scene of a light-plane crash. (W4OYI)

Loveland, CO - August 7. Hundreds of amateurs provided emergency communications following the devastating Big Thompson River flood. Communications were handled on 75 meters and two-meter repeaters. A complete story will follow soon. (W6SIN)

Repeater Log. According to reports received to date, repeaters were used to report 39 automobile accidents and related occurrences, six fires, two medical emergencies, one police emergency, and once to stop a burglary in process. Repeaters involved were: WR1ACL, WR3ADF, WR4ACO, WR5AHM, WR6ACJ, and WR9ABY.

For the month of July, 32 SEC reports were received, showing a total AREC membership of 10,961. Last year at this time, 39 reports were submitted, with a total membership of 13,895. Sections reporting were: Alaska, Ariz., Ark., Colo., Conn., Del., ENY, EMass., Ga., Ind., Ky., Me., Mich., Miss., Mont., NC, NFla., NNJ., Ohio, Okla., Ont., Org., SDgo., SCV., Sask., SFia., SNJ., Utah, Va., WVa., WMass., WPa.

## NATIONAL TRAFFIC SYSTEM

Mother Nature has been giving NTS a good workout of late. The RN7 gang was quite active in the Idaho flood disaster while RN6ers handled much of the load following the Guam typhoon. 2RNd was active during the Hurricane Belle threat. W0HXB reports a good ARPCSC forum at the Denver National Convention. WB2EWW/3 chaired the traffic program at the Atlantic Division Convention and reports it was a "booming success." Harv also says that 3RNd is holding up well, thanks to assistant net manager WA3THT. DCAN requires more participation from the three regions of the central area. Contact WB4EKJ if QRV. Certificates: K2KQC (2RNd), WB4ARJ, WA4EPJ, WB4WUX (4RNd), WB9TWT (9RN), WA7KHE, WB0BAL, WB0DJY, W0ETT, W0FFV, W0GMO (TWN). Recruit technicians for section slow-nets!

## July Reports

	1	2	3	4	5	6
EAN	31	1264	40.7	1,006	97.8	
DEAN	62	513	8.3	446	89.5	
CAN	31	893	28.8	689	98.9	
DCAN	48	159	3.3	164	66.1	
PAN	31	1141	36.8	892	98.9	
DPAN	50	74	1.4	107	65.6	
CTN	30	367	12.2	376	94.6	
1RN	56	423	7.5	449	88.2	
1RNd	30	82	2.7	227	70.0	
2RN	91	572	6.2	564	93.3	
2RNd	60	191	3.1	324	86.1	
3RN	62	350	5.6	408	95.1	
3RNd	31	135	4.3	431	96.7	
4RN	61	381	6.2	284	94.9	
4RNd	64	178	3.3	237	46.3	
RN5d	31	177	5.7	203	84.3	

RN6	62	721	11.6	516	96.7
RN6d	31	130	4.1	153	96.7
RN7	61	390	6.3	445	85.9
RN7d	40	50	1.2	110	31.7
8RN	54	221	4.0	245	76.0
8RNd	31	101	3.3	141	80.6
9RN	62	490	7.9	457	90.3
9RNd	31	134	4.3	276	83.8
ECN	62	254	4.1	302	97.3
TWN	62	455	7.3	320	91.9
TWNd	19	49	2.5	155	87.7

TCC Eastern	96 <sup>1</sup>	513
TCC Central	82 <sup>1</sup>	503
TCC Pacific	107 <sup>1</sup>	680
Sections <sup>2</sup>	3610	12230 3.3

Summary	4884	23821	4.8
Record	5386	27143	15.2

1 - NET	4 - AVG.
2 - SESSIONS	5 - RATE
3 - TRAFFIC	6 - %REP.

1 TCC functions not counted as net sessions. 2 Section and local nets reporting (105): BCEN (BC), MTN (MB), WQV/UHF (PQ), AENB AEND AENJ AENM AENR AENW (AL), ASN (AK), ATEN HARC (AZ), AMBN APN ARN OZK (AR), NEN (CA), CN CPN NMVTN (CT), DEPN (DE), FAST FMTN FPTN GN NFPN QFN QFNS SPARC TPTN (FL), GAREC GSN GSSBN (GA), IMN (ID, MT), ILN (IL), INN (IN), I75MN LCN (IA), GKS (KS), LAN LRN LSN LTN (LA), PTN (ME), MDCTN MDD (MD), EMRI WMN WMPN (MA), MACS MNN M16MN WMN WSN (MI), MSN MSPN MSSN PAW (MN), MSBN MSN MTN (MS), MON MOSSBN MSN (MO), MTN (MT), BARTEN NJN NJPN NJSN (NJ), SWN (NY), NLI NYPN NYS RTN WDN (NM), CN CNP NCSSBN PX RARS-2MN SCSSBN THEN (NC, SC), COAREC-10 OSSBN (OH), OAN OFON GLZ OPEN OTWN STN (OK), OSN (OR), WPA (PA), TN TPN (TN), TEX TTN (TX), BUN UCN (UT), VSN (VA), NSN (WA), WVN (WV), BWN WIN WNN WSN (WI).

## Transcontinental Corps

Traffic totals are down due to various problems with D J and K skeds. Three special K schedules were held on July 4 (on RTTY) to pass bicentennial-related traffic; W5GHP and WA6DEI presided. First-time TCC-E certificates were earned by WA1WEM and WB2UBW. TCC-P certificates were earned by WA7WXY and W0IWF.

	1	2	3	4	5
Eastern	124	82.0	1354	513	
Central	93	88.2	959	503	
Pacific	124	86.3	1426	680	
Summary	341	85.5	3739	1696	

1 - AREA	4 - TRAFFIC
2 - FUNCTIONS	5 - OUT-OF-NET
3 - % SUCCESSFUL	TRAFFIC

## TCC Roster

The TCC roster (July): Eastern Area (W2FR, Dir.) - W1s NJM QYV, K1s EIR GMW, WA1s MSK UGJ WEM, W2s FR GKZ, K2s HJ/VE2 SIL/1, WA2s DSA (CB PJL, WB2s LZIN UBW, K3MVO, WA3VBM, WA4UQ, K4KNP, W8s LTA PMJ, WA8HGH, WB8ITT, VE3s GOL SB, Central Area (W5GHP, Dir.) - WB4s LCR SKI, W5s GHP MI UGE UJJ, K5s TFG TTC, WA51QU, W9s CXY DND, WA9EED, WB9NOZ, W0s HH HI INH LCX NXG, K0CVD, WA0TNN, WB0HSP, Pacific Area (K5MAT, Dir.) - W5RE, K5MAT, WB5KSS, W6s BGF EOT MLF TYM VZT YBV, K6HW, W7s DXZ GHT, K7s IWD NHL QFG, WA7 WA7WXY, W0s IW LQ, K0s DRL TER, WA0KKR/7, WB0QOT, VE7ZK.

## Independent Nets (July)

	1	2	3	4
Central Gulf Coast	31	70	1874	
Hurricane				
Clearing House	31	234	563	
Hit & Bounce	62	1009	501	
Hit & Bounce Slow	18	138	33	
IMRA	27	910	396	
Mike Farad	27	72	262	
North American SSB	28	288	238	
75 Meter ISSB	31	480	1073	
7290 Traffic	42	350	1603	
1 - NET	3 - TRAFFIC			
2 - SESSIONS	4 - CHECK-INS			

## Public Service Honor Roll July 1976

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.

66	WB5PVL	WB5MTQ	WB4GHU
WB5AMN	WB5RLR	W7GHT	WB4PDQ
	WASTQA	WA7MEL	WB5LBR
65	K5TTC	K9ZTV	W5UJJ
WB5KGP	WA5YEA	WB9ODJ	WA5ZZA
64	W6RNL	VE1AAO	WA6DEI
WA1UGJ	WA0KKR/7	48	W71WN
W5GHP	VE3GJG	48	K9KHI
WB5NKD	55	WA2PJJ	W9NXG
61	WA2WIW	WA6FTY	W5SFL
WA1MSK	WB4OXT	47	K6EVH
WB2RUZ	WB91CH	47	W0NUB
WB2VTT	54	WB4ARJ	VE1AVL
WA3QOZ	54	W6RFF	VE1BDT
WA4EPJ	WB5NUM	46	43
WB4OBZ	WA6TVA	46	WA3VBM
WA5ANV	53	W9MFG	K4FLR
W7OCX	K4YFC	K0MRI	WA5JYH
60	W7VSE	WB0OCT	42
WA5RKU	52	45	WA3THT
59	WB2CST	WA5VBM	WB4DTG
W9MMP/0	K9LJU	KL7DD	W6BGF
58	K0CVD	44	WA6LBO
KIPAD	WB0RVN	44	41
57	51	W1BVR	WA2ECO
WA4FBI	WA3JYZ/3	W1ERW	WB2VVS
56	50	WA1FCM	WB2YKY
AA1VEI	W5KLV	AA1UDB	WB4EKY
WA2DSA	49	AB2ASD	WB5KUJ
W2MLC	WA2AIV	WA2RKI	40
K4BKX	WB2LZN	WA3SWF	WA1TBY
WB4TPT	K3YHR	WA3WPY	WB2EMU
WB5CDX	WB4EKJ	WA4DQZ	WB4DXN
	W40GG	WA4EUD	WA7KQE

## Brass Pounders League July 1976

BPL Medallions (see December, 1973 QST p. 59) have been awarded to the following amateurs since last month's listings: W5DAD KH6IQJ.

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	339	1198	1533	61	3131
W0WYX	55	1064	335	729	2183
W3VR	259	217	391	11	878
WB0MTA	24	307	336	1	644
WA5VBM	24	202	94	312	632
WB5NKD	5	306	276	25	612
WA1UAX	150	154	156	152	611
WA1UGJ	7	273	317	4	608
WB6EJG	8	297	297	4	602
W5JOV	9	290	277	13	589
W5GHP	46	248	244	4	542
AB2CST	19	221	253	33	526
K3NSN	25	250	250		525
W7TZK	51	281	2	269	503
WB6EIG (June)	8	273	267	6	554
WA1UGJ (June)	13	240	268	7	528

## BPL for 100 or more originations-plus-deliveries.

W0FIR	319	W9IOH	125
WA6BMH/6	300	K1BCS	124
WA6ORW	286	K7VWA	121
WA3ATQ	228	W9IOH	
WB0JYT	220	(June)	144
K9CPM	192	W9IOH	
W5TL	184	(May)	126
K0YFK	178		
1 - CALL	4 - SENT		
2 - ORIG.	5 - DEL.		
3 - RECD.	6 - TOTAL		

# 43rd ARRL November Sweepstakes Announcement

Achievement awards available this year.

If you liked the Bicentennial Celebration in July, you're bound to like the November Sweepstakes. It's not quite so hectic, not quite so long, and only one mode (phone or cw) per weekend. The exchange for the SS is only slightly longer than that used for the BiCi Celebration.

This year, for the first time, a certificate will be available to every single-operator station who makes 200 or more contacts on either or both modes (weekends). All the awards for the SS this year are brand new and extra nice. So brand new, in fact, that we still don't have one to reproduce here; you'll just have to take our word for it! When you send in your entry, you will receive whatever certificate(s) you're entitled to: Section winner, division winner, 200 or more contacts.

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.c. and affix one unit of first-class postage for each five sheets requested. *Please* use our forms instead of homemade ones.

In order to minimize interference to non-contest 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 27, 1976; 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! — *WA1STN*

## 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

## Contest Periods

STARTS	ENDS
<i>CW</i>	
Saturday, Nov. 6 2100 GMT	Monday, Nov. 8 0300 GMT
<i>PHONE</i>	
Saturday, Nov. 20 2100 GMT	Monday, Nov. 22 0300 GMT



One most interesting facet of the November Sweepstakes (and the VHF SS and DX Competition) is the ARRL-affiliated club competition. The 1975 SS club winner was the fledgling Northern California Contest Club, under the leadership of president WB6CEP. Bill is shown here receiving the club's gavel, signifying their status as top club in the country for 1975, from ARRL Deputy Communications Manager W1YL. (That's W6RGG in the background.) NCCC began in 1970, grew to 40 members by 1974, and with the infusion of a club newsletter (*The Contest Jug*) and additional membership, attained the Top Club status in 1975. Their success is evident by the fact that rival contesters in the south are busily organizing a Southern California Contest Club (to preserve their honor!). — *WA1STN*

Table 1	PHONE
<i>CW</i>	3850-3950
3550-3650	7200-7250
7050-7100	14250-14300
14050-14100	21300-21400
21050-21100	28550-28650
28050-28100	

# ARRL Sweepstakes

CALL USED. WALRDN

ARRL SECTION... CT



C.W.  PHONE

PREC <u>A</u>	CALL <u>RDN</u>	CK <u>61</u>	SEC <u>CT</u>
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
<u>14</u>	<u>11-7</u>	<u>2210</u>	<u>2211</u>	<u>51</u>	<u>318</u>	<u>B</u>	<u>WA7WXY</u>	<u>67</u>	<u>10A 49</u>	<u>2</u>
		<u>ON</u>	<u>13</u>	<u>2</u>	<u>1027</u>	<u>B</u>	<u>W3LPL</u>	<u>58</u>	<u>MD</u>	<u>1</u>
		<u>OFF</u>	<u>16</u>	<u>3</u>	<u>31</u>	<u>A</u>	<u>K4SKD</u>	<u>33</u>	<u>VA 50</u>	<u>1</u>
		<u>2230</u>	<u>20</u>	<u>4</u>	<u>962</u>	<u>B</u>	<u>W69FT</u>	<u>72</u>	<u>IND 51</u>	<u>1</u>
				<u>5</u>						
				<u>6</u>						
				<u>7</u>						

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 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, 1976 QST, page 73.

**QST**

ARRL November Sweepstakes

CALL USED WALRDN PHONE CT

MODE: CW  PHONE  VE8  VE9  VE10  VE11  VE12  VE13  VE14  VE15  VE16  VE17  VE18  VE19  VE20  VE21  VE22  VE23  VE24  VE25  VE26  VE27  VE28  VE29  VE30  VE31  VE32  VE33  VE34  VE35  VE36  VE37  VE38  VE39  VE40  VE41  VE42  VE43  VE44  VE45  VE46  VE47  VE48  VE49  VE50  VE51  VE52  VE53  VE54  VE55  VE56  VE57  VE58  VE59  VE60  VE61  VE62  VE63  VE64  VE65  VE66  VE67  VE68  VE69  VE70  VE71  VE72  VE73  VE74  VE75  VE76  VE77  VE78  VE79  VE80  VE81  VE82  VE83  VE84  VE85  VE86  VE87  VE88  VE89  VE90  VE91  VE92  VE93  VE94  VE95  VE96  VE97  VE98  VE99  VE100  VE101  VE102  VE103  VE104  VE105  VE106  VE107  VE108  VE109  VE110  VE111  VE112  VE113  VE114  VE115  VE116  VE117  VE118  VE119  VE120  VE121  VE122  VE123  VE124  VE125  VE126  VE127  VE128  VE129  VE130  VE131  VE132  VE133  VE134  VE135  VE136  VE137  VE138  VE139  VE140  VE141  VE142  VE143  VE144  VE145  VE146  VE147  VE148  VE149  VE150  VE151  VE152  VE153  VE154  VE155  VE156  VE157  VE158  VE159  VE160  VE161  VE162  VE163  VE164  VE165  VE166  VE167  VE168  VE169  VE170  VE171  VE172  VE173  VE174  VE175  VE176  VE177  VE178  VE179  VE180  VE181  VE182  VE183  VE184  VE185  VE186  VE187  VE188  VE189  VE190  VE191  VE192  VE193  VE194  VE195  VE196  VE197  VE198  VE199  VE200  VE201  VE202  VE203  VE204  VE205  VE206  VE207  VE208  VE209  VE210  VE211  VE212  VE213  VE214  VE215  VE216  VE217  VE218  VE219  VE220  VE221  VE222  VE223  VE224  VE225  VE226  VE227  VE228  VE229  VE230  VE231  VE232  VE233  VE234  VE235  VE236  VE237  VE238  VE239  VE240  VE241  VE242  VE243  VE244  VE245  VE246  VE247  VE248  VE249  VE250  VE251  VE252  VE253  VE254  VE255  VE256  VE257  VE258  VE259  VE260  VE261  VE262  VE263  VE264  VE265  VE266  VE267  VE268  VE269  VE270  VE271  VE272  VE273  VE274  VE275  VE276  VE277  VE278  VE279  VE280  VE281  VE282  VE283  VE284  VE285  VE286  VE287  VE288  VE289  VE290  VE291  VE292  VE293  VE294  VE295  VE296  VE297  VE298  VE299  VE300  VE301  VE302  VE303  VE304  VE305  VE306  VE307  VE308  VE309  VE310  VE311  VE312  VE313  VE314  VE315  VE316  VE317  VE318  VE319  VE320  VE321  VE322  VE323  VE324  VE325  VE326  VE327  VE328  VE329  VE330  VE331  VE332  VE333  VE334  VE335  VE336  VE337  VE338  VE339  VE340  VE341  VE342  VE343  VE344  VE345  VE346  VE347  VE348  VE349  VE350  VE351  VE352  VE353  VE354  VE355  VE356  VE357  VE358  VE359  VE360  VE361  VE362  VE363  VE364  VE365  VE366  VE367  VE368  VE369  VE370  VE371  VE372  VE373  VE374  VE375  VE376  VE377  VE378  VE379  VE380  VE381  VE382  VE383  VE384  VE385  VE386  VE387  VE388  VE389  VE390  VE391  VE392  VE393  VE394  VE395  VE396  VE397  VE398  VE399  VE400  VE401  VE402  VE403  VE404  VE405  VE406  VE407  VE408  VE409  VE410  VE411  VE412  VE413  VE414  VE415  VE416  VE417  VE418  VE419  VE420  VE421  VE422  VE423  VE424  VE425  VE426  VE427  VE428  VE429  VE430  VE431  VE432  VE433  VE434  VE435  VE436  VE437  VE438  VE439  VE440  VE441  VE442  VE443  VE444  VE445  VE446  VE447  VE448  VE449  VE450  VE451  VE452  VE453  VE454  VE455  VE456  VE457  VE458  VE459  VE460  VE461  VE462  VE463  VE464  VE465  VE466  VE467  VE468  VE469  VE470  VE471  VE472  VE473  VE474  VE475  VE476  VE477  VE478  VE479  VE480  VE481  VE482  VE483  VE484  VE485  VE486  VE487  VE488  VE489  VE490  VE491  VE492  VE493  VE494  VE495  VE496  VE497  VE498  VE499  VE500  VE501  VE502  VE503  VE504  VE505  VE506  VE507  VE508  VE509  VE510  VE511  VE512  VE513  VE514  VE515  VE516  VE517  VE518  VE519  VE520  VE521  VE522  VE523  VE524  VE525  VE526  VE527  VE528  VE529  VE530  VE531  VE532  VE533  VE534  VE535  VE536  VE537  VE538  VE539  VE540  VE541  VE542  VE543  VE544  VE545  VE546  VE547  VE548  VE549  VE550  VE551  VE552  VE553  VE554  VE555  VE556  VE557  VE558  VE559  VE560  VE561  VE562  VE563  VE564  VE565  VE566  VE567  VE568  VE569  VE570  VE571  VE572  VE573  VE574  VE575  VE576  VE577  VE578  VE579  VE580  VE581  VE582  VE583  VE584  VE585  VE586  VE587  VE588  VE589  VE590  VE591  VE592  VE593  VE594  VE595  VE596  VE597  VE598  VE599  VE600  VE601  VE602  VE603  VE604  VE605  VE606  VE607  VE608

# Straight Key Night

That which was lost was found . . . though in some cases just barely!

By Ellen White,\* W1YL

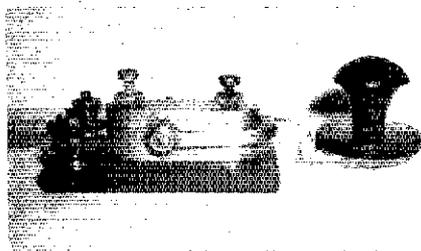
**G**ood heavens, we've been doing this almost six years! It was "yesterday" that K4MD convinced us that a Straight-Key Night would be a "fun" operating event. Several years later enthusiasm for it led to a midsummer rendition, replete with numerous examples of the glass-arm syndrome. Enthusiasm this July was evident though returns were down from the previous January 1 running. A total of 100 reports were received revealing participation by 562 fans. Most activity took place in the sixth call area, most Novices on from the 0 district, and a generally fine showing by the VEs. Several DX stations took part, particularly with the encouragement of the Scandinavian CW Activity Group.

Voting was brisk for both best fist and most interesting QSO. Tying for "best fist" award were W4BEY, K7TLP and W8GMH. Tying for most interesting QSOs were W3TZ, K7TLP and KV4CK. Sharing second-place honors for best fist were: WB2WQA AC3EEK W4YZC WB4ZDW WN4GZT WB6IBO W6AWP WB8VBS and W9MV. Other interesting sidelights (thanks to contest aide WA1AH1) revealed that 4s received the most votes for best fist while most 6s provided the interesting QSOs. Don't fail to note that tying for both best fist and most interesting QSO was K7TLP, our acknowledged certificate winner — FB!

Next scheduled SKN will be January 1, 1977. Start practicing!

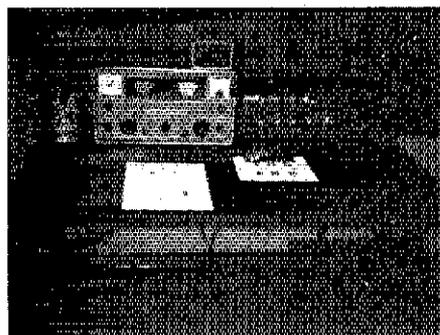
## Sideswipes

I used to think that I could send pretty fair, but a lot of guys made me feel sick that night. Ron, W8GMH,



Used in 1935 and still in daily use by K0UEA. He says it was old then and he believes it was known as a Navy Key.

made me feel sickest. Next time I'm gonna take my shoe off, so look out! — WA4CGO (John "Desenex" Tidball). I was in a tent camp, on Middle Quartz Creek (10,000+ feet elevation in the Colorado mountains) running an HW-101 from battery and E/G charger; plus an inverted vee from a 20 ft. temporary pole. It was *cold* when the sun went down. I sent with the straight key mounted on an old iron plate held in my lap; gloves on, slapping 4-engined mosquitoes with one hand, pounding



Will I be back for the next SKN? Does Murphy like to visit contests? — WN4GZT

brass with the other. Couldn't stick it out but sure enjoyed it. — W0RE. FCC should outlaw keyers; straight keys make people more friendly. — WN0PGZ. As a matter of interest I used the straight key of Fred W. Crandell, formerly WB0JRA, who became a Silent Key last year. It was a memorial gesture to a well-liked gentleman of this community. — W0FCL. My rig was dying but fortunately it didn't provide me with any bicentennial fireworks! — WA1PAZ. My first SKN and I doubled my enjoyment using my 50-year-old key and Frost Fones, both acquired when I was first licensed in 1926. — W2FGI. My vote is for W1EIH, for the best imitation of a keyer I heard. — WB2ZYR. VE3AWB turned out to be a R.R. buff which led to some interesting comments. — W2BGN. Thanks for a change from the routine. — NJ2PVL crew. I worked out a system of grading taking several items into consideration: readability, character spacing, letter spacing, and word spacing; grading them (1) for good, (2) for fair and (3) for poor. By adding the total points of each station I arrived at the fact that W8RQ had the best fist. But there was indeed very nice sending by all operators. — W4RHZ. An enjoyable activity on the eve of our nation's Bicentennial, of which amateur radio has existed a fourth of those glorious years. — WA4CMS. New rule for December: WBSNHH cannot discuss eating homemade biscuits while SKNing. — W5FX. Since SKN has turned out so well, why not have a QRP night where everyone runs under a certain power limit? — WB6HBT. An enjoyable evening, thanks. — K6OS. Enjoyed SKN very much with my old, old railroad key glued to a heavy copper base. It seems that all SKN people are extraordinarily

\*Deputy Communications Mgr., ARRL

friendly and good QSOers. — Sis, K7TLP. Most interesting QSO was with WA4EBN, about tobacco farming in Kentucky. — WN8WTS. Heard everything from beautiful code to sounds like garbage-can lids being rattled. — WB8OZA. When W0AP discovered that I, too, was a member of the Society of Wireless Pioneers, he favored me with a completion of the QSO with his J. H. Bunnell sideswiper. A most distinctive fist. — W9MV. My old J-37 is very disappointed; just one SKN QSO, with WINJG. Wait till next time. — I2VRF. I



kept telling myself, relax your arm, dummy, but my arm just would not cooperate. — W0LNZ. Nostalgia at its best again. Looking forward to the next SKN/Nostalgia Nite. — W8GMH. A contrast to the hectic pace during most other organized operating activities and contests, it is a pleasure to work SKN simply for the pure relaxed fun of it. — W6WQC. My vote for both best fist and QSO was also for the longest call worked, AA1DC/AA1CAM. — W8LWD.

[Editor's Note: Thanks, Joe, for the FB cartoon herein.]

## Strays



### ARRL FOUNDERS REMEMBERED

□ On a typically warm, summer day more than 40 amateurs gathered in Hagerstown, MD, at the gravesite of Hiram Percy Maxim to mark the 40th anniversary of his passing. Among those invited was Hiram Hamilton Maxim, son of IAW. Though he could not attend the ceremony assembled by the Foundation for Amateur Radio, he sent this letter:

"In 1911, when I was 11, I had a friend, John Garret, and he had a friend named Harmon Barbour. We all went to the same school. John told me that he had made a wireless set and that he could telegraph back and forth with Harmon who had also made a set. I told my father, Hiram Percy Maxim, about this. He exhibited predictable skepticism and allowed he would like to set up a test. So, he gave John a message to send to Harmon who was then to call back on the telephone and say what the message was. This was done. Harmon called back the correct message, and my father was hooked for life. John's transmitter was rather primitive. It consisted of a Model-T Ford spark coil with the vibrator screwed down, an electrolytic interrupter and a spark gap made from two zincs from a sal-ammoniac wet battery, the wires stapled down to a board. Where the wires crossed they were separated by small pieces of broken glass.

"My father was a very competent engineer. He had to have something better than that; so he bought a set from a firm in New York named Hunt & McCree. The receiver consisted of a tuning coil, an electrolytic detector, and a pair of earphones. The transmitter was, predictably, a Model-T spark coil and the usual spark gap made from two battery zincs.

"This outfit had its limitations. He

had to have something better. He saw a much more impressive set in a toy store in Hartford, bought it and brought it home. He and I could not seem to make it work and he took it back to the store.

"Two days later, a rather unusual-looking young man turned up at the house in the evening and said he was Clarence Tuska, and that he had made the set, and wanted to know why my father was dissatisfied with it. My father was so impressed with the young man that an immediate friendship sprang up that continued throughout my father's life. That was 64 years ago, and I can still see that young man standing in the doorway talking to my father.

"We eventually made the set work. It had a very advanced tuner called a 'loose coupler,' which my father and I could not understand at first. The detector was, of course, a galena detector.

"He and I worked the set every night. We got along so well that in 1913 we all got First Grade Commercial Radio Operators' licenses.

"We eventually worked up to a transmitter consisting of a 'one and a half-inch' spark coil, again with the vibrator screwed down, connected up in series with the Hartford Electric Light Company through a large choke coil consisting of miles of wire wound around a cast-iron core about three inches in diameter and ten inches long. The spark gap was two twenty-five cent pieces mounted on rods with a gap of about an eighth of an inch. This was a quenched gap, very new and advanced.

"With this outfit we could work about thirty-five miles. By this time there were many amateurs all over the country. Here is where the League started. Clarence Tuska and my father got the idea that if all the amateurs were persuaded to join a league that messages could be relayed all over the country.

And that was the beginning of the American Radio Relay League.

"Our equipment improved rapidly. The last transmitter I worked with my father was 'Old Betsy,' now in the League's museum, which was a rotary gap running about 7000 rpm with a one-kilowatt Thordarson transformer across it with a great case of Leyden jars as a condenser. It was a fearsome outfit. I often wonder what would happen if they hooked the thing up again and started to transmit. I suppose it would paralyze every radio in fifty miles.

"I worked the station steadily with my father until I went off to M.I.T. and also began to get involved with those distracting things called 'girls.' I now get on the air only with the radiotelephone on my boat.

"It is very heartwarming to me that you are having this service. As I look back to the beginnings of this worldwide organization and realize what it has become, I am amazed at what has sprung from that chance idea that occurred to my father and Clarence Tuska 62 years ago. I hope it will continue to grow and flourish as long as there is amateur radio. 73 OM"

### Hiram Percy Maxim Honored

□ Other letters-in-absence were received from C. D. Tuska, son of the League's co-founder, and from Sen. Barry Goldwater, K7UGA. Wreaths were presented by the Foundation for Amateur Radio and the Antietam Amateur Radio Club. All who attended the ceremony paid tribute to a man who made amateur radio a very important part of his life, displaying the real feelings at the root of our beloved hobby. Not only did Maxim make a valuable contribution to amateur radio, but to each of our lives through it and the fellowship of ARRL. — K4SHE

# Results: 1976 ARRL International DX Competition

Here's our cure for the wintertime blues.

By Jim Cain,\* WA1STN

Ordinary mortals who have little reprieve from the dastardly month of February must certainly feel lucky to escape with their lives from the shortest calendar month which always seems like 280 days instead of 28. A lucky few radio amateurs don't fare so badly, though. They have the ARRL International DX Competition.

Friday, the day before the first weekend of February, a government worker near Washington, D.C., takes "annual" leave at noon and heads for home in suburban Maryland, after a stop at the local hardware store. The snow has stopped, but ice accumulated in the past week sticks to trees and power lines like solder applied to a hot wire. It's the kind of cold where fingers pressed to bare metal stick, where a breath taken through the nose freezes inside. Gloves worn to protect from the bite of 10 degrees above zero prevent the wearer from performing any task more delicate than turning a doorknob. With all the odds against him, fortified by a cup of strong coffee, our friend is atop his 130' tower; disassembling his prop-pitch rotor, cutting, soldering, taping, hoping.

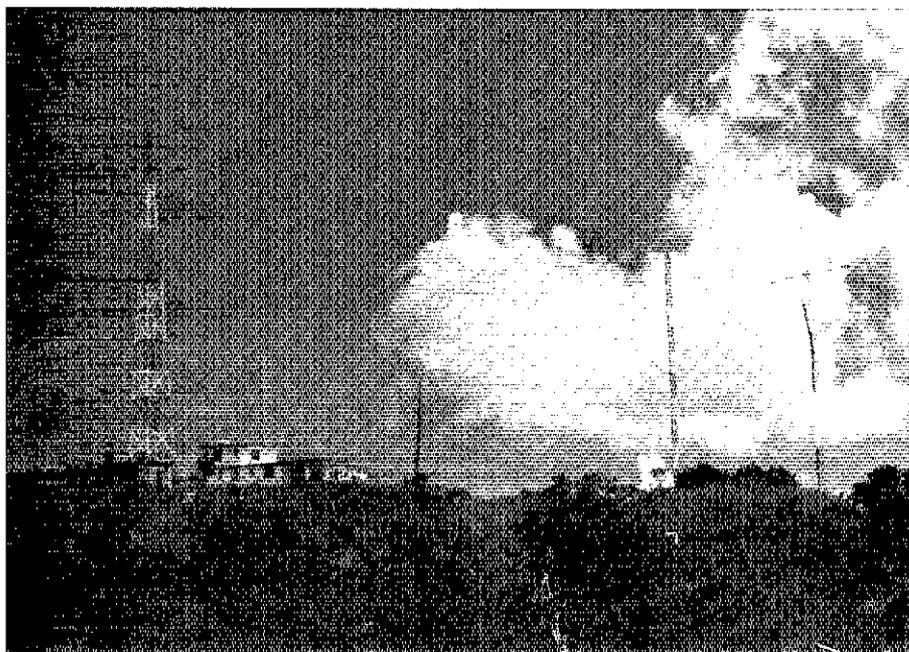
Chicago had the storm a week earlier, then sent it along to Maryland. The ice is gone and most antennas are still standing, in one piece. A school-teacher skips his last period of the day, a study hall, and stops on his way home at Barney's Rent-All, for a previously reserved coffee maker; 50 cups per batch, guaranteed quality. Together with the five pounds of beans from the last supermarket run, the system should provide for the needs of twelve sleepy, grown men and two wives for a period of forty-eight hours. Just a glance up-

\*Asst. Communications Manager, ARRL

ward before he hurries in the door assures the math teacher that all of last summer's hot work wasn't in vain; every boom is level, every element straight, guy wires tight, and only a couple of ground radials unrepaired after the lawn mower chewed them up and spit them out in the last mow of autumn.

Noon in Maryland is 9 A.M. in Washington state. It's raining, naturally. One graduate student's mind is not on his first class of the day, but rather on the last, and how he can avoid it. Only three weeks into the winter term and at probably the most propitious time for mysteriously missing a session, our

college person returns to his apartment, packs headphones and a fresh supply of contest log sheets, makes a cardboard sign reading "College Student to Tacoma" and heads for the highway. He hasn't seen the station he will operate in the DX Test since last November, hasn't operated on the ham bands since Christmas, but he knows the station as if he had built it himself. Four straight weekends on top of three towers (not all at once!) will do that. The only questions in his mind are how much antenna-repair work will be necessary between noon and contest time and how much will that antenna work sub-



A down-the-hill view of the antennas responsible in part for the top DX phone score from KP4AST. Left to right: Two-element wire beam on 160 (off the big 160' tower), rotary two elements on 80, seven on 15, five on 10, five on 20, and three on 40.



K2JOC is shown here running VP2MOC, one of many popular DXpeditions; this one on cw.

tract from the margin of endurance he has spent the past month building up.

Darkness has already fallen over Lisichansk, in the Ukraine. Members of the club station of the Coal Mines have taken their evening meals and assembled at UK5MAF, located in one of the technical school's engineering buildings. A heated discussion surrounds information read aloud from a dog-eared *ARRL Antenna Book* by one of the more fluent English-speaking club members. Will a director added to the 40-meter beam be worth the effort in a few hours? Would the time be better spent raising the 3.5-MHz antenna another 5 meters? What about the new solid-state keyer that the club's transmitter, running the maximum allowed power of 200 watts, seems to affect on the lower frequency bands? There aren't enough members present to accomplish all three tasks, so committees are formed to fix the keyer and raise the 80-meter dipole. The beam can be adjusted during the day tomorrow, if necessary.

Lloyd and Iris Colvin, W6s KG and DOD, have the ultimate solution for the February doldrums. They are in the Fiji Islands, approximately midway through a Pacific jaunt which will eventually last almost six months. Leading a life of leisure, they aren't even out of bed yet, while our acquaintance in Maryland desperately fights the cold and ice. They've already worked several thousand amateurs from the Fijis and the purpose of their trip is not particularly contesting. By the time March is over, though, they will have entered all four weekends of the DX Competition, on both phone and cw from the Fijis and from Nauru, signing 3D2KG and C21NI. Right now it's just too hot outside to get particularly excited about any last-minute changes in their DXpedition station.

At home in Oregon, Bill Rindone, WB7ABK, is talking to his travel agent, making plans to begin a worldwide tour in a few weeks. Bill is more interested in *being* DX than working it, at the moment. His trip will coincide with the last

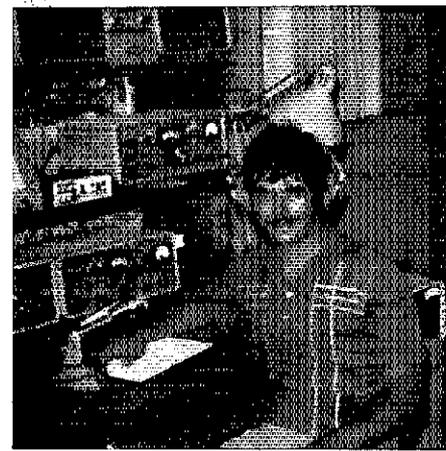
weekend of the ARRL Test, in March, and he will make almost a thousand cw contacts from Tonga Island, signing A35NN. It will still be cold and snowing in Connecticut when Bill's logs arrive late March, and the note attached to them written on Dateline Hotel-Tonga stationery, complete with palm trees, will be little encouragement to the log checkers, whose fingers are still numb an hour after coming in from the cold.

At four P.M. in Maryland the sun has already disappeared and the temperature is dropping. Fortunately, the contest is on phone this weekend, since our intrepid antenna fixer's keying hand will be uselessly frozen for many hours. The thermometers on Dutch Saint Maarten read 87 degrees, in stark contrast to the frigid USA, and a crew of Northeastern U.S. amateurs, led by Eastern Airlines pilot WIYE, prepare to assault the ham bands for 48 hours signing PJ8CO. Their several hundred pounds of radios and antennas having made it along with them and at the same time is a sure sign of success to come, a prophecy borne out by their final weekend tally of 4,656 contacts with the States and Canada. No frozen fingers in this group, but lots of sweat as they set up rigs and antennas for a multi-transmitter effort. Their primary goal is the phone contest, but they will stay two weeks and "try some cw," in their words. Try it they will, on the next-to-the-last weekend of February, to the tune of 2909 contacts on code, but first there is some talking (and beer drinking) to be done. February can be a glorious month.

It's summertime at Palmer Base, Antarctica, and personnel there can actually venture outside for minutes at a time without being blown away by fierce winds and blinding snow. Tom Frenaye, WB6KIL, is chief operator at KC4AAC, long the only source of communication back home for the few hundred men stationed at the base. Tom



Tom, WB6KIL, in cozy comfort at KC4AAC.



Here's Chip, K7VPF, shown at station of W7SFA. Not much introduction needed for anyone who ever works Sweepstakes or the DX Test; also a famous QST author (watch November issue).

has decided to take some time out from the phone patching and enter the ARRL contest, but isn't sure if it will be worth it. The last boat out is due to leave in the middle of the activity (late February) and what good is entering if only half the logs can be transmitted to Newington? Once the winter begins it will be six lonely months before another ship takes mail out and, more importantly, brings mail in. Tom has a good station, though, and decides he will solve the mail problem somehow. Through four weekends of the contest thousands of contesters are first amazed and then highly pleased at the level of operating shown by the unknown ham at KC4AAC. A change in schedule results in the last ship leaving the frozen continent the very morning after the last contest weekend, and Newington becomes the proud possessor of a complete set of contest logs from KC4AAC. Mail service to Tom will begin again just in time for him to receive this QST, along with his certificates.

Ships arrive at the Caribbean island of Montserrat every day, and one of them early in February contains WA8SEV and WB9MEV, along with some radios. Neither has much contest experience, but February seemed like a good time to head south. VP2M has been a particularly attractive spot for radio work lately, especially for the ARRL Competition with tailor-made propagation to the States. John and Irene intend to learn about contesting and make some statesiders happy. At the end of 48 hours they have produced over 4000 contacts, and we didn't hear a single complaint about their operating. Some old-timers should be so successful!

VP2MEV has company in the sunny Caribbean . . . K2BPP is on Anguilla; F6BBJ vacations and operates from Guadeloupe; W0OIR and W0OXN travel



The top club's top cw man: Frankford's W2GXD, also Hudson Division leader.

Participants aren't even thinking much about the DX Test at this point, because they know those first few hours can be extremely frustrating if you aren't a Big Gun. Old-timers will tell you that if everything is prepared, nothing needs a last minute fix, and all is well; the last two hours or so before a contest starts can seem like an eternity. Once 0000 rolls around it's go, go, go for 48 hours, and sitting on one's hands waiting for that can be murder. Maybe the guy with the busted rotor who spends his last hours working is lucky, after all!

Last February rotors were fixed, 50 gallons of coffee made, rides to Tacoma found, wives and husbands placated, log sheets received in time, planes caught, gear cleared through customs, licenses obtained, sleep caught up on, and even some sunspots cajoled onto the surface of our benevolent star. The DX Competition went on in grand style. Blessed by solar activity reminiscent of perhaps 1973, if not 1970, 15 meters opened nicely for all parts of the country on both modes, and it worked the second cw weekend into Europe for just about all areas east of W7. Ten meters was good for 40 multipliers on phone, but almost totally useless on cw. Things have indeed become depressing when we forget about ten and jump for joy merely because 15 opens up!

### USA Notes

On cw, W3LPL began his quest for a second time around as top single operator, a feat last attained by K1DIR in '67 and '70. Frank's first hour, 61 contacts on 40, is indicative of his entire performance. Last year's top cw man, K7VPF, had to settle for second this time from his home-away-from-home, W7RM. Competition was so stiff for the top ten listing it took 1.3 megapoints just to make it; seven call areas are represented in that listing of ten iron-

### One Weekend DXpeditions (All Are Certificate Winners)

<b>CW</b>	
A2CNN	(SM4CNN)
A35NN	(WB7ABK)
C21NI	(W6DOD,W6KG)
K6OJ/C6A	
W7APN/C6A	
W8LKW/C6A	
HB0AN	(HB9AHA,HB9AIU)
DK6NJ/HB0	(DK6NJ,DJ8MH,DJ8JY)
PJ8CO	(W1YE,K1LPA,K1DQV, WA2AUC)
PJ9JT	(W1BIH)
PZ1DR	(W3GXF)
VP2DE	(F6BBJ,FG7AN)
VP2G	(W5MYA)
VP2MOC	(K2JOC)
ZB2DM	(K7CBZ)
ZF1AL	K4SHB,WA4SVH,WB4TAF)
ZS6BNF	(SM4CNN)
3D2KG	(W6DOD,W6KG)
4U1ITU	(K4GTS)
8P6HN	(W0OIR,W0OXN)
9Y4AC	(VE7BZC)

### PHONE

C21NI	(W6DOD,W6KG)
FG0BKZ	(F6BBJ)
KG6AAY	(WA3HRV)
PJ8CO	(W1YE,K1DQV,K1LPA, WA2AUC)
PJ9JT	(W1BIH)
VP2EEE	(K2BPP)
VP2MEV	(WA8SEV,WB9IWN)
W1GNC/VP9	(W1GNC,WB2CHO)
3D2KG	(W6DOD,W6KG)
W0NAR/6Y5	(W0NAR,WA0ONK)
9Y4AC	(VE7BZC)

to Barbados; three Floridians operate from the Cayman Islands; W7APN, W8LKW and K6OJ are all in the Bahamas at one time or another during the four weekends. W1BIH makes his usual two-weekend stop at his home on beautiful Curacao, W0NAR and WA0ONK spend a weekend hamming from Jamaica, and W1GNC and WB2CHO arrange a last-minute trip to Bermuda to make almost 3,000 contacts as W1GNC/VP9.

Crowds are beginning to gather at various amateur installations in Maryland, in California, in New York, Indiana, Virginia, Florida, Michigan. At two hours until blastoff there is so much left to be done at a multi-transmitter operation. Those who have been through it before already have some of the problems solved, but improvements since last year always bring with them brand-new problems. Club officers are beginning to call members to remind them of the activity soon to start, excuses not allowed. At fourteen minutes past the hour, at 2214 and 2314, one can almost feel the receivers tuned to WWV for the latest propagation forecasts; one has to phone CQ magazine's Dial-A-Prop a half dozen times before he gets anything but a "busy" signal. Japanese signals are already peaking on 15 meters in California, a bad sign for later. The Europeans have faded from 14 MHz for most of the States, and it looks like another contest to start on 40 with occasional quick scans across 20 for PY and LU stations (the Africans will surprise us in the opening hours of the contest, though).

With two hours to go, serious contesters have already eaten their last supper for the weekend. . . they know that digestion processes will drain their brains of blood badly needed for the hectic first hours (where the contest is sometimes decided). Smart casual par-

men, from as far north as Connecticut and Washington to as far south as Texas and Florida, from East to West Coast. Even a middleman in the form of K4GSU, Doctor of Radio.

Single-operator phone was a struggle between the coasts, with guest operator WB6OLD at W6HX nosing out WA2CLQ at W1ZM. It was a battle by the books, with HX whipping all the competition on total contacts and ZM

### Division Leaders

#### PHONE

#### SINGLE OP

ALL	LOW	HIGH	
W3LPL	K3GZQ	WA2BYJ	Atlantic
K9HMB	K9UWA	WB9HAD	Central
W2GUH/0	—	WA0ONL	Dakota
K5KLA	WA5RTG	W4EFQ	Delta
WABYWX	WA8ZDF	WB8WO/8	Great Lakes
W2GXD	W2HHC	WB2SZS	Hudson
WA0PAO	W0PRY	WB0HOG	Midwest
W1ZM	W1FXD	K1RQE	New England
W7SFA	K7RSC	WB7ABK	Northwestern
K6CQF	K6QHC	W6PXG	Pacific
K4VX	W4QCW	W4WSF	Roanoke
WA0CVS	—	WA2WMT/0	Rocky Mt.
WB4UZT	W4YWX	W4ZTW	Southeastern
W6HX	WA0OOL/6	WB6PXP	Southwestern
K5PFL	—	K5BZU	West Gulf
VE2AYU	VE3ENM	VE1ANH	Canadian

#### MULTI-OP

M-S	M-M
AD3GJD	W3AU
—	WA9NPM
WB0ANT	—
W5PBZ	—
W8CNL	K8IDE
K2BMI	AC2PV
W0PCO	—
WA1K1D	W1MX
WA7ZLC	—
W6OKK	W6PAA
W4MYA	W4BVV
—	—
AA4UFW	AA4LZR
K6SVL	W6ONV
—	WB5OOE
VE7BGK	—

**CW Multiplier Leaders**

MINIMUMS	5	40	60	80	60	10	MINIMUMS	5	40	60	80	60	10	MINIMUMS	5	40	60	80	60	10				
BAND	160	80	40	20	15	10	BAND	160	80	40	20	15	10	BAND	160	80	40	20	15	10				
<b>ALL BAND - CW</b>																								
K1DPB	33	45	75	60	11		K6CQF	24	62	70	41	15		W3GM	20	73	97	93	88	20				
W1DAL	47	80	81	72	1		K6DC	14	64	68	18	1		W3GPE	64	93	129	74	10					
W1HFB	56	73	75	72	14		W6ABT	13	15	35	24	10		W3TV	29	61	81	83	15					
W1JFL	5	13	19	61	50	5	W6MUR	21	71	70	31			W3WJD	19	84	99	110	101	20				
AC1PL	3	51	56	70	65	1	W6NKR	24	64	54	21			W4BVV	20	74	110	112	96	18				
W1YN	34	65	64	48	7		W6OUN	2	42	69	76	45	13	AA4LZR	45	79	67	84	17					
WA1ABV	40	49	71	29	1		W6PAA	1	32	68	72	39	4	W5MYA	7	47	83	86	77	21				
WA1ABW	47	65	74	62	7		W6RTT	31	53	83	42	7	K6BCE	10	53	81	92	59	26					
WA1SSH	41	60	65	54	9		W6WB	29	34	48	38	15	K6RR	10	50	75	79	49	18					
WA1STN	42	62	65	62	9		WB6KKBK	1	22	62	67	34	8	W8HBK	7	49	74	76	67	2				
K2BMI	49	69	83	63	14		W7IR	6	35	74	83	50	14	W9CL	11	56	69	93	71	13				
K2FL	51	52	72	65	10		W7RM	8	34	70	82	42	1	<b>LOW BAND</b>										
K2LE	48	64	86	55	11		K8CXM	14	25	81	5			K1NOL	8	55	98							
W2AZO	34	47	64	52	10		W8RSW	13	40	84	58			K1RQE	15	61	74							
W2GGE	43	69	72	42	2		W8VSK	24	45	80	49	11		K1TZQ			72							
W2GXD	1	53	78	80	68	11	AA8NYB	36	45	81	33	1		W1BB/1	16									
W2HBT	40	53	50	80			K9BGL	35	64	68	55	10		W1OR		40								
W2HUG	5	16	16	38	17		K9UIY	19	29	83	12			W1SWX		44								
W2REH	44	63	79	60	10		AD9UKM	17	47	86	41	3		WA1UIK	2	55	74							
WA2YHK	39	60	66	59	7		W9OHH	27	66	82	53	2		W2FR		46	35							
WB2FIT	44	62	76	55	10		AC9PNE	8		22	13			W2TE	7		27							
W3BGN	4	49	72	87	64	12	W0PCO	35	64	78	57	3		W2TO		47								
W3EYF	25	60	72	46	2		W2GUH/Ø	35	52	81	58	3		WA2UJM		48	65							
AC3GID	15	17	69	63	3		<b>MULTI-SINGLE</b>																	
W3GRF	3	43	66	84	69	8	K1VTM	47	79	80	53	6		K4IEX		39	63							
W3KFQ	7	34	83	55	2		WA1KID	8	53	73	84	63	8	W4QCW	15	8	27							
W3KT	12	41	77	51	11		WA1LNQ	51	59	84	67	10		W4YWX	8	84	92							
W3LPL	62	94	91	83	17		WA1NKK	41	63	71	62	2		K5JVF	6	21	18							
W3NZ	45	47	50	40	4		WA1NRF/1	54	65	80	67	5		WA5RTG	6	38	68							
W3VT	24	73	77	54	1		W2YD	57	74	83	63	2		W6ITY	5	34	55							
WA3SZI	28	43	89	39			K3GJD	7	61	72	83	66	14	K9DWK	5	23	60							
AC9SZR/3	6	56	63	79	48	1	W3YXM	5	17	70	63	50	7	W9MEM	1	42	81							
K4GSU	10	47	77	83	77	10	AC4MYA	1	38	62	84	56	9	<b>HIGH BAND</b>										
K4HWW	32	36	55	53	13		W6BIP	18	44	53	39	16		K1MGA		70	65	9						
K4VX	3	44	76	81	69	8	WA6NGG	36	58	69	43	14		K1OEY		65	49	10						
K4YFQ	8	55	80	75	79	11	K7NHV	31	68	80	46	1		W1YG		76	55	11						
AD4TIG	38	65	82	66	15		W8LT	3	41	51	68	44	10	WA1NZT		80	75	12						
W4BV	35	62	69	58	2		AA9IVL	35	56	82	45	2		W2AO		70	60	8						
W4KXV	36	45	62	54	10		<b>MULTI-MULTI</b>																	
W4YZC	7	7	89				W1MX	13	71	85	84	75	9	W2DXL		95	73	16						
W8FAW/4	43	69	78	75	13		W1ZM	9	66	87	89	91	13	WA3WIK		83	56	4						
WA4DUS	6	19	30	46	29	5	K2CW/2	7	42	59	40		AD4BAI		94	86	16							
WA4TLB	5	41	60	78	55	5	W2PV	21	73	103	113	99	16	W4WHK		78	76	10						
K5PFL	5	49	71	69	66	12	W3AU	21	82	107	113	95	22	W4WSF		77	68	8						
W5JC	8	23	41	39	10		W3BWZ	12	62	83	94	77	13	W4WXZ		67	55	11						
W5RTX	32	54	74	57	10		W3FA	40	67	70	75	3	AB4TDH		81	69	14							
W5WZQ	12	53	84	84	75	10	W3FRY	15	81	100	114	95	20	W5GO		49	68	9						
WA5VDH	40	52	70	36	9									AD6SDR		73	35	11						
														W9KNI		91	56							

working multipliers at a level above most multi-operator stations. W3LPL, who has been known to claim to not own a microphone, "just got on to try out his antennas" and came in third. Competition toward the bottom of the Top Ten got a little scarce, as evidenced by the fact that WA1JLD put W1YK on the air just one weekend (43 hours) and came in tenth. Middleman on phone was K9HMB who scoffed at the old tale that the "Midwest can't win" and proceeded to come in eighth. Also, note FB phone scores from WA7WXY and W2GUH/Ø, both recently transplanted from the more multiplier-productive East Coast. Maybe they just weren't smart enough to realize that good scores *can't* be made from Minnesota or Idaho, so they went ahead and made them.

Multi-single proved an interesting category for many this year, especially as more and more active clubs institute repeaters for multiplier hints and kinks.

A few multi-single entrants find themselves listed in the multi-multi category, having been judged by the Headquarters



This is Charlie, W2HMH, Frankford phone winner and fourth-highest single-operator score.

Awards Committee to be closer to that grouping. The dividing line is a fine one which entrants must draw for themselves and then stick to, and the Committee wishes to avoid at all costs writing restrictive rules concerning multi-single. The new rule this year requiring single operators and multi-singles to submit logs in order by time (rather than by band) enables the Committee to more effectively police these categories. Keep in mind that the logging requirement does *not* in any way restrict one's pattern of operating (band change as often as you like and as your station setup will permit).

Multi-single seems to be more of an East Coast activity, probably because additional help, be it people or spotting net or both, is more important for chasing multipliers than for "running" stations. That's our theory, anyhow. Notice how many of the multi-single scores would fit quite nicely into the

**Phone Multiplier Leaders**

MINIMUMS	5	50	50	80	60	30	MINIMUMS	5	50	50	80	60	30	MINIMUMS	5	50	50	80	60	30				
BAND	160	75	40	20	15	10	BAND	160	75	40	20	15	10	BAND	160	75	40	20	15	10				
<b>ALL BAND-PHONE</b>																								
W1HFB		70	49	100	70	26	K9HMB	2	47	47	103	69	30	W4BVV	27	96	83	132	99	38				
W1YK		38	30	91	55	18	WA9BWY	2	34	39	88	57	30	AA4LZR		65	52	92	97	20				
W1YN		33	37	73	65	27	WA0CVS		45	48	74	55	32	WB5OOE	8	63	62	97	90	46				
W1ZM		78	50	115	64	37	W2GUH/0		46	28	82	52	31	W6ONV		59	51	95	67	24				
WA1ABW		47	41	87	71	30	<b>MULTI-SINGLE</b>				K8IDE	3	48	53	92	49	22	WA9NPM		52	38	92	51	28
WA1UAD	2	32	27	74	62	19	W1CF		96					<b>LOW BAND</b>										
W5UDK/1	2	29	32	86	60	30	WA1ABV		64	44	103	74	30	W1BB/1	12									
K2FL		44	37	79	66	33	WA1KID	4	56	53	120	70	32	W1FXD		43	68							
W2GXD	2	37	39	99	66	29	WA1LNQ		59	33	87	59	23	W1NJJ		59	27							
W2HBT		41	33	48	91		WA1NRF/1		70	42	108	63	27	W2HHC	8	54	53							
W2HMH		62	44	102	79	34	WA1STN		70	41	103	73	31	K4YFQ	14	59	53							
K3EF	2	38	27	82	49	25	K2BMI		68	40	80	75	24	W4QCW	17	18	40							
W3GID		38	1	67	61	20	K2IGW		31	37	91	48	24	W4YWX	20	76	62							
W3Kfq		3	23	84	60	20	W2EHB		33	30	78	61	18	K5KSI		62	52							
W3LPL		69	59	102	75	37	K3AVT		28	26	96	22	2	W5WMU		61	57							
W3USS	8	43	36	67	50	29	AD3GJD	3	69	42	95	52	21	WA5RTG	14	67	56							
W3VT		37	33	73	60	29	K3HZL		40	38	81	68	28	WA5UCT/5		69	38							
WA3WRD		23	31	81	36	15	W3GRF		49	49	101	69	19	W6ITY	2	53	36							
K4VX	3	54	40	99	60	31	W3YXM	5	32	54	68	53	26	WA8ZDF	11	86	69							
AC4QAW		32	46	84	56	19	W4MYA	2	51	41	89	54	33	K9UWA	5	45	46							
AC4WRY	9	52	28	46	25	19	W5PBZ		12	3	30	43	30	VE3BBN	5	50								
WA4DUS	10	33	14	51	26	5	K6SVL		35	41	67	62	28	<b>HIGH BAND</b>										
WA4TLB	5	49	30	96	54	27	WB6KBK	1	34	48	81	53	30	K1CSJ				90	45	18				
WB4PXW	6	46	32	51	54	29	W0PCO		55	43	99	53	23	K1RQE				96	79	34				
WB4UZZ		42	52	78	61	29	<b>MULTI-MULTI</b>				K1VBL				78	70								
K5JZY		35	40	53	65	37	W1MX	10	65	52	90	68	6	W1DO				80	20					
K5KLA		37	31	65	71	42	K2CW/2	9	48	47	48			W1YG				86	54	12				
K5PFL	13	56	54	73	67	38	AC2PV	26	95	78	140	102	39	WA1NKK				79	68	13				
K5VTA		35	34	52	60	30	W3AU	27	97	80	137	112	40	WA2BYJ				76	62	29				
K5YMY		31	38	57	63	35	W3DHM	13	76	73	123	84	37	WB2VFT				81	65	11				
W5NMA		35	49	43	55	31	W3FRY	17	56	68	121	83	37	W4WSF				101	68	35				
W6HX	3	56	52	77	67	34	W3GM	6	82	73	132	78	38	WA4HPF				102	56	31				
W7AYY		18	20	38	42	30	W3GPE		52	54	109	78	35	WB6PXP				75	66	29				
W7SFA	4	60	45	87	42	19	W3TV		24	18	53	60	18	WB9HAD				96	55	25				
WA7WXY		51	42	71	50	23	W3WJD	22	104	79	133	102	45											
K8YRV		20	44	83	41	23	AA3NGS	5	71	64	125	75	38											
WA8YWX		35	28	86	42	24	LU1BAR/W3	8	33	28	64	50	21											

single-operator top scores. It's that single-op category that separates the men from the boys (editorial). Note that nearly every large multi-single score went to a top contest-club aggregate.

The top four stations dominated multi-multi again this year; W2PV (whoops, AC2PV) finished first on phone again, the 20-meter total spelling the difference. Stacked beams and WB2OEU operating 20 are the reasons. W3AU had the highest multiplier of the entire contest at 494, and these days it takes near perfection to do so well. Gone are the days of 150 countries on 20 and 15 and over a hundred on 10 meters.

Cw multi-multi was led by W3WJD, with higher antennas this year on both 40 and 80; K6BCE and K6RR on cw join with W6ONV on phone to prove that multi-multi is indeed viable from other than the shores of the Atlantic. Your contest corner personnel unanimously voted the K6RR log "cleanest" in terms of content of call signs, multipliers, and general accuracy. Congrats! They would make a good Cedar Rapids receiver testimonial.



Another biggie from Puerto Rico: Mike, AJ4EAS, turned in the second-highest single-operator phone score, as well as a fine low-band cw effort.

1976 was the second trial year for the high- and low-band single-operator competitions; the Contest Advisory Committee is presently deliberating on a recommendation to either keep or do away with these specialized areas of competition. Two years ago it was thought that the sunspot drought would encourage considerable activity in the low-band competition, but that hasn't been the case. The chart below gives

some figures on the high- and low-band categories for the last two DX Competitions.

	1975	1976	DX-1976
High-band plus			
low-band cw =	180	212	326
All-band cw =	423	477	276
High-band plus			
low-band phone =	250	247	153
All-band phone =	408	432	117
Total W/VE	1261	1368	872

1976 grand total, including check logs: 2405

The above numbers speak for themselves; about the same number of "entrants" in each category, with the top scores up in three of the four groups. Kudos to WA8ZDF for retaining his low-band phone crown and to perseverant K1NOL who rose to the low-band cw top spot this year after a third-place in 1975.

**Club Competition**

Philadelphia's Frankford Radio Club did it again, primarily with their multi-

**Top Ten**

**SINGLE-OPERATOR CW**

W/VE	DX	Score
W3LPL	KP4EAJ	3,852,687
W7RM	PJ2VD	3,702,105
W5WZQ	KP4EKI	3,495,270
W2GXD	KH6IJ	2,512,488
K4YFQ	VP2MOC	2,139,000
K4GSU	VP2G	2,131,974
W3BGN	PJ9JT	1,869,120
W6OUN	KV4IO	1,626,888
K4VX	KH6CF	1,609,089
W1HFB	KH6HKM	1,479,816

**SINGLE-OPERATOR PHONE**

W/VE	DX	Score
W6HX		1,799,892
W1ZM		1,756,464
W3LPL		1,388,178
W2HMH		1,164,267
W1HFB		1,142,505
W7SFA		1,137,225
K4VX		1,066,779
K9HMB		1,008,432
W2GXD		944,112
W1YK		835,200

**Division Leaders**

**CW**

**SINGLE OP**

ALL	LOW	HIGH
W3LPL	WA2UJM	WA3WIK
K9BGL	W9MEM	W9KNI
W2GUH/Ø	KØIHG	WØHW
W5RTX	WA5RTG	W5TXA
K4GSU	K8UQA	WB8DTT
W2GXD	W2HHC	W2DXL
WØPCO	WØPRY	WØMUH
W1HFB	K1NOL	WA1NZT
W7RM	K7JCA	AA7JCB
W6PAA	WAØENP/6	W6ZT
K4VX	W4BAA	W4WSF
WAØCVS	K1PKQ/7	---
K4YFQ	W4YWX	AD4BAI
W6OUN	W6ITY	AD6SDR
W5WZQ	WB5OWX	W5GO
VE2AYU	XJ2AHI	VO1HH

**MULTI-OP**

M-S	M-M
K3GJD	W3WJD
AA8IVL	W9CL
WAØCPX	---
---	---
W8LT	W8HBK
W2YD	W2PV
---	---
WA1KID	W1ZM
K7NHV	---
WA6NGG	---
AC4MYA	W4BVV
---	---
AA4UFW	AA4LZR
W6UA	K6BCE
K5AKW	W5MYA
---	VE5NN

**DX Continental Champions**

**CW**

**SINGLE OP**

W/VE	Region
EL2T	Africa
JA2JW	Asia
EA2IA	Europe
KP4EAJ	N.America
KH6IJ	Oceania
PJ2VD	S.America

**PHONE**

**SINGLE OP MULTI-OP**

W/VE	Region
6W8FP	Africa
JA2JW	Asia
CT4AT	Europe
KP4AST	N.America
KH6IJ	Oceania
YV4AGP	S.America

operator stations, and some big help from across the river in Jersey. Biggest jump up for a club this year was from tenth to fifth by the Wireless Institute of the Northeast; West Coast clubs account for half the Top Ten, four from California plus the Western Washington DX Club. First try by the Southern New England DX Association, based in Boston, landed them in eleventh place, just a smidgen out of the Top Ten.

**DX Notes**

In alphabetical order, beginning with Africa; the Dark Continent continues to be the least active in our contests, with a few bright exceptions. Statesider EL2T, with the Voice of America in Liberia, dominated the cw mode, with old reliable 5T5CJ turning in an all-band

effort. Phone is more encouraging in one respect, there's more activity, but discouraging because some multipliers which are pieces of cake on phone seem to disappear into the woodwork on cw. 6W8FP put in quite a signal on all bands and topped Africa at 2.7 million, followed by Chuck, EL2T, again with 1.8.

He who wins Japan, wins Asia, as JA2JW proved again this year, taking both phone and cw honors. Yohtarō will take home two plaques to add to the two won last year. He worked 47 states on cw, missing only North Dakota, and all 48 on phone. With UAØFGM back home in Moscow there's not much chance of anyone breaking the JA domination unless someone makes an effort from one of the Mideast

spots (4X4, JY, etc.), or possibly if a single-operator entry takes place from UK9AAN or the like.

Europeans were treated to some excellent long-path 40-meter openings to our West Coast this year on cw, partially in compensation for absolutely atrocious conditions on 40 phone. While 6W8FP blasted through on 40 phone for hours on end hardly a European could be worked, UK5MAF and their 3-element Yagi and the CT4AT quad being the big exceptions. EA2IA again cleaned the continent on cw, with I2XXG and Gs 3FXB and 4BUE all pulling in at over a million. YU3EY teamed with YU3BO for a terrific 1.8 megapoint two-man effort, putting Drake gear, TH6DXX and dipoles to work. Probably the biggest treats were DXpeditions, two to Lichtenstein and Don Reibhoff of XV5AC and XU1DX fame working cw from Gibraltar (ZB2DM).

Reibhoff stayed home in Portugal for the phone Test and walked away with the continental plaque, making 1.4 million big ones, I3MAU coming in right behind. Both use quads on 40 and high antennas on 80, showing what can be done with the right skywires; W6 and W7 calls abound in both their 75-meter logs.

North America is still the place to be for making really big scores; we've already run over the many DXpeditions to various islands. KP4AST turned in the overall top score in the February/March doings, setting a new all-time multiplier record of 318 in the process. His 160-meter phone log is truly a thing to behold, the rest notwithstanding. AJ4EAS came in second with a meager 5.7 million points, second in Puerto Rico, second in North America, second in the world. Another effort worth special mention is over 1800 contacts low-band by W4EV/VP9.

KP4EAJ nosed out last year's top cw man, PJ2VD, for overall code honors; Chet plans better antennas for 1977! Special congratulations to K2JOC, W5MYA and W1BIH, who all made the top-ten cw listings in one-weekend operations from VP2MOC, VP2G and PJ9JT.

Hawaii holds sway in Oceania, KH6IJ placing fifth on phone worldwide and fourth on cw, among a passel of other islanders. On cw, a fine effort by VK2AR put his call sign in over a thousand 40- and 80-meter logs. ZL1AFW and ZL3GG again made over a kilo of contacts from halfway around the globe from North America.

Oceania phone can be summed up by noting that Hawaii had four entrants at or over two million points, and three New Zealanders over 1500 contacts. VK4VU, working over a tougher path, managed 1300 two-ways.

South America closes out this continent-by-continent synopsis; PJ2VD already mentioned as tops on cw and second overall (worldwide) with W1BIH operating PJ9JT on the other side of Curacao for number two score. KC4AAC, much farther from the States and Canada made over 2,000 code contacts; we aren't sure if Tom will be there again next year. Phone contacts from S.A. were much easier for W/VEs to come by, with a number of big scorers being led by old pro YV4AGP, who salted another continental plaque away.

So what does it all add up to? What does it all mean? Are we finally at the rock-bottom of the solar cycle, or is there worse yet to come? Well, 1974 was perhaps the worst for our winter four-weekend activity, and '75 was a little better and we'd have to say '76 was still an improvement. Sure, there is little to be worked on 28 MHz, 15 meters is basically out of the question for JA/East Coast and Europe/West Coast, 20 meters is dead a good third of the time, and even 40 meters gets racked by the poor conditions.

However, last year WA3LRO turned in 2.3 million phone points from W3WJD, and this year W3LPL came dangerously close to K1ZND's all-time cw record, still standing from 1972. Dave is starting to sweat that one. Maybe it's all in our mental attitude; if we think conditions will be bad, they will be. If we simply build bigger antennas, hang in there, and ignore the solar flux and K-index numbers, the scores just keep creeping up and up. What may happen about 1979 or '80 boggles the mind.

### Soapbox

After my October trip to VP2A land, my slush fund said that I had to operate this test from the home QTH. — (K2IGW) I used a hand-held type microphone in the phone session. It had a coiled cord which plugged into the right-hand side of the Swan and crossed over my log as I held it in my left hand. My left forefinger was numb for several days after from pressing the talk button. — (K6OJ/C6A) Trying to work the DX Contest with indoor antenna is insane! Nevertheless, I picked up nine new countries, bringing my total up to 98 worked, all with indoor antennas. — (WA3NGL) I was surprised that many hams asked for my country. I guess that at today's prices, few can afford the latest *Callbook!* C6A is ex-VP7. — (W8LKW/C6A) It seems like there is a direct correlation between the first and third weekends in Feb. and March and tornado watches in Mississippi. — (W5RUB) I think that we need some multipliers to adjust for limited power and time. — (WA4BAX) Wonder if I

have some sort of a record — this is the fourth year that I have entered the ARRL DX Contest, and it has been with a different call sign each time. The first year was 1973 and my call was K4VMA/VP7. The next year was as VP7DF, in 1975 it was as C6ADF, and this year it's VP5DF . . . Hopefully next year I'll be in the contest again, and again with a new or rather different call sign — this time back home (enough of this island living) as K4VMA. — (K4VMA) Weekend I — Where was Japan? Weekend II — 5-minute openings to Europe don't help the score at all! — (WA0TAM) Murphy spent both weekends with me. — (W6ANN) For the first time in 25 years, I operated with a short call — man, what a difference! — (K2LE, ex-WB2CKS) The multi-multi operators with their "CQDX" machines are taking a larger and larger part of the band!! — (W4BAA) During the Phone Test XYL decided it was time to wire the "family room." Lost 12 hours on Saturday, 1st weekend. — (K7ABV) First cw weekend effort almost nil due to XYL having a baby. — (W1GMF) Fantastic second weekend conditions! Had a blast running 'em off barefoot. (Is there any other way?) — (K9UIY) Do not even try to tell me that you did not preheat the ionosphere for this contest.



Who hasn't been beaten in a pile-up by this gentleman — K4GSU? Outside is considerable antenna hardware, almost all completely done by Bill himself. Result: number six cw score nationally.

### Low Power Champs

CW	PHONE	
WA1SSH	557,844	WA1SSH 276,942
WA3YQW	165,300	WB2LOF 100,188
K3JET	161,934	WA7HRE 75,492
AB2SJG	151,848	AB2BYU 71,820
AA2ZWH	148,944	WB2HZH 66,144
AC3ARK	138,726	K5TSQ 61,182
K9UIY	138,567	AA2ZWH 61,056
W1FCC/3	135,783	K5YRK 60,990
WB2FNS	130,806	W1HAF 54,162
K1LMS	130,146	W1FCC/3 53,976

### Ten Years After

Ten years of ARRL International DX Competition (total logs received): 1976 — 2405; 1975 — 1835; 1974 — 1971; 1973 — 2107; 1972 — 2470; 1971 — 2646; 1970 — 2822; 1969 — 2468; 1968 — 2225; 1967 — 2427.

### 1977 ARRL DX Competition

#### PHONE

Feb. 5-6, Mar. 5-6.

#### CW

Feb. 19-20, Mar. 19-20.

I do not remember such good conditions in a long time. I celebrated my 48th year in amateur radio by working 58 QSOs between 1107 and 1207 GMT on March 21 on 14-MHz cw. — (AC1PL) The indicator resistor inside the rotator burned out during the first phone weekend. Rather than take it down and fix it, I moved the entire shack over to a window where the beam was easily visible. It was just like Field Day! Nighttime was strictly by dead-reckoning. — (K2BMI) First weekend — Well they tell me Europe exists!! — (WB6GHH) If there were an award for politeness, my vote would have to go to PA0UKW. While I did not establish contact with him, I enjoyed listening to him as he handled the pile-up on 14.052 MHz with great tact. — (W2FTY) Great contest — for once propagation was right, so even us little people had lots of action. — (K4FOK) What a coincidence, last station worked in the contest was JA2HO. — (W2HO) During the good old days of quotas for W/VE, the well-equipped bunch would fill their quotas of common DX and then spend their time digging out the rare stuff. In that way they were not occupying every kHz. Many low-power DX stations could find a place to set up and have a bunch of us coming back to him. I think it was more fun for more people. — (W6BVM) Pray for CR9AJ QSLs. — (W1NJL) The first weekend in March was good, apparently due to unusual solar activity. I had not expected 10 meters to provide any contacts up here in Minnesota, but I was pleasantly surprised. — (W0LP) . . . the only antenna available was the 20-meter dipole up only about 20 feet — sort of an "underground antenna." — (W6BYH) One has to operate up here (Alberta) to appreciate the advantages of a more southerly latitude though. When conditions are just average or worse, it is really frustrating up here listening to the entire

Continued on page 92

U.S.A.

1

Connecticut

WHFB 1,322,400-290-1520-C-84
WALSTN 1,098,040-240-1807-C-68
KIDPB 768,096-224-1143-C-68
WALSSH 557,844-229-812-A-78
KIRLU 258,876-141-612-C-29
WIFTX 148,770-174-285-C-38
WICNU 134,685-123-365-B-33
WIBH 79,347-137-194-C
WAIUAC 74,694-118-211-G-60
WIVH 63,504-98-216-C-20
WVDC 35,180-70-158-C-28
WIGPK 29,160-72-135-B-14
KIASJ 23,804-64-124-B-7
KIKRYJ 22,968-66-116-A-24
WALSCV 22,176-56-134-C-10
WAIKOC 15,228-47-108-C-8
WALJCC 13,920-40-116-A-4
WIKKF 13,272-56-79-B-24
KITHQJ 9102-41-74-A-8
WAIUHU 1134-18-21-A-8
WIDQL 540-12-15-A-1
WAIUHN 288-8-12-B-3

Multi Single
WAIKID(WA1S, QNF, HNI, 290Net)
1,640,364-289-1892-C-90
WAINRF(1(WA1S MAO, OCC, 290 Net)
1,246,329-271-1533-C-96
WALNGL 1,120,287-131-1386-C-72
K1VTM (WA1ABV, 220 Net)
948,433-269-1193-C-73
WAINKK (multisp)
893,322-239-1246-C
KIJHX (K1THQJ)
320,250-125-84-C-4
KITZD (WA1OCC, 220 Net)
181,371-121-499-C-40
WIVV (220 Net)
84,000-112-250-C-10

Multi-Multi
WIZM (WA2CLQ, WB2S HZH JAM, 220 Net)
2,878,365-355-2421-C-94
Low Band
WIOR 8400-40-70-C-10
High Band
WAINZT 459,417-167-917-C-63
W1YG 458,838-142-1063-C
KIMGA 361,584-144-837-C-60
WAIWEM 28,980-46-210-C
W1AB 5148-33-52-C-3
W1OWD 90-5-6-B-2

Eastern Massachusetts
WIDAL 1,223,193-281-1451-C-73
AC1PL 972,684-246-1318-C-75
W1YN 697,818-318-1067-C-72
W1JFL 216,189-153-471-C-36
W1MR 167,475-142-385-C-30
W1NJ 145,710-135-363-B-30
W1DLF 108,324-118-308-B-45
K1VBS 32,193-73-147-A-4
W1SXX 6732-33-68-B-18
W1EQY 712-76-19-A-7
AC1HWM 585-13-15-E-3
Multi-Multi
W1MK(WA8WNU, WA9UCU, Opns.)
1,992,681-337-1971-C-96

Low Band
K1NOL 337,617-161-699-D-36
W1LUK 174,099-131-443-C-40
W1BS/1 1248-16-25-A-9
High Band
W1FJ 186,000-124-500-C-29
W8UDK/1 116,830-110-351-C-28
AA1SCX 57,260-60-318-C-12
W1YS 8560-96-98-B-13
AC1OPJ 4992-32-52-A-8
W1PLJ 1488-16-31-B-8
W1LF 243-9-9-B-3

Maine
W1SD 108,570-110-329-C
W1FRW 22,572-76-99-B-34
AA1TWN 18,600-62-100-B-12
Low Band
K1RQE 237,600-150-528-D-52
High Band
K1OEY 227,564-124-612-C
W1SKV 109,263-77-473-C-42
KH6IAC/W1 3024-24-42-C-4

New Hampshire
W1ABV 477,660-190-835-C-92
K1LMS 130,146-109-398-A-48
W1GME 45,360-84-180-C-25
W1HAF 12,740-53-80-A-4
Low Band
W1DXB 37,347-59-211-C-18
W1SWX 7260-44-55-B-11

Rhode Island
W1GFM 214,485-181-395-C
K1GMW 32,340-77-140-C-14
W1APOP 19,176-68-94-B-8

K1QFD 11,934-51-78-A-7
Low Band
K1TZQ 54,216-72-251-C-40
High Band
W1YRC 2112-22-32-C-3
Vermont
K1LIK 466,995-191-816-C-62
Western Massachusetts
W1ABW 1,036,578-255-1356-C-84
W1YK (WA1LD Op)
333,660-134-830-C-32
W1LFBX 135,450-129-360-C-4/
W1ATA 23,214-73-106-C-6

Low Band
K1RQF 18,285-93-115-C-
High Band
W1AUT 17,343-41-141-C-20
2
W2AZO 481,275-207-775-C-48
W2HO 364,797-177-687-C-60
K2BK 214,722-151-474-C-36
AA2MAI 127,806-119-258-A
AB2FAH 92,736-44-368-C-19
AA2EAK 26,394-53-166-C-15
W2ZUJH 17,574-58-101-B-9
W2RWF 16,254-43-126-C-18
W2DW 13,122-54-81-C-5
W2S2T 84-4-7-A-2

Multi-Multi
W2PY (K1S OME YKT ZND, W1S GNC GGO, W1S JKL JLD NNC, W2ASPL, WB2S AXV CKD FLF OEU, WA3SWP)
3,856,875-425-3025-C-96
Low Band
W2HHC 56,544-76-248-E-25
AA2AUB 18,252-52-117-C-17
High Band
W2DXL 771,144-184-1397-C-7
W2AO 301,392-138-728-C
W2WSX 123,405-98-433-B-35
AA2LJ 101,817-86-296-C-40
AB2BK 68,850-85-270-C-24
W2ZUYL 7659-37-69-A-4
AA2EAM/2 1070-17-20-A-1

N.Y.C. - L.I.
K2LE 1,069,992-264-1351-C-72
W2GGE 783,864-228-1146-C-64
W2YHK 559,944-231-808-C-60
K2QMF 387,516-172-751-E-42
WB2PYM 326,106-162-671-C-29
W2FVS 161,800-156-350-C
AB2SIG 51,848-148-342-A-23
W2GKZ 148,896-141-392-C-26
W2SGK 100,890-110-306-C-30
AD2MFY 93,264-116-268-A-42
W2EJO 78,084-108-241-D-50
W2YUJ 74,700-100-249-C-14
W2IR 35,916-81-146-B-13
W2MEJ 16,104-61-88-D-38
W2OTS 75-5-5-C-2

Multi Single
AA2LQO (K2S KSP UAT, W2DKM, WA2HSQ Opns)
208,593-147-473-C-46
Low Band
WB2QCF 54,027-87-135-B-13
WB2FLF 8610-41-70-C-6
W2TE 5916-34-58-C-6
W1AYJ 4950-33-50-B-7
W1AJOV 702-13-18-A-5
High Band
W2AB 93,100-60-545-B-15
K2HWL 58,714-82-259-A-54
W2FNY 36,368-60-180-C-10
WB2AMU 21,040-80-171-B-29
W2AFM 40,656-77-176-B-38
W2GC 22,194-54-137-C-13
WB2GDZ 8198-42-73-C-10
W2YIY (WB2FLF Op)
260-8-15-C-1
W2TUK 364-8-11-C-1
W2CZZ 18-2-8-B-1

Northern New Jersey
W2GXD 1,560,051-291-1787-C-76
K2BMI 1,024,152-278-1228-C-80
WB2FIT 843,999-247-1139-C-73
W2UO 188,748-147-428-C-19
AA2ZWH 148,944-116-428-A-57
AB2CST 117,528-110-332-C-51
AC2ZTR 100,440-124-270-C-35
W2ZZ 98,892-123-268-C-25
AB2RJ 51,000-85-200-C-11
W2DSA 46,182-86-179-F
W2HUG 44,180-92-160-A-21
W2HN 39,000-100-130-C
W2WJN 29,704-68-126-A-15
WB2RKK 17,556-38-154-C
AC2MB 9102-37-52-C-5
AB2VFT 4032-32-42-B-4

Multi Single
W2YD (WB2BM, W2S SRQ UOQ WB2RKK)
1,751,004-279-2092-C-94
W2ADNY (WB2CST)
272,078-158-574-C-55
K2OQJ (W2S YRD ZNW Opns)
7920-40-66-F-8
Multi-Multi
K2CW/2 (mult op)
227,328-148-512-C
Low Band
W2WBE 41,001-79-173-B-37
W2TO 14,523-47-103-B-15

K2QBW 4050-30-45-C-9
High Band
AC2EQK 258,375-125-689-C-48
K2EAC 95,481-103-309-B-42
K2KJR 34,697-63-173-A-12
WB2VTT 1939-19-27-A-3
W2UL 969-17-19-A-7
WB2RHK 720-12-20-A-1
W2MSP 54-11-8-B
WB2AEH 216-8-9-C
AB2SLF 18-2-3-B-1

Southern New Jersey
W2RHN 804,064-256-1048-C-41
W2HBT 618,825-233-925-C-67
K2FL 489,000-250-652-C-72
W2PAU 220,806-174-423-C-38
W2JHN 144,102-146-379-C-92
W2EA 116,739-119-327-B-51
W2SDB 111,960-120-313-C-50
WB2BYU 80,100-100-287-A-69
W2HNY 72,816-76-122-B-19
W2AYYA 21,063-59-119-F-8
W2AEJ 20,736-64-108-C-50
W2EAO 16,560-48-15-C-6
W2FGY 2856-28-34-B-8

Multi Single
K2FT (#K2KA, W2S NEA ORA)
454,290-190-797-C-73
W2RHE (WA2JXR)
428,970-181-790-C-60
W2UI (WA2JXR)
223,446-167-446-C-55
W2ABLW (multisp)
50,184-82-204-C-8
Low Band
W2FXN 1710-19-30-A-4
High Band
W2BZL 71,346-94-253-F-22
W2ZJZ 49,884-74-222-B-34
W2HAZ 21,222-54-131-E-12
W2IFE 2178-22-33-B-12
W2OSQ 1092-14-26-B-1

Western New York
WB2FNS 130,806-129-338-A-36
AC2FTH 116,706-106-367-C-27
W2RABD 91,242-111-274-A-28
W2MIBP 62,378-87-239-C-13
W2PUI 60,630-86-235-C-64
W2RCDV 58,999-94-207-C-20
W2ROH 40,887-83-163-C-28
W2WDE 27,528-74-124-A-17
W2EKLW 18,480-56-110-C-11
AB2SNZ 14,406-49-98-A-7
W2AJP 11,340-42-90-A-22
Multi Single
K2ZRO (WB2THGS, KBYV Op)
221,268-149-495-C-88
Low Band
W2UJMM 93,564-113-276-C-50
W2FR 32,862-81-134-C-12
W2NCI 546-13-14-A-8
High Band
W2SEC 88,500-100-295-A-4
W2MBC 43,020-60-239-C-24
W2FTY 4800-32-50-A-23
W2BCK 1440-16-30-C-1

3
W2WZ 139,783-141-321-A-26
W2KOS 80,004-113-236-B-27
W2WIT 82,426-19-182-C-15
Multi Single
W3KWH (multisp)
180,096-134-448-G-61
K3HZL (multisp)
122,688-144-284-C-24
Multi-Multi
W3TV (W3S AQH VW)
1,149,940-269-1420-C-50
Low Band
W3ASWF 22,320-60-124-C-11
High Band
W3JHK (WA3SZK Op.)
327,284-143-896-C-61
K3DR 54,522-78-235-C-32
W3HSD 21,870-54-139-B-14
4
W3GPE (K3S OIG WJV, WA3VYD Opn.)
3,311,130-370-2983-C-96
W3GM (multisp)
2,794,086-391-2382-C-96
Low Band
W3EJH 360-10-12-A-12
High Band
K3JG 100,980-85-396-C-18
W3ASZV 32,370-65-166-C-30
W3BB 16,764-44-127-C-8
W3EJVW 5580-37-50-C-7
W3HMR 714-14-17-C-3

Maryland - D.C.
W3LPL 2,261,052-347-2172-C-84
W3GRF 1,038,492-273-1268-C-55
AC9SZR/3 319,720-253-1080-D-62
W3EYF 378,225-205-615-C-74
K3AV 318,108-196-841-B-50
K3JFT 161,934-137-394-A-40
W3TOS 150,257-47-371-B-50
W3KS 111,720-133-280-E-21
W1NJX/3 109,056-142-256-D-53
AC3RAB 107,625-125-287-B-60
W3HVM 67,053-103-217-C-16
W3GZP 61,182-99-206-E-25
W3EAO 50,310-86-199-C-9
W3KOC/3 39,600-55-240-F-12
K3DI 25,179-77-109-C-16
W3ANGL 18,849-61-103-A-34
W3FCJ 18,720-60-104-B-12
W3JYV 14,539-57-85-A-28
W3ARFB 10,837-47-71-B-24
W3ML 8580-44-55-E-7
W3AZAS 5220-30-55-A-7
W3TN 3600-24-50-B-8
W3FLM/3 2280-19-40-C-3
W3FVZ 969-17-19-B-2
Multi Single
K3GJD (W3WZL, WA3VUJ)
1,315,373-303-1447-C-82
W3YXM (WA2JRG, W3GM)
W3BAUO, Opns)
456-22-212-717-C-83
AC3E2T (multisp)
14,278-54-119-C-4
Multi-Multi
W3AJ (K3XIEK, WA2LQZ, K3EST, W3S ADT IN, W3X HRV IJA)
4,736,160-440-3588-C-96
W3K4Z (W3PRK, W3S AFG NGS, W3S ADT IN, W3X HRV IJA)
2,164,668-341-2116-C-96
W3FA (W3BAC, WA3QIA)
780,300-255-1020-C-72

Low Band
W3CZQ 22,506-62-121-C-27
W3TUX 72-4-6-A-3
High Band
K3CHP 1710-19-30-C-9
W3HVQ 1368-19-24-B-4
W3ZH 975-13-25-C-2
Western Pennsylvania
W3VT 542,730-229-790-C-52
W1FCC/3 139,783-141-321-A-26
W3KOS 80,004-113-236-B-27
W3WIT 82,426-19-182-C-15
Multi Single
W3KWH (multisp)
180,096-134-448-G-61
K3HZL (multisp)
122,688-144-284-C-24
Multi-Multi
W3TV (W3S AQH VW)
1,149,940-269-1420-C-50
Low Band
W3ASWF 22,320-60-124-C-11
High Band
W3JHK (WA3SZK Op.)
327,284-143-896-C-61
K3DR 54,522-78-235-C-32
W3HSD 21,870-54-139-B-14
4
W3GPE (K3S OIG WJV, WA3VYD Opn.)
3,311,130-370-2983-C-96
W3GM (multisp)
2,794,086-391-2382-C-96
Low Band
W3EJH 360-10-12-A-12
High Band
K3JG 100,980-85-396-C-18
W3ASZV 32,370-65-166-C-30
W3BB 16,764-44-127-C-8
W3EJVW 5580-37-50-C-7
W3HMR 714-14-17-C-3

W3GPE (K3S OIG WJV, WA3VYD Opn.)
3,311,130-370-2983-C-96
W3GM (multisp)
2,794,086-391-2382-C-96
Low Band
W3EJH 360-10-12-A-12
High Band
K3JG 100,980-85-396-C-18
W3ASZV 32,370-65-166-C-30
W3BB 16,764-44-127-C-8
W3EJVW 5580-37-50-C-7
W3HMR 714-14-17-C-3

Maryland - D.C.
W3LPL 2,261,052-347-2172-C-84
W3GRF 1,038,492-273-1268-C-55
AC9SZR/3 319,720-253-1080-D-62
W3EYF 378,225-205-615-C-74
K3AV 318,108-196-841-B-50
K3JFT 161,934-137-394-A-40
W3TOS 150,257-47-371-B-50
W3KS 111,720-133-280-E-21
W1NJX/3 109,056-142-256-D-53
AC3RAB 107,625-125-287-B-60
W3HVM 67,053-103-217-C-16
W3GZP 61,182-99-206-E-25
W3EAO 50,310-86-199-C-9
W3KOC/3 39,600-55-240-F-12
K3DI 25,179-77-109-C-16
W3ANGL 18,849-61-103-A-34
W3FCJ 18,720-60-104-B-12
W3JYV 14,539-57-85-A-28
W3ARFB 10,837-47-71-B-24
W3ML 8580-44-55-E-7
W3AZAS 5220-30-55-A-7
W3TN 3600-24-50-B-8
W3FLM/3 2280-19-40-C-3
W3FVZ 969-17-19-B-2

Multi Single
K3GJD (W3WZL, WA3VUJ)
1,315,373-303-1447-C-82
W3YXM (WA2JRG, W3GM)
W3BAUO, Opns)
456-22-212-717-C-83
AC3E2T (multisp)
14,278-54-119-C-4
Multi-Multi
W3AJ (K3XIEK, WA2LQZ, K3EST, W3S ADT IN, W3X HRV IJA)
4,736,160-440-3588-C-96
W3K4Z (W3PRK, W3S AFG NGS, W3S ADT IN, W3X HRV IJA)
2,164,668-341-2116-C-96
W3FA (W3BAC, WA3QIA)
780,300-255-1020-C-72

Low Band
W3CZQ 22,506-62-121-C-27
W3TUX 72-4-6-A-3
High Band
K3CHP 1710-19-30-C-9
W3HVQ 1368-19-24-B-4
W3ZH 975-13-25-C-2
Western Pennsylvania
W3VT 542,730-229-790-C-52
W1FCC/3 139,783-141-321-A-26
W3KOS 80,004-113-236-B-27
W3WIT 82,426-19-182-C-15

Multi Single
W3KWH (multisp)
180,096-134-448-G-61
K3HZL (multisp)
122,688-144-284-C-24
Multi-Multi
W3TV (W3S AQH VW)
1,149,940-269-1420-C-50
Low Band
W3ASWF 22,320-60-124-C-11
High Band
W3JHK (WA3SZK Op.)
327,284-143-896-C-61
K3DR 54,522-78-235-C-32
W3HSD 21,870-54-139-B-14
4
W3GPE (K3S OIG WJV, WA3VYD Opn.)
3,311,130-370-2983-C-96
W3GM (multisp)
2,794,086-391-2382-C-96
Low Band
W3EJH 360-10-12-A-12
High Band
K3JG 100,980-85-396-C-18
W3ASZV 32,370-65-166-C-30
W3BB 16,764-44-127-C-8
W3EJVW 5580-37-50-C-7
W3HMR 714-14-17-C-3

Alabama
W3FAW/4 826,494-278-991-C-60
AD4TIG 511,966-266-817-C-64
W3FZQ 46,804-96-158-C-14
W4RAL 44,082-93-158-A-29
High Band
K4MG 45,153-87-173-C-20
WB4ZOG 312-8-13-C-3

Georgia
W4TED 223,713-159-469-C-48
K4RPM 169,433-111-316-A-29
W4KNW 105,444-116-303-C-18
W4PQQ 55,539-99-147-A-48
W4AGQJ 25,764-78-113-E-20
W4LDM 12,572-82-81-B-20
K4BAM 3534-31-38-A-4
Low Band
W4YWX 273,492-142-642-AC-51
High Band
AD4BA 356,248-196-946-C-62
AB4TDH 259,775-164-528-B-53
W4DXI 100,152-104-321-C-84
K4DLQ 61,971-91-227-C-43
W4LVM 38,184-86-148-C-4
Kentucky
K4G5U 1,496,992-304-1641-D-70

High Band
WB4KTR 990-13-22-B
North Carolina
W4NQA 285,282-162-587-C-30
K4GFH 136,320-128-356-C-32
K4FUV 46,191-89-173-B-50
K4UHW 20,301-67-101-F-14
W4ALWO 8870-47-70-A-3
Multi Single
WB4VU (WB4JUH, W4PHFW)
371,184-176-703-C-68
High Band
W4WXZ 202,692-133-508-C-35

Northern Florida
K4YFQ 1,534,764-308-1661-C-78
K4ZT 3550-37-50-A-4
W4G4HU 2112-22-32-F-10
W4ABAX 1197-19-21-A-7
Multi Single
AA4URF (AAKAMFK)
265,608-136-661-C-70
Low Band
K4IEX 84,248-102-308-C-21
High Band
W4WHK 273,552-164-556-C-64
W4EEO 7500-50-50-A-40

South Carolina
W44EWX 167,670-162-345-C-64
W4B4NR 87,912-132-222-E-35
High Band
AD4I 90,828-116-261-C-32
Southern Florida
W4BV 374,934-226-833-C-61
K4HWW 303,911-189-836-C-51
K4CL 289,848-196-611-C-86
W4HOS 162,450-190-361-B-43
AC4OZF 113,100-116-325-C-4
W4B4OW 96,216-99-248-AC-49
K4JRF 66,144-106-208-AC-49
W43SVH 16,929-57-99-C-18

Multi Single
AA4GAJ (WA4S BTQ BTR)
110,484-124-297-B-37
Multi-Multi
AA4LZR(K4GFG, W4S LBT, K4G, WA4S A2PCT LOZ, WB4S HXN YHN OGV VMH)
1,399,338-289-1614-C-96
Tennessee
W4B4FT 81,213-107-253-B-27
AB4WHE/4 29,640-76-130-B-35

High Band
W4AMKU 22,848-68-112-A-25
K4PR 147-7-7-L
Virginia
K4VX (WB4SQV, Opn.)
1,383,363-281-1641-C-72
K4PQL 705,375-209-1125-C-87
W4ATLW 638,304-244-872-C-70
W4KXV 413,588-207-866-C-46
271,932-171-737-C-42
K4JWD 267,786-174-513-C-47
K4VHH 217,989-159-457-F-50
W4VHC 177,057-103-373-E-25
W4SDM 69,605-131-419-C-30
K4FOK 139,725-135-448-B-36
W4KFC 126,750-128-338-C-30
W4NQP 112,644-126-298-B-8
W4ADUS 112,590-135-278-E
W4NH 106,605-115-309-C-20
K4ND 99,896-124-268-C-35
K4KA 90,390-121-240-C
K4JM 86,584-101-226-A-15
W4DEB 67,122-99-226-B-24
W4VH 58,402-93-238-C-20
K4ZVS 42,862-94-212-C-7
W4RW 34,020-70-162-D-10
W1FRF/4 32,994-78-141-B-20
K4KA 28,580-60-119-B-13
K4EJG 24,069-71-113-B-39
W4KMS 20,520-72-98-F-16
W4B4YPT 14,061-43-109-C-22
W4G 3,339-61-73-C-6
K4JYM 12,654-38-111-C-12

Multi Single
AC4MYA (#K4ZRX, WB4VU)
375,000-250-1300-C-91
WB4TBO (multisp)
30,267-89-171-C-18
Multi-Multi
W4BVW(K4S NPV OAE, W3BQV, W4S AMH SKH, K4GCK, W4VJN, WB4BGY, K5CIT, K8DDA)
4,088,010-430-3169-C-96
Low Band
W4BA 65,682-89-246-C-32
W4TVE 11,080-70-144-C-22
W4GCV 14,250-50-95-C-14

High Band
W4WSE 509,490-153-1110-C-56
K4JUL 14,151-33-89-C-7
K4ZM 12,842-24-21-C-2
W44MSX 18

<b>High Band</b> WBXTA 31,464-69-152-C-16	<b>High Band</b> W6YQQ (WB6GHH opr) 55,209-77-239-C-48 WSOK 39,295-45-291-C-30 AA6QWV 24,696-49-168-C-18 AA9KXJZ 15,480-60-86-C-16	<b>Low Band</b> K6QHC 33,234-58-191-C- <b>High Band</b> W6FUZ 8100-30-90-B-27 W6MMH 60-4-5-C-1	<b>Low Band</b> W6MTJ 48,150-75-214-A-38 W6AFH 1,328-31-184-C-21 K6DSK 11,328-59-64-B-27	<b>ROF, WA8YLF (opr)</b> 305,950-275-1098-C-96	<b>W0PAY 11,316-41-92-C-8</b> W09IKN 126-6-7-C-1
<b>Louisiana</b> W5RTX 723,903-227-1063-C-81 W50B 224,289-181-413-C-70 K5YMY 53,544-97-184-C-23	<b>Orange</b> K6OS 438,075-165-885-C-45 K6TXA 136,800-96-475-F-32 W6CY 136,500-130-350-C-60 AA5FIT 10,506-34-103-C-9	<b>Sacramento Valley</b> AA6JVD 323,760-152-710-C- K6DR 318,348-148-717-C-70 W6NKR 287,043-163-567-C-51	<b>Low Band</b> K6LZT/6 36-3-4-A-1	<b>High Band</b> W6BIL 3600-30-40-B-24 AC6KYA 3111-17-61-B-3	<b>High Band</b> W0PRY 14,580-54-90-A-20 W0MOC 5915-29-45-C-4 AA9VDX 3534-31-38-C-2
<b>Mississippi</b> W5RUB 114,363-131-291-C-18 K5RRG 28,782-78-123-C-33	<b>Multi-Multi</b> K6RR (multitop) 2,248,281-281-2667-C-93	<b>Low Band</b> W6ANN 160,254-87-614-D-50	<b>High Band</b> W6HJ 8760-40-73-C-18	<b>Ohio</b> W8RSW 413,010-195-706-C-50 AA8NYB 373,968-196-636-C-46 W8ZCQ 241,110-171-470-C-36 W8BFOS 134,475-163-275-C- K8CXM 129,376-125-345-C-52 W8DB 123,552-143-288-C-26 W8PBU 87,000-116-250-C-44 W8GOC 70,896-112-211-A- W8II 49,999-99-167-C- W8WDV 48,735-95-171-F-39 W8NPF 46,956-91-172-C-33 AD8HBN 34,113-83-137-C-11 W88NJJ 2175-25-29-B-12	<b>High Band</b> W0PRY 27,027-63-143-C-26 AA9WCR 91,80-48-68-A-8 AB9IPH 4580-30-51-A-18
<b>New Mexico</b> K5MAT 128,043-123-347-C-30 W50RF 62,040-110-188-C-17 W50RF 30,150-75-134-A-44	<b>Low Band</b> W6ANN 160,254-87-614-D-50	<b>High Band</b> W6HJ 8760-40-73-C-18	<b>Arizona</b> W71R 1,215,942-262-3547-C-85 WA7HRE 101,124-106-318-A-67 WA7YON 12,549-47-89-B-15 W7FCD 560-11-20-B-1	<b>Multi Single</b> W8L (W8LJKU, W888 INY JKS ZBF opr) 48,123-217-673-C-76 WA8DXA (+WA88 DXB RCN) 395,847-181-729-F-90	<b>Kansas</b> W0LUB 217,605-163-445-C-41 WA0GGG 10,350-46-75-C-8
<b>Northern Texas</b> K5VTA 145,044-153-316-C- AC5IUV 21,216-68-104-B-28 W50SD 14,700-50-98-A-21 W5USG 7524-44-57-A-24	<b>Multi Single</b> K5AKW (multitop) 154,089-117-439-C-89	<b>High Band</b> W6ANN 160,254-87-614-D-50	<b>Idaho</b> W7AYY 16,397-29-211-C-9	<b>West Virginia</b> AA8WPW 14,094-54-87-B-22	<b>High Band</b> W0LUB 217,605-163-445-C-41 WA0GGG 10,350-46-75-C-8
<b>Multi Single</b> K5AKW (multitop) 154,089-117-439-C-89	<b>Multi-Multi</b> W5MYA (+W58 BJA ZSX, W580OE) 1,579,320-321-1640-C-96	<b>Low Band</b> W6ANN 160,254-87-614-D-50	<b>Multi Single</b> K7NHV (+WA7WXY) 1,372,272-226-2024-C-91	<b>High Band</b> W8L (W8LJKU, W888 INY JKS ZBF opr) 48,123-217-673-C-76 WA8DXA (+WA88 DXB RCN) 395,847-181-729-F-90	<b>High Band</b> W0LUB 217,605-163-445-C-41 WA0GGG 10,350-46-75-C-8
<b>Low Band</b> W5UJCT/5 33,507-73-153-C-18 K5JVF 9720-46-72-D-20 W5LUJ 4761-23-69-C-7	<b>Low Band</b> W6ANN 160,254-87-614-D-50	<b>Low Band</b> W6ANN 160,254-87-614-D-50	<b>Montana</b> K7ABV 178,080-106-560- W7LR 142,230-110-431-C-50 AD7CP 2040-20-34-A-8	<b>West Virginia</b> AA8WPW 14,094-54-87-B-22	<b>High Band</b> W0LUB 217,605-163-445-C-41 WA0GGG 10,350-46-75-C-8
<b>High Band</b> W5UTT 12,450-50-83-C-14	<b>Low Band</b> W6ANN 160,254-87-614-D-50	<b>Low Band</b> W6ANN 160,254-87-614-D-50	<b>Nevada</b> WA7NIN (W6OAT opr) 119,310-97-410-C-20	<b>High Band</b> W8L (W8LJKU, W888 INY JKS ZBF opr) 48,123-217-673-C-76 WA8DXA (+WA88 DXB RCN) 395,847-181-729-F-90	<b>High Band</b> W0LUB 217,605-163-445-C-41 WA0GGG 10,350-46-75-C-8
<b>Southern Texas</b> W5WZQ 1,646-604-318-1726-D-96 K5PFL 1,103,232-272-1352-D-78 W5LPO 99,360-120-276-C-53 W5JC 79,497-121-219-B-5 W5PF 79,710-105-234-A-47 K5LWL 70,909-101-234-C- W5BJL 33,396-92-121-B-23 K5TSC 33,228-78-142-A-29 W5BE 26,136-72-121-C-20 W58W 44,664-31-68-B-11 W5LES 2898-23-42-C-2 K5JZY 1512-21-24-C-6 K5C 840-14-20-B-6 W5NMA 3663-11-11-B-2	<b>Low Band</b> W6ANN 160,254-87-614-D-50	<b>Low Band</b> W6ANN 160,254-87-614-D-50	<b>Oregon</b> W7TML 939,420-204-1535-C-75 W7LT 3168-16-66-B-71 WA7GZA 1944-18-36-A-19	<b>High Band</b> W8L (W8LJKU, W888 INY JKS ZBF opr) 48,123-217-673-C-76 WA8DXA (+WA88 DXB RCN) 395,847-181-729-F-90	<b>High Band</b> W0LUB 217,605-163-445-C-41 WA0GGG 10,350-46-75-C-8
<b>Low Band</b> W5SQWX 35,088-68-172-C-48	<b>Low Band</b> W6ANN 160,254-87-614-D-50	<b>Low Band</b> W6ANN 160,254-87-614-D-50	<b>Utah</b> W7VYJ 216-8-9-A-3	<b>High Band</b> W8L (W8LJKU, W888 INY JKS ZBF opr) 48,123-217-673-C-76 WA8DXA (+WA88 DXB RCN) 395,847-181-729-F-90	<b>High Band</b> W0LUB 217,605-163-445-C-41 WA0GGG 10,350-46-75-C-8
<b>High Band</b> W5GO 138,348-126-366-C-40 W5DXI 20,196-66-102-C-15 W5LW 3184-44-62-B-21 AC5OSJ 462-11-14-B-5	<b>Low Band</b> W6ANN 160,254-87-614-D-50	<b>Low Band</b> W6ANN 160,254-87-614-D-50	<b>Washington</b> W7RM (K7VPE, opr.) 1,728,441-237-2431-E-93 W7YTN 510,300-175-972-C-83 K7DZ 208,884-103-676-C-36 AA7OBL 195,228-102-638-C-48 W7WNY 192,768-128-602-C-40 W7EXM 133,200-111-400-C-35 W7HAD 125,247-83-503-B-76 W7LZF 62,694-81-258-C-28 K7WOK 55,449-61-303-C-4 AC7KWC 52,632-51-344-C-9 W7APN 13,407-41-109-C-7 K7RSC 10,808-17-208-C-10 K7EFB 5964-28-71-A-21	<b>High Band</b> W8L (W8LJKU, W888 INY JKS ZBF opr) 48,123-217-673-C-76 WA8DXA (+WA88 DXB RCN) 395,847-181-729-F-90	<b>High Band</b> W0LUB 217,605-163-445-C-41 WA0GGG 10,350-46-75-C-8
<b>Low Band</b> W5QENP/6 130,065-65-667-C-40	<b>Low Band</b> W6ANN 160,254-87-614-D-50	<b>Low Band</b> W6ANN 160,254-87-614-D-50	<b>Multi Single</b> K3MNT/7 (+WA1KKM) 817,791-169-1613-E-93 W5QQQ/7 (multitop) 854,607-167-1107-C-48 W7DAZ (multitop) 369,474-133-926-C-60 W7YH (multitop) 30,369-53-191-C-	<b>High Band</b> W8L (W8LJKU, W888 INY JKS ZBF opr) 48,123-217-673-C-76 WA8DXA (+WA88 DXB RCN) 395,847-181-729-F-90	<b>High Band</b> W0LUB 217,605-163-445-C-41 WA0GGG 10,350-46-75-C-8
<b>East Bay</b> K6BJJ 435,000-145-1000-F- AB6BK 41,580-55-252-B-70 W6RQ 2400-35-80-C- WINJL/6 8880-24-40-A-4	<b>Low Band</b> W6ANN 160,254-87-614-D-50	<b>Low Band</b> W6ANN 160,254-87-614-D-50	<b>Multi Single</b> K3MNT/7 (+WA1KKM) 817,791-169-1613-E-93 W5QQQ/7 (multitop) 854,607-167-1107-C-48 W7DAZ (multitop) 369,474-133-926-C-60 W7YH (multitop) 30,369-53-191-C-	<b>High Band</b> W8L (W8LJKU, W888 INY JKS ZBF opr) 48,123-217-673-C-76 WA8DXA (+WA88 DXB RCN) 395,847-181-729-F-90	<b>High Band</b> W0LUB 217,605-163-445-C-41 WA0GGG 10,350-46-75-C-8
<b>Multi Single</b> W6NGG (+K6PJY, W6AFWJ, W68 BBC HDH) 1,211,780-220-1836-C-93 W6TLV/5 (multitop) 1,007,655-197-1705-E-96 K6ZM (+W6BMV, W68CEP) 589,158-142-1353-C-96	<b>Low Band</b> W6ANN 160,254-87-614-D-50	<b>Low Band</b> W6ANN 160,254-87-614-D-50	<b>Multi Single</b> K3MNT/7 (+WA1KKM) 817,791-169-1613-E-93 W5QQQ/7 (multitop) 854,607-167-1107-C-48 W7DAZ (multitop) 369,474-133-926-C-60 W7YH (multitop) 30,369-53-191-C-	<b>High Band</b> W8L (W8LJKU, W888 INY JKS ZBF opr) 48,123-217-673-C-76 WA8DXA (+WA88 DXB RCN) 395,847-181-729-F-90	<b>High Band</b> W0LUB 217,605-163-445-C-41 WA0GGG 10,350-46-75-C-8
<b>High Band</b> W6RGG 97,614-102-319-C-23	<b>Low Band</b> W6ANN 160,254-87-614-D-50	<b>Low Band</b> W6ANN 160,254-87-614-D-50	<b>Multi Single</b> K3MNT/7 (+WA1KKM) 817,791-169-1613-E-93 W5QQQ/7 (multitop) 854,607-167-1107-C-48 W7DAZ (multitop) 369,474-133-926-C-60 W7YH (multitop) 30,369-53-191-C-	<b>High Band</b> W8L (W8LJKU, W888 INY JKS ZBF opr) 48,123-217-673-C-76 WA8DXA (+WA88 DXB RCN) 395,847-181-729-F-90	<b>High Band</b> W0LUB 217,605-163-445-C-41 WA0GGG 10,350-46-75-C-8
<b>Los Angeles</b> W6QUN (WB6OLD opr.) 1,395,303-247-1883-D-89 W6RTT 1,093,824-216-1688-C-81 K6YQY 113,730-85-446-C-48 W6DQ 74,181-79-313- K6OC 46,865-61-285-C- W6NBY 11,040-40-92-C-16 W6FZX 10,101-37-91-B-16 W6RZ 9833-43-77-A-25 W6RDS 6603-31-71-B-16 W6CQ 4320-30-43-B-9 W68HJK 3295-28-43-B-9 AA6ARP 1998-18-37-A-	<b>Low Band</b> W6ANN 160,254-87-614-D-50	<b>Low Band</b> W6ANN 160,254-87-614-D-50	<b>Multi Single</b> K3MNT/7 (+WA1KKM) 817,791-169-1613-E-93 W5QQQ/7 (multitop) 854,607-167-1107-C-48 W7DAZ (multitop) 369,474-133-926-C-60 W7YH (multitop) 30,369-53-191-C-	<b>High Band</b> W8L (W8LJKU, W888 INY JKS ZBF opr) 48,123-217-673-C-76 WA8DXA (+WA88 DXB RCN) 395,847-181-729-F-90	<b>High Band</b> W0LUB 217,605-163-445-C-41 WA0GGG 10,350-46-75-C-8
<b>Multi Single</b> K6ELX (+W6ABP) 119,016-72-551-C-52	<b>Low Band</b> W6ANN 160,254-87-614-D-50	<b>Low Band</b> W6ANN 160,254-87-614-D-50	<b>Multi-Multi</b> K6BCE (multitop) 2,890,926-321-3002-C-96	<b>High Band</b> W8L (W8LJKU, W888 INY JKS ZBF opr) 48,123-217-673-C-76 WA8DXA (+WA88 DXB RCN) 395,847-181-729-F-90	<b>High Band</b> W0LUB 217,605-163-445-C-41 WA0GGG 10,350-46-75-C-8
<b>Low Band</b> W6VVS 900-5-60-A-8	<b>Low Band</b> W6ANN 160,254-87-614-D-50	<b>Low Band</b> W6ANN 160,254-87-614-D-50	<b>Multi-Multi</b> K6BCE (multitop) 2,890,926-321-3002-C-96	<b>High Band</b> W8L (W8LJKU, W888 INY JKS ZBF opr) 48,123-217-673-C-76 WA8DXA (+WA88 DXB RCN) 395,847-181-729-F-90	<b>High Band</b> W0LUB 217,605-163-445-C-41 WA0GGG 10,350-46-75-C-8

## 1976 DX Competition

Scores are grouped in order by U.S. and Canadian call areas, alphabetically by country prefix, and in order by score within each entry category. Example: W1HFB, 1,322,440 points, 290 multipliers, 1520 contacts, power over 500 watts, 84 hours operating time. Power designators are A, 150 watts; B, 150-500; C, over 500; D, E, F, G, combinations thereof. Awards are scheduled for mailing

October 15. An asterisk denotes ARRL staff member, ineligible for an award.

**Disqualifications:** Per the criteria described on page 73 of QST, January, 1976; the following entries have been disqualified: cw; W3CRE, W6PLH; phone: W3CRE.

U.S.A.

PHONE
CONNECTICUT
W1ZM (WA2CLQ, opr.)
W1HFB

W1AUA 124,505-315-1209-C-90
W1AUA 328,536-216-507-6-95
W1AUS 276,942-202-457-6-97

W1K 20,532-59-116-B-28
W1K 3149-35-49-B-15
W1K 3175-25-29-A-2

Multi-Single
W1A1K (+WA1RYL, 220 Net)
W1A1K 1,322,580-335-316-AC-80

W1A1NRF1 (+WA1S MAO, OC, GNF, 220 Net)
W1A1NRF 1,216,440-310-1308-C-96

W1A1STN (+K1LTH, WALSTO 220 Net)
W1A1STN 1,216,350-318-1275-C-75

W1A1LNU (+220 Net)
W1A1LNU 641,277-261-819-C-37
W1A1VTM (+220 Net)
W1A1VTM 325,686-206-527-C-37

W1A1OCU (+K1LTV, WA1QNF, 220 Net)
W1A1OCU 263,835-165-534-C-45
W1A1VW (+220 Net)
W1A1VW 46,464-88-176-C-11

Low Band
W1A1QX 31,575-111-275-A-21
W1A1NET 35,550-79-150-C-29
W1A1PK 9670-35-54-C-10

High Band
W1A1NKK 322,000-180-671-C
W1A1VQ 234,352-152-492-C-2
W1A1VY 431,462-235-612-C-61

W1A1W 30,000-100-100-C-24
W1A1NRG 22,500-80-125-C-17
W1A1DPB 16,128-56-96-A-9

W1A1KJ 16,374-75-175-C-3
W1A1KJ 1188-18-22-B-2
W1A1WV 540-12-15-C-5

W1A1QZ 495-11-15-B-5
W1A1WB 192-8-10-C-1
W1A1VY 75-5-5-A-1

EASTERN MASSACHUSETTS
W5UDK/2
W1A1N 579,751-239-803-C-37
W1A1JY 16,374-75-175-C-3

W1A1W 160,740-141-380-C-30
W1A1MR 34,632-37-148-C-15
W1A1M 16,374-75-175-C-3

W1A1HW 8694-46-63-B-10
W1A1SS 8090-35-58-B-10
W1A1FL 5814-38-51-C-8

Multi-Single
W1A1C (+W1A)
W1A1C 125,568-96-436-C-65

Multi-Multi
W1A1M (+W2MZE, WA8WNU, WA9UCU oprs)
W1A1M 1,101,728-291-1262-C-74

Low Band
W1A1NJ 47,980-86-186-B-32
W1A1B/1 432-12-12-A-5

High Band
W1A1JJ 206,052-154-446-C-29
W1A1PL 5994-37-54-B-12
W1A1KH 3042-26-39-B-13

W1A1SX 663-13-17-C-2
Maine
W1A1SKV 144,399-127-379-C-34
W1A1SD 28,542-71-134-C-4

W1A1OTQ 23,316-67-116-B-26
W1A1CQW1 8568-35-93-C-2

High Band
K1RGE 534,204-209-852-C-50
AD1VMQ 87,552-96-304-A-5
AA1TW 840-14-20-B-5

NEW HAMPSHIRE
W1HAF 54,162-102-177-A-4
Multi-Single
W1A1BY (+WA2LQZ, WA1SJK, JYV JZC)
W1A1BY 1,260,830-315-1334-C-96

High Band
K1C5J 398,413-153-868-C
K1VBL 383,172-148-863-C-38

RHODE ISLAND
K1HMO 156,009-161-323-C-42
W1YRC 63,030-110-191-C-11

High Band
W1YNE 6384-38-56-C-7
VERMONT
K1IJK 35,640-88-135-C-20

Low Band
W1A1GX 2376-24-33-C-12
WESTERN MASSACHUSETTS
W1YK (+W1JLD, opr.)
W1YK 835,200-239-1200-C-43

W1A1BW 729,468-276-881-C-49
K1KNO 264,480-190-464-C-36
W1A1TA 22,587-71-108-C-2

Low Band
W1A1FBX 16,632-63-88-C-26
High Band
K1RGP 61,131-71-287-C-9
W1A1UT 4800-25-64-C-9

EASTERN NEW YORK

W2AZO 173,499-151-863-C-31
W2A2LM 32,802-77-142-C-35
W2DOW 4095-38-39-C-4

Multi-Single
AB2BXL (multop)
W2BXL 13,965-49-95-C-14

Multi-Multi
AC2PV (+K1SOME YKT ZND, W1QGO, WA1S NNC QZM RYL, WA2S EAH SPL, WB2S AXV OEU, SHH, WA3SWF)
W2BXL 4,534,560-480-3149-C-96

Low Band
W2MHC 82,800-118-240-C-45
K2JMY 17,420-46-90-C-21
W2EYK 11,748-44-89-C-16

High Band
W2BWR 2772-21-44-A-11
W2B25T 126-6-7-D-1

N.Y.C. - L.I.
K2CLE 425,106-209-678-C-71
W2SGK 88,140-113-260-C-26

W2LEL 81,021-112-239-B-52
W2H2HZ 66,144-106-208-A-48
W2GKZ 58,782-97-202-C-15

W2BSJG 29,172-68-143-A-13
W2BYJN 21,780-66-110-G-11
W2EYK 19,872-69-96-C-15

W2TE 19,872-69-96-C-15
AD2MEY 14,664-52-94-A-5
W1EVR 9504-44-72-B-7

W2BFLN 6264-36-58-D-6
W2BYWK 20,703-67-103-A-15
W2QAN 1479-17-28-B-1

W2A0VG 912-16-19-B-8
Multi-Single
AA2LQO (opr. W2DKM, K2KSP, K2UAT, WA2SHQ, WB2AM)
W2A0VG 130,620-140-311-C-36

W2A1UH (+WB2S BXO, PML, FLF)
W2A1UH 28,480-104-415-B-19
W2B2QB (+WB2YKL)
W2B2QB 5400-36-50-C

Low Band
W2B2FUN 24,072-68-118-B-30
W2B2FL 14,580-54-90-C-8

High Band
W2A2ZS 246,008-158-819-C-53
W2A2Z 29,268-113-222-C-37

W2A2Y 34,560-80-144-C-13
W2ACKR 25,784-62-144-C-24
W2AZVHH 18,144-96-108-B-19

W2A2W 4,628-11-14-C-14
W2B2NR 10,575-47-75-A-6
K2ZOV 8256-42-64-A-7

W2NB 1404-18-28-C-6
W2YVS 4958-11-14-C-14
W2BYKL 216-8-9-B-2

W2B2UF 126-6-7-A-1
W2B2NF 108-8-7-C-5
W2L 6-10-11
W2CZZ 27-3-3-A-1

NORTHERN NEW JERSEY

W2GKD 944,112-272-1157-C-71
W2BRK 462,645-207-743-C-37
K2OMB 266,242-181-494-C-40

W2ZZ 130,626-123-354-C-24
W2B2HJW 100,464-112-299-B-43
W2B2SD 87,840-120-244-C-34

W2A2W 84,648-98-174-C-29
W2A2UD 28,733-67-133-C-6
W2B2FT 25,842-37-118-C-8

W2A2FR 21,866-68-107-C-8
W2BYVN 7360-42-60-A-8
W2UL 4002-28-46-A-9
AB2RJJ 12-2-2-C-1

Multi-Single
K2BML (multop)
W2BML 833,448-287-968-C-90

Multi-Multi
K2CW/2 (multop)
W2CW/2 164,616-152-361-C

Low Band
AB2RTF 20,832-62-112-C-30
K2QBW 1104-16-23-C-11

High Band
W2B2VF 200,646-157-426-D
AC2EAK 128,484-129-332-C-30
W2KXK 19,278-63-102-C-10

AB2CBT 2640-20-48-B-14
SOUTHERN NEW JERSEY
W2HMH
K2FL 1,164,267-321-1209-C-66

W2HBT 410,338-313-642-C-49
W2BJN 236,439-189-547-B-49
W2RHE 213,108-172-413-C-35

W2BFG 88,200-120-245-B-42
W2BFG 73,070-130-213-B-41
AB2BYU 71,820-05-288-B-34

W2PA 61,560-120-171-C-22
W2AEJ 57,900-100-193-C-66
W2RTB 41,647-81-170-C-14

W2F 40,845-85-139-F-23
W2ITG 40,508-86-157-C-24
W2ZHN 25,986-71-122-C-17

WESTERN NEW YORK

W2LFO 100,188-132-253-A-41
W2EKF 53,628-82-218-C-15
AC2FHW 46,197-87-117-C-18

W2LJ 35,816-73-184-C
W2UJM 27,132-76-179-C-25
W2RQ 20,184-58-116-C-46

W2BCK 16,182-58-93-C-7
W2CDV 14,860-62-80-B-7
Multi-Single
K2IGW (+WA2MPB)
K2IGW 207,276-231-732-C-75

High Band
W2BYJ 278,556-167-556-C-48
W2RF 169,092-154-366-A-45
W2KIM 44,232-76-194-B-37

DELAWARE

W3WD 12,876-58-74-B-24

Multi-Single
W3NX (+WB3D, K3NEZ)
W3NX 486,486-234-693-C-80

Low Band
K3NEZ 588-13-15-C-6

High Band
W3DRD 1242-18-23-A-6

EASTERN PENNSYLVANIA

W3JSX 410,849-231-593-38
K3EF 332,493-223-497-C-30
W3KFP 306,660-190-538-C-51

W3WGD 29,873-186-531-C-6
W3GID 220,473-187-393-C-38
W3SZZ 190,710-163-390-C-66

W3GRS 150,255-189-315-C-6
W3K 129,183-149-289-C-6
W3YGH 110,715-121-305-C

W3YFV 103,722-118-293-C-32
W3ALB 103,545-117-295-C-36
K3JOK 78,860-121-280-C-6

W3HYJ 78,860-121-280-C-6
W3GHM 27,090-70-120-C-2
K3MGQ 14,700-80-98-C-21

K3CY 8643-43-67-C-5
Multi-Single
K3TGM (multop)
K3TGM 163,908-157-348-C-36

Multi-Multi
W3WJD (+K3YUA, W3BGN, WA3LRD)
W3WJD 4,149,660-485-2852-C-96

W3GM 2,465,043-209-209-C-96
W3DHM (+K3DQ, JG1, W3DQ)
W3DHM 2,164,386-406-1777-C-96

W3FR (+K3L, W3HTZ, W3KFL, WA3LNS RID)
W3FR 1,765,278-383-1543-C-98

W3GPE (+K3 OUI, W3V, WA3S, W3YD, WA3WSSO, W6JOU, T1ZCC oprs.)
W3GPE 1,480,920-328-1608-C-85

K3BW (+K3LJ, K3JLK)
K3BW 352,068-202-881-C-60
High Band
W3KVV 70,299-107-219-C-16

W3EYV 66,444-98-218-C-2
W3CGS 21,083-59-118-C-13
K3ZOL 3720-45-73-C-2

MARYLAND - D.C.

W3LPL 1,388,178-342-1353-C-80
AC3EJ 379,998-227-558-C-35
W3USF (WA3UO opr)
W3USF 566,279-233-524-C

W3GZP 158,364-159-332-C-53
W3MFA 89,604-182-262-C-6
W3A5X 66,869-117-219-C-50

W3OV 69,888-112-208-C
W3MLM 40,980-91-180-C-28
W3QO 39,000-80-150-C-10

K3JET 29,498-72-38-B-20
AD3XJ 27,981-77-121-E-22
AC3KMV 24,426-69-118-C-3

K3VA 15,423-53-97-A-16
W3AHH 9435-39-55-B-16
W1FLM/3 6216-37-56-C-6

W3ML 2405-35-21-E
W3KA 2808-24-39-C-4
Multi-Single
AD3GJD (+WA3VUQ, WB3AVN)
AD3GJD 498,108-282-1298-C-88

W3GRF (+K3G, W3YV)
W3GRF 1,021,082-281-974-C-60
W3YXN (+WA2ZRG, W3GMJ, WB3AUO oprs)
W3YXN 268,208-174-514-C-52

W3UO (multop)
W3UO 29,498-72-38-B-20
W3ZT (+WSTUX X oprs)
W3ZT 9381-23-49-C-6

Multi-Multi
W3AU (+CX1EK, K3EST, W3S ADT, AZD IN ZKH, WA3HRV UT)
W3AU 4,342,344-293-2936-C-95

AA3NGS (+W3 BWZ RRX, WA3AFG, W3K4F, W3WJ, W3EZR)
W3NGS 1,588,002-378-1903-C-96
LUIBAR (+LUD2K, W3NANE)
LUIBAR 316,404-204-517-C-74

WESTERN PENNSYLVANIA

W4ATL 552,015-261-705-C-68
AC4QAW 379,674-237-524-C-50

W4QXD 337,953-209-539-C-43
W4ZSH 227,430-190-399-C-38
W4A1V 188,282-158-393-C-85

W4ADU 111,239-136-133-C-47
W4AFRJ 99,456-148-224-C-45
W4BTA 83,394-113-246-C-20

AD4ZA 81,753-119-229-C-6
W4BYS 74,911-79-103-A-40
W4BYPT 59,340-92-218-C-33

W4IQ 42,504-92-164-C-13
K4D7D 40,050-89-180-C-40
W4M 31,098-76-133-C-10

W4JVU 24,911-79-103-A-40
W4FVW 23,266-76-102-B-8
W4TNN 15,132-52-97-C-16

W4KMS 12,842-36-74-F-12
K4WVT 7669-49-51-B-8
W4NQV 7788-44-59-B-8

AC4LGM 5145-35-49-A-5
W4HVU 1650-22-79-C-9
Multi-Single
W4MYA (+K4ZRK, W4B4VY)
W4MYA 777,600-270-960-C-83

W4BYV (+WA2CK, K4JNM, W4EBM)
W4BYV 422,400-220-640-C

Multi-Multi
W4B4V (+LU5 ZDC 8AGT, W3S 8GV IDT, WA3AMH, K4GKD, K4DDA)
W4B4V 3,650,850-475-2562-C-96

Low Band
W4QCV 26,580-75-118-E-12
W4UWJ 17,568-61-98-C-11

GEORGIA

W4ALW 343,710-201-870-C
W4QWV 189,024-179-352-E-55
AC4KNY 137,676-149-308-C-20

K4E 94,095-123-255-C-24
W4LW 26,778-71-119-B-16
AC4UUV (W3CCQ opr.)
W4UUV 10,290-49-70-G-28

Low Band
W4WVF 592,416-204-968-C-54
W4BDF 303,145-189-639-C-45

K4JWD 186,643-147-323-C-38
K4ALU 125,532-132-317-C-29
W4MYM/4

W4WV 43,564-78-181-B-26
W4W 11,885-58-189-B-32
K4JYM 18,003-53-117-C-12

K4B1V 16,170-49-110-C-37
W4K 627-11-43-B-15
K4ND 3276-26-42-C-4

W4MSX 210-7-10-A-2
Arkansas
W45VDH 189,435-173-365-F-31

Multi-Single
W4BZSS 48,672-104-156-C-8
AD4RZK 30,186-78-129-C-22

Multi-Single
W4BZSS (+WA3JIS)
W4BZSS 87,084-118-246-C-40

Low Band
W4BRTG 136,452-137-332-C
AA5VMC 29,784-68-146-B-25

LOUISIANA

K5KLA 430,264-246-583-C-62
K5MY 356,842-224-831-C-62

W5BRTX 241,614-116-433-C-48
W5SAWF 226,440-185-408-C-47

W5K 74,308-156-344-C-34
W5DR 59,933-87-153-C-13
W5AW5Y 2772-28-33-C-12

Low Band
W5WMM 105,846-118-299-C-48

MISSISSIPPI

W5B5VY 169,803-171-321-C-42
W5BUB 124,764-148-281-C-18

W5UCY 5880-35-54-C-10
NEW MEXICO
K5EYV 70,596-106-222-C-39

W5BORF 38,052-84-151-A-34
K5MAT 12,432-56-74-C-2

NORTHERN TEXAS

K5VTA 270,291-811-427-B-49
W5VYQ 62,457-109-191-C-30

K5YK 60,990-107-190-A-40
W5KHP 20,520-78-98-C-8

W5B 18,500-56-100-A-8
W5AE 2980-20-38-C-2

Multi-Multi
W5BOOE (multop)
W5BOOE 1,905,030-366-1735-C-96

Low Band
K5KE 86,526-114-253-C
W5AUC/5

W5AUC/5 56,349-107-269-C-52

High Band
W5UTT 20,691-57-121-B-18

OKLAHOMA

W5JME 49,329-87-

**EAST BAY**  
 K6UJS 546,060-190-958-E-1  
 Multi Single  
 WA6NGG (+K6PJY)  
 978,540-235-1388-C-80  
 AA6VEF/6(+W6BIGN)  
 567,072-176-1074-C-80  
**High Band**  
 WB6BKN 6138-31-66-C-19  
**LOS ANGELES**  
 W6HX (WB6OLD opr)  
 1,799,892-289-2076-C-92  
 K6QC 43,560-86-170-C  
 W6RIT 21,312-48-148-C-3  
 Multi Single  
 K6SVL (+K6GJD, W6NHX, W6SOW)  
 1,009,356-233-1444-C-87  
 K6ELX (+W6ABR)  
 159,744-104-512-C-69  
 WA6NBY (+W630V)  
 56,448-84-224-C-25  
**Low Band**  
 W6SEKL 94,950-75-422-C-37  
 K6BC 12,036-34-118-C-7  
**High Band**  
 WB6PXP 692,070-170-1357-C-65  
 W6BVN 63,000-75-280-A-27  
 W6VPT (W6CFM opr)  
 11,040-46-80-C-12  
 AA6KX/J 8580-44-65-C-12  
 W6RDS 5406-34-53-B-8  
 W6CQ 2961-21-47-C-8  
 W6RGE 162-6-9-B-7  
**ORANGE**  
 W6YMV 131,520-137-320-C-55  
 W6CY 84,525-115-245-C-39  
 AA6FIT 62,604-74-282-C-20  
 K6TFA 29,232-58-168-F-13  
**Low Band**  
 K6OS 3228-25-43-C-11  
**High Band**  
 WB6WIW 1650-20-28-B-6  
**SANTA BARBARA**  
 W6PRP 46,440-86-180-B-25  
 AA6LB 27,336-60-134-C-13  
 Multi Single  
 W6UA (+W6UM)  
 188,604-136-403-F  
**High Band**  
 WA6VYK 115,878-89-434-A-27  
 K6OW 64,680-88-245-C-40  
**SANTA CLARA VALLEY**  
 W6YX (WA7MQX, oppr)  
 626,898-163-1282-C-60  
 WA6MQS/6  
 200,650-150-787-C-60  
 K6BR 20,600-120-564-C-36  
 AC6BJB 100,206-114-293-C-32  
 K6TIL 88,200-84-350-B-27  
 W6VYK 76,660-105-244-B-29  
 WA6GFY (W6KMW opr)  
 60,606-74-273-C-15  
 W6EJ 57,900-100-193-C-23  
 W6MUR 46,350-67-208-C-22  
 K6RQ 23,988-85-123-C  
 K6SZ 18,975-55-115-  
 K6CN 18,078-46-131-E-10  
 W6BZH 18,274-39-122-C-7  
 W6BGS 9518-48-87-C  
 K6RU 7656-29-88-C-16  
**Multi Single**  
 W6OKK (+WB6DSV)  
 068,047-213-167-3-C-96  
 WB6KKB (+WA6PGE)  
 969,989-247-1309-C-88  
**Multi-Multi**  
 W6PAA (+W1ARR, WA3MQJ, WB6S CEP DSV LPK, WA6NEN)  
 709,238-198-1194-C-58  
**Low Band**  
 K6MA 3900-26-50-C-5  
**High Band**  
 W6EYV 159,426-102-521-C-28  
 W6WKM 33,475-67-208-C-22  
 AA6GFKT 33,373-53-147-B-  
 W6ZYC 16,470-45-122-C-29  
 W6GLM 16,377-53-103-E-21  
 W6ISQ 1224-17-24-C-2  
**SAN DIEGO**  
 K6PO 163,530-115-474-C-37  
 W6BZE 149,445-135-369-C-68  
 W6ABT 93,600-130-240-C-28  
 W6JOT 85,992-115-271-C-42  
 K6LFE 82,992-118-247-C-30  
 W6ZMX 79,782-104-256-C  
 W6CHV 72,576-144-168-B-8  
 W6MRA 46,134-69-233-C-10  
 WA6UFY 20,881-49-140-B-  
 AC6KBD 3415-23-38-A-14  
**Multi-Multi**  
 W6KON (+W6MRA, WA9UCJ)  
 2,017,536-296-272-C-96  
**Low Band**  
 WA9OOL/6  
 96,525-65-495-C-85  
 W6ITY 59,514-91-218-F-40  
**High Band**  
 WA6DNM 517,293-153-1127-C-  
 W6LON 18,306-54-113-C-10  
 W6VFR 15,778-45-74-C-29  
 W6ID 6000-40-50-C-6  
**SAN FRANCISCO**  
 W6WB 96,747-119-271-C-40  
**Multi Single**  
 W6BIP (mult)  
 187,432-123-508-C-45  
**Low Band**  
 K6LIM 2040-20-34-A-4

**SAN JOAQUIN VALLEY**  
 K6CQF (VE3DXV opr.)  
 832,419-219-1267-C-67  
 K6AO 52,421-71-248-C-18  
 W6BVM 3434-22-52-B-  
**Low Band**  
 K6QHC 20,691-57-121-C-  
**High Band**  
 W6PKG 516,375-153-1125-C-54  
 W6MMH 1260-14-30-C-4  
**SACRAMENTO VALLEY**  
 K6DR 134,082-117-382-C-40  
 W6NKR 7839-39-67-C-9  
**High Band**  
 W6BIL 5439-37-49-B-20  
 AC6KYA 2394-19-42-B-3  
 K5LZT/6 3-1-1-A-1  
**7**  
**ARIZONA**  
 W7AYV 185,592-148-418-C-30  
 WA7HRE 75,492-108-233-A-95  
 W7FCD 18,786-62-101-A-12  
**High Band**  
 WA7NFH 235,200-140-560-C-46  
 K7NKH 133,738-117-438-C-33  
**IDAHO**  
 WA7WXY 546,759-237-769-C-42  
**MONTANA**  
 K7ARV 35,964-74-162-C  
 WA7OBH 192-8-8-A-2  
**NEVADA**  
 W7JJO 1488-16-31-C-10  
**OREGON**  
 W7TML 566,544-176-1073-C-69  
 AA7HH 145,431-113-428-C-58  
 WA7VJ 37,620-44-285-C-22  
 WA7GZA 168-7-8-A-3  
**High Band**  
 WB7ABK 277,125-125-739-C-48  
 WA7PEZ 51,563-51-337-C-18  
**UTAH**  
 K7QXB 142,485-115-413-C-35  
 K1PKQ/7  
 100,233-111-301-C-20  
 W7HS 29,394-71-138-C-21  
**WASHINGTON**  
 W75FA (K7VPP opr.)  
 1,137,225-257-1475-C-91  
 W7YTN 224,388-138-542-F-75  
 W7WYV 81,354-91-298-C-16  
 K7GEX 51,606-61-282-C-40  
 K7DZ 50,126-65-257-C-22  
 W7BCY 38,115-55-231-C-44  
 WA7JRW 37,620-44-285-C-22  
 W7HAD 36,550-50-237-B-71  
 K7MOK 34,884-57-204-C-34  
 AC7KWC 19,584-32-204-C-5  
 K7OS 7350-35-70-C-12  
 K7RSB 594-9-22-C-3  
**Multi Single**  
 WA7ZLC (mult)  
 682,239-203-1071-C-96  
 K3MNT/7 (+WA1KKM, WA7UQG)  
 623,610-195-1066-C-66  
 W7RM (+W8R)  
 542,832-196-913-C-30  
 W7VRO (+W7S DGM EKM  
 WA7ZWC)  
 519,681-181-957-C-94  
 K7JCA (+W7XN)  
 270,732-112-657-C-30  
 W5QQQ/7 (+WA7UQG)  
 82,503-89-309-C-48  
 W7YH (mult)  
 49,248-72-228-B-  
**Low Band**  
 K7RSC 81,193-59-289-C-23  
 AD7EFB 21-1-7-A-1  
**High Band**  
 WA7LAG (K7RSC opr.)  
 202,738-94-718-C-39  
 W7JAL 89,050-54-422-C-21  
 K7LAY 18,318-43-122-C-24  
 WA7OBL 15,438-31-166-C-6  
 WA7AH 11,445-35-109-C-5  
 WA7ZG 8100-52-7-C-5  
 W7BQG 2940-20-48-B-15  
 W7JEG 2793-19-49-B-5  
 W7RVQ 63-3-7-B-1  
**WYOMING**  
 W7INH 83,160-126-220-C-37  
**8**  
**MICHIGAN**  
 K8YRV 322,197-211-509-C-48  
 W8TWA 290,895-205-473-C-72  
 K8CVC 19,110-65-98-C-36  
 K8YOV 744-7-4-A-1  
 AC8GLC 6327-37-57-C-13  
**Multi Single**  
 W8CNL (WA1DXS, WA8PPF, W8BS  
 GCC LDR)  
 384,408-228-562-C-44  
**Multi-Multi**  
 K8IDE (+H1MOL, K8HLR, W8BPIW)  
 744,129-267-929-C-60  
**High Band**  
 W8NWO/8  
 31,784-136-323-C-56  
 W8SRHJ 100,950-110-306-C-  
 WA8JUN 15,042-57-88-C-6  
 W8LS 14,382-51-94-C-18  
**OHIO**  
 WA8VXW 418,605-215-649-C-60  
 W8SFO 232,200-200-387-C-  
 WA8AJ 213,675-178-407-C-55  
 W8BTJL 138,528-156-296-B-30  
 AB8PYP 115,773-149-259-C-45

WBZCQ 114,240-140-272-C-30  
 W6EL 90,909-111-273-C-  
 K8CXM 79,005-115-229-C-19  
 AD8HBN 74,938-123-202-C-80  
 W8NPF 51,084-99-172-C-39  
 AA6FJS 46,919-93-163-C-44  
 WB1I 37,488-88-142-C-  
 W8YQR 35,154-93-126-A-15  
 W8DWP 33,012-84-131-D-40  
 WA8NYB 31,302-74-141-C-6  
 K8NKK 18,648-56-111-C-17  
 AA8VY 14,618-38-63-C-5  
 K8PSG 4998-34-45-C-8  
**Multi Single**  
 W8LTL (WA1LKU, W8BS, IBZ INY  
 JXS ZBF opr)  
 280,578-202-463-C-61  
 AB8IAY (+W8LXW, W8RZM)  
 32,868-83-132-C-30  
**Low Band**  
 WA8ZDF 213,144-166-428-C-53  
 AC8DO/8 9315-45-69-C-26  
 K8UGA 7992-36-74-C-13  
**High Band**  
 W8SWS 37,638-82-153-C-20  
 W8OEM 10,032-44-76-C-24  
 W8CBA 2376-22-36-B-16  
 W8VZE 1980-22-30-B-3  
 K8PVD 1932-23-28-C-6  
**WEST VIRGINIA**  
 W8JM 396-11-12-C-3  
**High Band**  
 AA8VZO 6195-35-59-B-20  
**9**  
**ILLINOIS**  
 K9HMB 1,008,432-298-1128-C-74  
 K9BGL 441,960-232-628-F-50  
 AD9UKM 159,408-164-324-F-60  
 W9DWO 131,809-149-303-C-18  
 AC9OH 78,045-121-215-C-  
 W9LUL 45,360-90-168-B-18  
 W9IJS 37,336-98-144-C-16  
 K9GMT 17,280-64-90-C-12  
 W9CRN 14,160-59-80-C-13  
 K9UIY 4928-31-53-A-15  
 W9JDK 3428-36-41-B-3  
 W9DDR 3627-31-39-C-10  
 AB9DUK 3240-30-36-B-8  
 W9HPG 297-9-11-A-8  
**Low Band**  
 K9PPY 33,228-78-142-C-16  
 W9YH (W8RNPB opr)  
 25,200-70-120-E-20  
**High Band**  
 W89HAD 493,888-176-746-C-48  
 W9WYB 130,680-134-325-C-35  
 W9MLG 126,367-131-319-C-47  
 W9IY 75,664-109-232-C-38  
 W9ACT/9 61,275-95-215-C-47  
 W9YRA 53,302-74-241-C-16  
 W9NLR 44,820-90-166-C-19  
 WA9VOL 36,979-78-156-C-12  
 W9GCG 36,979-78-156-C-12  
 W9REC 990-15-29-C-10  
 K9JLK 192-8-8-B-4  
**INDIANA**  
 W89WY 477,000-250-638-C-50  
 W89EP 118,020-140-281-C-29  
 W89IQ 62,732-113-188-C-32  
 AD9VK 40,824-72-189-C-26  
 W9USS 18-2-3-B-4  
**Multi-Multi**  
 WA9NPM (+K9GTE, WA9RJJ, W89S  
 BPG LT, W89CYG)  
 531,989-267-789-C-96  
 W9TQA (mult)  
 204,155-158-439-C-47  
**Low Band**  
 K9UWA 49,248-96-171-C-30  
**High Band**  
 K9CLO 19,660-50-131-C-14  
 K9QDF 18,300-61-100-C-18  
 W9RFFK 310-15-18-B-4  
**WISCONSIN**  
**Low Band**  
 W89MOQ 16,800-56-100-C-20  
**High Band**  
 W9GIL 34,293-71-161-  
**10**  
**COLORADO**  
 WA9CVS (W89DJY opr.)  
 826,008-294-1084-C-85  
 W9PAY 13,660-55-84-C-15  
**High Band**  
 WA2WMT/7  
 273,612-151-604-C-44  
 W89IKN 118,020-140-281-C-29  
 WA9TAM 54,144-94-182-B-29  
 W89VJ 35,109-85-141-C-22  
 W8PCM 9804-43-76-A-13  
**IOWA**  
 AC8FHE 168,012-156-398-C-41  
 WA9NAA 56,498-77-188-C-34  
 W8MJN 32,964-82-134-C-22  
 WA9VUY 1071-17-21-B-4  
 AD8EQA 816-16-17-B-6  
**Multi Single**  
 W8PCO (+K8FLY, W8S LBS MUH)  
 672,366-874-810-C-88  
 K8OAM (mult)  
 75,816-108-234-C-38  
**Low Band**  
 W8PRY 3960-30-44-A-  
 AA9VX 3444-28-41-C-7  
 W9MOQ 1482-19-26-C-3  
**High Band**  
 W89HOG 132,132-143-308-C-43  
 AA9VCL 86,768-104-214-B-24  
 W8SML 98,344-104-187-C-40  
 W89FHH 9315-45-69-C-9  
 W89EI 3864-28-46-B-9  
 W8MFK 3645-27-45-A-8  
 AC8HUP 900-15-20-C-2

**KANSAS**  
 WA9AGN 84,240-117-240-C-55  
 AC8IUB 66,462-106-209-C-17  
 WA9GSG 40,977-87-157-C-22  
**High Band**  
 AA9VJL 16,020-60-89-B-  
 WA9DO 10,224-48-71-A-15  
**MINNESOTA**  
 W8GUH/9  
 312,655-239-715-C-65  
 W8LP 11,088-48-77-C-20  
**Multi Single**  
 W8QANT (mult)  
 207,090-177-390-C-65  
**High Band**  
 W8HW 48,111-79-203-C-  
**MISSOURI**  
 WA9PAO 302,382-214-471-C-60  
 K9IFL 83,538-117-238-C-37  
 WA9FBQ 12,008-58-69-A-22  
 W89R 7686-42-61-A-30  
 AC8QYG 5148-33-61-B-12  
 AB9FLM/9 3528-28-42-A-9  
**Multi Single**  
 K9AZV (mult)  
 78,840-120-219-C-40  
**NEBRASKA**  
 WA9ZPM 25,560-71-120-C-30  
 K9SPM 19,344-62-104-C-23  
**High Band**  
 W89KB 22,815-65-117-B-32  
 K4AVQ/9 14,310-53-90-C-16  
**NORTH DAKOTA**  
 AD9VWV/8  
 115,020-135-284-F-60  
**SOUTH DAKOTA**  
 WA9CPX 381,936-218-584-C-82  
**High Band**  
 WA9ONL 201,600-140-480-C-  
**CANADA**  
**MARITIME**  
**Low Band**  
 VE1EP 1350-28-25-  
**High Band**  
 VE1ANN 11,026-35-105-C-11  
 VE1EK 7200-30-80-A-10  
**QUEBEC**  
 VE2AYU 147,822-142-347-C-7  
**Low Band**  
 XJ2AH 5406-34-53-C-7  
**ONTARIO**  
 VE3MV 29,184-64-152-C-30  
**Low Band**  
 VE3ENM 34,263-81-141-C-  
 VE3BN 21,120-55-128-E-32  
 VE3AK 3564-27-44-C-3  
**High Band**  
 XJ3EJK 8970-46-68-B-  
 VE2AEJ/3 2475-25-33-B-10  
**MANITOBA**  
 VE4RP 17,271-57-101-37  
 VE4JK 14,850-59-90-B-17  
**SASKATCHEWAN**  
 VE5RA 57,810-94-205-C-  
**Multi Single**  
 VE5NN (+VE5 DX NW OA XU)  
 56,856-103-184-C-  
**High Band**  
 VE5TT 1125-15-25-A-9  
**ALBERTA**  
**Multi Single**  
 VE6VM (+VE6CU)  
 11,040-48-80-B-88  
**High Band**  
 VE6WX 1830-17-30-B-12  
**BRITISH COLUMBIA**  
 VE7EL 106,812-129-276-C-66  
 XJ7AZ 18,447-43-143-E-17  
**Multi Single**  
 VE7BGK (+VE7s BCU CGR CGY)  
 93,432-68-458-A-8  
**Low Band**  
 WA6GUK/VE7  
 1482-12-38-A-15  
**High Band**  
 VE7DEW 9675-25-129-C-20  
**NORTHWEST TERRITORIES**  
 VE8RO 3564-22-54-B-18  
**DX CW**  
**Africa**  
**BOTSWANA**  
 AC2QCN (SM4QNN opr.)  
 34,020-60-239-B-  
**CANARY ISLANDS**  
**Low Band**  
 EA8BF 6318-26-81-A-  
**LIBERIA**  
 EL2T 1,177,920-192-2045-C-52

**Low Band**  
 EL2X 57,102-68-150-C-8  
**IVORY COAST**  
 TU2GI 107,532-87-412-B-  
**RHODESIA**  
**High Band**  
 ZE4JS 30,624-44-232-A-  
**SOUTH AFRICA**  
 Z56BNF (SM4CNN opr)  
 67,604-74-282-A-  
**MAURITANIA**  
 ST5CJ 245,421-111-737-B-20  
**Asia**  
**MACAO**  
 CR9AJ 16,848-27-208-B-  
**JAPAN**  
 JA3JW 654,534-138-1581-C-69  
 JE1SE 335,175-109-1025-B-  
 JA1CO 218,268-86-848-B-60  
 JA1GX 148,425-84-589-A-37  
 JA7DAH 71,154-67-354-B-27  
 JA6CNL 51,813-57-303-B-  
 JA1PS 44,541-49-303-A-25  
 JA7CPW 39,670-48-215-B-28  
 JA1BI 31,122-42-247-B-  
 JA7KD 29,832-44-226-B-20  
 JA8SW 29,187-47-207-A-  
 JA22JA 26,084-42-202-B-25  
 KA6DX 29,958-42-206-T-25  
 JA3GHG 23,940-38-210-A-42  
 JR2BPX 21,840-56-130-A-  
 JA1ZXK (K8HVT opr)  
 9,932-44-151-A-  
 JA1CSB 19,869-37-179-C-17  
 JA1FLK 18,684-36-173-A-21  
 JA7MLQ 17,442-36-163-B-15  
 JA1ARM 13,365-33-135-C-14  
 JH7BRG 12,963-29-149-C-  
 JA1WL 12,782-22-132-B-10  
 JA1UYF 12,650-26-150-A-35  
 JA1BNW 8814-28-113-C-  
 JA7EM 8568-24-119-C-12  
 JR2BSR 7011-19-123-A-13  
 JA1CF 6628-24-112-B-8  
 JA9GLT 6225-28-83-A-16  
 JR2BF 4368-16-91-A-  
 JA7ARW 3942-18-73-A-1-  
 JR1LD 3940-14-70-A-10  
 JA1BSU 2736-16-57-A-6  
 JF1OC 1287-11-39-A-  
 JA8YF 1188-9-44-A-  
 JR1CK 918-11-41-A-12  
 JH3KWQ 792-8-33-A-7  
 JA8HV 720-8-30-B-  
 JR3STC 156-4-13-A-  
 JA2BN 120-5-8-A-  
**Multi Single**  
 JAS5YA (JH1GU, JH2S, FKX 5G  
 JASVEN, JA9S GLL, DZS GOE  
 opr)  
 425,448-114-1370-C-  
 JA1YFL (+J2HJ, JH4KKW, W8  
 JANCJ opr)  
 137,592-91-504-C-39  
 JA1YAF (mult)  
 7336-65-383-A30  
 JA1YHA (mult)  
 65,697-61-389-C-  
 KA2US (+K4ZV)  
 56,271-51-371-C-25  
 JA7YAA (JP2VJ, JA7S, KP  
 KCL LMM LUR opr)  
 32,472-44-246-A-38  
 JA3YK (JA3OJU, JA3REU, W8  
 JR3BVX, JH3S, JAU HBF KW  
 PLE opr)  
 29,528-38-259-B-31  
 JAZZHX (+JAZZ, JEMPIEM  
 JH2RBQ, JR2AAZ)  
 882-6-49-B-  
**Multi-Multi**  
 JA1YXP (JA4TIN, JA8XQI,  
 JAYOZV, JH3MAL, JR1TG,  
 JE1MSB opr)  
 125,280-80-822-B-64  
 JAS3YD (JAS3O, JAS3OQ,  
 JASHHM, JA9OZG opr)  
 10,830-30-112-B-20  
 JH2ZRJ (mult)  
 750-10-25-A-  
**Low Band**  
 JA1MCU 64,900-57-380-C-25  
 JH1APZ 40,044-47-284-B-31  
 JH3BK 23,112-37-144-B-12  
 JA1HOM 17,313-29-199-C-30  
 JA1DQT 17,205-37-155-C-15  
 JA1ISA 15,444-26-198-B-16  
 JA1JFX 14,412-26-171-A-18  
 JF1TTC 9633-19-169-A-32  
 JG1EUS 6540-20-109-A-24  
 JA6PFR 6000-16-125-A-37  
 JA1JL 4430-16-132-B-20  
 JA7AJU/1 3315-13-85-A-10  
 JH1BRB 2970-15-66-B-  
 JH2IR 2301-13-59-A-28  
 JH3C 2112-11-64-A-  
 JF7CZ 1980-12-56-B-30  
 JG1AGZ 1848-11-56-A-20  
 JG1KLV 1674-9-62-A-21  
 JA2RE 148-9-44-B-16  
 JA1QD 1215-4-45-A-6  
 JA9KH 924-7-44-A-16  
 JH2BC 888-8-37-A-  
 JE1VDC 780-8-30-A-3  
 JA1XNP 680-7-27-A-3  
 JA3WHJ 480-5-32-A-  
 JA3BT 390-5-26-A-  
 JR3BJN 90-3-10-B-  
 JR2PK 278-3-1-  
 JA2M 18-2-3-A-2  
 JH9BQX 15-1-5-A-2  
**High Band**  
 JA1PCY 104,139-57-609-B-25  
 JH1AC 71,292-52-487-B-21  
 JA1EMX 68,874-53-433-B-19  
 JA1SIV 32,882-46-239-C-60  
 JG1EE 29,980-44-198-B-20  
 JH1MTR 19,994-34-198-B-20  
 JA9JBK 18,432-32-192-A-25  
 JA1WVO 17,010-35-162-B-10  
 JR1HS 15,051-29-173-B-9  
 JR1MY 13,810-28-159-B-24  
 JA9SV 12,585-27-155-B-  
 JR1FV 10,218-26-131-C-6  
 JH88BA 10,140-26-130-A-20  
 JA1FT 9941-31-107-B-17  
 JR3DTR 9396-27-116-A-17

JA1XMS 8262-27-102-C-8  
J3E3EJ 7488-24-104-  
JR2BDG 6552-24-91-A-  
JA8LFL 480-20-78-B-  
JA4AZZ 2646-14-63-B-12  
JA1BZM 2016-14-48-A-  
JA43XS 128-2-37-B-  
JE1WNH 888-3-37-B-  
JH1EJA 819-7-39-A-20  
JA1RUJ 630-8-42-B-  
JE3MWB 970-5-38-A-3  
JA4LDP 480-20-78-B-  
JA1AAT 336-7-16-B-  
JA3EGC 216-6-12-A-3  
JA3MFE 84-4-7-A-2  
JE1BGE 9-1-3-A-2

ASIATIC R.S.F.S.R.  
UA9KAN 148,368-88-562-A-  
UA9FAJ 11,248-33-114-B-  
UK9CAS 11,248-31-121-B-  
UA9IAP 1008-14-24-A-

Multi Single  
UK9LAB (UA9s LH NR MI,  
UW9s LT NE ops)  
240,534-83-966-B-  
UK9AAN (multiop)  
19,008-20-630-B-  
UK9ZAF (multiop)  
100,890-57-590-A-  
UK9FAA (UA9s EH FBE FBX  
ops)  
79,888-59-444-B-  
UK9OAO (UA9s ODY ODW OBU  
ops)  
11,934-34-117-B-  
UK9OOD (UA9s OAT OAG  
ops)  
10,836-28-129-B-  
UK9CBG (UA9s CCL CCF  
ops)  
5733-21-96-A-

Low Band  
UA9IAP 1485-9-55-A-  
UA9LH 1296-8-54-B-

High Band  
UA9KAK 38,998-42-302-A-  
UA9KAL 11,667-39-151-A-  
UA9SAU 17,450-31-189-B-  
UA9AG 10,692-33-108-B-  
UA9HAV 2580-26-110-A-  
UA9CBO 7614-27-94-B-  
UA9NIN 3782-23-37-B-  
UA9FDW 2376-22-36-A-  
UA9LRL 684-12-19-A-  
UA9CCL 360-8-15-B-

TURKEY  
Low Band  
TA1ZB 1080-10-36-B-10

ISRAEL  
4X4HT (WB2GSW opr)  
31,311-49-213-B-20

WEST MALAYSIA  
9M2FK 2160-16-45-A-

Europe  
PORTUGAL  
CT4BM 42,432-68-208-A-9  
CT10Y 3316-42-56-A-7

FED. REPUBLIC OF GERMANY  
DK3BJ 154,566-93-554-  
DK6FE 19,132-42-33-B-  
DL1GN 15,561-39-12-B-  
DK5MP 11,118-34-109-  
DK7GL 4789-29-35-A-

Multi Single  
DK2TU (DK1PD, DK5GB,  
DL7BI opr)  
810,810-154-1755-C-  
DL75Q (DL7s BG ON QU SY  
opr)  
649,935-143-1552-C-

Low Band  
DJ2VE 600-8-20-B-

High Band  
DK6IS 166,320-55-1008-B-  
DK3GI 140,900-34-870-B-  
DJ9ON 115,362-51-75-B-  
DL2HQ 29,229-51-193-B-  
DL1VA 24,768-43-192-A-  
DJ9VD 22,248-36-206-B-  
DJ1YH 15,984-36-148-B-  
DJ9NX 15,894-37-144-C-  
DL1TH 15,246-33-154-B-  
DK8BI 12,960-36-120-B-  
DK8KC 3480-20-58-B-

GERMAN DEM. REPUBLIC  
DM3YBF 97,266-86-377-A-  
DM5SDJ 17,136-48-119-B-  
DM2CXE 16,896-44-128-A-  
DM3BE 11,667-31-121-B-  
DM3XM 10,206-42-81-A-  
DM2CJJ 7920-33-80-A-  
DM2CCM 4800-25-64-A-  
DM2DZG 3213-21-51-A-

Low Band  
DM2FDM 2160-15-56-A-  
DM2FUL 1665-15-37-B-

High Band  
DM2CYE 14,472-36-134-A-  
DM2CPC 11,160-31-120-A-  
DM3PCK 9999-28-119-B-  
DM2FWL 11,667-31-121-B-  
DM3TF (DM4WFF opr)  
8666-22-101-  
DM2CDO 5400-20-90-A-  
DM2FBM 4392-24-61-B-  
DM2BLE 4200-20-70-A-  
DM3VAA 3009-17-59-B-  
DM2CJU 2940-14-70-A-  
DM2CJL 2052-12-57-A-  
DM2CXD 480-8-20-A-  
DM3VYL 231-7-11-A-  
DM5VHL 162-6-9-B-  
DM2AOL 3-1-1-B-

SPAIN  
EA2JA 1,405,026-177-2646-C-  
EA2CP 40,356-59-228-A-  
EA7CP 5610-22-85-B-

High Band  
EA4BV 34,731-51-227-A-

REPUBLIC OF IRELAND  
EI9J 297,442-107-802-A-28  
EI3CP 6162-26-79-A-

FRANCE  
F8VJ 529,104-146-1208-A-42  
F3IN 237,540-107-740-B-18  
F8RE 62,139-77-269-A-9  
F6CZU 98,653-57-343-A-  
F9BB 25,092-51-164-A-  
F6CCI 1638-14-39-A-

Low Band  
F8ZF 60,312-56-359-B-

High Band  
F6BFN 63,054-62-339-A-9  
F6DNR 24,040-44-180-A-28

ENGLAND  
G3FXB 1,082,730-170-2123-A-  
G48UE 1,071,180-165-2164-A-72  
G7KXJ 67,633-163-194-A-67  
G2QT 35,058-124-941-A-  
G3IAS 285,480-122-780-A-46  
G3FSE 242,757-111-729-A-  
G3APN 57,724-74-290-A-  
G3KSH 50,544-72-234-A-29  
G2AJB 7980-28-95-A-

Low Band  
G2RO 68,352-64-356-A-28  
G3XVY 69,599-56-348-A-17  
G3ZQW 16,695-35-159-A-10

High Band  
G3SXW 126,084-76-553-A-  
G3TXF 68,826-47-368-A-24  
G3YBH 62,952-61-344-A-8  
G6NK 8100-25-108-A-  
G3AWR 2640-20-44-A-  
G3DNF 1326-13-34-A-6

NORTHERN ISLAND  
GI3EX 155,320-95-545-A-  
GI3OLJ 42,630-49-290-A-23

SCOTLAND  
Low Band  
GM6RV 15,120-40-126-A-

High Band  
GM4ASY 60,534-59-342-A-

WALES  
GW3NW 38,415-65-197-A-

High Band  
GW4CXM 16,038-33-162-A-15

HUNGARY  
HA5MD 63,516-67-316-A-35  
HA5MO 32,563-64-201-A-16  
HA1ZD 14,742-42-117-A-29

Multi Single  
HG5U (HA8s UD UJ VL oprs)  
657,747-153-1433-F-  
HA9KLE (HA7s MK MJ LO LM  
L2 oprs)  
850,298-167-1298-B-96  
HA1KSA (HA1s TF SV TO oprs)  
480,441-127-1261-B-80  
HA5KDO (HA5s MK ML FN oprs)  
348,615-127-815-B-28  
HA3KJ (HA3s GJ HE, HA2RM  
opr)  
345,000-125-920-B-96  
HA8KCI (multiop)  
126,647-101-649-B-96  
HA8KVG (multiop)  
155,400-100-518-B-63  
HA9KOV (multiop)  
85,086-87-326-B-  
HA9KOL (multiop)  
42,075-51-275-B-  
HA5KJD (multiop)  
32,844-46-238-A-22  
HA8KVG (multiop)  
20,925-45-159-B-32  
HA5KAS (multiop)  
7584-32-79-A-16  
HA3KGS (multiop)  
4875-25-65-A-12

Low Band  
HA9MM 1092-13-28-A-6

High Band  
HA7MC 74,480-68-365-A-28  
HA5BA 53,808-59-304-A-15  
HA5VY 18,900-42-150-B-5  
HA9KLF 14,322-31-154-B-10  
HA5JK 7038-23-102-A-  
HA9IG 924-11-28-B-

SWITZERLAND  
HB9AGH 27,924-52-181-A-

Low Band  
HB9KC 22,140-45-164-B-

High Band  
HB9DX 123,438-74-556-B-  
HB9AYZ 29,664-48-206-B-

LIECHTENSTEIN  
Multi Single  
DKGN/HB9 (+DJ9MH, DJ8JY)  
598,728-192-313-  
HB9A (HB9s HA AIU oprs)  
566,865-183-1235-B-

ITALY  
I2XXG 1,047,540-170-2054-B-68  
I2FCP 458,451-133-1489-B-42  
I2BRAN 321,474-131-818-B-9  
I6POY 119,016-72-551-C-30  
I8RHZ 64,386-73-294-B-15

Multi Single  
I3GNQ (+I3AWW)  
1,051,380-165-2124-B-73

Low Band  
I6BQI 212,400-75-944-C

NORWAY  
High Band  
LA5HL 134,400-64-700-B-  
LA5SH 41,922-51-274-B-26  
LA5BT 33,190-49-217-B-22  
LA5Q 9324-28-111-B-  
LA5IE 3894-22-59-A-  
LA5YT 12-2-2-A-

BULGARIA  
LZ1XL 55,020-70-186-B-  
LZ2KKZ 35,058-124-941-A-  
LZ1KAA 33,380-83-210-B-  
LZ2GS 3525-25-47-A-

Multi Single  
LZ1KOP (multiop)  
165,678-106-538-B-

High Band  
LZ1FI 1089-11-33-A-  
LZ3KBA 910-10-17-B-  
LZ1KOZ 198-6-11-B-

AUSTRIA  
Low Band  
OE5KE 37,047-53-233-D-  
OE5FG 6900-25-92-C-

FINLAND  
Low Band  
OH3PE 2496-16-52-C-

High Band  
OH2LU 48,750-50-325-C-  
OH6KH 47,124-44-357-C-  
OH2BJN 30,917-43-269-C-  
OH2BAH 28,842-46-209-C-  
OH6BG 18,014-46-203-B-  
OH6MM 15,840-33-160-A-  
OH9PP 12,746-37-124-  
OH6JG 9612-36-89-C-  
OH6GM 5,505-38-135-A-  
OH2BMG 2295-19-51-B-  
OH2BCD 600-10-20-B-  
OH7SC 189-7-9-B-2

CZECHOSLOVAKIA  
OK1JALW 687,848-152-1508-A-  
OK35L 459,710-101-524-B-50  
OK1WIN 43,340-59-265-A-  
OK1WC 37,459-58-185-A-  
OK2BW 25,530-46-185-A-  
OK2SW 13,959-37-109-B-  
OK1KCI 14,061-43-109-B-  
OK3CU 8217-33-83-B-  
OK3KFO 7725-25-103-A-  
OK2BA 6077-27-75-A-  
OK1FBH 5628-28-201-B-  
OK1BL 4095-21-61-A-  
OK3YOV 3363-19-59-A-  
OK1JW 1359-11-41-A-  
OK1MWN 540-10-28-A-  
OK2PAW 459-9-17-A-

Multi Single  
OK1KSO/OK1KS AAU ADH AJJ  
AEZ SF WT oprs  
899,814-141-1418-B-89  
OK3KFF (multiop)  
2436-117-685-B-  
OK3KAP (multiop)  
50,562-53-318-B-  
OK1KOK (OK1s MPP MSS  
opr)  
29,640-48-185-B-  
OK3KFO 13,959-37-109-B-  
OK3RMW (multiop)  
1390-18-25-A-

Low Band  
OK1FCW 30,282-49-206-A-  
OK1MDK 22,608-48-471-A-  
OK1DIM 22,176-42-171-A-  
OK1MSP 16,422-34-161-B-  
OK1MZ 3420-19-70-A-  
OK1MSP 1224-17-24-B-  
OK1AEH 561-11-17-C-  
OK1MZ 270-9-10-A-  
OK1JW 216-6-12-A-  
OK1IAS 72-4-6-A-  
OK3CIJ 72-4-6-A-  
OK2PGU 27-3-3-A-

High Band  
OK1TA 150,750-76-670-B-  
OK3EA 111,739-65-573-B-  
OK2ZK 73,566-67-386-C-  
OK3KE 67,368-65-368-B-  
OK3RE 65,493-57-383-B-  
OK1FA 53,361-49-383-B-  
OK1JW 51,293-39-281-A-  
OK2KRT 51,268-39-281-A-  
OK1DVK 37,026-31-242-A-  
OK2RO 25,878-42-203-A-  
OK1JW 25,878-42-203-A-  
OK1JW 25,878-42-203-A-  
OK1FAM 33,192-32-137-A-  
OK1DWA 9240-22-140-B-  
OK1IAS 8867-27-107-A-  
OK2PS 7029-29-54-A-  
OK1LV 5850-25-78-A-  
OK1JW 5220-20-87-A-  
OK1BRN 5175-20-69-A-  
OK2ZK 5123-17-73-A-  
OK2SMQ 3498-12-68-B-  
OK3FON 3417-17-67-B-  
OK2DL 3240-18-60-A-  
OK1JW 2772-14-66-A-  
OK3BT 2730-14-65-A-  
OK1AUP 2052-19-36-A-  
OK2SMO 1488-16-31-A-  
OK2LI 1324-12-54-B-  
OK2BDH 600-8-25-A-  
OK3TFY 360-8-15-A-  
OK2BL 342-6-19-A-  
OK2ZK 272-4-6-A-  
OK1AWH 144-6-6-A-  
OK1KZ 72-4-6-A-

Belgium  
ON4XG 208,926-106-657-B-  
ON8B 80,484-76-353-A-30

High Band  
ON6ZW 10,851-31-117-A-

DENMARK  
OZ1LO 85,800-55-520-B-  
OZ1W 2772-14-66-A-  
OZ4HW 8874-29-102-A-  
OZ3PO 8664-38-76-B-

High Band  
OZ6XT 81,954-50-471-B-  
OZ1VY 66,900-50-446-A-  
OZ2NU 3234-22-48-A-  
OZ8E 528-8-22-  
OZ1W 2772-14-66-A-  
OZ4HW 8874-29-102-A-  
OZ3PO 8664-38-76-B-

NETHERLANDS  
PA9EP 119,328-88-452-B-  
PA9LOU 75,615-71-355-A-7  
PA9LOR 93,460-60-397-A-  
PA9BT 40,827-75-171-A-40  
PA9TAU 11,058-44-84-  
PA9TA 8928-32-93-A-

High Band  
PA9KFF 23,028-38-202-A-18  
PA9DDN 18,144-42-144-A-  
PA9WRS 4500-25-60-A-  
PA9WRH 3300-22-50-  
PA9GJA 1326-17-26-A-

SWEDEN  
SM5AOE 334,152-177-952-B-40  
SM4AZD 192-8-8-  
Multi Single  
SK7CE (SM7s RN DXX EBC ECM  
opr)  
EGL F JE FUE GAB GBM GC  
opr)  
347,256-104-1114-C-

Low Band  
SM6DGR 360-8-15-B-

High Band  
SM2EKM 95,876-52-621-B-17  
SM5BNZ 77,374-53-486-B-  
SM5AO 63,964-46-348-B-  
SM2GY 46,671-47-331-B-  
SM5BDS 25,704-42-205-D-  
SM6BZE 20,592-39-174-B-  
SM5GK 16,208-19-146-A-  
SM6FKF 16,200-40-139-B-18  
SM6CCM 13,068-36-121-A-  
SM7CMV 11,250-30-126-B-  
SM5GM 8064-32-94-B-  
SM6GN 7752-34-96-A-  
SM5EJ 5913-27-73-B-  
SM6DGR 2784-16-98-A-  
SM5FC 2308-19-88-B-  
SM6JY 120-8-8-  
SM5CAK 27-3-3-B-

POLAND  
SP7CTY 104,786-82-426-A-  
SP702 30,362-34-311-B-  
SP2FA 26,961-31-153-A-  
SP8WJ 22,137-47-157-A-  
SP9CSJ 13,899-41-113-A-  
SP8K 13,899-41-113-A-  
SP6FLB 2448-16-66-B-  
SP9ZU 2331-21-37-A-  
SP6FER 750-10-25-A-

Multi Single  
SP9KEY (SP5G RM, SP9s BAL  
ICA oprs)  
209,550-110-635-B-  
SP9KRT (SP9s HMF ZW opr)  
5229-21-83-B-  
SP9PDF (+SP9F)  
5148-72-78-A-

Low Band  
SP9GH 2193-17-43-B-  
SP3IP 1386-14-33-A-  
SP8MJ 627-11-19-B-  
SP9HVN 273-7-13-A-  
SP6GE 273-7-13-A-  
SP5IXI 36-3-3-A-

High Band  
SP7D 21,294-39-182-B-  
SP5AG 18,870-34-189-A-  
SP2FGO 16,126-34-158-A-  
SP5AG 14,304-31-110-A-  
SP8UJ 10,978-27-110-A-  
SP9BBH 8910-27-110-A-  
SP5FLA 6440-24-95-A-  
SP5FLA 6440-24-95-A-  
SP8KXN 3315-18-75-  
SP2KLS 2400-16-50-A-  
SP9AMH 2379-13-61-  
SP5QOL 2038-14-49-A-  
SP2BK 2529-13-61-  
SP9IGY 1521-13-39-A-  
SP3HC 1110-10-37-B-  
SP7EJU 966-14-29-B-  
SP9ZU 825-11-28-A-  
SP7EIS 675-9-28-A-  
SP8RA 540-10-18-B-  
SP5AL 486-9-18-A-  
SP5AU 288-12-12-A-  
SP9PNB (SP9CD opr)  
180-6-10-B-

GREECE  
SV9WEE 5220-29-60-F-28

EUROPEAN RUSSIAN U.S.F.R.  
UW6MP 28,710-58-165-A-

Multi Single  
UK6LAZ (multiop)  
25,239-126-722-B-  
UK3ACR (multiop)  
33,750-50-225-B-  
UK1NAA (multiop)  
16,275-31-179-B-

High Band  
UA3GM 82,926-51-542-B-  
UA3NB 31,995-45-237-B-  
UA4IU 14,348-34-145-B-  
UA4SM 14,208-37-128-B-  
UVA3P 1224-12-54-B-  
UK1TAB 750-13-20-B-  
UA3IBC 72-4-6-A-

KALININGRADSK  
High Band  
UA2DP 68,058-57-398-B-

WHITE R.S.S.R.  
Multi Single  
UK2WAM (multiop)  
11,522-34-113-A-  
UK2ABC (multiop)  
3340-20-58-B-

High Band  
UC2WAN 19,722-38-173-A-  
UC2AAQ 6132-28-73-A-  
UC2LAS 4599-21-73-A-  
UC2AAK 3450-23-80-A-  
UC2WA 3324-13-54-B-  
UK2AAP 494-11-18-B-

UKRAINE  
UR5DW 13,038-41-106-B-  
UT5LF 7854-34-77-B-

US5KAM 3036-22-46-A-  
Multi Single  
UK5MAF (UB5s MAK MDC,  
UY5LK opr)  
15,800-100-655-B-  
UK5JAA (multiop)  
104,874-77-454-B-  
UK5JAA (multiop)  
17,415-49-129-B-  
UK5QBE (multiop)  
14,310-30-159-B-

Low Band  
UR5ZAT 18,126-38-159-A-  
UB5FAQ 1365-13-35-B-

High Band  
UB5WAL 40,392-44-306-B-  
UY5HV 30,364-48-211-B-  
UB5UAT 27,387-51-179-B-  
UY5TE 10,218-26-131-B-  
UB5FBU 7841-17-44-B-  
UB5QCK 3060-17-60-A-  
UB5VAV 1305-15-29-B-

GEORGIA  
UF6CX 2394-19-42-A-

KAZAKH  
High Band  
UL7GAA 1134-14-27-B-

MULDAVIA  
UO5GR 4212-27-52-B-

LITHUANIA  
UP2BA 38,817-57-227-B-  
UP2BAO 12,808-32-123-B-

Multi Single  
UK2BAS (UP2s PAJ PAO  
PCY opr)  
351,333-103-1137-B-6C  
UK2PBR 143,550-66-725-B-  
UK2PAT (multiop)  
8072-27-112-B-

High Band  
UP2BFB 1806-14-43-B-  
UP2NX 351-9-13-B-

LATVIA  
Multi Single  
UK2GKW (multiop)  
263,828-99-1225-B-  
UK2GAY (UC2s OD PP PU oprs)  
45,500-81-300-B-

Low Band  
UQ2GEC 254-7-12-A-  
High Band  
UQ2GDQ 46,092-46-334-B-

ESTONIA  
High Band  
UR2DQ 25,538-43-222-B-  
UR2RJ 4047-19-71-B-

ROMANIA  
YO3DD 14,508-39-124-B-  
YO5AVN/3  
10,212-37-92-A-  
YO2SZ/7 1782-18-33-A-

Low Band  
YO2BL 8832-23-128-A-  
YO3BEJ 3840-16-80-  
YO7AW 2160-18-40-A-  
YO2BON 459-9-17-A-

High Band  
YO6KEI 47,376-56-282-B-  
YO8KAF 21,496-52-266-B-  
YO6AD 23,760-48-169-  
YO2BEO 1221-11-37-A-  
YO6LG 810-9-30-A-

YUGOSLAVIA  
Multi Single  
YU5EY (YU3RO)  
593,774-182-2956-C-  
YU2AC (multiop)  
8

PANAMA  
HP1AC 304,560-135-752-A  
  
ALASKA  
KL7HRP 395,694-114-1157-C-40  
AL7IDH 357,669-117-1019-C-32  
AL7AL 317,190-97-1090-C-32  
AL7EWA 51,423-61-281-B-10  
High Band  
KL7HDX 24,753-37-223-C-9  
PUERTO RICO  
KP4EAJ 3,852,687-263-4883-C-69  
KP4EKI 3,495,270-263-4430-C-69  
Low Band  
AJ4EAS 651,000-124-1750-C-38  
VIRGIN ISLANDS  
KV4IO 1,626,888-212-2558-B-50  
GREENLAND  
Low Band  
OX3RA 30,528-48-212-A  
High Band  
OX3AB 307,317-89-1151-A  
OX3OA 1,044,328-72-483-B  
SINT MAARTEN  
Multi Single  
PJSCQ (W1YE K1PA K1DQV  
WA2AUC ops) 1,989,756-228-2909-C-48

GUATEMALA  
VE2AQS/TG9 259,776-123-704-B  
COSTA RICA  
T12WX 1,004,892-196-1709-A  
DOMINICA  
Multi Single  
VP2DE (FG7AN F68BJ ops) 499,212-147-1132-A  
GRENADA  
VP2G (WSMYA opr) 2,131,974-234-3037-B-42  
ST. KITTS  
VP2KR (+VP2K KA KF KK KN)  
1,163,878-178-2217-B  
MONTSERRAT  
VP2MOC (K2JOC, opr) 2,139,000-250-2852-C-33  
High Band  
VP2MB 17,535-35-167-A-12  
TURKS & CAICOS ISLANDS  
VP5DF 525-11-16-A-3

MEXICO  
XE2MX 870,870-182-1595-B  
XE1FL 387,288-132-978-B-42  
NICARAGUA  
YN1FWN 48,600-79-216-B-9  
CAYMAN ISLANDS  
Multi Single  
ZF1AL (K4SHB WA4SVH WB4TAF  
ops) 2,100,636-236-2967-C-48  
JAMAICA  
Multi Single  
6Y5ED (+5Y5EB)  
65,026-85-255-B-31  
BARBADOS  
Multi Single  
8P6HN (W8OIR OXN ops) 1,145,664-208-1836-B-28

Oceania  
TONGA ISLANDS  
A35NN (WB7ABK opr) 423,654-154-917-A  
REPUBLIC OF NAURU  
Multi Single  
C21NI (W6s KG DOD) 428,904-148-966-B  
PHILIPPINE ISLANDS  
DU6EG 2124-12-59-BC-10  
GUAM  
KG6JAW 79,296-64-413-F  
Low Band  
KG6JFY 55,152-48-383-C-11  
HAWAII  
KH6JJ 2,512,488-248-3377-C-76  
KH6CF 1,809,089-211-2542-C-63  
KH6HK 1,479,816-221-2232-C  
K4VWI/KH6 118,341-81-487-B-44  
Low Band  
KH6JAC 186,732-91-684-E-10  
AH6HSW 167,970-110-509-A-20  
KH6HNT 16,872-38-148-A-8

High Band  
AH6JIA 88,366-74-398-B-16  
AUSTRALIA  
VK7QM 364,146-137-886-A-75  
VK7CM 66,024-84-282-A-14  
Low Band  
VK2AR 289,170-90-1071-A-30

Multi Single  
VK3MR 229,548-94-814-A  
VK3QI 151,641-87-581-A-24  
VK2AYD 27,993-43-217-A-11  
VK4UR 11,856-38-104-A  
VK3APN 8613-29-99-A  
VK8BA 189-7-9-A-1  
LORD HOWE ISLAND  
VK2OO/LH 71,928-74-324-A  
INDONESIA  
High Band  
YB9ABX 693-11-21-B  
NEW ZEALAND  
ZL3GG 705,936-191-1232-A-30  
ZL1AFW 462,384-152-1014-A-43  
Low Band  
ZL1AMO 184,320-96-640-B  
FIJI ISLANDS  
Multi Single  
3D2KG (W6s KG DOD) 431,496-156-922-B

South America  
BOLIVIA  
CP1EU/6 141,300-100-471-C-12  
ECUADOR  
High Band  
HC5EE/H01 30,318-62-163-C-5  
ANTARCTICA  
KC4AAC (WB6KIL, opr.) 1,256,640-187-2240-C  
ARGENTINA  
LU6EF 902,088-201-1496-B-91  
LU5DVO/P 398,046-163-814-B  
PERU  
OASV 151,506-114-443-A-20  
NETHERLANDS ANTILLES  
PJ2VD 3,702,105-277-4455-C-62  
PJ9JT (W1BIF, opr.) 1,869,120-220-2832-C-32  
BRAZIL  
PV1BOA 614,889-161-1273-A-41  
PV3NE 505,812-183-1102-B-35  
PY7SR 436,482-137-1062-B  
PT2JB 8004-23-116-A-3  
Low Band  
PY6AVY 4950-25-66-B  
SURINAM  
PZ1DR (W3GXF, opr.) 391,878-118-1107-C-14  
VENEZUELA  
YV1HQ (VE3EQZ, opr.) 929,223-201-1541-B-35  
Low Band  
YV1TO 126,795-79-537-C-15  
High Band  
YV1OB 453,252-107-1412-A-40  
TRINIDAD & TOBAGO  
9Y4AC (VE7BZC, opr.) 548,205-161-1135-B-22

DX PHONE  
Africa  
LIBERIA  
EL2T 1,844,520-190-3236-C-60  
High Band  
EL2X 330,720-106-1040-C-18  
EL2U 31,644-35-293-B-6  
SOUTH AFRICA  
Low Band  
ZS6DW 155,556-87-596-B-16  
MAURITIUS  
High Band  
3B8CV 3927-17-77-B  
MAURITANIA  
High Band  
5T5CJ 134,853-79-569-B-12  
SENEGAL  
6W8FP 2,773,713-227-4073-C

Asia  
MACAO  
High Band  
CR9AJ 252-4-21-B  
KOREA  
High Band  
HM2JN 360-5-24-A  
JAPAN  
JA2JW 289,170-90-1071-C-60  
JA7GAX 19,502-32-197-A-23  
JA6KLI 15,659-27-192-B-29  
JA6NL 12,090-26-155-B  
JA1GHR 6912-18-128-B  
JH7CZQ 3354-13-86-B-50  
JH3CGC 2226-7-106-A  
JA1YXP 1880-10-66-A  
JA1EMX 1833-13-47-B-4  
JA1CFJ 1518-11-46-A-6  
JA9JUK 1080-10-36-A-9  
JA1OBW 750-5-50-A  
JH2BPV 378-7-18-A

Multi Single  
JA1YFL (JR1GVZ, JH2KKW,  
JA4JB, JA6CJ ops) 117,195-65-601-B  
JA7ZKR (JH7CZQ, DPU FDL  
FILE ops) 2535-13-65-A-60  
JH2ZLR (multiop) 627-11-19-A  
Low Band  
JA1ELY 27,225-33-275-B  
JA1HOM 819-7-39-C-13  
JA1XCS 12,940-23-196-C-4  
JH1BRB 189-3-21-B  
KA6DX 66-2-11-C-3  
JA2RER 30-1-10-A-2  
JH1JBX 24-1-8-A-2  
High Band  
JA1PCY 27,156-31-292-B-25  
JA1HVS 24,012-29-276-C-22  
JH1ACQ 13,524-23-196-C-4  
JA1PUK 9288-24-129-B-11  
JH7BRG 3408-16-71-C  
JA1SJK 2340-10-78-B-5  
JA1MCA 1518-11-46-B  
JR2BDF 1242-9-46-A  
JH1MTR 924-7-44-A  
JA4GXS 912-8-38-A-6  
JA1AE 18-1-29-A  
KE1QXE 705-8-47-A-10  
JH1BQE 648-6-36-B  
JA2TKO 630-7-30-B-5  
JH2BIA 504-6-28-A-25  
JA2JJA 486-6-27-B-2  
JA6UYF 480-5-32-A-8  
JA2BNN 210-5-14-A  
JA3CVO 18-3-22-A  
JA1UUS 183-3-26-A-8  
JE3MWB 156-2-26-A-4  
JA3XRC 153-3-17-B-3  
JG1RDV 144-3-16-A-4  
JA1AAT 146-6-14-B  
JA7KXD 108-4-9-B-2  
JA9ANF 99-3-11-A-2  
JA4JDP 99-3-11-A  
JH1JED 99-3-11-A  
JA1QR 36-3-4-B-1  
JR2MKV 30-1-10-A-3  
JA3ELU 18-2-3-A  
JH1BQX 18-1-6-A  
JH8BQJ 6-1-2-A-1

MINAMI TORISHIMA  
Low Band  
JA8IEV/JD1 456-8-19-A  
ASIATIC R.S.F.S.R.  
High Band  
UA9CBO 1350-10-45-B  
UA9FBZ 912-8-38-A  
ISRAEL  
High Band  
4X4HT (WB2GWS opr) 252-7-12-B-1

Europe  
PORTUGAL  
CT14AT 1,386-264-178-2596-C-82  
CT1OY 352,775-117-1005-A-29  
CT1DW 83,877-3-383-B-20  
CT48M 13,068-36-121-A  
High Band  
CT1QZ 133,250-50-889-C-27  
CT1NY 36,432-46-264-B-23  
FED. REPUBLIC OF GERMANY  
DK3BJ 77,280-70-368-C  
DJ2YE 594-11-18-C-2  
Multi Single  
DA2DS (multiop) 5229-21-83-C-11  
Multi-Multi  
DL5AY (DA1A, AD AY HL LY LD  
LK PK, DA2S, CW JG KY, DL1ZX  
DK8ZD, ops) 152,880-70-728-C  
High Band  
DL8JS 75,870-45-562-C-22  
DJ8BA 75,735-45-561-B-23  
DK8FZ 20,394-33-206-C-10  
DK5VO 15,066-27-186-B  
DA2KD 3060-20-51-B-18

SPAIN  
EA1FX 277,368-104-889-B  
EA4HL 143,289-87-549-C  
EA5TD 77,544-72-359-B-10  
High Band  
EA3VM 68,166-42-541-C-24  
REPUBLIC OF IRELAND  
Multi Single  
EI9CB (multiop) 199,290-65-1022-B-36

FRANCE  
F8BV 4488-22-68-A  
Low Band  
F68RK 744-8-31-A  
High Band  
F8BON 54,912-52-352-A-25  
F8BFH 49,134-38-431-A-22  
F8RC 28,431-30-243-B

POLAND  
SP9AI 11,049-29-127-C  
Multi Single  
SP9KRT (SP9s HMF ZU ops) 3120-16-55-B  
SP9PDF (SP6FH, SP8NO  
ops) 2352-16-49-A  
High Band  
SP9FLY 3213-17-63-B

SWEDEN  
High Band  
SMSBNZ 34,850-35-330-C  
SM4DQE 18,426-37-166-C  
SM2EKM 7050-25-94-B-6  
SM6ATN 6498-19-38-C-5  
SM4CGM 660-11-20-B-2  
SM6EDH 480-10-16-C-5  
SM5CAK 324-9-12-C-2  
SM7TV 109-5-7-B-1

NETHERLANDS  
Multi Single  
PA9SMK (+PA9WRR) 89,635-55-519-C-29  
High Band  
PA5QIG/A 7458-22-113-C  
PA6ATY 5103-27-63-A-14  
PA6NVK 2028-13-52-B  
PA6EHF 1758-3-55-A-5  
PA6KFF 360-8-18-A-3  
SWEDEN  
High Band  
SMSBNZ 34,850-35-330-C  
SM4DQE 18,426-37-166-C  
SM2EKM 7050-25-94-B-6  
SM6ATN 6498-19-38-C-5  
SM4CGM 660-11-20-B-2  
SM6EDH 480-10-16-C-5  
SM5CAK 324-9-12-C-2  
SM7TV 109-5-7-B-1

NETHERLANDS  
Multi Single  
PA9SMK (+PA9WRR) 89,635-55-519-C-29  
High Band  
PA5QIG/A 7458-22-113-C  
PA6ATY 5103-27-63-A-14  
PA6NVK 2028-13-52-B  
PA6EHF 1758-3-55-A-5  
PA6KFF 360-8-18-A-3  
SWEDEN  
High Band  
SMSBNZ 34,850-35-330-C  
SM4DQE 18,426-37-166-C  
SM2EKM 7050-25-94-B-6  
SM6ATN 6498-19-38-C-5  
SM4CGM 660-11-20-B-2  
SM6EDH 480-10-16-C-5  
SM5CAK 324-9-12-C-2  
SM7TV 109-5-7-B-1

NETHERLANDS  
Multi Single  
PA9SMK (+PA9WRR) 89,635-55-519-C-29  
High Band  
PA5QIG/A 7458-22-113-C  
PA6ATY 5103-27-63-A-14  
PA6NVK 2028-13-52-B  
PA6EHF 1758-3-55-A-5  
PA6KFF 360-8-18-A-3  
SWEDEN  
High Band  
SMSBNZ 34,850-35-330-C  
SM4DQE 18,426-37-166-C  
SM2EKM 7050-25-94-B-6  
SM6ATN 6498-19-38-C-5  
SM4CGM 660-11-20-B-2  
SM6EDH 480-10-16-C-5  
SM5CAK 324-9-12-C-2  
SM7TV 109-5-7-B-1

Multi Single  
JASVBA (JA9s BEX DPR DZS  
FSU GLD, GE, JH1GUO, JH2s  
FKX SUG ops) 80,040-58-460-C  
JA3YDS (JH2AZV, JA3UOQ,  
JH3HRW, JR3PYW, JA9s FOR  
GLT ops) 14,898-26-191-B-38  
JA3ZBI (multiop) 1584-24-147-B  
KA6JC (+KA6DX)  
4704-16-98-C-8  
JA3YKC (JH3s HBF KWQ PLE  
JA3REU, JR3VW ops) 4335-17-85-B-15  
JA2ZHX (JA2s AO CLA EAU  
EMP JEM, JH2s RBQ WJK ops)  
1404-9-52-A  
Multi-Multi  
JA1YFL (JR1GVZ, JH2KKW,  
JA4JB, JA6CJ ops) 117,195-65-601-B  
JA7ZKR (JH7CZQ, DPU FDL  
FILE ops) 2535-13-65-A-60  
JH2ZLR (multiop) 627-11-19-A

Low Band  
JA1ELY 27,225-33-275-B  
JA1HOM 819-7-39-C-13  
JA1XCS 12,940-23-196-C-4  
JH1BRB 189-3-21-B  
KA6DX 66-2-11-C-3  
JA2RER 30-1-10-A-2  
JH1JBX 24-1-8-A-2  
High Band  
JA1PCY 27,156-31-292-B-25  
JA1HVS 24,012-29-276-C-22  
JH1ACQ 13,524-23-196-C-4  
JA1PUK 9288-24-129-B-11  
JH7BRG 3408-16-71-C  
JA1SJK 2340-10-78-B-5  
JA1MCA 1518-11-46-B  
JR2BDF 1242-9-46-A  
JH1MTR 924-7-44-A  
JA4GXS 912-8-38-A-6  
JA1AE 18-1-29-A  
KE1QXE 705-8-47-A-10  
JH1BQE 648-6-36-B  
JA2TKO 630-7-30-B-5  
JH2BIA 504-6-28-A-25  
JA2JJA 486-6-27-B-2  
JA6UYF 480-5-32-A-8  
JA2BNN 210-5-14-A  
JA3CVO 18-3-22-A  
JA1UUS 183-3-26-A-8  
JE3MWB 156-2-26-A-4  
JA3XRC 153-3-17-B-3  
JG1RDV 144-3-16-A-4  
JA1AAT 146-6-14-B  
JA7KXD 108-4-9-B-2  
JA9ANF 99-3-11-A-2  
JA4JDP 99-3-11-A  
JH1JED 99-3-11-A  
JA1QR 36-3-4-B-1  
JR2MKV 30-1-10-A-3  
JA3ELU 18-2-3-A  
JH1BQX 18-1-6-A  
JH8BQJ 6-1-2-A-1

Multi Single  
JA1YFL (JR1GVZ, JH2KKW,  
JA4JB, JA6CJ ops) 117,195-65-601-B  
JA7ZKR (JH7CZQ, DPU FDL  
FILE ops) 2535-13-65-A-60  
JH2ZLR (multiop) 627-11-19-A  
Low Band  
JA1ELY 27,225-33-275-B  
JA1HOM 819-7-39-C-13  
JA1XCS 12,940-23-196-C-4  
JH1BRB 189-3-21-B  
KA6DX 66-2-11-C-3  
JA2RER 30-1-10-A-2  
JH1JBX 24-1-8-A-2  
High Band  
JA1PCY 27,156-31-292-B-25  
JA1HVS 24,012-29-276-C-22  
JH1ACQ 13,524-23-196-C-4  
JA1PUK 9288-24-129-B-11  
JH7BRG 3408-16-71-C  
JA1SJK 2340-10-78-B-5  
JA1MCA 1518-11-46-B  
JR2BDF 1242-9-46-A  
JH1MTR 924-7-44-A  
JA4GXS 912-8-38-A-6  
JA1AE 18-1-29-A  
KE1QXE 705-8-47-A-10  
JH1BQE 648-6-36-B  
JA2TKO 630-7-30-B-5  
JH2BIA 504-6-28-A-25  
JA2JJA 486-6-27-B-2  
JA6UYF 480-5-32-A-8  
JA2BNN 210-5-14-A  
JA3CVO 18-3-22-A  
JA1UUS 183-3-26-A-8  
JE3MWB 156-2-26-A-4  
JA3XRC 153-3-17-B-3  
JG1RDV 144-3-16-A-4  
JA1AAT 146-6-14-B  
JA7KXD 108-4-9-B-2  
JA9ANF 99-3-11-A-2  
JA4JDP 99-3-11-A  
JH1JED 99-3-11-A  
JA1QR 36-3-4-B-1  
JR2MKV 30-1-10-A-3  
JA3ELU 18-2-3-A  
JH1BQX 18-1-6-A  
JH8BQJ 6-1-2-A-1

Multi Single  
JA1YFL (JR1GVZ, JH2KKW,  
JA4JB, JA6CJ ops) 117,195-65-601-B  
JA7ZKR (JH7CZQ, DPU FDL  
FILE ops) 2535-13-65-A-60  
JH2ZLR (multiop) 627-11-19-A  
Low Band  
JA1ELY 27,225-33-275-B  
JA1HOM 819-7-39-C-13  
JA1XCS 12,940-23-196-C-4  
JH1BRB 189-3-21-B  
KA6DX 66-2-11-C-3  
JA2RER 30-1-10-A-2  
JH1JBX 24-1-8-A-2  
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JA1PCY 27,156-31-292-B-25  
JA1HVS 24,012-29-276-C-22  
JH1ACQ 13,524-23-196-C-4  
JA1PUK 9288-24-129-B-11  
JH7BRG 3408-16-71-C  
JA1SJK 2340-10-78-B-5  
JA1MCA 1518-11-46-B  
JR2BDF 1242-9-46-A  
JH1MTR 924-7-44-A  
JA4GXS 912-8-38-A-6  
JA1AE 18-1-29-A  
KE1QXE 705-8-47-A-10  
JH1BQE 648-6-36-B  
JA2TKO 630-7-30-B-5  
JH2BIA 504-6-28-A-25  
JA2JJA 486-6-27-B-2  
JA6UYF 480-5-32-A-8  
JA2BNN 210-5-14-A  
JA3CVO 18-3-22-A  
JA1UUS 183-3-26-A-8  
JE3MWB 156-2-26-A-4  
JA3XRC 153-3-17-B-3  
JG1RDV 144-3-16-A-4  
JA1AAT 146-6-14-B  
JA7KXD 108-4-9-B-2  
JA9ANF 99-3-11-A-2  
JA4JDP 99-3-11-A  
JH1JED 99-3-11-A  
JA1QR 36-3-4-B-1  
JR2MKV 30-1-10-A-3  
JA3ELU 18-2-3-A  
JH1BQX 18-1-6-A  
JH8BQJ 6-1-2-A-1

Multi Single  
JA1YFL (JR1GVZ, JH2KKW,  
JA4JB, JA6CJ ops) 117,195-65-601-B  
JA7ZKR (JH7CZQ, DPU FDL  
FILE ops) 2535-13-65-A-60  
JH2ZLR (multiop) 627-11-19-A  
Low Band  
JA1ELY 27,225-33-275-B  
JA1HOM 819-7-39-C-13  
JA1XCS 12,940-23-196-C-4  
JH1BRB 189-3-21-B  
KA6DX 66-2-11-C-3  
JA2RER 30-1-10-A-2  
JH1JBX 24-1-8-A-2  
High Band  
JA1PCY 27,156-31-292-B-25  
JA1HVS 24,012-29-276-C-22  
JH1ACQ 13,524-23-196-C-4  
JA1PUK 9288-24-129-B-11  
JH7BRG 3408-16-71-C  
JA1SJK 2340-10-78-B-5  
JA1MCA 1518-11-46-B  
JR2BDF 1242-9-46-A  
JH1MTR 924-7-44-A  
JA4GXS 912-8-38-A-6  
JA1AE 18-1-29-A  
KE1QXE 705-8-47-A-10  
JH1BQE 648-6-36-B  
JA2TKO 630-7-30-B-5  
JH2BIA 504-6-28-A-25  
JA2JJA 486-6-27-B-2  
JA6UYF 480-5-32-A-8  
JA2BNN 210-5-14-A  
JA3CVO 18-3-22-A  
JA1UUS 183-3-26-A-8  
JE3MWB 156-2-26-A-4  
JA3XRC 153-3-17-B-3  
JG1RDV 144-3-16-A-4  
JA1AAT 146-6-14-B  
JA7KXD 108-4-9-B-2  
JA9ANF 99-3-11-A-2  
JA4JDP 99-3-11-A  
JH1JED 99-3-11-A  
JA1QR 36-3-4-B-1  
JR2MKV 30-1-10-A-3  
JA3ELU 18-2-3-A  
JH1BQX 18-1-6-A  
JH8BQJ 6-1-2-A-1

Multi Single  
JA1YFL (JR1GVZ, JH2KKW,  
JA4JB, JA6CJ ops) 117,195-65-601-B  
JA7ZKR (JH7CZQ, DPU FDL  
FILE ops) 2535-13-65-A-60  
JH2ZLR (multiop) 627-11-19-A  
Low Band  
JA1ELY 27,225-33-275-B  
JA1HOM 819-7-39-C-13  
JA1XCS 12,940-23-196-C-4  
JH1BRB 189-3-21-B  
KA6DX 66-2-11-C-3  
JA2RER 30-1-10-A-2  
JH1JBX 24-1-8-A-2  
High Band  
JA1PCY 27,156-31-292-B-25  
JA1HVS 24,012-29-276-C-22  
JH1ACQ 13,524-23-196-C-4  
JA1PUK 9288-24-129-B-11  
JH7BRG 3408-16-71-C  
JA1SJK 2340-10-78-B-5  
JA1MCA 1518-11-46-B  
JR2BDF 1242-9-46-A  
JH1MTR 924-7-44-A  
JA4GXS 912-8-38-A-6  
JA1AE 18-1-29-A  
KE1QXE 705-8-47-A-10  
JH1BQE 648-6-36-B  
JA2TKO 630-7-30-B-5  
JH2BIA 504-6-28-A-25  
JA2JJA 486-6-27-B-2  
JA6UYF 480-5-32-A-8  
JA2BNN 210-5-14-A  
JA3CVO 18-3-22-A  
JA1UUS 183-3-26-A-8  
JE3MWB 156-2-26-A-4  
JA3XRC 153-3-17-B-3  
JG1RDV 144-3-16-A-4  
JA1AAT 146-6-14-B  
JA7KXD 108-4-9-B-2  
JA9ANF 99-3-11-A-2  
JA4JDP 99-3-11-A  
JH1JED 99-3-11-A  
JA1QR 36-3-4-B-1  
JR2MKV 30-1-10-A-3  
JA3ELU 18-2-3-A  
JH1BQX 18-1-6-A  
JH8BQJ 6-1-2-A-1

Multi Single  
JA1YFL (JR1GVZ, JH2KKW,  
JA4JB, JA6CJ ops) 117,195-65-601-B  
JA7ZKR (JH7CZQ, DPU FDL  
FILE ops) 2535-13-65-A-60  
JH2ZLR (multiop) 627-11-19-A  
Low Band  
JA1ELY 27,225-33-275-B  
JA1HOM 819-7-39-C-13  
JA1XCS 12,940-23-196-C-4  
JH1BRB 189-3-21-B  
KA6DX 66-2-11-C-3  
JA2RER 30-1-10-A-2  
JH1JBX 24-1-8-A-2  
High Band  
JA1PCY 27,156-31-292-B-25  
JA1HVS 24,012-29-276-C-22  
JH1ACQ 13,524-23-196-C-4  
JA1PUK 9288-24-129-B-11  
JH7BRG 3408-16-71-C  
JA1SJK 2340-10-78-B-5  
JA1MCA 1518-11-46-B  
JR2BDF 1242-9-46-A  
JH1MTR 924-7-44-A  
JA4GXS 912-8-38-A-6  
JA1AE 18-1-29-A  
KE1QXE 705-8-47-A-10  
JH1BQE 648-6-36-B  
JA2TKO 630-7-30-B-5  
JH2BIA 504-6-28-A-25  
JA2JJA 486-6-27-B-2  
JA6UYF 480-5-32-A-8  
JA2BNN 210-5-14-A  
JA3CVO 18-3-22-A  
JA1UUS 183-3-26-A-8  
JE3MWB 156-2-26-A-4  
JA3XRC 153-3-17-B-3  
JG1RDV 144-3-16-A-4  
JA1AAT 146-6-14-B  
JA7KXD 108-4-9-B-2  
JA9ANF 99-3-11-A-2  
JA4JDP 99-3-11-A  
JH1JED 99-3-11-A  
JA1QR 36-3-4-B-1  
JR2MKV 30-1-10-A-3  
JA3ELU 18-2-3-A  
JH1BQX 18-1-6-A  
JH8BQJ 6-1-2-A-1

Multi Single  
JA1YFL (JR1GVZ, JH2KKW,  
JA4JB, JA6CJ ops) 117,195-65-601-B  
JA7ZKR (JH7CZQ, DPU FDL  
FILE ops) 2535-13-65-A-60  
JH2ZLR (multiop) 627-11-19-A  
Low Band  
JA1ELY 27,225-33-275-B  
JA1HOM 819-7-39-C-13  
JA1XCS 12,940-23-196-C-4  
JH1BRB 189-3-21-B  
KA6DX 66-2-11-C-3  
JA2RER 30-1-10-A-2  
JH1JBX 24-1-8-A-2  
High Band  
JA1PCY 27,156-31-292-B-25  
JA1HVS 24,012-29-276-C-22  
JH1ACQ 13,524-23-196-C-4  
JA1PUK 9288-24-129-B-11  
JH7BRG 3408-16-71-C  
JA1SJK 2340-10-78-B-5  
JA1MCA 1518-11-46-B  
JR2BDF 1242-9-46-A  
JH1MTR 924-7-44-A  
JA4GXS 912-8-38-A-6  
JA1AE 18-1-29-A  
KE1QXE 705-8-47-A-10  
JH1BQE 648-6-36-B  
JA2TKO 630-7-30-B-5  
JH2BIA 504-6-28-A-25  
JA2JJA 486-6-27-B-2  
JA6UYF 480-5-32-A-8  
JA2BNN 210-5-14-A  
JA3CVO 18-3-22-A  
JA1UUS 183-3-26-A-8  
JE3MWB 156-2-26-A-

**High Band**  
 YN1RWG 1,048,572-146-2394-B-44  
**JAMAICA**  
 WB9AJF/6Y5 3,791,644-268-4716-C-55  
**Multi Single**  
 W9NAR/6Y5 (+WA8ONK) 2,004,015-239-2799-A-48  
 6Y5ED (+6Y5F) 1,861,401-201-3087-C-68

**Oceania**  
**NAURU**  
**Multi Single**  
 C2INI (W6s KG DOD) 331,290-136- 818-B-

**PHILIPPINE ISLANDS**  
 DU6EG 1560-13- 40-E- 9

**WESTERN CAROLINE ISLANDS**  
 KC6AQ 36,855- 35- 351-C-30

**GUAM**  
 KG6AAV (WA3HRV, opr) 91,455- 67- 453-C-20

**Low Band**  
 KG6JFY 7650- 25- 102-C-

**High Band**  
 KG6JAR 1794- 13- 46-C- .

**HAWAII**  
 KH6IJ 4,080,384-264-5152-C-76  
 KH6GQW 3,595,428-243-4832-C-96  
 AH6HML 2,509,296-244-3428-C-60  
 AH6BZF 1,946,700-225-2784-C-43  
 K4VWI/KH6 377,875- 95- 975-C-70  
 KH6IBX 277,632-128- 723-C-22

**Low Band**  
 KH6JAC 39,598- 66- 301-B- 4

**High Band**  
 AH6IJA 799,592-114- 876-B-26

**AUSTRALIA**  
 VK4VU 2,619,044-158-1306-A-

**Low Band**  
 VK3QT 21,462- 49- 146-B-20

**INDONESIA**  
**High Band**  
 YB9ABV 162- 6- 9-8- 6  
 YB9ABX 132- 4- (1-B- 1)

**NEW ZEALAND**  
 ZL3QG 1,448,928-216-2236-A-63  
 ZL1BKX 1,188,450-190-2085-A-45  
 ZL2BCO 877,074-194-1507-A-49  
 ZL2HE 271,273-225- 712-A-46  
 ZL2ACP 48,240- 60- 268-A-

**Low Band**  
 ZL1AQO 43,902- 54- 271-C-

**High Band**  
 ZL2GJ 31,050- 46- 226-B-  
 ZL2AH 9858- 31- 106-A-36

**FIJI ISLANDS**  
**Multi Single**  
 3D2KQ (W6s KG DOD) 283,509-109- 867-B-

**South America**

**CHILE**  
**High Band**  
 CE3UH 11,100- 37- 100- .

**BOLIVIA**  
 CP1AT 252,648-132- 638-B-17

**High Band**  
 CP1EU/6 413,280-120-1148-B-16

**ECUADOR**  
 HC1BU 1,889,850-213-2930-B-

**Multi-Multi**  
 HD5EE (HCs 1MM 2NW 5DP  
 SEE 5EJ SLJ 5MC oprs)  
 3,285,150-242-4525-C-58

**Low Band**  
 K4ERO/HC1 423,096-122-1156-D-25

**COLOMBIA**  
 HK3LT 220,590-114- 645-B-10

**ANTARCTICA**  
 KC4AAC (WB6KIL, opr) 1,398,599-233-2001-C-19

**ARGENTINA**  
 LUBAJG 2,945,880-245-4008-C-  
 LU2A 2,593,500-250-3458-C-80  
 LU3HAK 742,671-179-1383-C-41

**High Band**  
 LU1ADI 287,892-132- 727-A-26

**PERU**  
**High Band**  
 OASV 231,210-105- 734-A-18  
 OA4ANR 116,388- 53- 732-B-

**PYRENEAN ANTILLES**  
 PJ9JT 2,399,400-248-3225-B-

**BRAZIL**  
 PY2C5S 40,650- 50- 271-C-10

**Low Band**  
 PY2FLZ 38,106- 58- 219-C-  
 PY2GWE 2508- 19- 44-C-10

**High Band**  
 PY2ELV 653,079-137-1689-A-  
 PY4KL 567,243-149-1269-B-  
 PY7FI 442,782-128-1183-C-19  
 PY1CHP 341,388-116- 981-B-25  
 PY1BAR 276,675-119- 775-C-41  
 PY7VNY 200,043- 93- 717-C-  
 PY27BG 61,807- 67- 407-C-  
 PT2JB 6,524- 34- 162-A- 9  
 PY1BOL 15,840- 44- 120-C- 6  
 PY9UC/PY2 13,576- 37- 125-C- 2

**VENEZUELA**  
 YV4AG 1,195,232-288-6013-C-  
 YV1AVO 3,125,838-247-4218-B-71

**High Band**  
 YV5BVF 173,259- 93- 621-B-22

**TRINIDAD & TOBAGO**  
 9Y4AC (VE7BZC, opr) 441,048-136-1081-B-18

Continued from page 85

U.S. working Europe or JA when we can't even hear 'em. The second weekend of the contest (cw) was a real ball though. Twenty meters was hot as a pistol, even with my modest 80 watts. —

(VE6CGS/K5ABV) Who said condx bad? I found somebody everywhere, everytime. — (I2FGP) Where was North Dakota? — (JA2JW) I got my kicks this time from the mixture of incredulous and complimentary remarks passed on the size of my 2-watt signal by the

QRO boys. — (EI3CP) Interest by the U.S. stations in the special prefixes seems to be minimal! My check log shows a ratio of about 1 special prefix call for 8 normal U.S. calls on cw. — (G3TXF) The quality of the operating from the U.S. was to be heard to be believed — almost nil requests for repeats — and that was during heavy QRM and my sending text only once. Great job. — (VK2AR) Had only about 5 hours of operating time the first weekend, as things were extremely hectic with a ship at the dock and everyone preparing to leave. Was disappointed at conditions on ten meters the second weekend, as fifteen was excellent. Also sorry that eighty was so lousy, but I am working on my antennas. — (KC4AAC/WB6KIL) This is sort of a jubilee — 20 years ago I started taking part in the ARRL contest . . . I was amazed to find quite a lot of the original operators here again. The highest percentage of OTs were from W6 land. — (OK3EA) Still wondering what we did to deserve such good conditions. Fancy duping W7s on 80 meters. — (G4BUE) What happened to 40 meters? Somebody stole it? — (G4BTY) In 1975 we had 36 useable hours out of the 48; in 1976 we had only 29 useable hours. Useable hours mean the hours when U.S. signals could be heard at all. — (PA0SMK) I was at C3IME, Andorra, for the first weekend cw test, but one meter of snow in the mountains prevented me from reaching the planned operating site. Las Escaldas, surrounded by 6000-foot mountains, prevented any "W" QSOs and an effort to pack through the snow brought our attention to the dangers of being "snowed in." We exercised logic on the side of caution and retreated to the wine cellars and discos of Las Escaldas. — (C3IME/K7CBZ) Hope I was able to give a new one to at least a few of the W/VE stations in the contest, even if conditions were really poor from L. H. — (VK200/LH)

**Affiliated Club Scores**

CLUB	SCORE	ENTRIES	PHONE WINNER	CW WINNER
Frankford Radio Club(PA)(3)	44,495,310	84	W2HMH	W2GXD
Potomac Valley Radio Club (VA)(4)	40,160,775	76	W3LPL	W3LPL
Murphy's Marauders(CT)(1)	36,117,750	65	W1ZM	W1HFB
Northern California DX Club(CA)(6)	11,825,253	56	K6CQF	W6PAA
Wireless Institute of the Northeast(NJ)(2)	10,297,084	56	WB2RKK	K2BMI
Western Washington DX Club(WA)(7)	9,950,778	46	W7SFA	W7RM
Southern California DX Club(CA)(6)	9,663,582	21	W6HX	W6OUN
Northern California Contest Club(CA)(6)	6,860,300	22	W6YX	WB6KBK
San Diego DX Club(CA)(6)	4,609,317	23	WA6DNM	W6MAR
Richardson Wireless Klub(TX)(5)	4,290,216	14	K5VTA	K5YTA
Southern New England DX Club(MA)(1)	4,119,549	19	W5UDK/1	W1DAL
Texas DX Society(TX)(5)	4,090,449	10	K5PFL	W5WZQ
Indy DXers(IN)(9)	3,383,526	9	WA9BWY	AA9RJI
Order of Boiled Owls(NY)(2)	3,147,813	12	K2LE	K2LE
Northern Illinois DX Association(IL)(9)	2,803,224	14	AD9UKM	W9OHH
Central Virginia Contest Club(VA)(4)	2,727,021	15	W4ZSH	W4ZSH
Southeastern DX Club(GA)(4)	2,319,156	17	W4LVM	AD4BAI
Ohio Valley ARA(OH)(8)	2,221,812	20	WB8FOS	WB8RSW
Northern Alabama DX Club(AL)(4)	2,149,737	7	WB8FAW/4	WB8FAW/4
Eastern Iowa DX Association(IA)(0)	2,061,432	20	AC0FHE	W0PCO
Michigan DX Association(MI)(8)	1,977,489	8	W8TWA	K8IDE
Delta DX Association(LA)(5)	1,947,585	9	K5YMY	W5RTX
Arizona DX Club(AZ)(7)	1,800,942	7	WA7NFH	W7IR
South Jersey Radio Association((NJ)(2)	1,629,132	15	W2FGY	W2PAU
Lake Cook DX Association(IL)(9)	1,179,624	5	K9HMB	—
Alamo DX Amigos(TX)(5)	847,203	12	WB5HGS	W5LPO
Buffalo Area DX Club(NY)(2)	833,211	8	—	WB2FNS
Virginia Century Club(VA)(4)	824,190	5	WB4OXD	—
Columbus ARA(OH)(8)	765,831	10	WB8ZDF	W8ZCQ
North Florida DX Association(FL)(4)	732,963	4	AA4UFW	W4WHK
ARINC Amateur Radio Club(MD)(3)	669,918	16	W3GZP	W3TOS
Trwin City DX Association(MN)(0)	345,387	3	—	W0YCR
Neenah-Menasha Amateur RC(WI)(9)	329,274	4	—	W9PJT
Connecticut Wireless Assoc.(CT)(1)	299,850	4	—	W1FTX
Charlotte Amateur Radio Club(NC)(4)	238,797	4	—	K4GFH
Lake Success Radio Club(NY)(2)	191,073	8	W2SGK	W2SGK
McDonnell Douglas Aeronautics ARC(CA)(6)	170,937	4	—	K6TXA
Poughkeepsie Amateur Radio Club(NY)(2)	151,764	3	W2HHC	—
Memphis Amateur Radio Assoc.(TN)(4)	124,083	4	—	WB4WFT
Kankakee Area Radio Society(IL)(9)	105,021	5	—	W9NLR
North Kentucky Amateur Radio Club(KY)(4)	104,454	3	—	—
Gloucester County ARC(NJ)(2)	48,564	4	—	—
Meriden Amateur Radio Club(CT)(1)	19,365	6	W1KKF	W1KKF
Chicago Radio Traffic Association(IL)(9)	14,430	6	W9REC	W9REC

# Operating News

## Operating People—Past and Present

At the risk of stealing some thunder from "Behind the Diamond," another column in this journal which concentrates on outstanding amateurs who have made significant contributions to the League, we would like this month to devote this column to a few exceptional amateurs in the operating field. They aren't the only ones worthy of note, by any means, and we don't intend to demean or belittle the many accomplishments of the many others. It is just that these four are currently "in the news" of today's operating amateurs.

**W1BVR.** Today's world (maybe yesterday's too, as a matter of fact) seems to worship the flamboyant, the unusual, the spectacular or romantic, and often neglects the real underlying values that keep it (the world) from crumbling about our ears. Thus, people who have dedicated a lifetime quietly and unobtrusively to the betterment of a way of life often go unnoticed, while others who burn brightly for a comparatively short time attract major attention before they burn out.

Percy Noble, W1BVR, typifies the former type. He is well enough known around New England, but most of the rest of the hams in our two countries probably never heard of him. Nevertheless, on July 6, 1976, Percy observed his fortieth anniversary as an elected ARRL official, over a 42-year period. Is there any other amateur who can show a record like this? We doubt it.

Percy was first elected Western Mass. SCM in 1934. In 1936 he was elected New England Division director and served in this capacity for 18 years, followed by six years as an ARRL vice president, after which he resumed his Western Mass. SCM-ship and is still SCM today. During these 42 years, he took a 2-year "vacation" in the late sixties — both his and the century's. During that time, he was merely an ORS appointee, something he started back in 1924 and has held continuously ever since. While a director, he was elected to the ARRL Executive Committee (probably the first director so elected) and served as chairman of several Board committees.

There are some Percy Noble types in our younger generation today, but we could use a lot more of them.

**W3EML.** During the recent ARRL Board

Meeting in Denver, we were advised by a terse memo from Headquarters that W3EML was a Silent Key. We don't run obituaries in this column and this is not intended as one, but Bill Overbeck was an outstanding amateur and operator known among the traffic-handling clan all over the field organization. He was a traffic man's traffic man, starting 'way back in the thirties. He was out of the game for a few years, then came back into it with a bang in the fifties and became interested in NTS, serving as 3RN manager and later as TCC director, Eastern Area. In the latter function he was a real go-getter, on the air every night lining up TCC personnel, making sure that schedules were kept (and doing more than his own share in the process), taking on extra liaison assignments at regional and area levels. His infectious enthusiasm created a situation in which operators were figuratively standing in line for a chance at a TCC spot, and those holding them had to really perform to keep them. Although always a cw man, he even experimented with conducting TCC skeds on phone and RTTY. Health problems forced him to give up his TCC directorship, but right up to the last he was still in there handling traffic as only Bill could. It doesn't seem possible that Bill's ubiquitous, jack-rabbit fist will no longer be heard on the traffic lanes.

**W1CWX.** On September 1, Bob White relinquished the reins of DXCC and supervision of the DXCC Branch of the Communications Department in order that he might take over a new assignment — supervision and administration of the ARRL QSL Bureau. This function has been assigned to the newly created Administrative Services Department; so Bob will no longer be a part of the CD. We wish him well in his new assignment.

For many DXers, it signals the end of an era. Bob started with the CD in 1952, 24 years ago almost to the day as you read this. Doing what? Why, sorting and examining DXCC cards, what else? He has been at it ever since, and so popular has DXCC become that in 1967 it was set up as a separate branch of the CD, with Bob in charge as an assistant communications manager. The DXCC award, with its various versions and endorsements, went through a number of phases in its long history, as DX itself gradually changed from a

concept of seeing how far you could work to seeing how many different places you could work. Bob came into the picture in the post-WWII era, when DX and DXCC fever were reaching their height. As the years passed and problem after problem was faced, coped with and (usually) resolved, Bob's knowledge of DX lore and especially of the DXCC award group increased far beyond that of any other amateur, although there probably are some who will dispute this.

Although Bob has been considered a controversial character by many, and although the department and indeed the entire League have been embroiled in many a controversy on DXCC matters, some of them involving legal action, he has never had an equal when it came to dedication to his job. In the early days of the fifties and sixties he devoted thousands of hours of his own time to keeping up with the load, to meticulous examination of each card submitted for an award, to travel and correspondence on DXCC matters. Overtime? We never heard of such a thing, for career people, in those days. Nobody asked him to do it, and very few appeared to be grateful that he did. But it had to be done to maintain DXCC at the level of integrity which it now enjoys, so Bob did it, voluntarily, and continued to do it until the effective date of his transfer and assumption of an entirely new but related function. DXers use the QSL Bureau. DXers know Bob White. It was a good choice, and with Bob in charge you can depend on it being done properly. But make no mistake about it, DXCC will miss him.

**W1VCG.** Who takes over DXCC? Dave Newkirk does. Dave has been working under Bob for over two years as communications assistant and now takes over the Branch as assistant communications manager. Dave came to us in 1974 as WR9CJS, just a DXCC clerical assistant finding something to do while he determines the ultimate scope and direction of his life. He didn't expect to stay this long, and certainly didn't seek a career at Headquarters; but these things grow on you as you grow into them, and we hope Dave is here to stay. He has the name for the job; his OM is Rod Newkirk, W9BRD, long-time conductor of "How's DX?"

### W1AW OPERATING SCHEDULE

Operating-visiting hours are Monday through Friday 1 P.M. to 1 A.M., Saturday 7 P.M. to 1 A.M. and Sunday 3 P.M. to 11 P.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 details and the general contact schedule are available upon request. All frequencies shown are approximate. If you wish to operate, you must have your original operator's license with you.

**Staff:** Chief Operator/ARRL Asst. Com-

munications Mgr. C. R. Bender, W1WPR; Alan Bloom, WA3JSU; Chris Schenck, WB2SEZ. The fall-winter schedule will appear in the November issue.

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.

### Code Practice

*Approximate frequencies:* 1.82 3.58 7.08 14.08 21.08 28.08 50.08 and 145.888 MHz.

For practice purposes the order of words in each line may be reversed during the 5-13 wpm transmissions. Each tape carries checking references. Details on Qualifying Runs appear monthly in QST Operating News. The 0130Z practice is omitted four times a year on designated nights when Frequency Measuring Tests are sent in this period.

Speeds	EDST	UTC
5-7½-10-13-20-25	9 A.M. MWF 9:30 P.M. TThSSu	1300Z MWF 0130Z MWFS
10-13-15	4 P.M. M-F 7:30 P.M. Dy	2000Z M-F 2330Z Dy

35-30-25-20-15

9:30 P.M. MWF 0130Z TThS  
9 A.M. TTh 1300Z TTh

2330 M-S 2030 M-S 0330Z T-Su

CW Bulletins at 18 wpm (1.82 3.58 7.08  
14.08 21.08 28.08 50.08 145.588 MHz):1630 M-F 1330 M-F 2030Z M-F  
2000 Dy 1700 Dy 0000Z DyCW Bulletins at 10 wpm (same frequencies as  
above):

0000 M-S 2100 M-S 0400Z T-Su

RTTY Bulletins at 170-Hz shift are repeated  
at 850-Hz shift when time permits (3.625  
7.095 14.095 21.095 28.095 MHz):1730 M-F 1430 M-F 2130Z M-F  
2300 M-S 2000 M-S 0300Z T-Su

To improve your fist by sending in step with WIAW (but not over the air!) and to allow checking the accuracy of your copy on certain tapes, note the UTC dates and QST text to be sent in the 0130Z practice from the August issue of QST.

10/4 It Seems to Us 10/21 Public Service  
10/12 Correspondence 10/27 World Above  
10/15 League Lines 11/1 YL News

## Bulletins

Columns indicate times in EDST-PDST-UTC(Z).

Phone Bulletins (1.82 3.99 7.29 14.29 21.39  
28.59 50.19 145.588 MHz):

2100 Dy 1800 Dy 0100Z Dy

## 5BWAS AWARD

(Updating the September listing, starting with nr. 254): W2MIG K7RSB ZL3GQ WB5FZJ K2FL K8OOK.

## NEW A-1 OPERATORS

W1VAH W2TPV WB2VYK W4CFP W5WAX  
K5WVX W0CY W0HS W0OP W0PKD  
W0UWH DK8EI F6AXP.

## SCM ELECTION RESULTS

Balloting results: In the Kentucky Section, Mr. Ted Huddle, W4CID, Mr. F. Clarke Walker, Jr., WB4HWM and Mr. Homer G. Wyatt, K4UNW were nominated. Mr. Huddle received 237 votes, Mr. Wyatt received 139 votes and Mr. Walker received 76 votes. Mr. Huddle's new term of office begins October 30, 1976.

EST

# Operating Events

## OCTOBER

1-31: Aruba Salutes America Party, sponsored by the Aruba ARC PJ3ARC, open only to the USA and possessions. Any U.S. ham who contacts 3 PJ3 stations during this period will receive a special A.S.A. certificate along with a QSL. To apply, a letter, card or copy of the log will suffice. Any single band or multiband entry, any single mode or combination of modes is allowed. Mail entries to the Aruba Amateur Radio Club, Box 273, San Nicolas, Aruba, Netherlands Antilles.

2-3: California QSO Party, VE2 Contest, VK/ZL/Oceania Jubilee DX Contest phone, p. 91 Sept.

2-4: CARTG RTTY DX SS, p. 91 Sept.

3: ATV Contest, p. 91-92, Sept.

7: West Coast Qualifying Run, W6OWP prime W6ZRJ alternate, 10-35 wpm at 0400Z (Universal Coordinated Time, abbreviated UTC, Z used as a designator), on approximately 3590/7090 kHz. This is 2100 PDST the night of October 6. Please note that the dates are always shown at least two months in advance and times are always the same local "clock time," i.e., 9 P.M. local Pacific time. Underline one minute of the highest speed copied, certify that the copy was made without aid, and send to ARRL for grading. Please include your full name, address, call (if any) and enclose an addressed stamped envelope (legal size).

9-10: CD Party phone, open to all ARRL officials and appointees; starts 2300Z Oct. 9 and ends 0500Z Oct. 11. VK/ZL/Oceania Contest cw, p. 91 Sept.

10: RSGB 21/28 MHz Phone Contest, p. 92 Sept.

13: WIAW Qualifying Run, 10-35 wpm at 0130 UTC, transmitted simultaneously on 1.82 3.58 7.08 14.08 21.08 28.08 50.08 and 145.588 MHz. (Note, please, that this is 2130 EDST, 9:30 P.M. local eastern time, the night of Oct. 12.) Underline one minute of the highest speed you copied, certify that the copy was made without aid (use of a typewriter is, however, OK), send to ARRL for grading. Please include your name, call (if any) and complete mailing address. A large s.a.s.e. will help to expedite your award/endorsement.

16-17: CD Party cw, Scouts Jamboree-on-the-Air, RSGB 7 MHz DX Contest, WADM Contest, p. 92 Sept.

17-18: Manitoba QSO Party, p. 92 Sept.

19-20: YL Anniversary Party cw, p. 92 Sept.

25: WIAW Special Qualifying Run, Sunday evening local time. Details same as under the Oct. 13 listing, 9:30 P.M. EDST Oct. 24.

30-31: CQ WW Contest phone, p. 92 Sept.

## NOVEMBER

3: West Coast Qualifying Run.

6: Frequency Measuring Test, open to all, begins with a callup at 0230 and 0530 UTC November 6. (Remember, this is the evening before - local time!) The periods for measurement start at 0237 (20 meters), 0245 (40 meters), and 0253 (80 meters): For the late run, 0537, 0545 and 0553, respectively. Each measuring period lasts five minutes. Submit your averages for each 5-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: 14,095, 7040 and 3534 kHz; late-run frequencies 14,084, 7026 and 3545 kHz. Your report must be received by November 17 to qualify for the February QST report of the competition. WIAW will start transmitting the official results in a special bulletin November 18.

6-7: Sweepstakes cw, this issue. RSGB 7 MHz DX Contest phone, p. 92 Sept. Trilliums Weekend Contest, sponsored by the Ontario Trilliums Ladies ARC, from 0030Z Nov. 6 through 0030Z Nov. 7. Call CQ TOT, the Trilliums will call CQ 1W. Each Trillium station may be contacted twice. For example: One phone and one cw contact (same band), one phone and one cw (different bands). Exchange signal report, name, QTH (Trilliums will give their club numbers). No crossband though crossmode is permitted. Usual log info. All logs must be signed by the op. Five points for each cw or phone contact. Low power multiplier of 1.25 for all transmitters running 150 watts cw, 150 watts a-m, 300 watts PEP and under. A bonus of 100 points for working 10 club members, an additional 100 for 20, etc. Logs must be postmarked by Dec. 31 and received not later than Jan. 15, 1977. Certificates, plaques, etc. The TOTs will operate all frequencies and modes on 80-40-20. Some spots to watch include: 3770 3855 3685 7240 7103 14280 14140 14035 kHz. Logs to: Eva Colleck, VE3EVA, 155 Midland Ave., Scarborough, Ontario, Canada M1N 3Z8.

9-10: YL Anniversary Party phone, details p. 92 Sept.

11: WIAW Qualifying Run.

13-14: European DX Contest RTTY, full weekend UTC. In addition to regular WAE rules (see p. 87 July), special regulations for this segment permit contacts among all continents and also one's own continent (these count 1 point per QSO). QTC traffic is allowed between all stations (send and received) but NOT between stations in the same country. Mailing deadline is Dec. 1. Send to the WAEDC Committee, Box 262, D-895 Kaufbeuren, Germany. North Americans may send their entries to Hartwin E. Weiss, WA3KWD, 323 North St., Millersburg, PA 17061. Missouri QSO Party, sponsored by the St. Louis ARC, from 1800Z Nov. 13 through 2300Z Nov. 14. The club is sponsoring this 13th annual affair in an effort to activate some of the hard-to-work counties. Valid QSOs are between Missouri and all other stations. The same station may be worked once each band/mode. MO mobiles will count separate from each different county. Some suggested frequencies are: 3540 3910 7040 7240 14040 14280 21110 21360 28110 28600 50-50.5. Score 1 point per QSO. MO use states, provinces and countries for multiplier, others use MO counties (maximum 115). MO mobiles total separate score from each county activated. Awards. Mailing deadline is Dec. 15. Send to: St. Louis ARC K0LIR, 842 Tuxedo Blvd., Webster Groves, MO 63119. Include an s.a.s.e. for results.

Delaware QSO Party, sponsored by the Delaware Amateur Radio Club, W3SL. Operating periods are 0001A-0600Z and 1600Z-2200Z Nov. 13, and 0001Z-0600Z and 1600Z-2200Z Nov. 14. Stations may be worked once per band, per mode, for QSO points. Delaware stations send QSO no., RS(T), and county. Out-of-state send RS(T), ARRL section or country. Freqs.: Cw 3560 7060 14060 21060 28160, phone 3975 7275 14325 21425 28650, Novice 3710 7120 21120 28160. Delaware stations score 1 point per QSO times the no. of sections/countries. Outside Delaware score 5 points per Delaware QSO times 1 for one county worked, 3 for two counties worked, and 5 for all three Delaware counties (New Castle, Kent, Sussex). Awards and certificate for working all 3 of the counties. Mailing deadline is Dec. 31. Send entries to John Low, K3YHR, 11 Scottfield Dr., Newark, DE 19713. S.a.s.e. for results and/or W-DEL Award.

14: OK DX Contest, sponsored by the Central Radio Club of Czechoslovakia, the full period UTC; 160 through 10 meters. (Note: OK stations on 160 may operate cw only.) Contacts between stations of the same country count only as a multiplier, no contact-point credit. Crossband and crossmode not valid. Exchange report and ITU zone (p. 87, April, 1972 QST). A station may be worked just once on each band. A complete exchange counts one point but two-ways with OK stations are worth 3 points. Multipliers are the sum of ITU zones, all bands. Categories are single op. all band, single op. single band, multiop. all band. Club stations are considered multiop. Log each band separately,

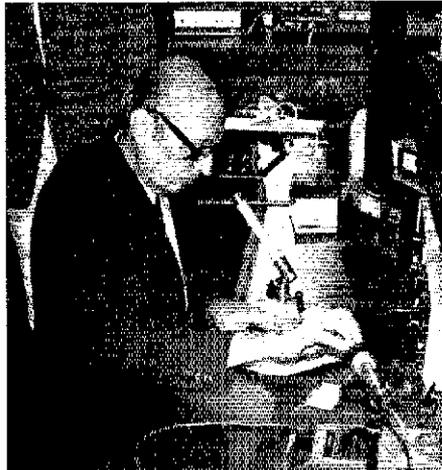
note time, date, stations, exchanges, points, ITU zone (each new one on a separate band). Include usual contest declaration. Mail entries by Dec. 31 to the Central Radio Club, Box 69, Prague 1, Czechoslovakia.  
 20-21: Sweepstakes phone, this issue.  
 27: Ten-Meter Ground Wave Contest, 24th annual, sponsored by the Breeze Shooters, Inc., 9 P.M. to 1 A.M. local time. All modes permissible. Points are determined on a dis-

tance and input power basis with separate awards for leaders in four circular zones centered on the Point in downtown Pittsburgh. Mobiles and Novices/Technicians also compete for separate awards. Logs must be postmarked by Dec. 6. Logs and rules available from Richard Evanuk, WA3IUM, 311 Evergreen Ave., Pittsburgh, PA 15209.  
 27-28: CQ World Wide Contest cw, full details, p. 92 Sept.

## DECEMBER

2: West Coast Qualifying Run.  
 4-5: 160-Meter Contest.  
 11-12: 10-Meter Contest, Spanish Contest.  
 17: WIAW Qualifying Run (+40 wpm!).  
 26: HA5-WW Contest.  
 29: WIAW Morning Qualifying Run.  
 31: Straight Key Night (starts New Year's Eve). QST

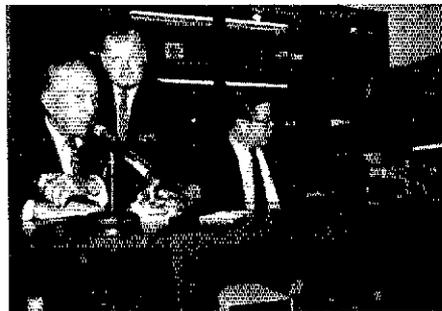
# Strays



During the 1912 Titanic emergency this key was used by David Sarnoff for sending messages on a traffic net. Here, Vic Clark, W4KFC, uses it in the NN3SI opening ceremonies to send part of a Walt Whitman poem reflecting the Nation of Nations theme that the station is a portion of. (W3RIWW, Smithsonian Institution photo)



"Novice Wireless Operators Form New Association" was a caption in the Camden (NJ) Daily Courier for June 13, 1916. At a dinner marking the 60th anniversary of their formation and ARRL affiliation, the South Jersey Radio Association had four of its original charter members in attendance. From left to right: Hendry Byam, ex-W2BOD; Gordon Kressel, W2BQ; ARRL Atlantic Division director Harry McConaghy, W3SW; Bill Pyle, W3WR and Ed Patterson, W2YR.



The ceremonial activities for NN3SI also included a special greeting by Dr. S. Dillon Ripley (left), Smithsonian Institution secretary and commissioning of the station by Harry Dannals (center), W2TUK. Joe Finncutter (right), W3IK, is the station control operator. (Smithsonian Institution photo)

bled artifacts to show that "Modern technologies of mass production . . . and instantaneous worldwide communications made America not an isolated nation of immigrants, but a single nation among nations, all intricately tied together in a vast complex . . ."

Volunteer amateurs from the organization man the station about six hours per day, so visitors to Washington, DC (and on the air!), should have a very good chance of catching them. From September through March the museum is open from 10 A.M. to 5:30 P.M., Eastern Time. Summer hours are extended to 9 P.M.

Already the station has proven quite popular on the air. More than 75 countries and most states have been worked on all high-frequency bands and OSCAR, plus it has served as net control for the Foreign Service net. The FCC has authorized the special event call sign until June 7, 1977, and the station will operate indefinitely since the exhibition has been planned to continue for five years.

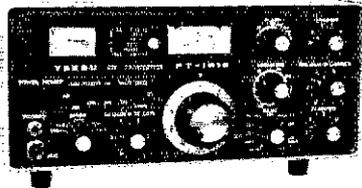
When NN3SI went on the air, greetings were exchanged with Canada's National Museum of Science and Technology, VE3JW; the American Radio Relay League, WIAW; the Antique Wireless Association, W2AN, and the Department of State Radio Club, AC3DOS. Its first message in the ceremony was this excerpt from a poem by Walt Whitman: "The earth to be spanned . . . the

distant brought near, the lands to be welded together. America is a Nation Among Nations." — KH6HQG

## STOLEN EQUIPMENT

- Taken from car in Philadelphia, PA, on July 22. Linear Systems SB-144, Serial No. 720052. Joe Reisert, W1JAA, 17 Mansfield Drive, Chelmsford, MA 01824.
- ICOM 20, Serial No. 7495, with mic and bracket assembly stolen from car in Wilmington, MA, on July 26. Ron Casagrande, K2KYR/1, 3 Wildwood Lane, Salem, NH 03079 or Wilmington, MA, police.
- Yaesu FT101B, Serial No. 83N204792, stolen on July 21 in Waterloo, IA. Lloyd B. Stoaks, K0OWW, RR3, Grinnell, Iowa 50112 or Waterloo Police Dept. Case No. 76-6349.
- Regency HR-2B, Serial No. 49-02817, taken from auto. Kristen N. Johnson, WA1TJP, 86 Alton Road, Quincy, MA 02169.
- Stolen from auto in basement garage on April 30/May 1. Drake transceiver, Serial No. 28706 with soc. security no. 408-03-8329 inscribed on bottom and rear of chassis. Midland SWR meter; Shure hand mic, Serial No. 201, both with same s.s. number. Edwin M. Keyes, WB0RR, 4280 East Iowa Ave., Apt. 801, Denver, CO 80222.

# YAESU



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- SP-101PB Speaker/patch. . . . . 59.00
- FA-9 Fan . . . . . 19.00
- MMB-1 Mobile mount. . . . . 19.00
- RFP-102 RF speech processor . . . . . 89.00
- XF-30B AM filter. . . . . 45.00
- Labor - AES install AM filter. . . . . 12.00
- XF-30C CW filter, 600 Hz. . . . . 45.00
- DC-1 DC-DC conv for EX. . . . . 57.00
- Crystals For FT-101 series . . . . . each 5.00
- FT-301S 160-10m 40w PEP Xcvr . . . . . 535.00
- FT-301S Digital As above, digital. . . . . 700.00
- FT-301 160-10m 200w PEP Xcvr . . . . . 769.00
- FT-301 Digital As above, digital. . . . . 935.00
- FV-301 Remote VFO. . . . . 109.00
- FP-301S AC ps (FT-301S/301S Dig) . . . . . 80.00
- FP-301 AC ps (FT-301/301 Dig) . . . . . 125.00
- FP-301 CID AC ps w/clock, CW ID. . . . . 199.00
- FR-101S 160-2m Receiver. . . . . 489.00
- FR-101 Digital Receiver. . . . . 629.00
- FC-6 6m converter. . . . . 30.00
- FC-2 2m converter. . . . . 40.00
- Crystals For Aux/SW. . . . . each 5.00
- XF-30B AM filter. . . . . 45.00
- XF-30C CW filter, 600 Hz. . . . . 45.00
- XF-30D FM filter. . . . . 49.00
- FM-1 FM detector. . . . . 20.00
- SP-101B Speaker. . . . . 19.00
- SP-101PB Speaker/patch. . . . . 59.00
- FL-101 160-10m Xmtr. . . . . 545.00
- RFP-101 RF speech processor . . . . . 89.00
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- FT-620B 6m SSB/CW/AM Xcvr . . . . . 449.00
- PB-1424 Marker unit. . . . . 33.00
- XF-90B AM filter. . . . . 45.00
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## CANADIAN DIVISION

**ALBERTA:** SCM, Sydney T. Jones, VE6MJ - SEC: VE6XC, VE6CE and his XYL have retired and have moved their QTH from Edmonton to Lake Wabamun. VE6QL was recently honoured on the occasion of his retirement and VE6AC and XYL were on hand for the occasion. VE6BBF is working on an antenna tuner. VE6EA has married off number one son. The repeater sponsored by the Amateur Radio League of Alberta and using the call VE6SS is now in operation from its permanent site at Pigeon Lake, 30 miles SW of Edmonton. VE6HR and his fellow workers are to be congratulated on a job well done and from the first few days reports the coverage excellent. Traffic: VE6FS 80, VE6AAT 36, VE6VVS 7, VE6OY 7, VE6AMM 6, WA6LYX/VE6 2.

**BRITISH COLUMBIA:** SCM, H. E. Savage, VE7FB - We have visited The Sand Dunes of Florence, OR, looking and thinking what a place for FD! In July we attended the QK International Hamfest at Coonolly State Park in WA. One hundred amateurs and families with over 25 Canadian amateurs also attending. Our PAM VE7SE took my son and I in his new truck bush whacking hill climbing to a hidden lake for fishing. We did a climb up a steep cliff with a view of the country! Also spent some time with VE7UD and VE7GD and their families. VE7GD now retired and has moved to Sorrento.

**MANITOBA:** SCM, Steve Fink, VE4FG - RM: VE4PG, PAM: VE4JP, ECs: VE4NE, VE4NW, ORSS: VE4RC, VE4RC, VE4UL, VE4EA, VE4TY, OPSS: VE4LU, VE4CV, VE4OO, VE4SW, VE4V, OBSS: VE4HE, VE4MG, OVS: VE4AS, VE4OL/VA and emergency medical communications via VE4CR and VE4JP from West Hawk Lake on July 2. VE4PG spent part of July repairing his rig, while VE4UL was tracking down a BCI problem. Two-meter ssb activity is on the rise in the province, while more Heath 2021 are showing up. In the 2m band (6600-7330 local): 44 sessions, 105 QTC 282 GN, 103EPN (3765 kHz 1900 local); 31 sessions, 905 QNI, 30 QIC. Traffic: VE4UL 83, VE4PG 38, VE4YE 32, VE4IX 26, VE4UO 24, VE4JP 18, VE4LN 8, VE4LB 6, VE4EJ 5, VE4HA 5, VE4HR 5, VE4PA 5, VE4XN 5, VE4FK 4, VE4NE 4, VE4CR 2, VE4JA 2, VE4NM 2.

**MARITIME & Nfld.:** SCM, Aaron D. Solomon, VE1OC - Asst. SCM: Maurice Gladden, VO1FG, RM and APN Mgr., VE1AAO, Nfld. Tfc. Net Mgr.: VO1GW. It is with deep regret that I announce VE1XG has become a Silent Key. Recent hospitalization included a 21 hr. QM UB; VO1LU. Many VE and WA operating 2 and 75 meter Repeater VE1MT located at Woodstock, N.B. on 37/97; VE1TO on 10/70 temporarily from VE1AIN's QTH. Ex-VE1AMA operating Can. Forces station, Lahr, Germany DA2CF Moncton, SONRA and HUMBARS report successful FD. VE1APY/SU reports heavy phone patch traffic. NBARA Executive Incl. V1WK, pres.; VE1S, pres. VE1S, pres. VE1S, pres. VE1S, pres. AZB AKB XG KC AIP, dir. VE1SY and XYL presently touring Europe. VO1JN mobile on 2 and 75 meters. VO1FG operating as FP9FG. VO1KM won VO1AA Memorial Award & VO1KE won Fred Ezekiel Memorial Award. Congrats to both. VO1JR working for his pilot's license. VO1LU operating 2 meters from hospital. APN sessions 31, QNI 149/24, QTC 107 NTN sessions 25, QNI 50 (June). Traffic: (July) VE1AVL 127, VE1AAO 116, VE1ACU 107, VE1ZH 32, VE1BDT 35, VE1APY/SU 28, VE1AMN 25, VE1OC 22, VE1AYG 12, VE1AMB 9, VE1BDT 7, VE2YO 6. (June) VO1GW 72, VE1BVF 69, VO1KE 2.

**ONTARIO:** SCM, Larry Thivierge, VE3GT - Asst. SCM: Noreen Nimmons, VE3GOL, PAMS: VE3s AGN, EWD GJG, RMs: VE3s DPO FRG GPN, OOs: VE3s AC T.A. AFA, VE3G, VE3SH, VE3SH, VE3SH Canadian Division Director has withdrawn his nomination and will serve the balance of his term. Lets get behind Ron and give him our full support in this difficult position. VE3GT is re-activating the Laurentian Net on 3755 kHz at 6:45 to 7:15 PM local time. SSB and cw check-ins are most welcome. We extend our sympathies to the family of VE3BRT who has become a Silent Key. Don't forget the RSO convention in Toronto Oct. 22 to 24th. SARC Convention Committee hard at work on next year's National Convention. Congrats to VE3GGO for knock-off his ear VE3S and WACAN on cw. New Advanced Stations are VE3S GVV, VE3S GVV, VE3S GVV, VE3S GVV. VE3HB supplied 2-meter communications equipment inter-collegiate soccer tournament. Same station will handle traffic to USA and Canada for visitors to the "Steam Era" exhibition at Milton. Repeater VE3JTY moved to a higher location near the Don Valley Parkway and QZ. VE3GNN has added six new countries to his growing list. VE3GNN enjoyed a fine summer at Pointe Au Baril and was active on various traffic nets. OSN net certificates issued to VE3s GPN AWE SB GOL DV GT EKC CYR BZB DZK FRG GJG HGJ and DVE. VE3CLX has a new TRAC on the air. With the increase in Canadian postal rates now in the time or you to take advantage of our fine traffic system that has access to the whole of North America. Traffic: (July) VE3SB 21, VE3GOL 216, VE3FRZ 366, VE3GJG 129, VE3AWE 97, VE3DZK 83, VE3COK 68, VE3GT 67, VE3GPN 54, VE3EKC 51, VE3GCE 51, VE3EWD 47, VE3GNN 46, VE3HGI 31, VE3EDPO 30, WABETX/VE3 28, VE3ATR 2, VE3DH 13, VE3EBC 11, VE3GEQ 11. (June) VE3GEQ 7.

**QUEBEC:** SCM, Larry Dohy, VE2YU - Once again the untiring efforts of VE2YU and his associates paid off with a highly successful operation from CZ20 at the Olympics in Montreal. On behalf of the radio amateurs of Montreal and Quebec we extend to all those associated with CZ20 our hearty congratulations on a job well done. It is hoped that amateur radio will

continue to play an important part in future olympic games. VE2s BFH BAQ YU QO and others met regularly for a "yellow lunch" keeping in touch with the many activities in and around Montreal. VE2XL and VE2GV are heard regularly on HF with their newly acquired rig and Advanced licenses. VE2YU returns to Montreal after the completion of a work assignment in Toronto. Traffic: VE2WT 1/3, K2HI/UE2 119, VE2EC 48, VE2BP 38, VE2YU 17.

**SASKATCHEWAN:** SCM, P. A. Crosthwaite, VE5RP - I just got back from a good trip up the coast of British Columbia. Taking a freighter to Stewart visiting AK and many ports on the way. We were able to listen and work vhf stations such as Aeronautical, Maritime, and while on land we talked to a tractor mobile, VE5RA and I were interested in stacking a pair of five-element 20-meter beams until we found out how much of a problem it would be. If your membership is near due, don't let it lapse, help support amateurs and the ARRL-CARR. Traffic: VE5BO 49, VE5HP 10, VE5OL 10, VE5RS 7, VE5RP 4.

## ATLANTIC DIVISION

**DELAWARE:** SCM, Roger E. Cole, W3DIX - SEC: K3KJ, RM: W3FEB, PAM: WA3JDM, PSHR: K3YHR 49, WA3WY/3 44, W3LZN reports stolen equipment ICOM IC22-A serial No. 340971. Please report any information to State Police at 302-571-3060. The DE Emergency Phone Net was in session from 12:42 PM to 10:35 PM local time during Hurricane Belle. There were many fine comments on the efficiency, cooperation, and general attitude of the NCS stations and participating amateurs. Among those losing antennas during the storm were W3YAH, who lost 2- and 20-meter beams, and W3YV, who lost his "wires" but got back into the net later in the evening. DEPN, QNI 66, Tfc. Net. Traffic: WA3WY/3 47, W3DIX 39, W3FEB 37, PSHR 25, WA3JDM 18, W3WD 9, WA3JUN 8, WA3QFF 5, W3YAH 4, W3JANC 1.

**EASTERN PENNSYLVANIA:** SCM, George S. Van Dyke, Jr. W3HK - SEC: W3FBF, RMs: K3MVO, WA3GQ, W3PHQ, PAMS: W3AVJ, WA3PZO. Net reports: PFI, QNI 384, QTC 334; AREC 10m, QNI 4, QTC 0; AREC 2m, QNI 5, QTC 0; PSHR: WA3QOZ WA3THT WA3YJG/3 W3ATJ, BPL: W3CUL W3VR K3NSN WA3ATQ. Reports: OBs: WA3QOZ W3ATJ W3AVJ W3ID; OOs: K3NSN W3KEK W3KCM W3CL; OVs: W3GQA W3CD WA3BQU, Atlantic Div convention turned out to be a real good one! W3CUL did a fine job with the ivories at the organ! W3CUL plus W3VR equal 98 yrs of ham radio! WA3ATQ off on another marine Conventional! WA3YJG at camp all summer but still in tic biz. W3WRE reports the YLs are all set for another Conventional! K3MVO says QRN is topping the GRM! WA3GCS and K3VZ1 got the big A! W3GQZ now has a new QTH back in action. W3ID busy with 2M Tfc net. WA3RMV going to 4x4-Land & be looking for contacts. W3EJ says QRN is giving intruders competition! W3HUS now W3FM. WA3UDS with 2 watts got 76 QSOs on 75 tone! Lehigh Valley Hamfest a success, they have two new hams, W3GCU and W3JCU had nice visit in NC tnx to ham community! Del Lehigh AKC news looks good. Central Penn ARC had a wingding Picnic! A had storm took out the Lancaster repeater for a short while, OH2BQB an exchange student is returning home with new gear, look for him. More upgrades: W3LRF & W3EJ, W3EJ and WA3JLR & WA3JULQ the Big A and W3B3HC moved up to G. Remember if you have traffic for the SCM and you don't hear me I do have a mail box and phone! Traffic: W3CUL 3131, W3VR 878, K3NSN 526, WA3ATQ 355, WA3QOZ 319, WA3THT 233, WA3YJG 293, W3PHQ 282, WA3PZO 24, WA3WY/3 71, W3WRE 64, K3MVO 64, W3ATJ 44, W3AVJ 31, W3B2BA/3 20, W3QYV 18, K3JUL 17, W3ADE 16, K3RVC 16, W3AXA 10, W3ID 7, WA3WAC 7, WA3VHR 5, W3BNR 4, W3ACKA 4, W3HK 3, W3HXS 3, WA3B3J 2, A3R3K1 2, W3EJ 1, W3GOA 1, W3GMK 1, W3KCM 1, W3KEK 1, W3VDQ 1.

**MARYLAND-DISTRICT OF COLUMBIA:** SCM, Karl R. Medrow, W3FA - MDD/W3BZV 3643 kHz at 7 and 10 PM local time daily. MDPN/W3MWD 3928 kHz at 8 PM MDT and 1 PM SS. MDD/W3WEDP 3920 kHz at 8 PM TTS. MDD/W3BZV 3925 kHz at 5:15 PM local M.S. Meet the gang here, Congrats to AA3YKK our July PSHR man. OO reports from WA3KCY WA3SXH ACBZY/3 AA3UHJ WA3NSA and WA3JZ. W3B3ALX is 16 years old and went from Novice to Extra in 10 months. Thanks to W3KNR for the help with the YL and WA3KCY spearheaded antenna zoning changes in Annapolis County. WA3SXH starts at the U of MD. W3B2JR/3 with good news has renewed ham activity. W3CDQ has been operating NN35. WA3JY expects to move to MA this fall. W3B3UA claims RF makes his tomatoes grow big. W3B3AGU vacationing in VE-Land. W3ZEE moved to MS permanently and already active. Lightning struck the antenna system of W3ECS with severe damage to rotators. W3GRF lost portions of his 40-meter four-element boom in a freak wind. Now repaired and up. It's BIG. WA3UPH is back with a 38 fatter and Quad plan for DX. WA3JEL was named MARS Man of the year. Congrats. WA3JJS is a regular liaison with the YL and WA3JJS reports the Mountain ARC was active from the Cumberland Shopping Center. EC reports from W3JHH and WA3ZCE appreciated. With the nets: Sessions/TFC/QNI average. MDD 60/151/6.4. Top Brass W3FVZ AA3QJA W3BET and WA3WY. MDPN 27/105/201 with W3ADQ topper and W3LDD W3DXX and WA31V/3

others. MDCNT 18/34/13.1 with 10p Honors to AA3YKK K3ORW and WA3EOP. Traffic: (July) WA3QIA 123, W3FZV 66, W3FA 65, WA3SJS 55, W3MWD 54, WA3ZEE 51, AC8BZY/3 47, W3BSYT 45, WA3JOP 47, WA3AF 46, W3JUF 45, W3B3UA 24, WA3SJI 24, WB2TJR/3 17, WA3ZAS 12, WA3PRW 8, WB3AGD 4, WA3KY 4, (June) WB3AGO 3.

**SOUTHERN NEW JERSEY:** SCM, Raymond F. Clancy, WB2GTE. Congrats to new Novices W2ZGZY, W2RGGX, W2NGB and W2NAG. W2ZGZY, W2N2GEY, W2N2GK; W2N2AWU Advanced; W2N2BMC Technician; W2N2AWO General. WB2LCC reports West Jersey RAC has another class on the way. K2AXQ now an OO. WB2JUN says FD is a CQ contest. W2YOF says you missed the Burl. Co. ARC Picnic Aug. 24. W2JI needs an EC for Camden Co. any 12krs? WB2LVB, Jr. and WB2MGV, Sr. have an antenna farm. WB2KFK DX's in Marlton. SJRA's Aug. 14 picnic was a success. K2GEY finished a DVM. K2EGH wkd 13 orig states on 6M. W2JAV reports the Cumberland Co. Radio Net has been meeting for 30 years - W2BX Tue. 8 PM 2 and 6M. WA2AML sez Southern Counties ARA sponsored a computer seminar received Extra and Gen. and sent W2NAG. W2QXQ out of hospital. WA2JCF eynahled QSQ Russian and Finish hams on a visit. W2NNAK working on new antenna. W2APD has Bicen WAS. WB2ESB new EC for Cape May Co. W2HOB busy with MARS. NJPN - ARCC Burl. Co. plus VHF net. WA2WRS received 2 M frs for birth day. WB2CCR moved to new QTH. WB2LCC and WB2LWB at Antenna as participants. Traffic: WB2LCC 24, W2JI 19, W2HOB 14, WB2OSQ 12, K2BG 10, W2IU.

**WESTERN NEW YORK:** SCM, Joseph M. Hood, K2YAH - Asst. SCM: W. D. Thompson, W2MTA. SEC: WB2FD. Some of the many clubs and individuals who are planning novice licensing courses for late summer or fall of this year are: W2RUF in the Buffalo, NY area, WB2TEQ Hilton, NY, WB2GGM Monroe Community College, WB2NSD Rochester ARA. If you or your club plans to hold such classes kindly advise me so that they may be listed here. If not, why not? Amateur radio needs all the good amateurs we can get. Those holding classes should also read Official Bulletin 601 of July 29. WA2ECA has a new 15-820. WA2LCC has a new pair of 3-500Zs percolating. W2RR/22 BADXC beat RAWNY, ARATS and STARS combined Field Day score according to WA2EPA. WA2JP who operates with AREC doing flash flooding in the Binghamton area a new tri-bander up. Pleased to report that K2DNN is back to work after a 9 month QRX for surgery. ARATS has reelected WB2GUF, pres.; WB2QCK, secy; WA2RJC, vice-pres./treas.; W2VCI, WB2CJL, WB2UNH and WB2QCK dir. Congratulations to WB2LE on his appointment as CO. Your SCM, Asst. SCM and SEC are in the process of reviewing all section appointments. Any appointment which has been inactive for an excessive time will be cancelled unless the appointee notifies me of his interest in retaining the appointment. Pleased to report that the DRUMLINS ARC have become an APRL affiliate. Looking forward to Hamburg International Hamfest in Sept., Syracuse Hamfest Oct. and the Antique Wireless Association's annual radio conference to be held Sept. 30 to Oct. 3 in Canandaigua, NY. Also thanks to the Radio Society of Ontario for the invitation to WB2YZL and yours truly to speak at their convention in Toronto on Tuesday, WA2LYK 346, WB2LVB 242, W2MTA 199, W2OEC 125, W2FR 83, WA2ICB 78, W2PZL 48, WA2AIV 35, WB2QIX 35, W2RQF 21, WA2HSB 18, K2OFV 17, WA2ZJP 15, W2FZK 14, WA2EGA 10, WA2DRC 7, WA2EJ 2, K2YAH 1.

**WESTERN PENNSYLVANIA:** SCM, Donald J. Myslewski, K3CHD. SEC: W3ZUH. Asst. SECs: K3SMB, WA3JW. PAM: K3SMB. RMs: W2KAT/3 W3NEM, W3LOS, W3JUN.

Net	KHz	Time/Days
WPA CW Traffic	3585.0	7:00 PM Dy
Pa. Phone	3960.0	5:00 PM M-F
WPA RACES	3990.5	9:00 AM Su

New appointment: WB3AGB as OBS. Current holders of the OPS appointment will be contacted by the PAM, K3SMB for the purpose of an HF phone net for the WPA Section. Welcome to the Gulf Science & Technology ARC and Washington Amateur Communications (WACOM) ARC, new clubs in the section. Officers for the Gulf S & T Co. ARC for 1976-77 are: W3ZDF, pres.; W3JEA, vice-pres.; W3N3CVG, secy.; W3N3CNV, treas. The Mt. Washington repeater in Pgh. is operational on 147.99/39 MHz. The Nittany ARC will sponsor code and theory classes this fall. I would like to urge all clubs in the WPA Section to consider classes for the beginner. Many are interested but only need someone to help get started. Classes given by various clubs in the Section have resulted in the following Novices: W3N3COR, W3N3COX, W3N3CNU, W3N3CVG, W3N3CSV, W3N3CPU, W3N3CNV, W3N3CSS, W3N3CST, W3N3CNC and W3N3CC. Congrats to W3N3CNC to the ranks following WB3ADI upgraded to General Class and WB3ADI to Advanced. W3SN has been appointed Asst. Director by Atlantic Division Director, W3SW. WA3RVD provided the Foothills ARC with man powered generator during Field Day. WB3AGD acquired a Triton IV. The Greater Pgh. Sky-Warrior Net meets every Tue. on WB3AGH 146.22/82 MHz at 2030 local time. The WPA CW Traffic had 30 sessions in June, handled 155 messages with 336 QNI. For the month of July, the WPA CW Traffic Net had 31 sessions, handled 148 messages with 330 QNI. TSHR credits WA3BVM 45 and WA3WFF 44. Traffic: WA3BVM 47, WA3KAT 14, W3ECP 113, K3CHD 48, W3KUN 47, K3MIV 37, WA3AHP 31, K3SMB 22, W3SN 13, WA3SSW 12, WA3ZAO 12, K3OYB 8, W3YD 8, W3IDO 5, WA3PMT 4, K3SIN 2.

**CENTRAL DIVISION**

**ILLINOIS:** SCM, Edmond A. Metzger, W9PRN - Asst. SCM: Harry J. Studer, W9RYU. SEC: W9AES. PAM: WA9KFK. RM: K9ZTV. Cook County EC: W9HPG.

Net	Freq.	GMT	Days	T/c
ILL	3690	0030/0400	Dy	252

ILL Phone	3915	2245	Dv	248
NCPN	3915	1200/1700	M-S	205

K9EBA is now an Advanced. Perry Williams, W1UED was guest speaker at the Egyptian radio Club's July meetings along with SCM, W9PRN. Congrats to K9EBA and his XYL - a new baby girl in the household. The Naval Training Center Great Lakes Amateur Radio Club and The Central IL Radio Club of Bloomington

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- TV-300-HP High-pass filter ..... 7.95
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- SPR-4 Programmable rcvr ..... 629.00
- 5NB Noise blanker ..... 70.00
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- TA-4 Transceiver adaptor ..... 35.00
- Plain crystal selector dial ..... 3.00
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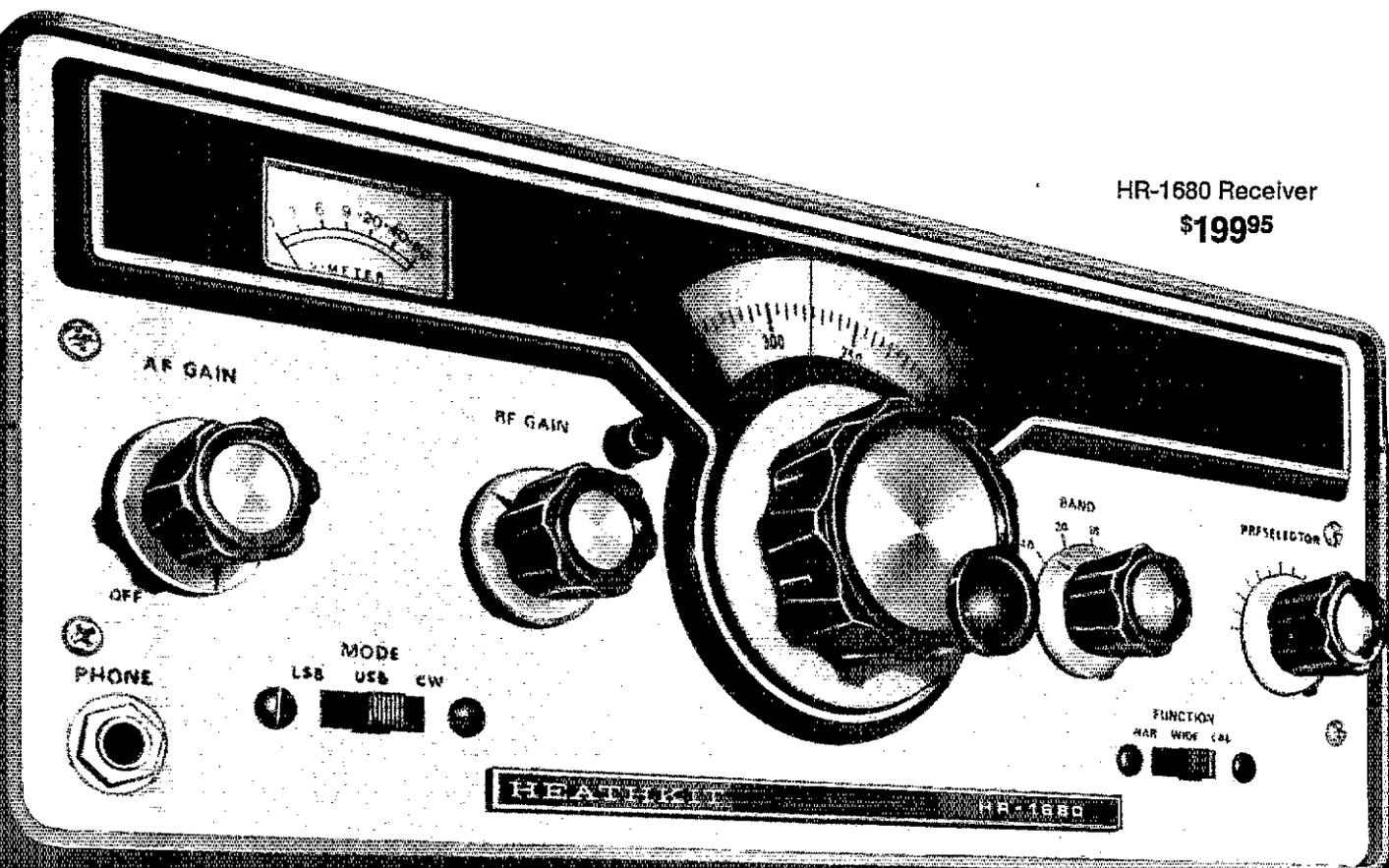
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**FREQUENCY COVERAGE:** The HR-1680 covers 500 kHz segments of the 80, 40, 20 and 15-meter bands plus two 500 kHz segments for the lower 1 MHz of 10 meters.

**ADVANCED CIRCUIT DESIGN:** Has a superhet double-conversion receiver with a double-tuned RF stage and AGC controlled IF and RF stages. A four-pole crystal filter provides excellent SSB reception, and a two-stage active audio filter provides a very sharp band-pass for really clean CW. The use of quality solid-state components throughout eliminates heat buildup and drift, so you get outstanding frequency stability on every band.

**OPERATING EASE:** An easy to read calibrated "S" meter helps you tune for the strongest relative signal; the extra-large spinner tuning knob and easy-to-read calibrated dial make tuning fast and accurate. A front-panel headphone jack lets you use low-impedance headphones to work stations in private. Preselector, AF and RF gain controls, mode and function switches

let you set up with real precision. The built-in AC power supply makes the HR-1680 ideal for permanent stations, and there's an external battery input for 12 VDC portable or standby battery operation.

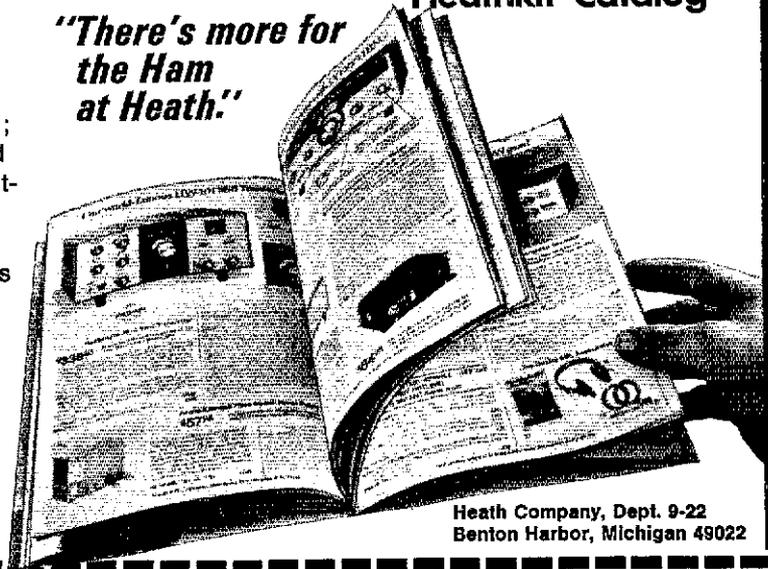
**SPECIFICATIONS:** Sensitivity is excellent at less than 0.5  $\mu$ V for 10 dB S+N/N for SSB operation. IF Selectivity is 2.1 kHz min. at 6 dB down and 7 kHz max. at 7 dB down. Frequency stability is rock-steady: less than 100 Hz per hour drift after 30 minutes warmup and less than 100 Hz for a 10% change in line voltage. And the dynamic range is an outstanding 120 dB for excellent reception of widely varying signals.

**EASY, ENJOYABLE KITBUILDING:** An open chassis layout, printed circuit boards and a wiring harness make the HR-1680 a pleasure to build. Like all Heathkit Amateur Radio products, the HR-1680 combines quality and value at a low kit-form price. Order yours today using the coupon below. **SEND FOR YOUR FREE CATALOG** — nearly 400 superb electronic kits. Just check the box on the coupon!

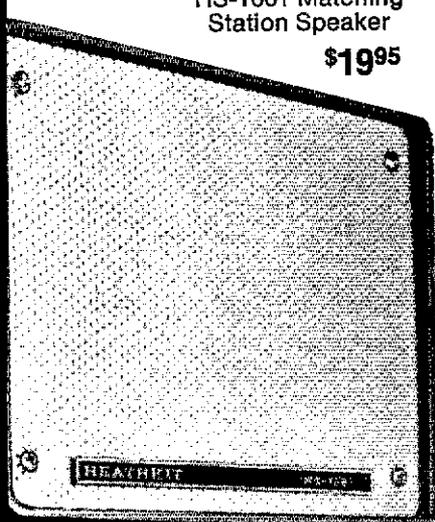
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have been approved as ARL affiliated clubs by the League executive committee. Congratulations to WBSKHK on receiving his DXCC award. The Montgomery County AREC Club was honored with a full page article of their activities in the local Hillsboro newspaper. New calls in the Bloomington area are: WN9VEA, WN9VEE, WN9VED, WN9VDM, WN9VDN, WN9VKE, WN9VLC, WN9VQX, WN9VQY and WN9VQZ. The National ARL Convention held in Denver was visited by a good representation of the W9-Land amateurs. The newly elected officers of the Tri-Town Radio Amateurs Club, Inc. are: K9PMV, W9JBM and W9HQQ. Their annual family picnic had an FE turnout. WB9HYD, WB9GGG, WB9MKT and WB9EIA are the new officers of the Lamoine Emergency Amateur Radio Club. Their new repeater will be on 147.69 and 147.09. The Southern IL Univ. ARC at Carbondale, WA9FGX has a new Venus 551V monitor. W9CJW, trustee for the club visited the Tokyo International Amateur Radio Association (TIARA). WB1LH the XYL of W9ICN has joined the ranks of the Silent Keys. WA9OBP is back on the air after a very disastrous fire. WB9FWD received his extra class license. Traffic: WB9NVN 273, W9NXG 344, WB9TWT 215, WA9VGW 193, WA9JJE 122, K9ZTV 119, W9JXV 107, WA9KFK 101, W9NJP 86, WB9SMA 84, K9KHI 87, WB9NOZ 82, W9HOT 53, WA9ACN 43, WB9NIC 41, W9OYL 38, W9KR 35, W9LNO 28, WA9JG 22, W9PDR 20, WA9OBP 19, AB9DED 12, WB9FWD 7, WB9ELP 5, W9HPG 4.

INDIANA: SCM, M. P. Hunter, WA9EED — SEC: W9UMH. Congrats to the following clubs for affiliation: Indip. Ham Assn., Blue River Valley ARS, Old Post ARS. WB9VKC has a new Tech license (ex-WN9MAM). WA9KBS recently passed the Extra Class. WN9VPG is the youngest ham at age five. Change the net time for INN to 2230Z instead of 230Z, my mistake. K9OTB hosted FP8DH during his recent visit to Indip. WB9TH reports much rig trouble among the Terre Haute hams. K9TIV will be on RTTY and possibly TV in Sept. WB9QPN has a new TH6DX at 60 feet. FWRC is claiming section honors for FD four transmitter class. W9UMH received the Wouff Hong degree at Milwaukee. WA9ITB placed well in the May 8 FMT with an 18.1 ppm deviation. He is also new class 1 OO station. There seems to be much interest in low band DX. Some good summer goodies being logged. W9LTU advises he also passed his Extra Class exam. Red Cross ARC will sponsor Novice classes in Oct. W9EJ has returned from Indonesia and is back in the swing on QIN. After reviewing requirements for BPL, W9IOH is a new recipient. Nat. Traffic: QIN 354, ITN 606, IPDN 6, HOOS VHF 9. Traffic: WB9KTR 382, W9OJ 270, WB9FOT 147, W9HUF 142, K9TKE 140, W9QLW 129, WB9OZW 114, WB9SUM 112, W9GGW 97, W9LTU 95, WB9SKA 90, WB9IHR 81, WB9NAQ 45, W9BQ 42, K9YBM 41, W9DZC 35, WB9QBM 32, W9KWB 30, W9ZNU 28, W9ENU 28, K9WVJ 26, W9UEM 25, K9RPZ 24, K9CZT 23, W9LJN 23, WA9TJS 22, AA9ITB 20, WA9OHX 20, WA9OKK 20, WB9DIX 19, K9RWQ 18, WB9THY 18, K9JQY 15, W9RTH 14, WA9QCF 12, WB9ORM 10, W9BDP 8, WB9KGR 7, WA9BVS 6, K9HMC 6, K9RGF 6, W9DKP 6, WB9SCH 6, W9CMT 4, WB9VKC 4, K9DIY 2, WA9USP 2.

WISCONSIN: SCM, Roy A. Pederson, K9FHI — SEC: K9PKQ. PAMs: WA9LRW, WA9YK, K9LTK, RMAS: WB9ICH, K9KSA, W9MFG, K9LGLU. Nets: Froq. Time, QNI, QTC, Mgr.: BWN, 3985 kHz, 1145Z M-S, 470, 386, WA9YK, BEN, 3985 kHz, 1700Z Dy, 711, 169, WA9LRW, W9BN, 3662 kHz, 2230Z Dy, 959, 243, K9LTK, W9BN, 3662 kHz, 2230Z M-WF, 125, 21, WB9ICL, W9SN, 3662 kHz, 0000Z Dy, 187, 95, W9MFG, WIN-L, 3662 kHz, 0300Z Dy, 218, 106, K9LGLU, WI Ex. PO, 3925 kHz, 1701Z M-F, 546, 33, WA9NIX. RACES station in Madison new call WC9AAG. AREC and YIARC provided communications for Bicentennial Parade. ARL convention went off very well. Lots of forums, meetings, eyeball QSOs, food and a lot of fun. The West Coast is to be commended on a job well done. W2TUK, W9PRN, W1ICP, W9HPG and Don Waters from ARL were present. Armin Meyer was the speaker. New Novices North Freedom, WN9VJS (YL), WN9VJQ Sauk City, I regret to report the following silent keys: W9BQM, K9EWL. Ex. PO picnic had 40 taking novice class & finished it. WNA picnic at Baraboo had 58 registered plus the families, everyone had a good time, big prize a digital watch was won by WB9LKC. WNA Manuals are ready, need one? Contact K9UTQ. New Novices: WN9UKF Wausau, WN9JQR Wisconsin Rapids, WN9VGW Stevens Point, WB9IK, if Member ARL, W9IEM new mgr. of BEN. K9CPM made BPL. Traffic: (July) K9CPM 621, W9MMP/9 326, WB9KPX 166, WB9ICH 139, W9DND 132, W9PVH 114, K9LGLU 106, K9MZO 91, W9SFL 91, W9MFG 71, K9FHI 63, W9LRW 53, W9IHO 49, W9IEM 36, WB9JISW 36, WB9QCF 36, K9TQ 34, WB9SHK 28, WB9TNG 28, WB9NME 27, WB9SXX 20, WA9YK 19, K9ANV 17, WB9KMW 15, K9JPS 14, WB9PYG 12, WB9QFW 12, W9KHH 10, WB9LKC 7, (June) WB9KPX 59.

### DAKOTA DIVISION

MINNESOTA: SCM, Frank Leppa, K9ZKE — SEC: WA9OFZ, PRA WB9NGX. Attention: Novices: the Minn Slow Speed Net has expanded to seven nights a week, 5:30 PM on 3710 kHz. Don't pass up this opportunity to increase your operating skills. FCC amateur exams will be given in Sioux Falls, SD, Oct. 19, file form 610 now with St. Paul FCC. W9WH is now MN chief QSO. Members interested in sending bulletins contact W9WH or K9ZKE. Two mtr openings occurred July 10 with WA9JUK, Duluth, working K9IKV, Mpls. with 10 W to a 1/4 wave whip via simplex. Other reports too numerous to mention were noted. Willmar 31/91, now autopatch, Marshall and Austin building autopatch, Austin and Waseca are linked. WB9CQ and W9JG are waiting for license. Bloomington RACES now WC9RA. Machines authorized for Hardwick, Hinkley, Fergus Falls, and Park Rapids, WR9ADY (St. Paul) has four receive sites. Mesabi group installing 25/88 machine near WB9RL's back yard. Reports of 2M ssp are frequent, with T5700s being used by WA9US, WB9LP, WA9CCR, WA9CQG and WB9OAG. W9MD and W9MJS are using homebrew gear. The passing of WA9VTZ to the ranks of Silent Keys saddens all of us who knew her. New Novices are: WN9TBD, WN9TWH, WN9UAI, WN9UKI, WN9UTV. Techs: WB9QZS, WN9SLT. General: WN9NNU, WN9NYQ, WN9DQ, WB9SXQ, WB9SQX. Advanced: WB9GR, MSPN PAM, AB9DOY is in the hospital and expects to be home in a week. WB9LDW

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Now you don't have to let everyone know that you've got a mobile ham transceiver. Our model ASPR798 gain disguise antenna looks and acts just like a normal Ford antenna, operating on AM and FM broadcast\* as well as the 2 meter band. We know the disguise is effective because we've been making them for law enforcement agencies for years. Antenna Specialists has an entire line of disguise antennas to prevent the theft of your VHF FM rig. Exact replacements for Chrysler and Ford products and universal mounts for everything else on wheels.

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\*When used with corresponding antenna coupler.

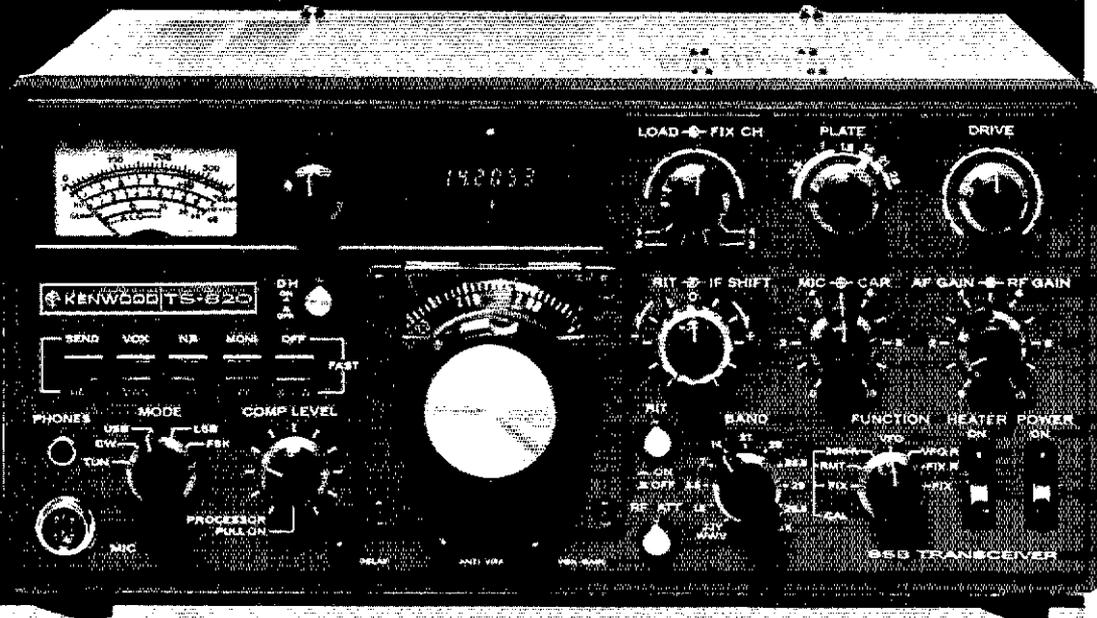


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# KENWOOD'S TS-820 *the Pacesetter*



**KENWOOD HAS ATTAINED A HIGHER LEVEL OF ACHIEVEMENT IN ITS TS-820 THAN EVER REACHED BEFORE. THE DISCRIMINATING AMATEUR WHO WANTS THE VERY BEST NEED LOOK NO FURTHER NOR WAIT ANY LONGER. THE TS-820 "PACESETTER" WILL PROVIDE SUPERIOR PERFORMANCE, VERSATILITY AND FEATURES FOUND IN NO OTHER TRANSCEIVER.**

**THE NEW "PACESETTER" IS THE ULTIMATE PROOF OF KENWOOD'S DEDICATION TO OFFERING ONLY THE VERY FINEST.**

What makes the TS-820 the Pacesetter: Full 160-10 band coverage, QRM-killing IF shift, true R.F. speech processor, husky AC power supply, state-of-the-art PLL VFO system, rugged final amplifier, RF negative feedback circuit . . . all this and more built in to make the TS-820 the Pacesetter that it is.

We haven't forgotten the other standard Kenwood features either . . . efficient noise blanker, 25 kHz calibrator, built-in speaker, CW Sidetone and semi-break-in circuits.

Let's take a closer look at some of these important features. This month the Digital Readout:

The Digital Display Readout directly

indicates the transmit and receive frequencies by counting the carrier, VFO, and heterodyne signals. Unlike dials using a VFO signal only, it indicates the accurate frequency in any operating mode. The readout accuracy is determined by the standard 1 MHz oscillator which is calibrated to WWV. The counter actually figures the frequency down to 10 Hz and the digital display reads out to 100 Hz. Frequencies are displayed in Kenwood blue digits for long operation without fatigue.

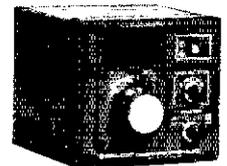
When the Digital Display is installed, the D.H. (display hold) switch is used as a memory device. By pressing the switch, the selected frequency will remain displayed.

## Specifications

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

## Additional Features

**FINAL AMPLIFIER:** The TS-820 is completely solid state except for the driver (12BY7A) and the final tubes. Rather than substituting TV sweep tubes as final amplifiers in a state-of-the-art amateur transceiver, Kenwood has employed two husky S-200 (equivalent to 6146B) tubes. These rugged time-proven tubes are known for their long life and superb linearity. Tubes run cool with the aid of a noiseless fan (standard) mounted on the rear panel. The above tube and power combination minimizes the possibilities of TVI and helps maintain the Kenwood reputation for excellent audio quality. Most modern SSB transceivers employ some type of ALC circuit in the final stage. The TS-820 uses R.F. negative feedback from the PA plate circuit to the driver cathode permitting a high degree of linearity at the high power level of the PA tubes. This accomplishes third order intermodulation products 35 dB or greater below the output signal . . . you get one of the cleanest signals on the air today.



VFO-820

The VFO-820 is a solid state remote VFO designed exclusively for use with the Kenwood TS-820 Pacesetter. The VFO has its own RIT circuit and control switch. It is fully compatible with the optional digital display in the TS-820. The perfect extra to any Pacesetter station.

### CW-820

500Hz CW Crystal Filter

### TV-502

The TV-502 transverter puts you on 2-meter the easy way. Simply plug it in to the TS-820 (or TS-520) and you're on the air. Operates in the 144.0-145.7 MHz frequency range with a 145.0-146.0 MHz optional

either way is the  
right way

...they're both  
**KENWOOD**



## the TR-2200A

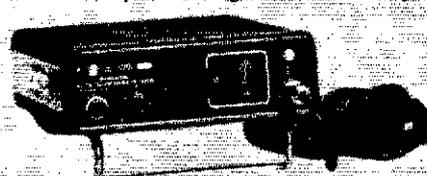
*Kenwood's high performance portable 2-meter FM transceiver... completely transistorized, rugged and compact.*

2 channel capacity. Built in telescoping antenna can be easily replaced, or stored in carrying case. Connector for external antenna also. External 12 VDC or internal ni-cad batteries, complete with 120 VAC battery charger. 146-148 MHz frequency coverage. 2 channels, 6 supplied. Battery saving "light off" position. Hi-Lo power switch (2 watts - 400 mW). Sensitivity: 0.5 uV or less/26 dB S+N/N. Built-in speaker. Size: 5-3/8"x 2-5/16"x 7-1/8", 3-3/4 lbs. Complete with Dynamic mike, D-T-S carrying case. All cables, speaker/headphone plug and 10 Ni-Cad batteries. Amateur net... \$229.00.



## the TR-7200A

*Kenwood's superb 2-meter FM mobile transceiver. Designed to withstand the most severe punishment while providing consistently excellent performance.*



Packed with features like the PRIORITY function... Put your favorite crystals in channel 7, and the

7200A switches there with the push of a button... no matter what channel you are on. 146-148 MHz coverage, 22 channels, 6 supplied. Completely solid state. Voltage required: 13.8 VDC. Antenna impedance: 50 ohms. Frequency adjusting trimmers on every crystal. RF output power: 10 watts (or 1 watt at low power). Adjustable frequency deviation (factory set at  $\pm 5$  kHz). Automatic VSWR protection. Receiver sensitivity less than .5 uV for 27 dB. Selectivity: 12 kHz/-6 dB and 24 kHz/-70 dB. Size: 7-1/16" W x 2-3/8" H x 9-7/16" D, 5-1/2 lbs.

Complete with dynamic mike, DC power cord, mobile mount, mike hanger, auxiliary connector and external speaker plug. Amateur net... \$249.00.

The perfect companion to the TR-7200A is the PS-5 AC/DC power supply. Together they provide an efficient and handsome base station. The PS-5 is complete with a digital clock and automatic time control feature built in. Amateur net... \$79.00.

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**when you**  
**know you've**  
**got the**  
**very best!**



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Repeater or simplex, home station or mobile, 1 watt or 50 . . . what really counts is the intelligence that gets radiated. Jim Larsen, W7DZL found that out years ago when he was both hamming and running a two-way commercial shop. That's when he started working with mobile antennas . . . gain antennas that didn't waste power in useless heat. Today, thousands and thousands of Larsen Antennas are being used. We call it the Larsen Külrod® Antenna. Amateurs using them on 2 meters, on 450 and six call them the antenna that lets you hear the difference.

Larsen Külrod Antennas are available for every popular type of

Illustrated . . . Larsen JM-150-K Külrod Antenna and mount for 2 meter band. Comes complete with coax, plug and all mounting hardware. Easy to follow instructions. Handles full 200 watts.



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and WB0NAA completed Bicentennial WAS, with several others in hot pursuit. W8HZU is handling traffic on 20 M 555 to the So. Pacific at midnight local time. AB0JYT originated huge amounts of traffic (about 900) at the Manka to Farmfest. Thanks to W0RQJ for hosting the MSN picnic at his home. K0QOQ, 93 years young, received the MARS certificate of merit. Traffic for the W0RQJ 17, K9CYD 277, WA0TFC 26, W8HZU 11, WB0OAG 17, W0WGYT 88, WB0NZB 83, WB0OCT 75, K0ZZE 72, K0PZ 71, WA0TGM 68, K0ZHI 53, WB0CPC 50, WB0OFQ 47, WB0MAD 42, WA0URW 39, W0RQJ 37, AB0LDW 28, W0NPGZ 26, WB0PMZ 20, WA0W0V 20, WB0PKG 18, WB0L1 16, WA0JPR 14, W0JMX 13, WB0GEU 11, W0KLG 10, WB0QCW 10, WA0L1S 9, WB0PBN 9, K0FLT 8, W0NO 5, W0OPX 3, W0RIQ 3, W0LYP 2, WB0JA 1.

**NORTH DAKOTA:** SCM, Mark J. Worcester, WA0WLP - GBS: K0PVG. WB0GMT is engaged. WA7IRT/0 on the air at Langdon. New Novice calls at Grand Forks, WN0UCI WN0UKR and WN0UKS. Ham Fest had a good turnout and will have report next month. WB0NAD going for a Baring license and can be seen flying around Bismarck. WA0WLP trying to get on 2 meter SSB.  
 Net - KHZ CDT/Days Sess. QNI QTC  
 Manager  
 DATA - 3996.5 2300 5-6 30 245 74  
 WA0SUF  
 Traffic: WA0SUF 77, W0DM 10, WB0BMG 6, WB0GFZ 5, WA0GFZ 5, WA0JPT 3.

**SOUTH DAKOTA:** SCM, Edward Gray, WA0CPX - Jerry formerly K0ESP is now W2HFW at Fairport, N.Y. Jerry is looking for the S.D. gang on 20 meters. K0HNU from Huron is now DAINE in Germany. WB0MUK from Vermillion is stationed in KG6 Guam and is looking for the S.D. gang on the low end of 20. WR0AHN is now on 22/82 in the Southern Black Hills on Bear Mt. the second highest elevation in S.D. by just a few feet. Carlton Heimbeck N.Y. of K0DTZ has earned her driver's license. K0CK passed his extra. They are both from Rapid City. NS0DAK cards should go via K0CXL with an SASE. In Huron WB0PLP has his Advanced, WB0LULX, Technician, and WN0UTJ. John Souvestre, WA5NYY SEC.

### DELTA DIVISION

**ARKANSAS:** SCM, S. M. Pokorny, W5UAU - SEC: WA5VNV. PAM: W5POH WASZVZ. RM: W5MYZ. Welcome to ham radio, WN5 TKN TKV TLB TMZ TNL: WB5s TPI TQO TRO. Nets: KHZ, Time/Day, QNI, QTC, Mgr.: OZK, 3760, 164, 35, W5MYZ; APN, 3937, 1100 M-S, 746, 37, W5POH; M-Bird, 540, 17, WA5ZWZ; ARN, 3995, 2330 DV, 397, 31, K5FOY. New EC: WA5PMY, Mississippi Co. and WA5TIX Lepanto Co. Canceled WA5TLC and WA5TXX. WA5ULI. Cancel ORS of WA5TXA. Sorry the TXA leave the state. Renewed PAM W5POH, RM W5MYZ. OPSs, W5GVE W5PBZ W5UAU WA5VDH. ORSs, WA5HNN W5KL WA5TRG. Traffic: WA5HNN 145, W5POH 40, K5AO 39, W5MYZ 35, W5UAU 25, W5GUV 15, W5SHY 3, W5GQH 1.

**LOUISIANA:** SCM, Robert P. Schmidt, W5GHP - Asst. SCM: John Souvestre, WA5NYY SEC: W5BQI. RM: WA5PRI. PAM: W5EQU. VHF PAM: W5VBK. The LA State Hamfest will be in New Orleans Oct. 30-31. Make plans to attend. For further information contact WA5NYY. K5SVD, chmn. for the 1979 National convention in Baton Rouge, has asked all clubs to submit one member to be on the advisory committee. These names should be W5TLC by the end of Oct. WA5TQA active on all traffic nets is a new EC for East Baton Rouge Parish. W5CDDX active on the traffic nets, and trying to get on RTTY. W5CEZ is 75 years young, still very active on MARS. Many thanks to the New Orleans VHF club, and the Westside ARC for their help at the Lutheran Youth Conference in the super Dome. The two cities have 15 members in their new Novice class, run by W5BNIF.

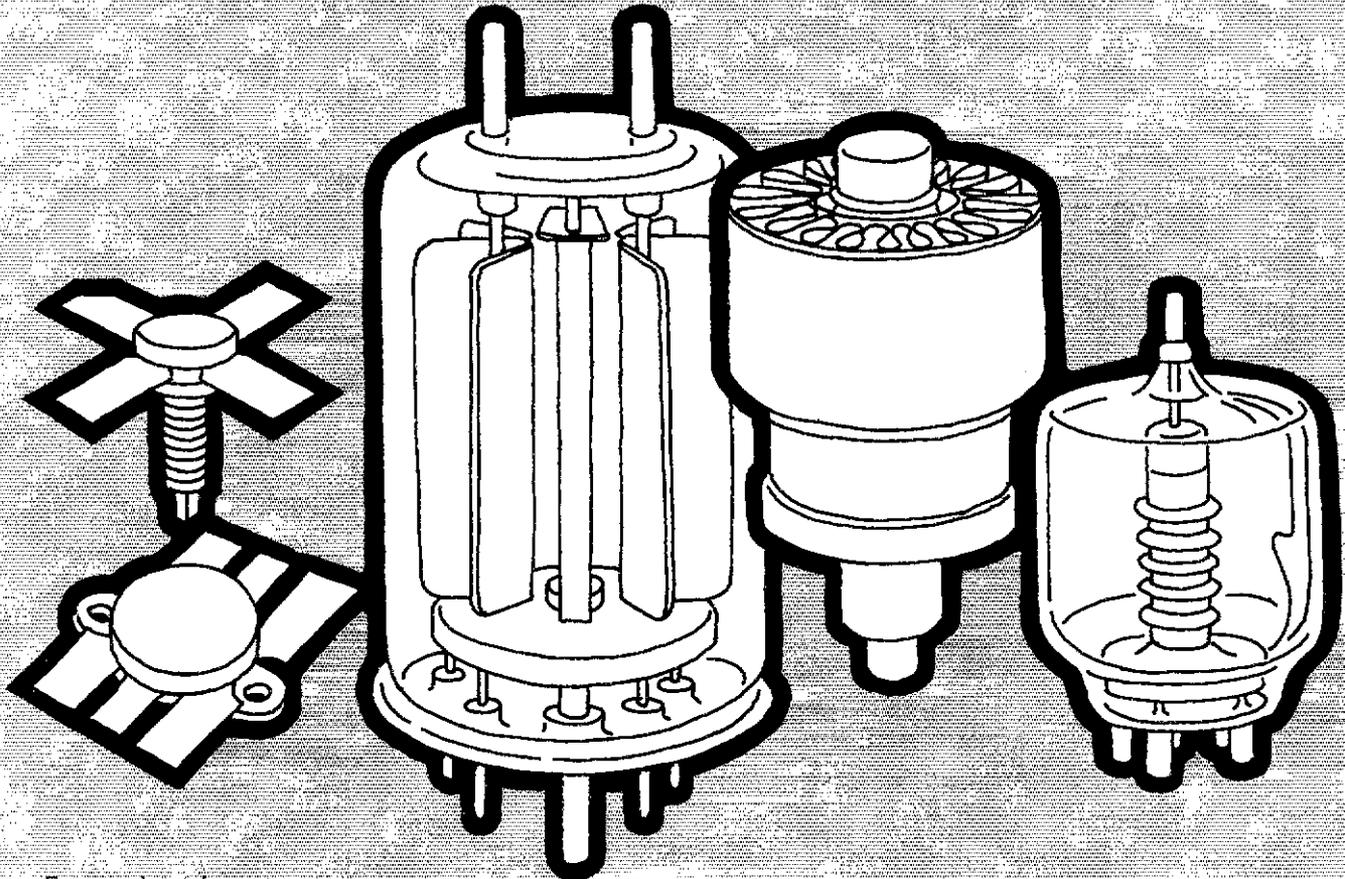
Net - Freq. Time/Days QNI QTC Manager  
 LAN - 3615 7 & 10 DV 419 244 WA5PRI  
 LTN - 3910 3:40 PM DV 212 66 W5EQU  
 LSN - 3703 8:30 PM M-F 176 37 WA5ANV  
 LRN - 3587.5 7:00 PM Su 23 8 W5SFHU  
 Traffic: W5GHP 542, K5TTC 270, K5TFG 103, WA5VQE 98, W5MI 69, WA5ANV 63, WA5TQA 54, W5CDDX 35, W5SPTH 33, W5SLBR 28, W5BIKT 27, W5NSOM 10, WA5QVN 8.

**MISSISSIPPI:** SCM, W. L. Appleby, W5DCY - Enjoyed FB visit. Keester AFB ARC. Appts: W5SIR K5MIT W5VTN WA5DPB ECs. Action underway to form a MS Coast Am Rad Council between KAFB ARC, MCARC, JCARC, Jackson Co. ARC will again operate Special Call Station KM5BSA Oct. 15-17. W5NDDE W5KFN helping Novices in HBA area. Keester AFB ARC has Novice class underway with 85 at first meeting. Emergency Repeater System, MCOMB, Jackson Co. ARC, Laurel Jones Co. ARC and Delta Am Rad Assn. now ARRL affiliates. Hernando ARC & Chickasaw ARC have requested affiliation. Monroe Co. ARC should be firing up soon. Look for activity from Univ. of MS ARC. 3910 W5SFX needs more Co. and District ECs. Welcome new amateurs: WB5s UAJ, W5YI UCH IZN UAJ UAK; WN5s UDB USZ UBN TKW TLF TRJ TMR TMS TLN TMQ TGY TRG TMA TOV TDN. Latest repeater counts puts it at 25 for state. K5IRC K5RSS K5JX WB5TIB heard on vhf-fm. MSN Net cert issued to W5DIL W5SRRY. W5FT now Asst. Mgr. CGCHN. W5SG active on Navy MARS cw nets. MS represented 83.9% on DRN5. MSBN check-ins 1041, traffic 163; MSN check-ins 46, traffic 15; CGCHN check-ins 1874, traffic 70. Traffic: W5SKUJ 107, K5OAF 107, W5LXX 98, W5EDT 85, W5MTG 52, W5NPM 40, W5DCY 37, W5SMM 31, W5NCB 29, W5LS 21, W5BLU 17, W5SJV 16, W5VTN 10, W5SNJZ 9, W5SSNB 8, W5LL 3, W5HAS 2.

**TENNESSEE:** SCM, O. D. Keaton, WA4GLS - SEC: WB4DYJ. PAM: WB4PRF. RM: WB4DJJ.  
 Net - Freq. Time(2)/Days Sess. QNI QTC  
 Manager  
 TPN - 3.980 1040 M-F 78 3218 243  
 WA4EWW 1145 M-F  
 W4PEP 0030 M-S  
 WB4YPO 1400 55UW  
 TN - 3.635 0030 DV 31 182 104  
 K4YFC  
 ETVHFN - 145.2 1900 TTh 9 43 2

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146.37-146.97  
WA4VVX 0130 F  
The TN Civil Defence Weather Net is now meeting at 0100 Wed. on 146.16 in-146.76 out; Nashville amateurs are encouraged to join in, WN4JGL received the Certificate of Merit for participating in the "American Revolution Bicentennial Weather Net" MARA's Field Day contacts were 1672 with 3 transmitters. Many thanks to the amateurs who participated in the Powder Puff Derby. The Crossville Hamfest was a success as usual, always a joyous occasion. We are glad AL, SCM, WB4EKJ was with us, hope you got to meet him. The May issue should have reported MARC (not DARC) had 232 enrollment in radio class. Traffic: K4CNY 188, K4YFC 126, WN4CNY 58, WB4ZS 51, W4OQG 49, K4JSE 48, WB4PRF 42, WB4DJU 40, W4RUW 35, WA4GLS 23, WB4BKF 20, W4LLJ 19, K4KCK 18, WB4YPO 13, WA4IDN 11, WA4VWV 10, WA4BCC 9, W4SGL 9, W4CZL 8, W4CZL 7, W4TVV 7, WB4MPJ 6, WA4MIU 4, W4PSN 4, WB4VEN 4, W4VJW 3, WB4WH 2.

### GREAT LAKES DIVISION

KENTUCKY: SCM, Ted Huddle, W4CID — SEC; WA4GHQ. Appointments: WA4IGS as ORS. July Nets!

Net	QNI	QTC	Net	QNI	QTC
KRN	298	24	KYN	258	135
MKPN	969	102	8DAREC	63	7
KTN	1036	145	8DAREC	71	9
KPON	44	23	EKYN	8	1

K4FUM is now publishing an FB KYN newsletter. QNI a couple of times and get on the mailing list. Welcome back an OT, WB4AIN. John is now an OBS and hard at it, K4HRF is helping out the SCM by taking much of the first of the month QTC. New antenna at 21 W4IN air, WB4KTR. K4TXJ has moved his KC4 phone patching to 40 meters. Watch, K4TXJ 114, W4BAZ 85, WA4IGS 72, K4HRF 68, K4FUM 67, WB4EOR 59, W4CID 49, WB4AUN 42, WN4CAR 39, WA4HEM 29, WB4QVS 28, WA4AVV 24, K4YZU 23, WA4FAP 15, K4HFD 13, K4LLO 10, W44AGH 7, K4AVX 5.

MICHIGAN: SCM, A. L. Baker, W8TZZ — SEC; W8MPD. RMs: WB4YA K8KMQ W8YIQ. PAMS: WB8JIX K8LNE. VHF PAM: W8WVV.

Net — Freq.	Time/Days	QNI	TFC	Sess.
MACS — 3953	1500 Dy	874	290	35
QNN — 3663	2300/0200 Dy	433	138	49
ELETN — 3932	0030 Dy	658	109	37
BRMEN — 3930	2130 Dy	580	108	30
WSBN — 3935	2301 Dy	614	80	31
UPEN — 3922	2130 Dy	619	37	31
M16M — 50.7	2300 Dy	289	30	27
AREC — 3932	2200 S	62	15	4
VHF PAM report		433	6	14

One new appointment in July EC WBLMT in Washtenaw County. Saginaw repeater now operational on 147.84/24. New licensees: WNB3 ZWB AWT ANR AGG AXF AZK BHR BHS. WA8JQ received his Extra. Congratulations. Election results: Dart Rep. pres., W8CMV, vice-pres., W8SZT, secy., K8EPZ, treas. Arrow Repeater: W8GND, dir. W8RFA, trustee. New BR/MEN mgr. is W8AZI. K8SWW says his FP8AG trip a flop. Tried for three days to land on St. Pierre (Island). Heavy fog. Taxied from St. John's N.F. \$146.00 taxi fare, lost power. 24 QSOs. Tenth Annual contest of the Month Awards distributed by the MACS Net to W8FQ, Ar. W8DT, May W88FBG, June. W8GLC advises L'Anse Creuse ARC victorious in MI QSO Party and once again asserts Contest Supremacy. New equipment reported at: W8CAP HR 212, K8GXV Brimstone 144, WN8ZSB TS 520. Regretfully report W8DZR a Silent Key. Traffic: (July) WB8DKO 222, K8LNE 190, WB8POL 168, W8MC 123, W8SIT 107, W8OIE 90, W7KQU/8 80, W8OW 60, W8TZZ 53, W8NOH 46, WN8SHL/8 44, K8VGA 38, W88BYB 37, W8PDP 37, W8YIQ 36, W8JIX 32, W88FBG 31, W8JYA 29, W88IBL 27, K8JED 25, W88KBZ 25, W8IHX 22, K8ZJU 18, W88VOM 17, W88DJS 15, K8DTG 14, W88PW 14, W88NC 13, W88BNC 13, W88QE 13, W88VA 13, W88VIZ 13, W88RVG 12, W88LUC 11, K8AMU 10, K8WRJ 10, W8LDS 7, W88LOE 7, W88FXR 6, W8FZL 6, K8JHA 6, W88MTD 6, W88WV 6, W88MJ 5, W8RNQ 5, W88ZPE 5, W88CXF 4, W8LUE 4, K8SWW 4, W8DCN 3, W8GLC 3, W8JAX 3, W8LOU 2, W8LD 1, W8HKL 1, W8WV 1. (June) W8LNC 81, W88DJS 25, W88WWM 14, W88MTD 13, W88LOE 12, W88ZPE 8.

OHIO: SCM, Hank Greeb, AC8CHT — Asst. SCM; William K. Shaeffer, W8MCR. SEC: W8KPN. PAMS: W8DIL WA8SS. RMs: K8IKD W88JGW W88WAK. Net reports.

Net — Freq.	Time (Z)	Sess.	QNI	QTC
QNN — 3.728	2330	20	96	95
OSSBN — 3.9725	1430/2000/2345	93	2304	664

06MN — 3.577 0100 31 204 91  
BN — 3.577 0200/2245 52 262 148  
BNR — 3.605 2200 31 82 107  
QNN — 3.577 2310 30 116 30  
Silent Key: W8WXL Allen County AREC provided communications for two parades with W8BAI, K8CLV W88DEH K8EBN W88ELT W88ISY W88JBS W88LV W88LIG W88MRH W88NKS W88ORT W88ORU W88PJZ W88TDO W88UET W88ULQ W88VCO W88WFN and W88YNB assisting. W88MK is new ham in Cincinnati, Barnesville Area ARC. Detian County RC Meets Two Meter Group, Weirton Area Repeater Assn., and Wood County ARC are among the newly affiliated clubs in the section. WN8ZVL is active from Springboro. W88CQA has arranged Public Service Announcements on 10 different broadcast stations throughout the midwest. W88WTS District General test. W88T P is active on CW, SSB and RTTY. WA3BGE/8 moved into a house — and is glad to have more room for antennae. Central Ohio AREC honored past EC, W8ERD, at a special banquet. K8OCL is experimenting with antenna for 2-meter fm. Traffic: W8MCR 418, W8PMJ 237, W8DIL 452, W8OQM 150, W88KID 149, W88HGH 133, W88MRL 127, W8PTT 126, W8LTA 116, W8ALS 109, W88JGW 93, W88CJU 88, W88JD 78, W88PAV 83, K8LXA 56, W88KKI 55, W88QZ 55, W88VLR 52, W88CXM 51, W88VWH 49, W88TRK 45, W8LZE 41, W88SD 39, W88FD 38, W88SI 37, W8OE 30, AC8CHT 23, K8LGA 23.

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 Components: 13 Transistors, 10 Diodes, 6 FETS, 4 ICs  
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Sensitivity: 12 db SINAD: .25 Microvolt  
 Selectivity: ±7.5 KHz, @ 6 db or less  
 Squelch Threshold: 0.1 Microvolt  
 Modulation Acceptance: More than 5 KHz  
 Adjacent Channel Rejection: More than 85 db (±30KHz)  
 Intermod response: More than 70 db  
 Image Responses: More than 70 db  
 Spurious Response: More than 70 db  
 Audio Output Power: 4 Watts at less than 15% distortion (5 Watts Max)  
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 Circuit Type: Double conversion, Superheterodyne, Crystal Controlled, 8 Pole Crystal Filter  
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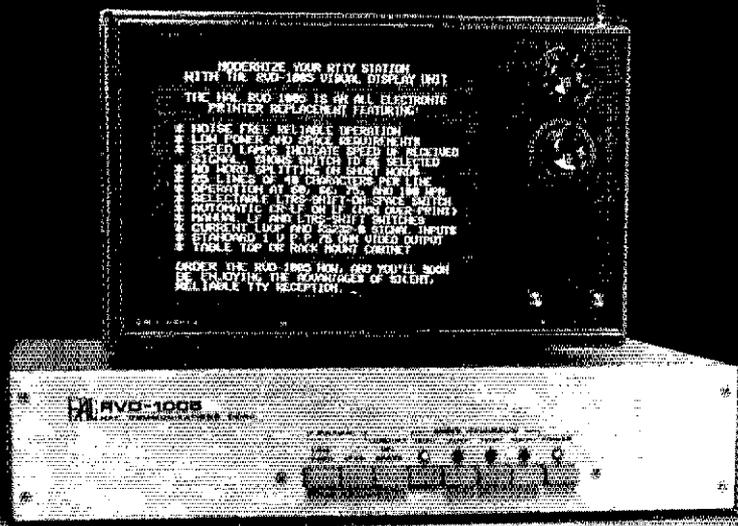
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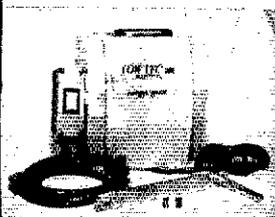
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### HUDSON DIVISION

**EASTERN NEW YORK:** SCM, Gary J. Ferdinand, WA2PJJ — SEC: K2AYG. Asst. SEC: WB2VIJK, RM; WB2IXW, PAM: WB2QEI, RM for RTTY; K2OYG. July net totals CHN (QNI 563, QSP 234), NYPON (QNI 390, QSP 82), NYS (QNI 624, QSP 232), RTN (QNI 65, QTC 23). W2RUF reports that her CW Traffic Training Net, NYSTN, will reactivate in Sept. on 3728, weekdays at 5 PM at Novice speeds. It's a good opportunity to get into a cw net at a very slow speed. Technicians take note! To assist prospective Novices, Novices and Techs., WA2PJJ will run weekly code practice sessions every Tue, evening beginning 8 PM. Speeds of 5, 10, and 15 wpm (higher if requested) will be used. Frequency: 3699 kHz. Get your plans set for the Hudson Division convention, Nov. 13-14. See QST for details. OO report received from K2DW. Similar OO reports are requested from other OOs, assuming continued appointment is desired. WB2GOJ reports that he will (with the help of the Poughkeepsie ARC) run a Novice class in Hyde Park this Fall. WB2RUZ and WA2PJJ also plan to assist. W2YJR worked 28 states QRP in the B.C. contest. WA2PJJ was surprised by QSOs from VR3, FK8, JA, VK, 2L in the contest. W2CJY received his WAS and reports 3-day turnaround from the ARRL. EC WB2FV reports the Glens Falls area AREC provided white water derby communications despite rain, red ants and two feet of poison ivy! Ex-RM, WA2FEI, reports being alive in OH after a permanent move. Congrats to WB2GUE on the new license. ARC, WB2YGR, has a mutual help program to get new Novice graduates on the air. ARRL Affiliated Clubs: are you making plans now for license classes? An experimental FCC program might make you eligible to give and grade novice-level exams to avoid FCC delays. PSHR to: WB2RUZ WA2PJJ WA2RKI WB2VVS and WB2EMU. Traffic: (July) WA2PJJ 319, WB2EMU 161, WA2RKI 97, WB2RUZ 77, WA2UJL 72, WB2VVS 37, W2YJR 35, K2OYG 23, WB2EKM 16, WA2CJY 15, WB2TGL 14, WB2GOJ 10, K2OUA 10, WB2ELA 9, W2DW 2. (June) WB2GOJ 7.

**NEW YORK CITY — LONG ISLAND:** SCM, John H. Smale, WB2CHY — Asst. SCM: Art Malatzky, WB2WJF. SEC: K2HTX, RM: WB2LZN, PAM: WB2PYM. The following are traffic nets in and around the section:

Net	KHz	Time/Day	Manager
NLI*	3630	1900/2200 Dy	WB2LZN
NLI Phone*	3928	1730 Dy	WB2PYM
NLS*	3730	1830 Dy	WB2WRT
Clear House	3925	1100 Dy	WA2DDD
All Svc	3925	1300 Su	W2OE
Mic FARAD	3925	1300 MTWThFS	W2OE
ESS	3590	1800 Dy	K2IIR
NYSTPEN	3925	1800 Dy	WA2RSP

\*Denotes section net, all times are local. I want to personally thank everyone who helped out during Hurricane Belle. The only thing I want to ask of everyone is to please check into your local town AREC Net first. The times and freqs are listed in this column every other month. If you don't see anything for your town, it's probably because there isn't an EC for your town. Why not inquire to see if you qualify to do the job. The requirements are listed in Operating An Amateur Radio Station. Remember, the local EC will tell you what to do, and the Phone Net will try to meet on 3928 kHz. WB2TSF reports the FCC info for is 212 620 3436. W2FZ W2AIM and W2PF attended the Nat. ARRL Convention in Denver. W2FZ won the grand prize (complete Drake station). W2AIM won 1st prize at QCWA breakfast (Millen Meter). The LIMARC Flea Mart was a great success in spite of the rain. K2RIW acquired an AZ-EL mount for his 30 ft dish. K2QVS working on a 432 5b amp, hopes to have it ready by this fall. WB2LZN is looking for more stations to check into NLI and help out with the liaison and handling of traffic, why not try it. WA2YEI reports his "tuna tin 2" works great, and he is now building the "herring aid 5" receiver and July QST. He also has added a model railroad in his shack for times when activity is low. LIMARC also had a very successful clinic Aug. 3rd, lots of people got their rigs back where they should be. WA2YEI now OVs. WA2GMD has retired from school teaching and is moving to a new QTH in CA. CHBIBK had 524QQ at its June meeting. He discussed many of his activities in Kenya. WA2ROD has returned from 3 weeks in OL-Land, he had many 2M QSOs including an eyeball with DK8ON. The Grumman ARC wishes to thank K2KSP W2DVG W2WDD WA25MF and WB2PUE for their public services contribution in providing communications for the Hicksville-American Bicentennial International Soccer Tournament. They spent a total of 28 hours operating on 2m thru WR2ACW. Wantagh ARC had a turnout of 75 prospective novices at their June 18 class. New club officers are WB2EHH pres.; W25JM, vice-pres.; K2PAY, treas.; WA2UJM, rec. secy.; WA2KOC, comm. secy.; Traffic: WB2LZN 492, WA2ECO 244, W2C 136, WA2YKG 65, W2HXT 50, W2GKZ 38, K2GCE 20, K2JFE 9, WA2YEI 9, W2PF 6.

### NORTHERN NEW JERSEY: SCM, Louis J. Amoroso, W2ZZ

Net - Freq.	Time(PM)/Days	Sess.	QNI	QTC
Manager				
NJN - 3695	7:00 Dy	31	390	155
WB2CST				
NJN - 3695	10:00 Dy	31	212	82
WB2CST				
NJSN - 3730	8:15 Dy	29	149	149
WA2WIW				
PHC - 3950	6:00 Dy	31	667	269
WB2VTI				
NJPN - 3950	9:00 AM Su	4	43	2
WB2VTT				

SEC: WB2PBO. PAMs: WA2OPY (VHF) and WB2VTT. RMs: WA2WIW and WB2CST. New appointment, W2NR as OO. OO reports from K2JFJ AB2CST and AB2TFH. Congratulations to WB2CST on again making BPE. Congratulations to WA2DQA, WA2WIW WB2CST and AB2ASD on making PSHR. We wish to welcome into Ham radio the following in the Edison area — WN2EVF WN2EVH and WN2EVJ. Good luck and lets hear from all of you. Congrats to K2LOS on passing the General and to WA2T2M on the passing the Advanced. Updates on Oscar DXCC totals for some of the NJDXA group are W2BXA at 73.

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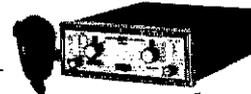
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## GTX-10-S

2-meter FM, 10 channels, 10 watts (Xtals not included)



**\$149<sup>95</sup>**

## GTX-2

2-meter FM, 10 channels, 30 watts with pushbutton frequency selector (Incl. 146.94 MHz)



**\$189<sup>95</sup>**

## GTX-1

2-meter FM, 6-channel, 3.5 watts Hand-Held

**\$249<sup>95</sup>**

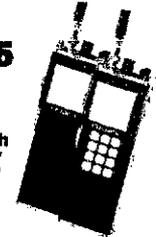
(Bat. not incl.)

## GTX-1T

Same as GTX-1, plus Factory Installed Tone Encoder

**Operate Auto Patch \$299<sup>95</sup>**

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Ringo Ranger ARX-2 6 db 2-M Base Antenna @ \$29.95 \$ \_\_\_\_\_

Lambda/4 2-M and 6-M Trunk Antenna @ \$29.95 \$ \_\_\_\_\_

TE-I Tone Encoder Pad for plug-in installation on most amateur transceivers @ \$59.95 \$ \_\_\_\_\_

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and the following standard crystals @ \$4.50 each \$ \_\_\_\_\_  
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### ACCESSORIES FOR GTX-1 and GTX-1T

PSI-18 Optional Nicad battery pack \$29.95 \$ \_\_\_\_\_  
 PS-2 Charger for GTX-1(T) battery pack \$39.95 \$ \_\_\_\_\_  
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 TE-III Tone Encoder (for use with GTX-1) \$49.95 \$ \_\_\_\_\_

Add \$4 per Radio for Shipping, Handling, and Crystal Netting.

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Amateur Net

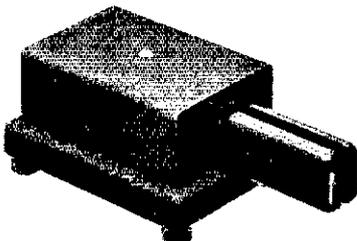


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W2LV 65, K2QBW 54 and W2GZZ 53. WA2GEZ reports his DXCC total now at 175. W2ODV group rovd ARRL affiliation. He NJN/NJPN picnic was its usual big success. The NJDX affair. The following groups report they are holding Fall and Winter Amateur Radio courses: The Old Barney ARC conducting Novice classes. WA2PCF has details. WA2DIW will conduct Novice classes at the Wayne Adult School beginning Sept. 29 for 12 weeks. The Bergen ARC also planning classes. K2SML has the details. The Nutley ARC Society will conduct a weekly Novice class beginning Oct. 4 at 7 PM in the Red Cross Building at 169 Chestnut St. WB2PBO reports that the Cranford ARS will conduct Theory classes on the 2nd and 4th Thur. of each month beginning Sept. 9. Please pass the above info to anyone interested in getting a license. If you live in near these groups I am sure they would welcome all the help they can get. WR2AHV group report their repeater doing FB job on 147.90/30. Finally to all clubs. Please keep me informed of the classes you plan to conduct and give me a couple of months notice if you can. Traffic: (July) AB2ST 526, AB2ASD 255, AB2VTI 149, WA2DRA 127, W2RJC 2, WB2RJK 89, WA2IHW 75, W2CU 73, WA2PCF 67, W2SWE 53, WA2WXM 51, WB2CLW/2 50, WB2HSG 43, WA2SLF 38, WA2RMZ 30, WA2DIW 27, W2ZZ 23, WA2YWK 20, WA2CQJ 17, WA2DLZ 14, W2WHB 13, W2NEMQ 12, W2ZEP 6, W2WQ 5, AA2CCF 7, WA2UOQ/2 7, W2ODV 6, WA2FLU 2 (June) WB2HSG 42, WB2HSD 24, K2ZFI 21, W2WHB 4, WA2QHN 1. (May) WB2RKK 138.

**MIDWEST DIVISION**

IOWA: SCM, Max R. Otto, W0LFF - SEC: W0IYW, PAM/VHF: K0LKH, PAM/HF: W0BAVW. The Davenport ARC assisted a 100 mile bike ride using W0SSA, WA0EWF, WA0GXC, WB0FBP, W0RKE, W0RNE, WA0WAV, W0GNS, W0GCS, K0MST, W0GQC and WA0VTR. W0BW has a CW-DXCC certificate. W0UTD is new Ft. Dodge Tech. OBS W0JAQ is back on the air with Bulletins M-W-F. W0BOWV moved to AR WB0HG to IL and W0BJYF to CA. WA0DXZ will soon have K2 of 2. WB2RJK 89, WA2IHW 75, K0UJJ and AB0RWV have Bicentennial WAS - So. Land Repeater Assn. along with Ringgold Wireless Assn. (W0UJF) have become a duly affiliated society. New appointments: K0IRI OO-V, K0DBW OBS, K0UJJ OVS and W0PKH OO-1/11. Welcome to W0RTECH W0RTEJ W0RTEZ and W0RTEUF all in Humboldt. Yours truly, go out time at 3900 club picnic at Spencer. W0ASM and K0HGN co-NCS a net on .94/.94 Tue. 2330Z with 40 on the roll. W0TGG gave some PR on WMT-TV showing his action during CO disaster. WA0QNZ sporting new Kenwood TS-820. Hope to see you at Cedar Rapids Hamfest on Oct. 3rd. Net - Freq. Time(Z)/Days Sess. QNI QTC Manager Iowa 75M - 3970 1730 M-S 27 1694 80 WA0VZH Iowa 75M - 3970 2300 M-S 27 1063 76 WA0ACX (June) 26 1015 44 Tall Corn - 3560 2330 54 330 103 K0A2 1 0300 DV IA Novice - 3710 0300 Dy 27 27 2 AB0RWV (June) Traffic: (July) WA0 424, K0EVH 143, W0YLS 112, K0AZJ 101, W0LJW 29, W0BAVW 21, W0MOQ 11, W0LFF 10, W0BW 5. (June) W0BQJ 9.

KANSAS: SCM, Robert M. Summers, K0BXF - SEC: W0R. RM: K0MRI, W0SI. WA0SEV, W0RCL, VHF-PAM: WA0EDA, W0HI is now TV Broadcst Engr., at KAKE-TV, Wichita. The CKARC Group set up an Amateur Radio Booth at the Tri-Rivers Fair for 3 days. OVS W0HGG reporting good VHF conditions during July. The Mobile Amateur Radio Awards Club, Inc. 58 going strong, always new activity. Got the slow down in Ham activity. The reporting is slow this month. Net activity July '76 QKS, QNI 408, QTC 189; KWN, QNI 479, QTC 174. ECs: Remember monthly reports now go to W0KLL. Newest EC appointments, K0QLC Zone 4, WA0JX Zone 14, W0PSN Zone 10A, EC reports for W0PSN 10A QNI 56, QTC 1 and Zone 7 WA0GSG QNI 23, QTC 2, Zone 6B W0KC QNI 40, QTC 0. Zone 13 QNI 2, QTC 0. Late report for June W0HBM made PSIR with 61 points and traffic total of 129. Report stayed in the mail to Ohio and back. Traffic: W0R 329, W0HI 214, W0QYH 128, W0HCH 103, K0EPC 93, W0MLKA 83, W0RNI 63, W0RNE 60, K0BFX 58, WA0MLE 56, K0MRI 53, W0PS 35, WA0BB 32, W0GSG 29, W0GLUN 16, W0FCL 14, WA0OWH 12, W0FDJ 11, W0ERQ 5, W0KLL 1.

MISSOURI: SCM, L. G. Wilson, K0RWL - Asst. SCM: Joe Flowers, W0OTF. SEC: W0DBW. Congratulations to W0PBJ on passing his Advance license; W0RDX, W0SRO and W0RUT on passing their General and to W0GNS, W0RTEJ, K0R, K0L, TIM, TIN, TIO, TQR, TVA, TVC, TD, TVE, TVF, TVG, TVH, TVI, TVJ, TVK, TVZ, UHB, UHC, UHD, UHG, UHH. The Ozark ARS will be putting on a public demonstration of ham radio at the 25th annual Crane Broiler Festival, an event attended by up to 10,000 people. Congratulations to new hams W0TDR, W0DYI and W0IYV who are both active with W0RTEJ and W0RTEJ both took part in the Bicentennial celebration and made several contacts.

Net	QNI	QTC	Net	QNI	QTC
Tri-Lake	14	1	MSN	160	113
MON	191	107	MON 2	129	77
SEN	84	10	MOSSB	971	170
PHD	36	10	Hambutchers	292	79

SI. AREC 67 3  
The St. Louis ARC will sponsor the 13th annual MO QSO Party, Nov. 13-14. Check QST for rules or K0LIR, St. Louis ARC, information via W0AUB. K0LIM reports working several NC and TX stations on two meters. WA0TU reports on six stations from the East Coast coming through like gang-busters. Ozark ARC is now a charter member club of ARRL. K0FZX recovering nicely from open heart surgery; however, hamming time is limited. MOKAN Council of Clubs had W0ICP, Lew McCoy as guest speaker recently. Very fine turnout for the excellent Washington Hamfest. Due to W0GNS and special school I was unable to receive Field Day reports in time for the last edition from the following: W0LRX, WA0UGU, W0CZT, W0QX and W0ETY. Traffic: W0HH 329.

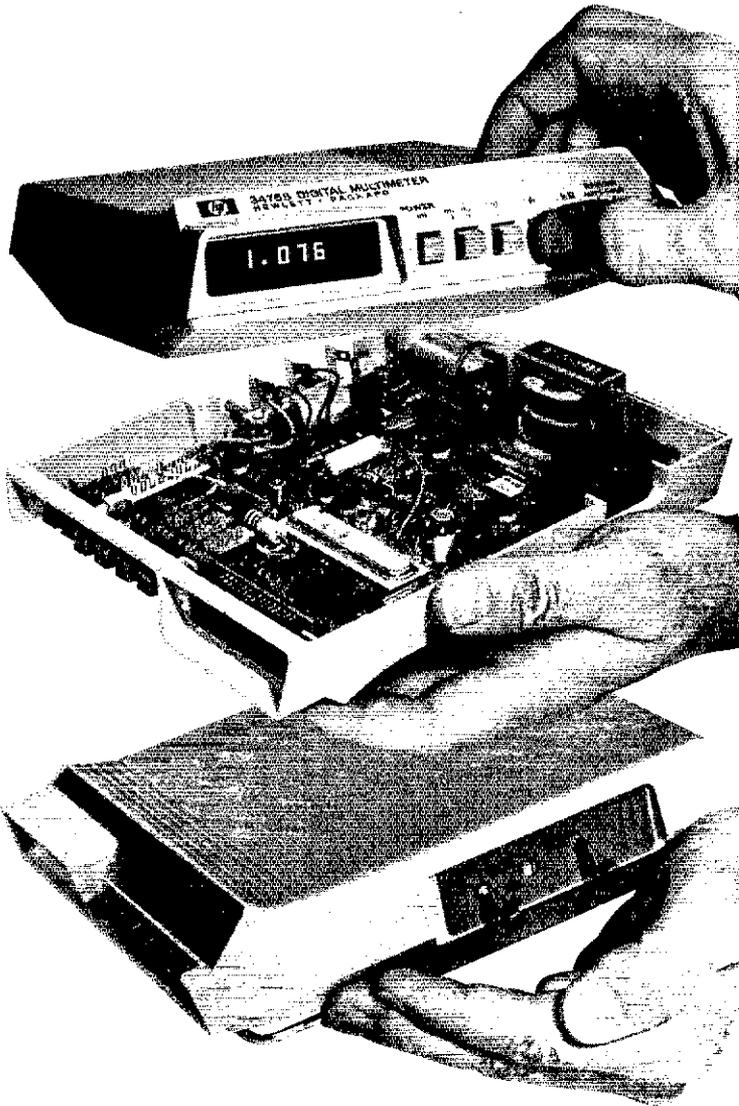
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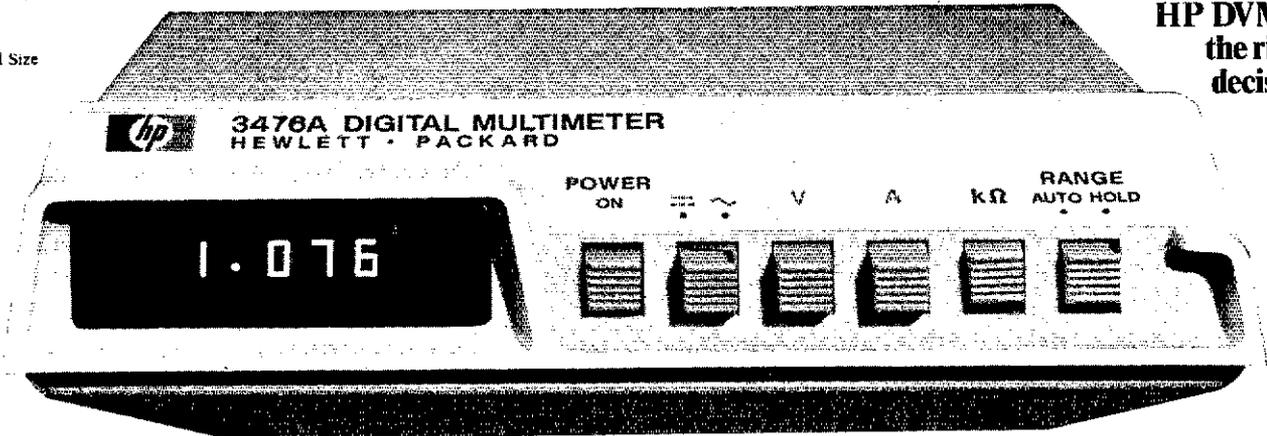
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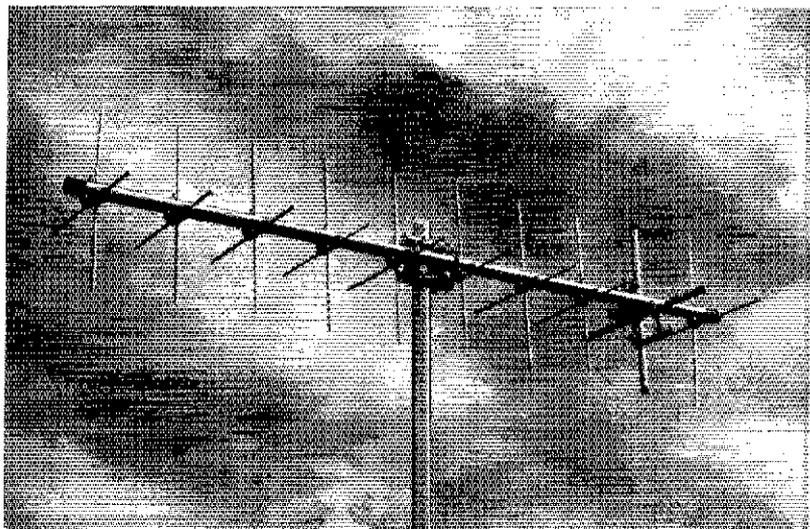
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A147-20T

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# CQ OSCAR ...

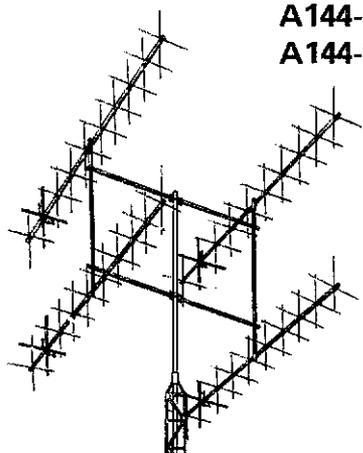
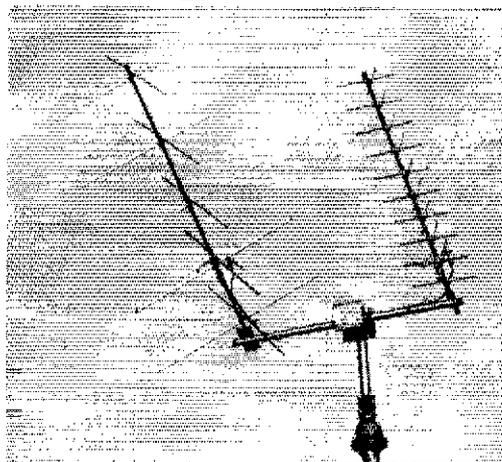
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### SPECIFICATIONS

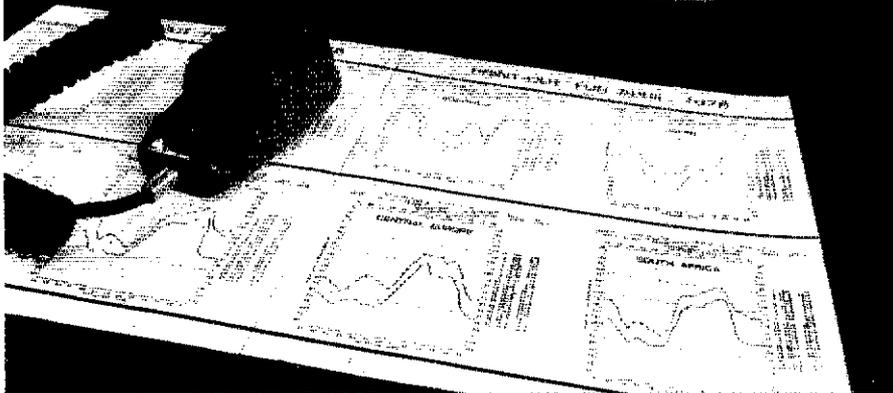
Model	A147-20T	A144-10T	A144-20T	A432-20T
Center Freq. (MHz)	144.5/146.5	145.9	145.9	432
No. Elements	10/10	10	20	20
Weight (lbs.)	6	3.5	6	3.5
Wind Surf. Area (ft. <sup>2</sup> )	1.42	.74	1.42	.37
Mounting	Center	Rear	Center	Rear
Dimensions (Inches)	40x40x140	40x40x70	40x40x140	14x14x57

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Co. SCMs WA & OR together displayed ARRL materials and W7HLF gave slide presentations of some FD activity. Swap shop also active. The OEN picnic, K. Falls turned out 132. W7AXX, W7DHz visited W. EG Medford, OR. 3701. OXO, 438. QNI, 161. QTC 31 sess. WA7UJO WA7QFK working on a tower. OSN & BSN getting more check-ins. Traffic: (July) W7VSE 267, K7NTS 150, K7IWD 120, K7OUF 115, W7IWN 108, WA7UJO 70, WA7TXV 56, K7WWR 41, W7HLF 39, WA7YEU 25, W7LT 19, WA7ZAP 3. (June) WA7YEU 20.

WASHINGTON: SCM, Mary E. Lewis, W7QGP — K7GWE 450 MHz RTTY repeater will be operational as soon as license arrives this fall with standard 170 Hz aisk shift. W7MCU presented a talk and demonstration on Oscar at Tacoma Ham Fair. 6-meter picnic was held at Camano Island State Park Aug. 15. Bremerton repeater was divested from club and separate association was formed to be incorporated later. New ARRL affiliated clubs are Clark County ARC Inc. and Spokane Radio Amateur Inc. Congratulations. W7CKZ reports Amateur Radio Project, WA granted approval by Bicentennial Commission were the Explorer Ship and broadcast made from top of Mount Constitution to Capitol cities of other 49 states and DC. Without funds it looks like the Explorer Sailing Vessel will stay in dry dock on the east coast. Net and station activities report next month. W7QGP attended 3 major state Hamfest at Eugene, OR; W1MU West Yellowstone, ID and National in Denver promoting ARRL NW Division Convention July 1977. See U in Seattle 1977.

## PACIFIC DIVISION

EAST BAY: SCM, Charles R. Breeding, K6UWR — Asst. SCM: W6ZF, VE2A(Q)/W6, SEC: W6IHH. Asst. SEC: W6DS1. It is with great sadness that I report WA6DKW has become a Silent Key. At the July meeting of the East Bay RCWA6LLX gave a fine talk on the repeater operation of WR6ACS and WR6ACR. I would like once again to remind all that there is a new OO appointment available for those operating in the VHF bands. Drop a line to your SCM for information. W6IHH attended a planning meeting for the emergency exercise, BASE/76, JR1TSH and JH3VHU will be living in Hayward for the next nine months while attending Calif. State Univ. at Hayward. W6JIK a new member of the Mission Trail Net. Welcome to W6ZK (K6) in the Main Islands. GCRC lists the following in the Section: WA6MFO W6M6MT W6M6FE WA6LVZ W6M6BG W6M6MH WA6LQF W6M6HB WA6MKW W6BLVY and W6NLYC. W6TI operated by W6RG transmits NCDXC Bulletins on 14002 at 0200Z Mon. This is the same as 8 PM PST or 6 PM PST on Sun. Traffic: (July) K6JZP 475, K6HW 407, W6TYM 382, W6BJK 119, WA6PI 92, W6BUZX 35, W6ZKUN/6 15, K6PMG 14, WA6CAZ 12, W66VEW 6. (June) WA6PI 115.

PACIFIC: SCM, Pat Corrigan, KH6GQW — RM: KH6JAC. Congrats to KH6BWT FNBFDX on Life Membership. Many KH6s active in Bicentennial Contest. EARC has new repeater on .37/97. Our best wishes to KH6IQU in his new QTH in W6. Remember EARC's transmission each Mon. at 8 P.M. on State rpt system. K6SUF 2 visited from Guam in Aug. WA6F. This year's Powder Puff Derby with W6GRAN, KH6IFS program on Am Rpt at 4:30. 19m has been open nicely. KH6IU working Europe with his vertical. KX6LP 16, K6H6LU in new residence on the Valley Isle. KH6HOU active from the Big Island. K6VDV visiting family. K411 had short visit in KH6 on his way to F.E. and Down Under and attended Slidebar Club dinner with W6GRAN using Oscar again on upswing. Welcome back to KH6HGP, KH6HGG banged up his mobile. Several VHF Engr. synthesizers showing up in KH6. Congrats once again to KH6CZ for fine FMT score. KH6HGG now staffer at ARRL. Our congrats to K1ZND and W1CUT on promotions. KH6IPY active in CO flood traffic. Traffic: KH6IQU 172, KH6GGQW 15.

SACRAMENTO VALLEY: SCM, Norman Wilson, AA6JVD — SEC: AC6SMU. New officers for the Mt. Vaca Radio Club are: WA6ESA, pres.; WA6APX, vice-pres.; WA6CNE, secy.; K6FO, treas.; W6GO WA6SBY WB6TXC and K6MVZ/6, dir. W6TEE will chair the new Sacramento Area Council of Radio Clubs. This year's Powder Puff Derby with W6GRAN in charge, was a great success with some FB traffic totals turned in. WA6ORW made BPL and K6QIF descended below 2 meters. PA6MTE/W6 was a visitor to Sacramento with Kenwood TR 2200G in hand. Jan made 40 Two meter QSOs thanks to crystals loaned by K6AHV. QSL via AA6JVD. W6BKOE is now active on 40-meter ssb. In the club contest, W6BLL recovering from a serious heart attack with the help of a hopefully RF shielded pace maker. The RAMS have their new solid state repeater on the air. Traffic: WA6ORW 300, W6DEF 81, K6RPN 10, W6RSP 7.

SAN FRANCISCO: SCM, Rusty Epps, W6OAT — W6OAT is back East somewhere, so this column has been assembled by W6GLF. WA6ICB hitting 2M repeaters 300 miles away from Eureka; Jim reports 1/2 mile WNW from classes at College of Marin. WA6AIV adds that FWRA received plaque from March of Dimes for Bike-a-Thon aid. W6GGR back from TG-Land after yeoman service with Red Cross there. W6RQ Radio Quilicks: K6IPM/6 active in SF; W6BLLA advanced; W6SACI has 146 and 450 repeaters interlock. W6FVX erecting tribander and threatening to work the world — if it doesn't work him first. K2GMV/6 has new TS820 transceiver; W6M6BB (JA3USA) operates RTTY by dictating to XYL, who punches out text on keyboard. W6GUPV says D1N6 condx have been bad on 40M. No. Calif. Contest Club gear up for big effort in All-Asian DX Contest. WA6ST's completing 432 amp. WR6AQQ new in Ukiah. Hey, good buddies, send in some news or Rusty may never come back; 10-4? Traffic: W6RNL 164, W6NL 136, K6FP 112, W6GUPV 12.

SAN JOAQUIN VALLEY: SCM, Ralph Saroyan, W6JPU — Asst. SCM: Charles P. McConnell, W6DPD. K6RAU conducting code class on 3780 kHz, A2 A3 LSB at 0630-0700 Pacific local time. Pass the word to the word to the code to the team that W6RAU has a 20-ft. dish for Moon Echo work, and is getting good echoes. WA6JDB received his private pilot's license, and will be Air/mobile. W6SMS received WAS No. 139 for 6 meters. W6DPD received WAS No. 142 for 6 meters. W6DPD worked 5 W5 stations on 2 meters 1m and ssb. WA6JBF W6JCN WA6BUH W6VEP and K6JGY all helped with communications

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FRONT PANEL SELECTION of key operating functions. No need to manually connect and disconnect the unit from the line for bypass applications.

FRONT PANEL SELECTION of up to three different antennas, or two antennas and a dummy load. The two may be selected in the matched or bypassed mode in each circuit with the flip of a switch.

FRONT PANEL SELECTION of forward or reflected rf power with a built-in precision wattmeter — not just a relative indicator.

This coax to coax 2kW tuner will tame VSWR up to 5:1 at any phase angle. If your 75 meter antenna is flat on ssb, but has high VSWR on cw, this could be just the answer.

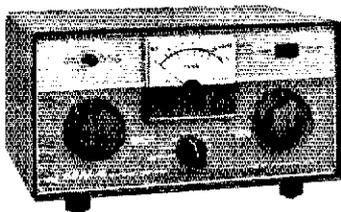
Excellent for beams that exhibit a high VSWR on the opposite end of the band from where you set the elements.

The MN-2000 provides an additional 25 to 35 dB second harmonic attenuation which can help reduce TVI.

Covers 80-10 meter ham bands. Considering the built-in coax antenna switch, by-pass switch and rf wattmeter/VSWR bridge, the MN-2000 is a real value at \$220.00.



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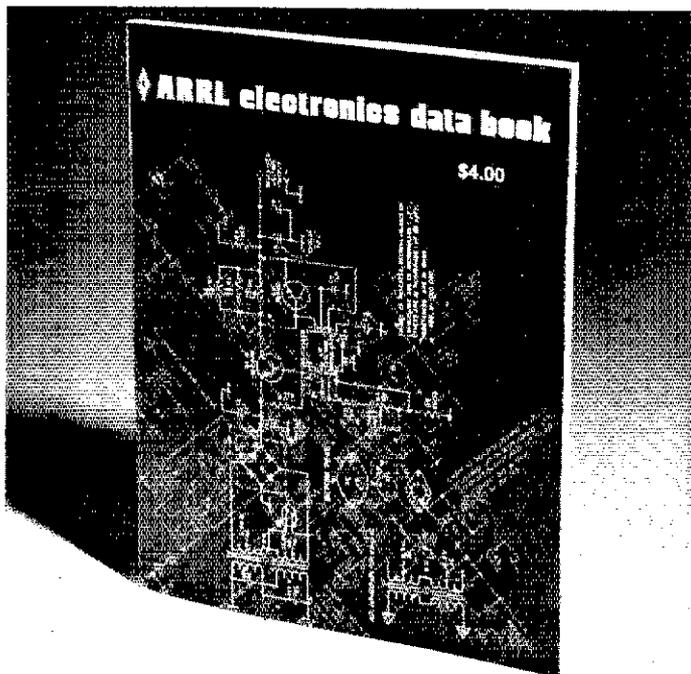


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in the 1976 Powder Puff Derby. W6NTQ a new Novice. K6OGX and W6BNWP putting up new 2-meter repeater. W6NEI on 2 meters fm. W6KOC has an FT221. K6RGZ and W6TTP conducting code and theory classes in Hanford. The Central CA chapter of the QCWA was organized in Delano with W6QV pres. and W6YO as secy. Traffic: W6RXI 76, W6JDB 7.

**SANTA CLARA VALLEY:** SCM, Jim Maxwell, K6AQ — W6RFF made PSHR. Fantastic 2M opening in late July, with KH6GRU working W6BWB K6GSS and others on the 23rd. The band opened again weakly on the 25th. Don't forget the popular West Valley ARA auction scheduled for Oct. 20. The WVARA Bicentennial station, operated over July 3-4 in the San Jose Civic Auditorium, was a roaring success, 16 pieces of emergency traffic were handled. Participants included K6LJU W6BHWQ W6BAHC W6NHD W6BZD W6JAB W6WEQ W6NEQS W6BZPW and W6ESF. WASHAD is giving tutoring through Prospective Novices at the SCV Water District. W6ESF now proud possessor of an Extra Class ticket, cranked up his tuna tin rig and snagged a VE7! Congrats also to K6QIC for his new Extra Class ticket, to new Novice W6OKA, and to W6JJK and W6HJI, both waiting for their General papers. NCN check-ins are down for July according to Net Log. W6RFF wishes to ex-NCNER and ex-K6WT, now K7EQ up in his new WAQTH. SCCARA Prexy W6ZM reports membership is growing by leaps and bounds. 147 members now carried on the books. The annual SCCARA Christmas party now timed up for Dec. 9. W6BKY QRV after several years of inactivity with son W6GLD showing the way. A Bicentennial WAS is in the works for BKV. Communications for the annual July 4th long distance run in Mountain View was provided by W6LIJ W6LSN W6ASH K6VT K6SEM and W6OCP all of the Foothills ARS. Our collective hats should be off for the FARS gang, the WVARA gang reported above, and others for their very helpful Public Service activities. Kudos to PAARA member W6HDM, who has had two technical books published this year. W6DEF has not slowed down any in his new Placer County QTH. He's organizing a Novice class, and also managed to handle 57 pcs of traffic for the recent Powder Puff Derby. Traffic: (July) W6BY 352, W6RFF 129, W6NW 61, W6AUC 59, W6ESF 19, W6KZJ 17, W6HAD 9, K6AQ 4. (June) W6BCH 35, W6HAD 17.

### ROANOKE DIVISION

**NORTH CAROLINA:** SCM, Chuck Brydges, W4WXZ — SEC: W4EHF. PAM: W4OFC. VHF PAM: K4GHR. RM: K4NC. EC of the Month is W4FXM, Fayetteville, who led his Cumberland County troops to big totals in the SE1. The Carolinas Novice Net (CNN) had QNI 215, QTC 74, so if you are Novice or Tech try 3718 at 5:30 PM local daily. K4QDM is new Asst. Mgr. of Central NC 11c Net which is daily on 13/73 Salisbury Rept. at 1:30 PM local. W49NEW/4 visited ARRL Atlantic Div Convention and ARRL Roanoke Div Convention and logged 2300 miles of VHF/HF mobile operation. Also at Norfolk for the Roanoke Division Conv were Pres. Dannels, W2TUK, 1st VP Clark W4KFC, Dir. Wicker W4ACY, Vice Dir Morris W8JM and all SCMs plus many others. Your SCM attended Cary ARC meeting K4ASG received the Certificate of Merit for his fine efforts during the Guatemalan earthquake, W4PED (N. Augusta SC) received the Roanoke Division Amateur of the Year Award and Charlie has done some fine work over the years, congrats! Iredell Co. is organizing with a very informative newsletter sent to all amateurs in the county and a repeater soon to be with K4PDL and W4LW spearheading. W4PSL passed General Class after 3-week stint as Novice. Raleigh ARS continues to roar along and was one of forty clubs picked in the Nation to experiment with training program licensing classes under ARRL materials. Mecklenburg ARS had big FD for club call W4FB/4 also ran up Top Division score in VHF QSO Party. Newly affiliated clubs in NC are Cary ARC, Alamance Repeater Assn., Catawby Valley Tech, Inst. ARC, Surry Community College ARC and Forsyth ARC. Traffic: (July) K4FTB 107, K4MC 99, W4OFC 81, W4MXG 80, W4KSO/4 75, W4FNM 72, W4WXZ 71, W4OCT 42, W49NEW/4 30, W4ACBB 23, W4SRD 22, W4AHT 16, W4QJL 16, W4VOX 7, W4EHF 6, K4QDM 4, W4TCR/4 4, K4ZKQ 4, W4PSL 3, W4CES 2, K4TTN 2. (June) W4WII 11, W4FFX 5.

**SOUTH CAROLINA:** SCM, Tom Lufkin, W4DAX — Asst. SCM: Gary M. Barnette, W4MWP. SEC: W4TNS. PAM: W4MTK. RM: W4OBZ. Appointee of the month SEC W4TNS who has been very active organizing Emerg. Communications in S.C. If you can help, contact Bill. Congrats to W4PED on being awarded the Roanoke Division Public Service Award at the Division Convention in Norfolk. Computer and ARC of Belton-Hones Path HS is now affiliated club in state. Enjoyed meeting everyone at Charlestowne Hamfest, W4EML and K4OKD big winners. SCM attended meeting of Orangeburg ARC. All appointees are reminded that one requirement of their appointment is a monthly report to SCM (address on Page 8 QST) Traffic Nets: (Net. Freq. QN. CTC) SCSSBN, 3.915 MHz, 7:00 PM, 958, 93. Blue Ridge 2 Mtr, 01/61, 8:30 PM, 913, 37. CNN 3.718 MHz, 5:30 PM, 215, 74. CNE 3.573 MHz, 7:00 PM, 269, 191. CNL, 3.573 MHz, 10 PM, 205, 77. PKX 3.900 MHz, 6:50 PM, 13. PKX 3.900 MHz, 7:10 PM, 187, 11. Traffic: (July) W4ARJ, W4BDB 315, W4APG 103, W4NTO 89, K4FRX 80, W4ADZ 39, W4JUK 33, W4ANK 32, W4MTK 26, W4ECJ 24, W4UDK 16, K4ZU 10, W4NBK 9, W6TZW 5, W4HNQ 4, W4BDG 2. (June) W4CAK 56.

**VIRGINIA:** SCM, Robert L. Follmar, W4QDY — SEC: W4DTG. PAM: (V5BN) K4VWK. Asst. PAM: W4YJU. RM: K4JAF. V5BN W4EPJ 4RN-W4SHJ. Glad to announce the following new appointments: PAMs: K4VWK; Asst. PAM: W4AYJU. OO W4OXD. OBS W4BRC. EC VA Bch. K4BKK ORS/OPS. On July 9 a tanker truck carrying 8k gallons of gasoline was hit by a train in Tazewell VA. Three persons dead & 3 injured in the explosion which turned the area into a no-man's-land. W4EPJ was at the scene when the accident occurred and initiated the setting up an emergency net for Tazewell. VFN was called into session and many phone calls and tlc handled. FB gang! W4EPJ VSN Mgr. report 71 stns checked into the net during last several months! He needs NCS. Volunteers anyone? CN's W4ANTV working on a new parabolic reflector and W4ANTV rpt's July FB for 6-mtr activity. OO rpt's: W4HU nabbing CB out-of-banders & malfunctioning ham transmitters;

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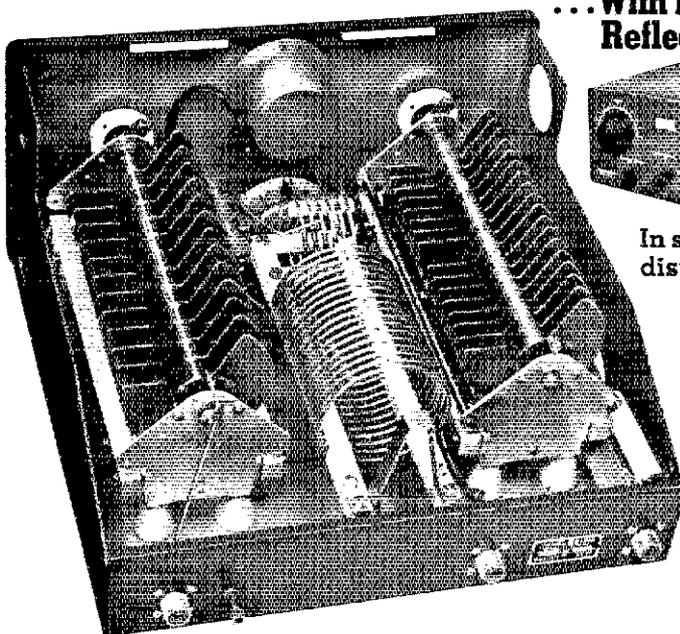
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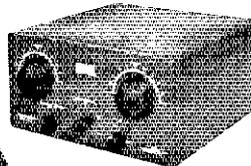
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WB4KCL has Kenwood TS520 with digital readout and WA4PRP snags intruders on the 40-mtr band. The SCM presented certificates to 24 Novices completing 66 hours of instruction under WA4BLUE, kudos to Dick KAMSQ publishing "The Millimeter" for central V/A. Snowbirds, HARRIS, RF, FB paper and we say so long to WA4MMP who transfers to OR. We had a good turnout and time at the Roanoke Div. Convention in Norfolk (SCOPE). FB programs, lots of space (indoors) & aircond. Thanks to the convention planning gang for FB job. Much credit to Vernon Fix W4THN chmn. Your SCM met & talked with many nice, new faces. Special thanks to Dennis W4JF, 1st V.P. Vic Clark W4KFC; Dir. Phil Wicker W4QCY; Ellen White W4YL & Lew McCoy W4ICP for their big assist with the ARRL booth. All publications were sold out! K4MLC has new Swan 600 Custom to go with his 600T. WB4EKY enjoyed all site session in Bicentennial Cele. K4GR checked out in aircraft so could be mobile airborne. HI. W4EXI & W4RCH silent keys. W4A4LK waiting for cooler wx to work on antennas. WB4DTK got General after 9 months Novice. W4A4JF bldg new HW-8. W4ZM put on his "Spark" demo at NFK Conv. VY interesting to all. W4LGM passed Extra, moving to Macon, GA Sept. 1. V.P. W4KFC attended W. Va. State National Conv. Atlantic & Roanoke Div. Conv. & ARRL Board meeting! W4TMN sez he was lucky enough to be NCS of the VFN on July 4, '76 & that he won't be able to do that again. HI. W4JUJ spent 3 wks in Finland, Sweden, Norway & Denmark. WB4OXD installed a 20M yagi on 100 ft. tower & 15M and 10M Yagis on a 50-ft. tower. FB. Traffic: (July) WA4EJ 2, K4NKX 1, W4JUN 1, W4MLC 156, WA2ICU/4 114, WB4EKY 96, K4GR 58, W4LXB 58, W4QDY 54, W4SUS 46, WB4ZNB 46, W4SHJ 42, W4A4LK 41, WB4FLT 40, K4JM 33, WB4DTG 32, WB4DTK 25, WB4DQZ 22, K4VVK 21, W44YIU 21, WB4FD 19, W4A4JF 16, W4YZC 15, W4MK 9, W4ZM 8, K4KA 7, W4LGM 5, K4CGY 4, W4KFC 3, W4GEQ 2, W4TMN 2, W4DM 1, (June) WB4FD 10, K4VVK 10, W4MK 6, K4CGY 4, W4A4WQ 4, W4JUJ 3, W4GEQ 2, (May) W4ZDN 67, K9PIV/4 28.

WEST VIRGINIA: SCM, K. C. Anderson, W8DUV - SEC: W8NDY, PAM: W8BDQX, RM: W8HZA, Net Mgrs. Phone W8BDQX, CW W8BII, Novice W8TDA. W8KJC completed auto-patch & now working on rig for 10-meter cw. W4ARA club (Fairmount) held transmitter hunt for 10m. W4JUN accepted. Asst. SCM. Regret to report W8ZJS of So. Charleston a Silent Key. W8DUV and W8DUW took week's vacation in order to attend Roanoke Division Convention in Norfolk, Va. We found WV well represented at the convention. W8BIAH/W8JMJ, W8WCK/W8BNDY, W8BMY and 11 others made 556 messages with 61 points. WVN handled 46 messages with 125 check-ins. Traffic: W8BII 53, W8HZA 44, W8FZP 6, W8DUV 3, W8JM 2, W8P0S 2, W8KJC 1.

### ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Clyde O. Penney, W8HLC - SEC: K8FLQ, RM: W8BICK. PAMS: K8CNUV W8BYGQ. Congratulations to W8BMTA who is the newly appointed NCS for Colorado on Wed. evenings. At the National Convention here in Denver, ARS N8BRL reports 536 QSOs on 10 meters, covering 35 states and 5 Canadian provinces. Total membership of the CO 10-X chapter now stands at 454, which is made up of 93 locals & 361 out-of-state. Congratulations to W8PLV who recently passed his Extra Class exam. A hearty "welcome back" to K8SPR who has been off the air for a while confined to the hospital. Congratulations to WN8TWA & W8BIMCL who recently passed exams for Novice & Tech licenses respectively. W8BEMD is enjoying his new Wilson HT. NFK Tfc. for July: Columbine QNI 1011, QTC 87, informals 277, time 1328 min., CWN QNI 283, QTC 357, 31 sessions, time 1371 min.; Hi-Noon QNI 728, QTC 22, informals 167, time 1145 min. Late Net Tfc. June: Columbine QNI 1533, QTC 66, informals 336, 1647 min. Traffic: (July) W8PYW 2183, W8BYG 64, W8MTA 54, W8WCK 129, W8HXB 125, W8BTAQ 86, W8ACNA 73, W8BMRU 71, K8WZN 64, K8TIV 56, W8BBL 53, W8EJD 511, K8RTO 45, W8BHA 43, W8RE 37, W8MYB 32, W8YCD 28, W8CXW 26, W8VGG 25, K8OTU 24, W8ATMA 20, W8DGN 16, W8BIZO 16, W8BIMCL 16, W8BYED 9, W8VYNG 6, W8CWP 5, K8CNUV 2, W8BIM 2, W8HLC 2, W8HLS 2, W8HRS/0 2, K8SPR 2, (June) W8FLQ 10, W8BIZO 8, W8OSU 3.

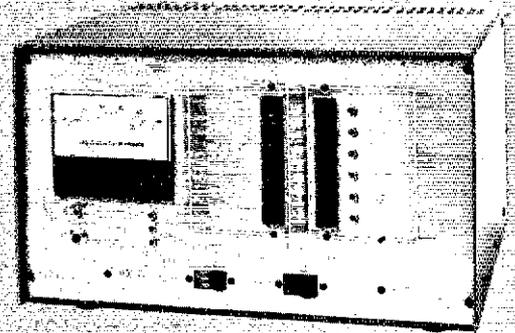
NEW MEXICO: SCM, Edward Hart, Jr., W5RE - Asst. SCM: Joe E. Knight, W5PLR, SE: W5ALR, RM: K5KPS W5VDH. PAMS: W5PNY W5DMG. Promoted from ORS 11 to ORS, W5SOLA, formerly W5SOLA. He and W5VDH, a new RM, will run a new slow speed net to meet on 3735 kHz every evening at 8:30 PM local time starting Oct. 1, 1976. The new will be called at 10 West and will meet at the speed of the stations reporting in. W5JOV earned a BPE. W5MIV has received his WAS '76 certificate. Southwest net (SWN) meets daily at 7:15 on 3685 kHz and this month reports 224 stns reporting for a tfc total of 219. K5KPS sez chdx are sorry, but that is not a bad report. New Mexico Road Runner Net (NMRRN) meets daily at working on 3940 kHz reports 83 stns in the net and 62 tfc. Traffic: W5JOV 589, W5LH 282, W5SKSS 180, W5ENI 141, K5KPS 138, W5RE 94, W5YTX 80, W5VDH 49, W5DMG 29, W5MIV 9, W5YQ 4.

UTAH: SCM, Ervin Greene, W7EU - Thanks to WA7ZBO and help, one of the most successful WIMU Hamfests was held at Macks Inn. W8SIN and W7PGY along with SCM from WA7GQP were present and conducted a very interesting forum. Facilities were available for all who wished to participate from Mini-computer demos to transmitter hunts including autostart RTTY and SSTV. MT will be in charge next year and it promises to be even bigger and better. Congrats to WA7VNG and K4L for new boy of the month. W7OCC awarded the special Bicentennial Armed Forces Day Certificate for cw copy. Several UT hams enjoyed the National Convention in Denver including W7BE who took extra time to site see enroute. UARC annual steak fry was well attended. WA7LBQ a recent visitor to WA7MEL. Thanks to W7UTM for working on 3940 kHz reports 83 stns in the net and 62 tfc. Traffic: K4HLR 176, W7MEL 83, W7ZIC 83, W7HLS 76, W7OCC 17, W7BE 12, W7EU 11, W7UTM 6, WA7VNG 4.

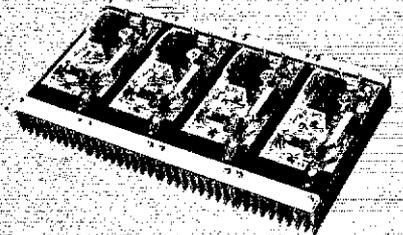
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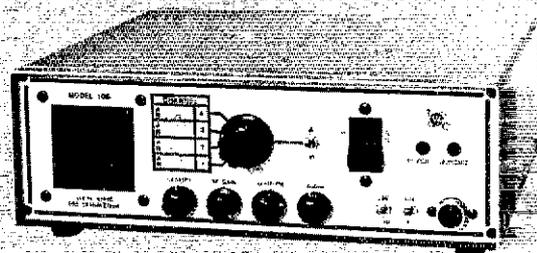
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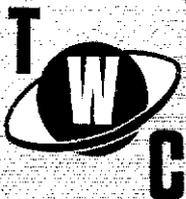
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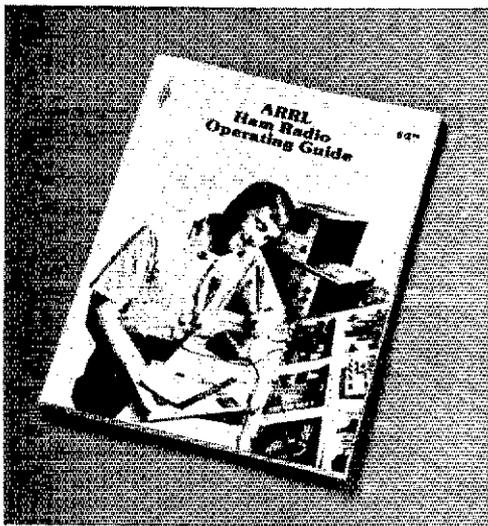
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**WYOMING:** SCM, Joe Ernst, W7VB — A reminder that volunteers are needed to help carry the Weather and Traffic nets in WY thru the winter months. Your help will be greatly appreciated, contact net mgrs. W7PT of Cody reports their repeater on Cedar Mountain was operational in early Aug, in time to catch a lot of tourists going thru Cody to Yellowstone. W7SDA reports 2-meter skip on July 17th enabled him to work WBFTW thru Ann Arbor, MI repeater WR8ADH. WB8JMX/7 also on 2 meters working both the Cody and Boysen repeaters. Our neighboring states sure busy with emergency communications; the Teton Dam break in ID, then the big Thompson flood in CO, showed what a terrific time being in the field with repeater and mobiles in times of emergency. W7TZK and K7VVA sure piling up the traffic count and BPL certificates as they run the morning weather nets. W7SDA reports the WY Cowboy Net held 21 sessions, 470 QNTs and 13 QTCs in July. Traffic: W7TZK 503, K7VVA 289.

**SOUTHEASTERN DIVISION**

**ALABAMA:** SCM, Jim Hrashear, WB4EKJ — WA4TMG now using new TS-520. WB4CXD awarded plaque of appreciation by American Red Cross. Congrats to W4ISD on receiving the 50-year pin from QCWA. Sorry to learn WB4LNM has moved out of our Section. WB4CXD reminds us their 6-meter repeater (52.97/52.37) is being used to transmit RTTY weather bulletins. Congrats to recent affiliate Twin Base ARC WA4PRY. They have a Montgomery area PS assisting state and local law enforcement. Red Cross and CD during emergencies; WA4OWB NCS. W4HMY NCS the Central AL Net each Sun. at 2000 on 2-meters. Appointed WB4MGG as EC; WA4MWH QRS. Endorsed WB4SVH EC and OBS. Welcome to W4NS LCL, LQM RRL LZX LTA MAD MCB NGU MTK MTL MVB MZL NGA NOF NPK NPX NQG NQH NQI NQJ NQK NQL NQN NQO NQP NQQ NQR NQT NQU NQV NRA NRE NRM NRA NRE NRM NRV NYU OJD OOM OON OOO OTV OUE OVL OVZ OWC OXS OXX OKZ OYA OYC OYD OBN ODC ODD ODE ODF OGG OGH OGI OGL OGM OGN OJY OJW OJK OMS; WA4s MBX NMQ LTK NNK NTT NTU NXW NYB NYX OGS OHE OJK OJQ OKK ONN OPT PBQ; WB4s LQF LTJ NNA NNK NOY NSB ODA ONG OXQ OZK OZN. Traffic: (July) WB4EKJ 206, W4RQS 162, WA4JDH 12, K4LYY 95, WA4EAD 68, WN4RND 46, WB4RCU 23, WB4YU 17, WB4AYO 10, WA4RMP 7, K4HJM 4, WB4SVH 4, WA4MLK 3, WB4TVY 2, (June) WA4TMG 26, K4LYY 17, WB4CXD 6.

**GEORGIA:** SCM, A. H. Stakely, K4WC — Net — Freq. Time (7)/Days. QNT QTC  
 GSN — 3.985 2300/0200 Dy 325 154  
 GTN — 3.718 2330 Dy 162 33  
 GSBN — 3.975 2330 Dy 1645 109  
 NEGEN — 147.75/15 0130 M  
 AREC — 3.955 2300 W  
 CVEN 1 3.950 1730 Su  
 CVEN 2 — 146.34/94 0130 Dy  
 Albany — 146.22/82 1800 Su  
 Atlanta — 146.22/82 0100 M  
 GARS — 147.75/15 0100 T  
 QCWA — 3.830 1300 Su  
 W. Robins — 146.25/85 0030 W

SEC: K4VRL. RM: K4FLR. PAM: K4JNL. WN4HHX new QRS. W4BAI had fun in recent contest K4CRO has new QTH but still in Gainesville. W4IMQ enjoyed Sawnee Mtn. group picnic. Dublin ARC now ARRL affiliated. Oconee ARC had great FD coverage in newspaper of a job well done. K4FLR makes PSHR. Congrats to WB4HHR on new call. WN4HHX doing a terrific job with GTN. WN4NCA has helped get this net going with WN4CNY due thanks for filling in. GTN Honor Roll includes WN4CNY WN4DVJ WN4FKY WB4HHR WN4HHX WN4NCA and WN4OLA. You technicians try GTN — you'll like it! Rome Harvest Oct. 10. WB4REG working West Indies on 6. Traffic: K4FLR 83, W4BAI 43, NCS 24, W4LIQ 23, W4DON 15, WA4AEL 14, K4FRM 11, K4CRO 6, WAJM 4, K4WC 4, W4SHL 2.

**NORTHERN FLORIDA:** SCM, Frank M. Butler, Jr., W4RKH — New appointments: WB4MMH as EC for Jacksonville Beaches, W4UHC EC St. Johns Co., WB4VMA EC Columbia Co., W4VRR OBS; WB4FHT WB4WYX QRS; WA4GDX Class C OO (VHF); WN4JMM WA4EWH WB4FHT WB4HRG WB4GHR and WA4QQQ earned SNCS for QFNS. WA4QR, active on VHF many years ago, back on 2m fm with TS-700. Playground ARC held "Old Timers Night." W4GAN received letter of appreciation from FL Secy. of State for traffic handled. Tallahassee ARC planning second repeater and autopatch on 3/19. Eight TARC members earned Red Cross first aid cards. Santa Fe C.C. ARC, WB4JIR, an ARRL affiliate. They won award in FL QSO Party, were active in FD. The Bolles HS ARS new call WB4QWH. WA4NID now Advanced Class. OO reports received from K4MZX WA4GDX. WA4SGF WN4PVT AA4NID WB4DHI W4VWK & others put on ham radio exhibit at Jax mall. AC4ZTV winner of June NCFARS "picup." The Beaches ARS officers are WA4NKA, pres.; WB4MMH, vice-pres; WA8OFU/4, sec.; W45ME, treas. They meet on last Thur. 8 PM, at Mayport Navy Base. WB41TP awarded plaque by Orlando ARC for long service to club. CERA sponsors code practice on their 16/76 machine. WB4FHT received advanced ticket, is NCS on traffic nets! Gulf Coast ARC may take over support of 07/67 repeater. K4B55 & WB4TPR are Section reps. to DRNS. Traffic: (July) WA4FB1 245, WB4GHU 163, AB4DXN 130, W4LDM 82, WB4FHT 81, WA4NID 79, WB4HHR 71, AB4TPR 68, WA4EYV 56, WA4WBM 55, WA4KJ 42, WA4J 39, WB4HRG 36, WB455 36, WB41Y 36, W4ARKH 34, WB4WYX 29, WA4CRI 16, WA4TNC 14, WA4EY 12, K4EX 11, WB4QWH 11, W4IA 7, K4RNS 6, WB4VAP 5, WB4VMP 5, K4BV 4, (June) WB4WYX 46, WB4NLU 28, WN4HRG 23, WB4YTX 20, WB4RVW 14, K4RNS 11, WA4CRI 10, WA4NID 8, WA4TNC 8.

**SOUTHERN FLORIDA:** SCM, Woodrow Huddleston, K4SCL — SEC: WB4LAL, Asst. SEC: W4WYR. RMS: K4EBE W4MEE. PAM: WA4NBE W4OGX. New appointment: WA4HF QRS. Endorsements: W4YTC OBS, W4NTE EC and OBS. W4NTE was first to earn new QRS certificate since QFNS was organized as slow session of QFM. A new resident in St. Petersburg is WA1VA/4, former OVS in Maine, now active on 6 and 2 SSB. WA4CTM has new job as field engineer for Burroughs (computer) Corp. Congrats. WA4ARX has new Kenwood TS820. WB4FYU is heading up new section of Dolphin 30 net. B3LLO kHz, 7 PM MWF for novices and technicians and cw practice. WA4KKE has worked 103 countries — enough for DXCC if he



Since 1969, the year in which TEN-TEC introduced the first solid-state HF transceiver, progress has been rapid. It was in this year that we produced the POWER-MITE which triggered the booming QRPp activity. Two years later, the ARGONAUT followed, demonstrating that Ham Radio can be more than just push-button communication.

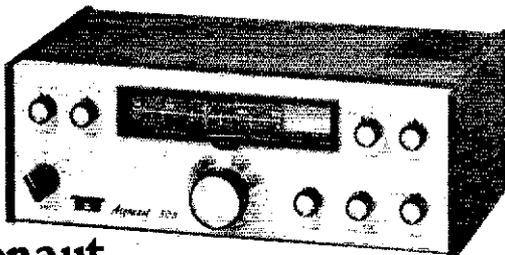
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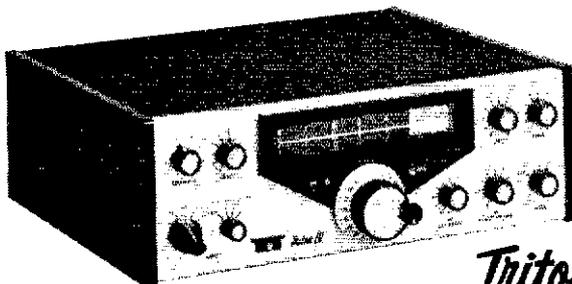
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MAINE: SCM, Ed Bristow, WA1MUX — SEC: WA1FCM, PAM: K1GUP, RM: W1RWG. Nets: PTN, QNI 163, QTC 111. New in ME WA1YJ(V), YMR(G), WN1s YFG YGT YGX YHA YIH YJC YJF YJJ YJL YJW YJY YKR YKC YMZ YNA YNB YNN YNY YND YNE YOF YOG YOY YOS YOT. PSHR: W1ERW W1RWG WA1FCM. SEC rpt: full AREC memb. 42, limited 28, total 70. Acadia Naval Radio Amateurs (KINAN) now ARRL affiliated. QSL Mgr. KH6IAC/1. OBS K1RQE sends bulletins S-M-Th, 7:30 PM local on 28.6 MHz. For info on NE Contest Club contact K1RQE or K1OEY, KG6JFY (K1MTJ) able to relocate his station after Qum. typhoon. Contestbook ARC plans another novice class in the fall through SADI. W3WAS home from hospital. K1NMP still recovering. Best wishes fellows. W1CEV was also in hospital. The Kezar Falls gathering huge success. K1RQE reports over 100 European QSOs in 2 evening sessions in late June on 10 M E-skip. The Abbot fest expected to top last year. Traffic: (July) WA1FCM 174, W1ERW 84, K1MZB 67, W1AJHT 56, W1RWG 44, WA1MUX 29, K1GDI 27, W1GU 21, W1AJCN 21, WA1NKE 4, WA1RDX 4, WA1VGC 2, KINAN 1, KH6IAC/1 1. (June) KH6IAC/1 30, WA1RDX 23, KINAN 17. (May) KINAN 27.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1SWX — SEC: K1RSC, RM: WA1GCE, PAM: Open. Greetings from the Volvo Int'l Tennis Tournament in North Conway. New vacation spot for Aug. K4HUI & W8VFU were visitors to license plate collector K1BCS. The GSPN & W1ABU repeater assisted in locating a missing VT boy. W1EEF back on the OO job. Your SCM received FD messages from the Concord Brasspounders W1OC & Keane ARA operating ARA on 416 check-ins & Youson's truly a camping trip from NH to FL. K1PQV reports excellent signals from the Derry, Concord & Burlington repeaters. W1DXB has been portable 1 in York Beach, ME. The Keane ARA repeater will be on 147.975/375. The membership varies from Novice to Advanced. The GSPN had 416 check-ins & Youson's truly attended the NE Barndog Net meeting in Lowell, MA. W1IIQ & W1FSK also there representing NH. GSPN had 416 check-ins & 167 traffic. W1MPP and K4RO in Bartlet for the summer. Traffic: K1BCS 187, W1GUN 67, WA1PVN 38, W1SWX 3, W1AYS 1.

WESTERN MASSACHUSETTS: Percy C. Noble, W1BVB  
Net — Freq. Time(PM)/Days Manager  
W MA Phone — 3935 4:30 M-F WA1MJE  
W MA CW — 3562 7:00 Dy W1DWW  
W MA Emerg. — 3935 8:30 AM WA1DNB  
We welcome additions to all the above. WMPN (June) sessions 22, QNI 191, QTC 16, WMPN (July) sessions 22, QNI 202, QTC 15, WMN sessions 31, QNI 177, QTC 118, WEM (July) sessions 4, QNI 52, 55B plus 62 (thru liaison 2-mtr. fm) QTC 5, WMEN (July) sessions 4, QNI 73 55B plus 78 (thru liaison 2-mtr. fm), QTC 5. Tri-Co. WMAREC (WA1PLS reporting) 22 sessions, QNI 74, W1Z (ex-WA1TF1) spending a year in Germany as W1Z/OL. Will be on 20 and 15 W traffic (July) W1TM 157, W1DWW 50, WA1MJE 58, W1BVB 35, WA1LNP 83, W1RCP 34, W1LPL 30, W1BBI 14, WA1OJZ 6, W1DOY 4, WA1OLK 2, WA1PLS 2. (June) WA1MJE 164.

### NORTHWESTERN DIVISION

ALASKA: SCM, Roy Davie, KL7CUK — Vacations played havoc with activities this month. KL7DG and XYL had a nice 12 day canoe trip on the Yukon River. He was active with QRP on the FD from the wilds of AK. The Anchorage Club was very active with a set up in the city for P1. K7WU/CL7 has departed AK for W7-Land. KL7JDO has completed WAS for Bi-Cent for 75 phone. Congratulations, KL7HOV reports 699 check-ins for ASN. KL7GCH has been working in Kodiak and not too active from his home QTH. KL7CUK now operational on 4383.8 USB KHz the AK emergency frequency. There are many technician licensees on the Novice bands these days, also many studying code for their General. KL7HMI reports that she and her OM KL7HMJ handled a considerable amount of traffic this month, also JAN reads the Official Bulletins on 2-meter FM which covers a large number of people. Traffic: KL7HMI 33, KL7JDO 6.

IDAHO: SCM, Dale A. Brock, WA7EWV — SEC: W7JMH, PAM: WA7HOS, RM: WA8KKR/7.  
Net — Freq. Time/Days Sess. QNI QTC  
Manager  
FARM 3.935 0200 Dy 30  
WA7RQI  
IMN — 3.635 0300 M-F 22 185 135  
W7GHT  
RACES — 3.99 1415 M-F 22  
W7KDB  
W7CJ of Potlatch was honored as the longest licensed Ham at the Spokane Amateur Radio Council Hamfest. Thanks to the excellent work of the Pocatello Amateur Radio Club, Governor Cecil D. Andrus proclaimed Aug. 1st through Aug. 8th as Amateur Radio Week in ID. Traffic: WA8KKR/7 264, W7GHT 240, W7GBO 88.

MONTANA: SCM, Harry A. Roylance, W7RZY — Asst. SCM: Bertha A. Roylance, K7GHA, SEC: WA7IZR, PAM: WA7PZO, WN7EQJ & WN7EQV are new calls in Hardin. W1MU Hamfest was one of the biggest ever. W9SIN Dir. of the RM Division, W7PGY NW Dir. and W4KFC First Vice President was in attendance. It was nice meeting with these officers. Pres. for ARRL is K7TV. What say you MT hams lets give Ron a hand. Butte and Missoula were honored with W7PGY and W4KFC presence at meetings. W7RZY is making plans for working the Oscar satellites. Again it a sad duty to report the passing of one of our members W7LPL. Ray was an old friend and a very good cw operator. Traffic: WA7PZO 6, WA7OBH 2.

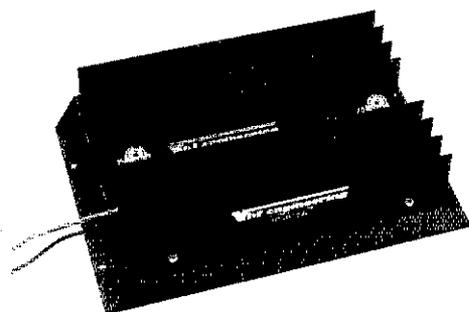
OREGON: SCM, Dwight J. Albright, W7HLF — Asst. SCM: Daniel O'Connell, WA7TDZ, SEC WA7UHC, PAM: K7RQZ, RM: K7OUF, AREC, 3993.5, 0200Z QNI 403, QTC 4, QS T 19, 31 sess., WA7NEQ: AREC Jc 14, 06, 02, W7F 88 CW, 147.33, 3 sess., WA7TAE: AREC PDJ, 146.6, 0147.33, 0230Z, QNI 693, 36 tlc, 48 sess., K7WWR: OSN (cw), 3585, 0145Z, 184 QNI, QTC 9, 31 sess., K7IWD. We are looking for Class V VHF (Intruder Watch) and OOs WA7UJU and W7IHU apptd in Jackson Co. W7JAW looking into the matter with Coos County EC W7TZD. The Latco Co. Hamfest a success! Feature by K7KYV some 341 hams registered. Rusty took top honors in the code copy contest at 36 wpm, W7JWJ was at 52 wpm (on typewriter). WA7UJM new EC for Wash.

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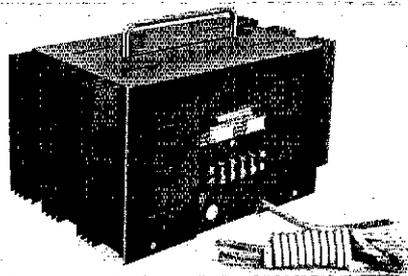
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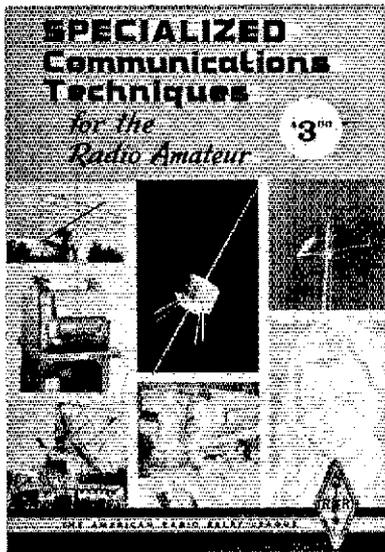
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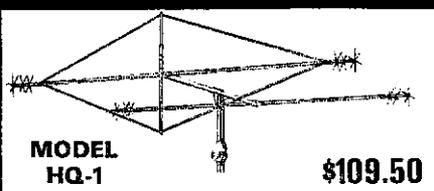
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can get QSLs! He reports formation of Southeast Wireless Radio Club for Bell Telephone System employees and retirees. WA4FYZ reports newly affiliated Univ. of Miami club has two new licensees, WN4PPB and WA4PUH. WA2CYU has graduated from UM and returned to NY. We will miss him. WA4LGT has a new IC230. WA4VY is outfitting a new emergency communications van for Red Cross Miami. RadioPH ad that Gulf Coast Amateur Radio Council is going great with preparations for the Convention to be held Nov. 6 and 7 at Clearwater, Sheraton Sand Key. WB4VVO expects to have at least \$3000 worth of prizes for the convention. Important meetings, FCC exams, extensive new equipment displays and a transmitter hunt are part of the fare. Traffic: (July) K4SJM 376, W4EME 38, K4SCL 275, K4TH 271, WA4SCK 160, WA4NBE 154, WA4JPV 133, WB4AID 92, W4NFK 92, W4EH 90, WA4CTM 70, WA4HF 70, K4CFV 67, WA4KKE 56, K4BLM 51, W4IRA 50, WB4ALH 32, WA4EIC 30, WA4QM 30, WB4WYG 25, K4EUK 23, WA4JQG 20, WA4YT 19, W4T 17, K4CQ 17, W4SMK 13, WA4KER 10, WA4LGT 8, WB4ELL 5, WA4KNX 3, (June) WB4ALH 86, WA4KNX 10, K4EUK 7, WA4KKE 5, WA4TOP 4, K4DRH 2, K4RCP 2.

**WEST INDIES:** SCM, David Novoa, KP4BDL -- PAM: KP4AOC, RM: KP4WL, OPS: KP4ACQ, KP4EBQ, KP4EGC, OOS: KP4ZC, KP4QM. Appointments KP4S CV and EGF OBS. Two meter activity continues growing with old timers like KP4s ADKCSM and CSO, and new hams like KP4EMB and EMP heard daily thru the repeaters. Many Technicians are operating on the Novice bands. Keep practicing, Gen. It's easy now. KP4AST passed his Extra Class exam. Bravo! New pres. of the Radio Club de Puerto Rico is KP4CV after KP4BBK's resignation. Traffic: KP4EHF 42, KP4BSQ 37, KP4CNT 14, KP4DGT 14, KP4HG 9, KP4RK 1.

### SOUTHWESTERN DIVISION

**ARIZONA:** SCM, Marshall Lincoln, W7DQS -- PAMs: W7JQG, WA7KQE, RM: K7NHL. Congratulations to K7VOR on receiving the AZ Amateur of the Year award at the Ft. Tuthill hamfest. W6KW, SW Div. Director, summarized the recent ARRL Board meeting actions. WB7CHQ won the grand prize at the hamfest. A cw net has been started to give beginning traffic operators a head start on the system. The slow speeds: It is called the New Mexico Arizona Net (NAN) and meets on 3735 kHz at 2030 local time. W5VDH is net mgr. A new club in the Yavapai County area is the Minqua Amateur Radio Assn. Secy-treas. is WA8FSU77, Box 603, Chino Valley 86223. W7RUY has been appointed EC in the Coconino Co. for the Page area. WB7CAG appointed GRS. Members of the Tucson Repeater Assn. helped the Jaycees with communications at the July 4th fireworks. New calls in Flagstaff are WN7s ESG EUJ EVX EVY EYU and WA7YVG. Nets: Cactus Net QNI 1,097, QTC 484; ATEN QNI 505, QTC 35; certificates to W7RZ W7CRZ K7NTG and W7CAF; SWIN QNI 224, QTC 219. Traffic: K7NHL 20, WB7CAG 82, W7UQJ 66, WA7VTM 52, K7NTG 24, WA7KQE 18, WA7YKM 16, K7UXB 14, W7DQS 9, W7CAF 4, WB7GK 2, WB7CZL 2, WA7JCK 2, K7NMQ 2, WA7NHQ 1.

**LOS ANGELES:** SCM, Eugene H. Violino, W6INH -- Assn. SCM: Kevin A. Beraly, WB6OYN, RMs: WB6PKA, WB6JL, WB6SCL, WB6SCL. There are many changes being made in the new FCC rules, the first FCC action on restructuring was taken late last week and Novices and Technicians became the principal beneficiaries. For further details read QST and of Hr reports. There are now fourteen RCs in the area sponsoring code and theory classes, if you know anyone wanting to obtain an amateur license please advise them. The United RC of San Pedro was invited to the Denver convention twelve members attended. The club presented an hour slide show on homebrew construction, an activity in which many of the members participate. The speech was prepared and given by W6S2Z an electronics instructor at Carson High School. Other members attending were WB6ROH W6WIS WB6JFD WB6UIA WA6BZA WB6FVU WA6QVC K6CW K6IPJ WA6UBU W6OAW W6ANN and W6S2H. Their booth was used to demonstrate members homebrew projects; also 2,400 1-square-inch protic boards for a 555 oscillator were given away. Whow, what an undertaking for a medium sized club! Many thanks from L.A. group fellows and congrats. Recently received a letter from one of our ORS, OPS, OO and EC, WA6IDN, he has now moved to CT and is working at ARRL. Seems very excited about the position and he of SCN wish him the best of luck, we will sure be missing him. Congrats. Congrats to new ORS appointee, WB6KJI. The SCATS Teletype club held a picnic in the San Fernando Valley recently with 60 people in attendance. The raffle not only netted the club \$30.00, but many people came away with several prizes. The club meeting was opened by WA6TVA. The San Fernando RC held their annual picnic at the Woodley Ave Park, in the Sepulveda Dam Recreation Area. Archie sporting a new Comcraft 144/220 MHz mobile unit and is planning a high frequency antenna farm with beams. W6JT and a group of hikers climbed to the top of Mt. Whitney recently, he took his ham radio with him and was able to work several distant repeaters. K6LBU is expecting to leave KH6-Land very soon and this will leave a hole in our Hawaiian net, hopefully someone will pick it up. In the meantime we will go through K6BDK at 11 PM and he will QSP via s.b. Traffic: W6OEO 252, WB6PKA 232, W6INH 186, W6HJU 164, W6QAE 54, W6SCL 35, K6EA 30, WA6EUV 24, WB6YD 24, W6NKE 15, K6G 14, W6RO 12, WB6EPS 6, W6BWG 5, WA6FEJ 2, WA6ZKI 2.

**ORANGE:** SCM, William L. Weise, W6CPB -- Asst. SCM: Dick Birbeck, K6CID. SEC: WA6TVA. PAM/RM: WB6AKR. Sorry to report the following Silent Keys, W6DTR, and WA6BJO. Our condolences to the family. Amateur Radio exhibit at the Orange County Fair, July 12-25, was a great success. Our thanks to all who participated. Congrats to all who participated in the Powder Puff Derby, July 9-10, W6KIJ K6CID WB6TMO WA6KER and all the others who assisted. A job well done. Congrats to all the Novices and Techs who now have 250 Watts and additional privileges. You now have the opportunity to gain additional technical information and increase your code speed to assist in upgrading. Hope you make it soon. K6GGS reports that the 220 MHz repeater in San Bernardino County will soon have auto-patch, WB6AKR has a new T5700 on the air and is making lots of contacts. The annual contest was well represented by the Orange Section WA6FIT W6SOR WB6AKR WA6WZO and a host of

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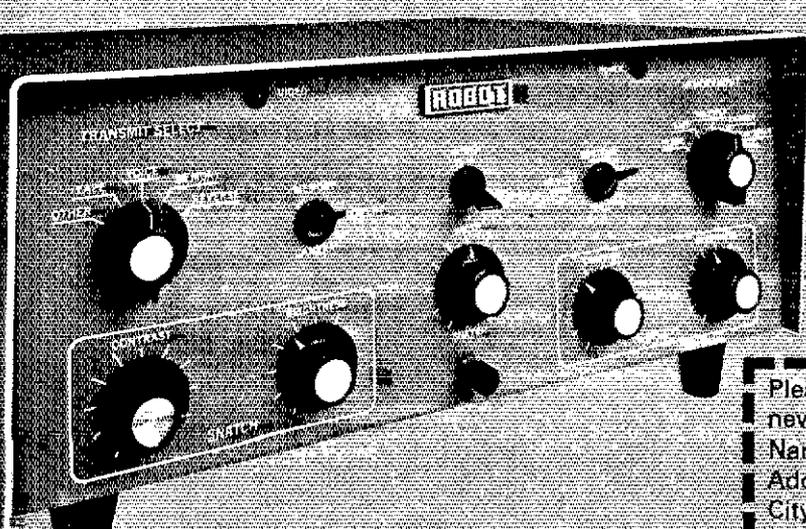
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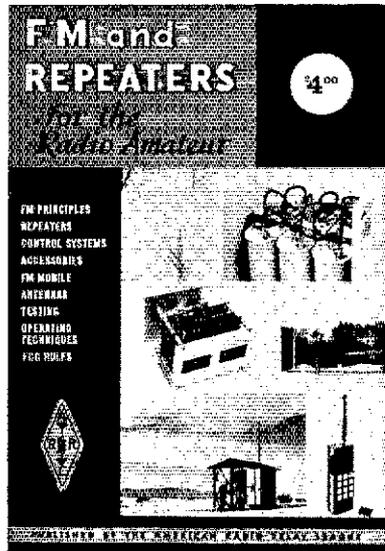
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others. Congrats to all participants. California State College, San Bernardino's police office, monitored by WA6KH is doing an excellent job assisting motorists, police, Fire Department, etc., by coordinating reports of accidents, breakdowns, and fires. Congrats to Tom and his staff. Traffic: (July) WB6EIG 602, W6WRJ 108, W6CPB 59, WA6KH 33, WA6TVA 23, WA6YWS 22, W6QBD 2. (June) WB6EIG, 554.

**SAN DIEGO:** SCM, Arthur R. Smith, W6INI — W6TET provided home-base comm. for S.D. Mtn Rescue Team during search for two lost motorcyclists. W6SRS WA6JFY and W6LJ attended Red Cross seminar on disaster exercise planning. Under the leadership of WA6GDC W6VCE and W6KBT San Diego amateurs raised \$1700, made necessary arrangements, and flew a seriously ill U.S. citizen from Mexico to San Diego so he could receive treatment not available in the Mexican hospital. WA6HGK handled traffic for Loveland, CO flood disaster. Palomar Club is having repeater site problems due to new landlord. SD DX Club officers: K6IV, pres., W6ZUM, vice-pres.; K6SDR, secy-treas. W66CHP upgraded to General. W6INI was comm instructor for week-long Red Cross Disaster Training Institute at Harvey Mudd Col in Claremont, CA. Palomar's monthly Flea Mart on Swan parking lot, Ocean side, first Sat. each month is popular. Dayton's 58 Club Section breakfast, second Sat. each month at Normal Heights United Methodist Church, 4660 Mansfield, S.D. Come between 0800 and 0900. Try DRN6, 7267 KHZ, 1400 daily, for outgoing traffic. WA6ORJ on air from new QTH in Ramona. WA6EJL new OPS. Traffic: (July) W6GGF 170, W66FTY 140, W66HCF 34, W66CFT 23, WA6UFY 4. (June) W66CFT 24.

**SANTA BARBARA:** SCM, D. Paul Gagnon, WA6DEI — WA6ARU and W6BKQO assisted a burn victim while in the wilds on FD. Much activity on Bi-centennial contest including W66CWE and W6PRP. W6POLU has joined RACES in Santa Barbara. WR6ANW on site in Santa Barb. The SB Club auction was a big success. WA6BL5 has been filling in as Net Control on the Section HF net 3935 Wed. at 2000. We are looking for a PAM. The VHF net meets on WR6AFI on Wed. at 2030. The Pointsettia ARC has donated League pubs to Santa Paula and Oxnard libraries and planning more. W6BAGX W6L6X1 and W6WDS are new Pointsettia club members. W66532 now a Silent Key. WA6DEI vacationed in Northern CA. The Ventura County AREC assisted in the County Medical Drill. PSHR; WA6LBO 42, W66CWE 28, WA6DEI 44, Traffic: WA6DEI 421, W66BMH/6 300, W66CWE 173, WA6MBZ 151, W66JKM 51, WA6LBO 44, W66IBO 10.

### WEST GULF DIVISION

**NORTHERN TEXAS:** SCM, L. E. Harrison, W5LR — Asst. SCM: Frank E. Sewell, W5IZU, SEC: W5DWL, PAM: W5GSN, New SCM W5EJ, Ted Heitcheur, 1409 Cooper Dr, Irving TX. All present NTEX LO will be recommended to W5EJ including ASCM, SEC, RM, PAM, SRO. He may not approve. W5ASAKO moved to Wright-Patterson AFB (Dayton) where now serving internship. Missprint noted, should have been W5ASAKU. Two MDs serving with Art. Board mtg results RTTY not permitted in HF portion A-3 bands. AM not to exceed 6 kHz bandwidth. Restudy in 5 yrs. Arlington ARC Novice class in full swing. W62Y5R coming to TX. Licensee who is affiliated with ARRL as is Denton Co. ARC W6FXW. Glad to have you. W5TI, Ft. Worth Club was recipient of "Eye Bank Plaque" from Lions Dist. 2E2 plus framed certificate of appreciation from the Lions Eyebank. W5TI also a retired American Airlines pilot, organist, banjoist, and enjoys sailing, golf and jogging. W5BCKR assisted in working the Longview repeater while traveling in Harrison County. TX. WA6JPK for quick response. The XYL and OM expect to attend National CWA mtg Houston in Oct. PARC is known as Panhandle ARC Amarillo Editor K5IBI PO Box 7002. Excuse delay in reporting meeting of Golden Eagle Hamfest & swapfest, Aug. 14/15 which will be history when you read this. W5QPX SRO NTX submitted 37 observations showing 95% 19C rpts. Any you guys ever heard of "chirrupppps." Please check your keying, you would be suprised. Remember W5QPX isn't a Cop! he's one of you people trying to help keep you and me outta trouble. By the way we need some volunteers for class 5 QOR. Traffic: W5TI 490, W5YK 12, WA5INJ 11, W5LR 10, W5INJ 9.

**OKLAHOMA:** SCM, Leonard Hollar, WA5FSN — W5ZUS and WA5WIC, along with a group from N. TX, have a chapter of the Happy Fliers going. Listen for them. AeroMobile, Lawton is making some improvements to their Repeater, Phone Patch, etc. W5NRXZ getting a Newer TX and W5X Net going on 3743 KHZ at 7:30 P.M. local. Give them a hand. Help them with traffic. W55RLR, new OPS & ORS appointee. W5BAGZ W5BPHI and W55RLG all recent upgrades. New calls heard include W5N5UCM W5N5TMI W5N5TSU W5N5TYA W5BUOE and W5B5PZH. I believe there is a class going in every large community in the state and more planned. We saw a lot of the people at Ham Holiday and plan to be out and around the state more this fall. Next big activity for OK is Texoma Hamarama Oct. 30-31. This is your Column. Send in the material and we will include it in the column, as space permits. Traffic: 203, W55NKC 612, W55NKC 676, W55KGF 6, W55RE 203, W55R 158, W55OYU 109, W55PVL 54, W55UCM 39, W55AZS 28, W55FKL 36, W55UG 32, W55RLR 29, W55RLG 22, W55JGU 20, W55ELG 19, WA5FSN 19, W5PML 11, W55EGG 5, WA5FLV 4, WA5OYU 4. (June) W5FW 32, W5NRXZ 25, K5OCX 1, W55NMV 2.

**SOUTHERN TEXAS:** SCM, Arthur R. Ross — SEC: W5TQP, RM: W5UGE, PAM: W5AMN, SEC W5TQP looking for some T240s for his 160-meter final. EC W5UJJ looking for manual for Collins 310B for at least a schematic. OO K5HGB starting new Radio

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These are ideal, maximum gain antennas for point-to-point or repeater control applications. An available long boom (12' model), optimized at 432 ± 2MHz, is particularly desirable for EME and DX communications. Eight of these beams, using KLM high efficiency couplers are comparable to a 128 element, extended, expanded collinear array.

A typical antenna: (KLM-420-470-14)  
Elements: 14.

Gain: \*\*  
Beam width: 18 degrees @ 3db pts.  
Diameters: Boom: 1" (25.4mm)  
Elements 3/8"D (9.5mm)

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Do you operate both phone and CW and so are forced to compromise with higher VSWR on one or the other mode? Not with this KLM 20 meter monobander! Multiple driven elements and other KLM design exclusives, give broad-band action, low VSWR over 13.9 to 14.4MHz. F/B (and sides) ratio is excellent, gain is exceptionally high. \*\* Impedance is 200 ohms balanced (matched w/KLM's 4:1 4KW p.e.p. balun (optionally available). Assembly is simple and fast.

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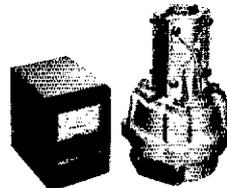
5 full size elements: Boom: 42', 3" (76mm)D.  
Turning radius: 28' Wgt: 65 lbs. (29.4KG)

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Elements: 14.

Gain: \*\*  
Beam width: 18 degrees @ 3db pts.  
Boom: 208" (5283mm). Wgt.: 9 lbs (4 KG)



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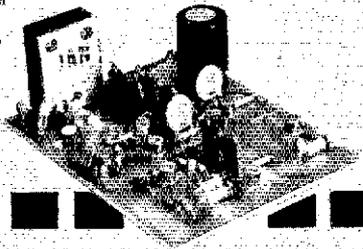
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Explorer post. EC WSTFW reports novice licenses beginning to come in. W5ES Bulletin says club house has grand new ceiling lights inside the new paint job outside. No. 1 5M IRLC, OVS K5ZMS says the Six Meter International Klub has 1442 members in 48 states and 15 countries. OVS W5SCIT has new "Personal phone" RCA 450 MHz handy-talky. OPS W5VBM made BPL again, including 312 deliveries; received 26 messages from W5KPL/HR2 with Amigos de las Americas. W5KR's code class and study group has two new novices: W5STKO and W5URVY. Traffic: (JULY) W5VBM 632, K5H2R 330, W5KLV 236, W5RRU 210, W5UJJ 180, W5YEA 158, W5NUM 61, W5SAMN 47, W5TQP 28, W5JYH 17, W5BRHO 14, K5ROZ 10, W5BWV 8, W5TFW 8, K5RVF 4, W5YXS 4. (June) W5JYH 37, K5ROZ 2.

### IRON POWDER TOROIDS

CORE SIZE	MIX 2 5-30MHz u = 10	MIX 6 10-90MHz u = 8.6	MIX 12 60-200MHz u = 4	SIZE OD (in.)	PRICE USA \$
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T-80	55	45		.80	.80
T-68	57	47	21	.68	.85
T-50	51	40	18	.50	.55
T-25	34	27	12	.25	.40

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CORE SIZE	MIX O1 u = 125	MIX O2 u = 40	SIZE OD (in.)	PRICE USA \$
F-240	1300	400	2.40	6.00
F-125	900	300	1.25	3.00
F-87	600	190	.87	2.05
F-50	500	190	.50	1.25
F-37	400	140	.37	1.25
F-23	190	60	.23	1.10

Charts above show uH per 100 turns. Use iron powder toroids for tuned circuits. Use ferrite toroids for broadband transformers. Q1 for .1-70 MHz, Q2 for 10-150 MHz.

Ferrite beads 20-500 MHz (fit #18 wire) \$2.00 Doz. Wideband chokes 20-500 MHz (Z=850 ohms) 95¢ Ea. Specify core size and mix. Pack and ship 50¢ USA and Canada. Air parcel post delivery worldwide \$2.00; 6% tax in Calif.; Fast service; Cores shipped from stock via first class mail or air. Send for free brochure.

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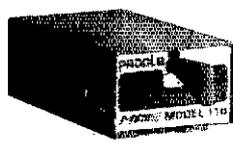


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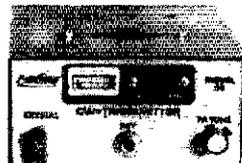


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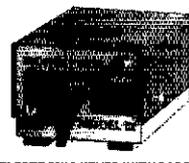
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15 watts input. Full break-in keying. All solid state. Crystal control. 160, 80 or 40M plug-in coil. Zener regulated chirpless keying. Has built-in 120 Vac power supply. OPTIONS: Built-in keyer and/or sidetone. Paddle Model 11B is compatible with built-in keyer option.

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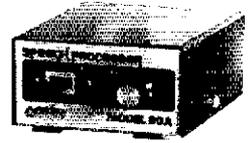


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C-MOS circuitry. Solid state output switch. (250V, 1 AMP MAX.) 8-45 WPM. Fixed spacing. Dot 1:1, Dash 1:3. Self-completing Dot/Dash. No on/off switch required. Sidetone has 2-inch speaker. Paddle travel adjustment. Rubber feet. 4 penlight batteries (not included).

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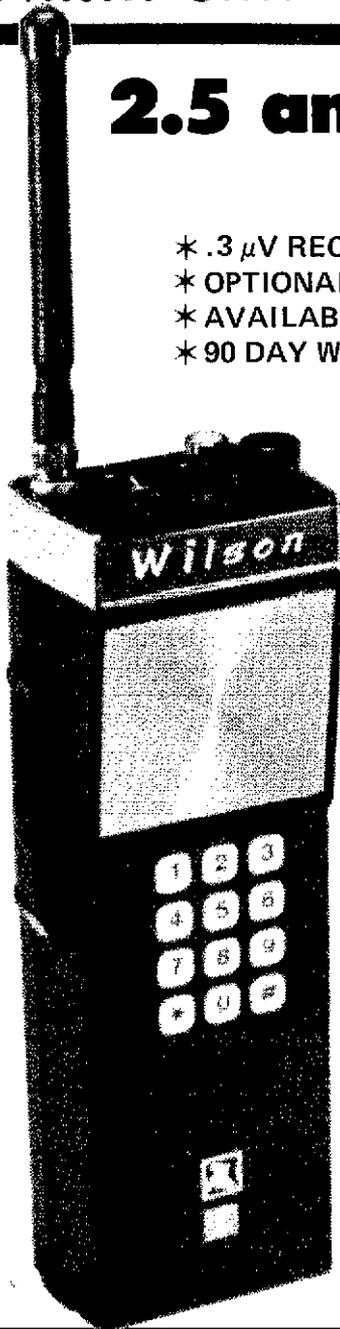
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# 2.5 and 5 WATT 2 METER

6 CHANNEL HAND HELD TRANSCEIVERS

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- \* AVAILABLE FOR MARS OR CAP • 10 DAY MONEY BACK GUARANTEE
- \* 90 DAY WARRANTY • INCLUDES 52 SIMPLEX and "DUCKIE" ANTENNA



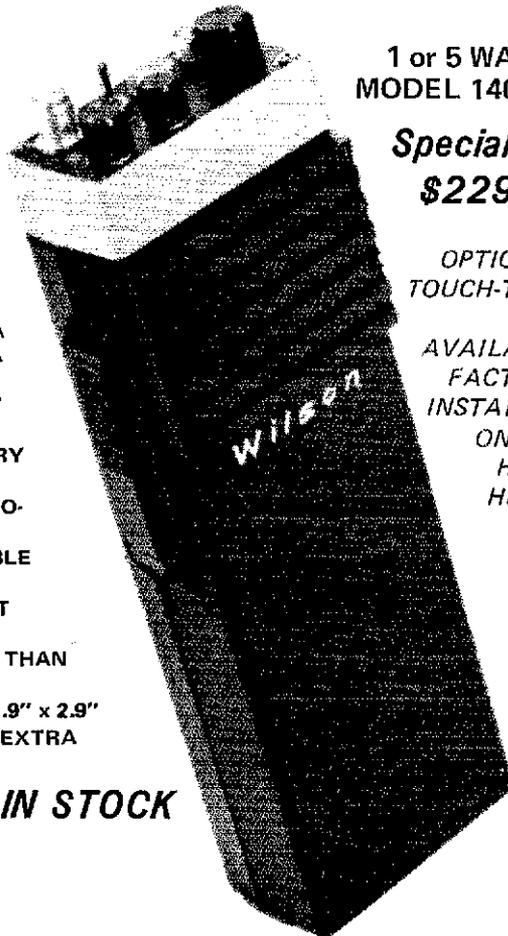
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- ALL PLUG-IN CRYSTALS (Same as WE-224 Mobile)
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 RCVR: 14 MA - XMTR: 500 MA  
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 RCVR: 140 MA - TX @ 1W: 400 MA  
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- 1402 HAS S METER & BATTERY INDICATOR
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2.5 WATT *Special at*  
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1 or 5 WATT  
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A.			G.	
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D.			J.	
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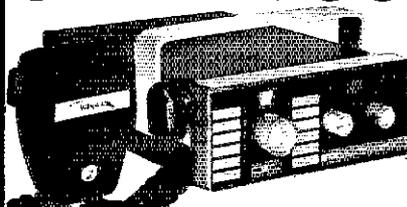
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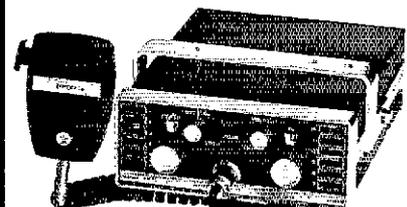
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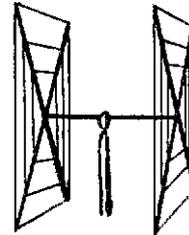
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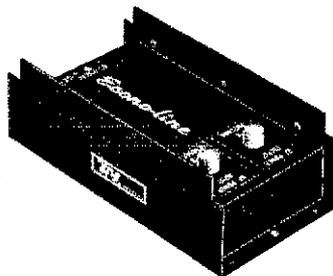
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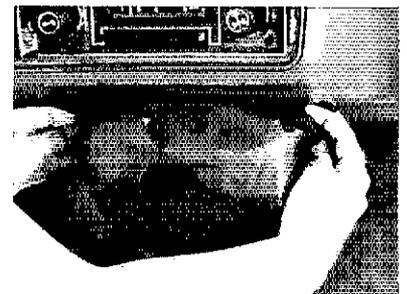
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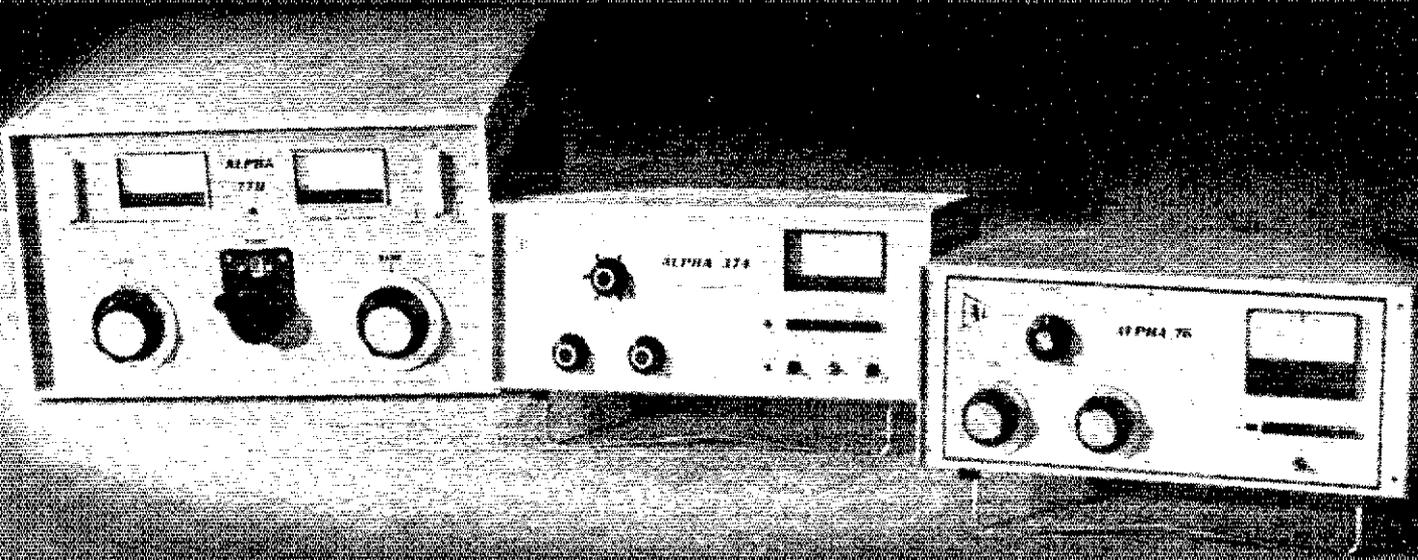
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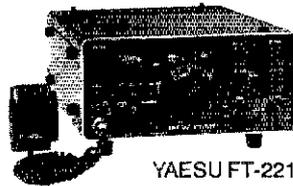
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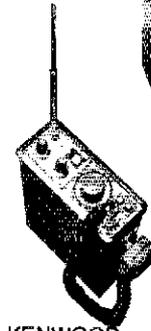
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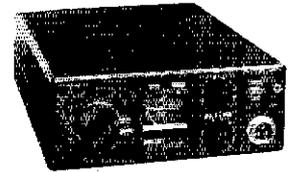
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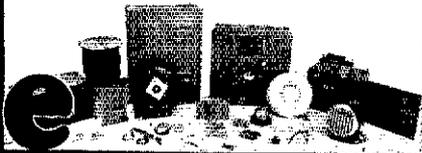
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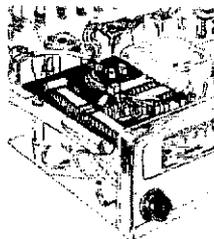
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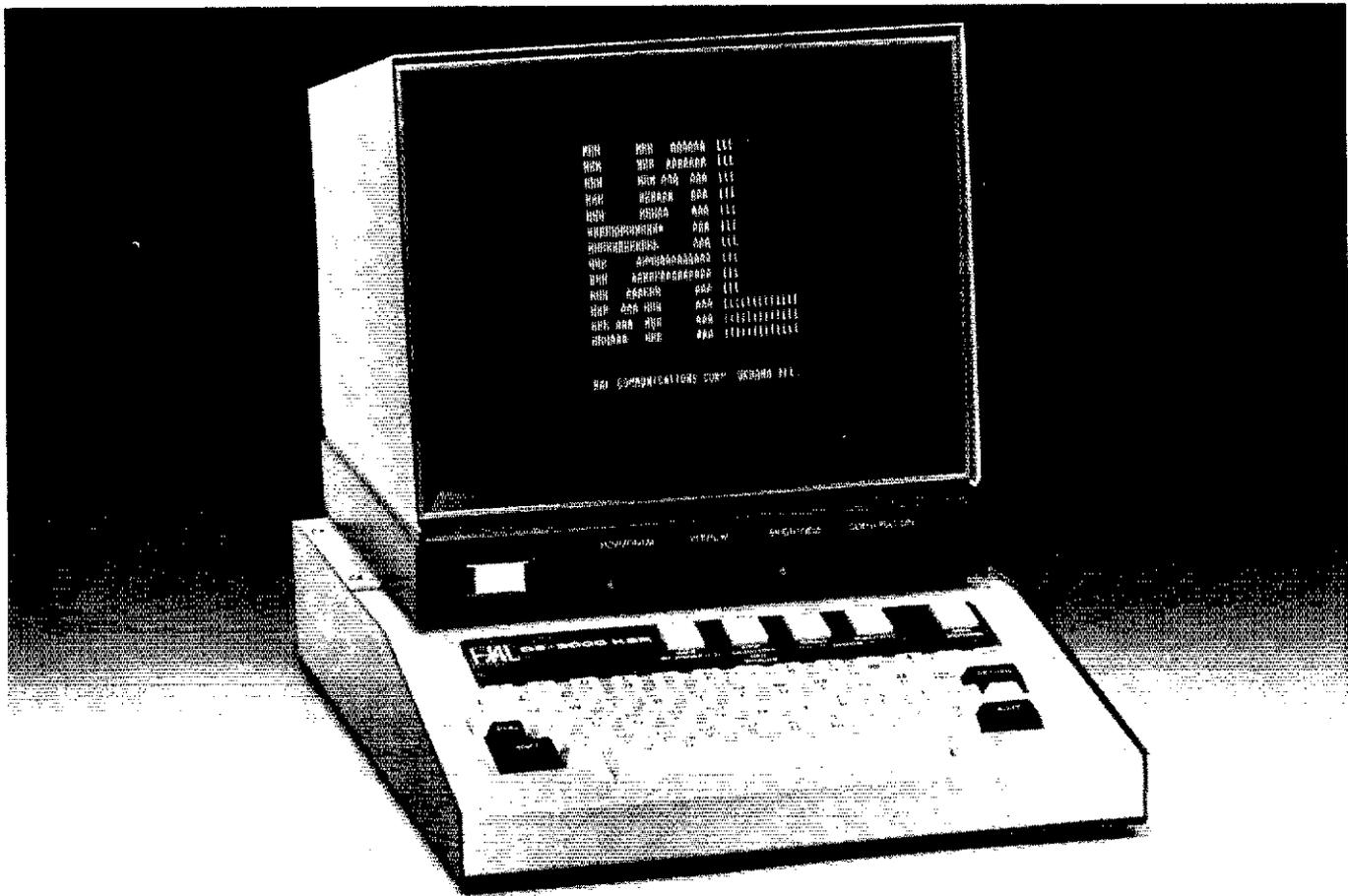
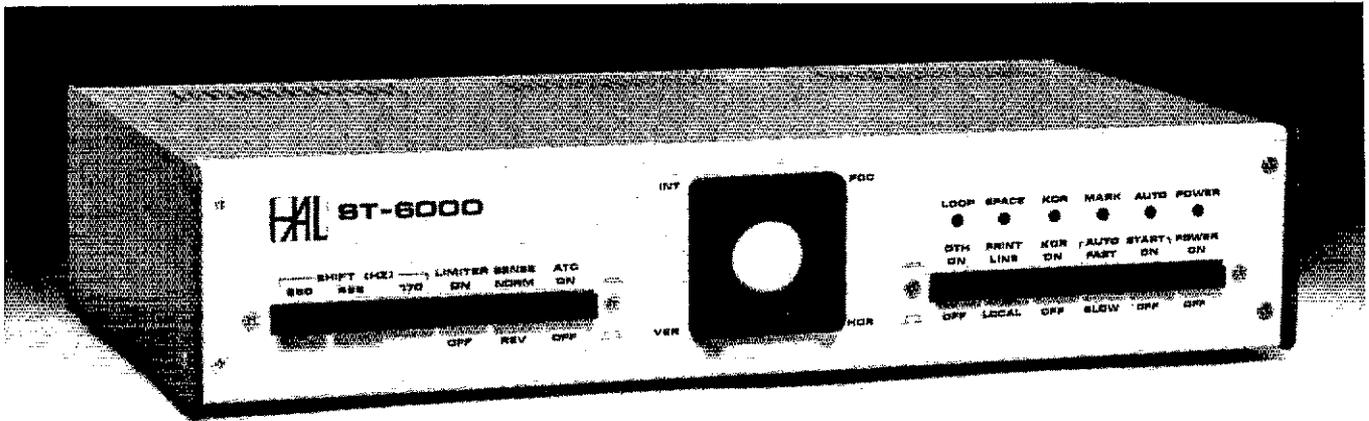
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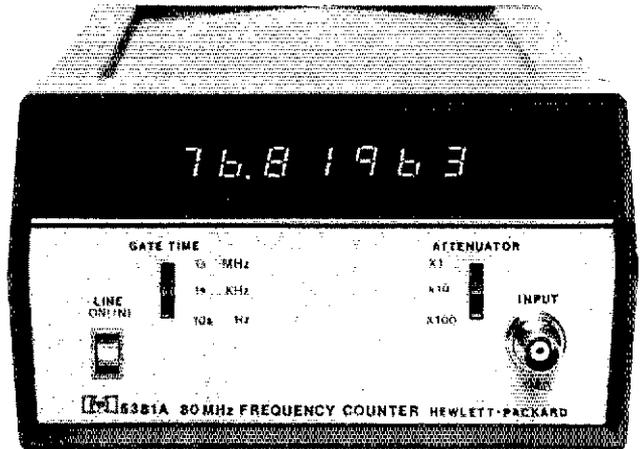
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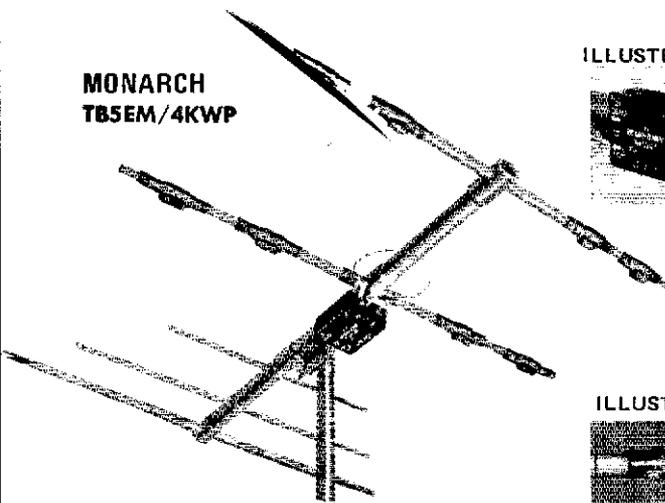


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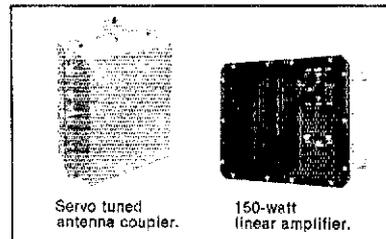
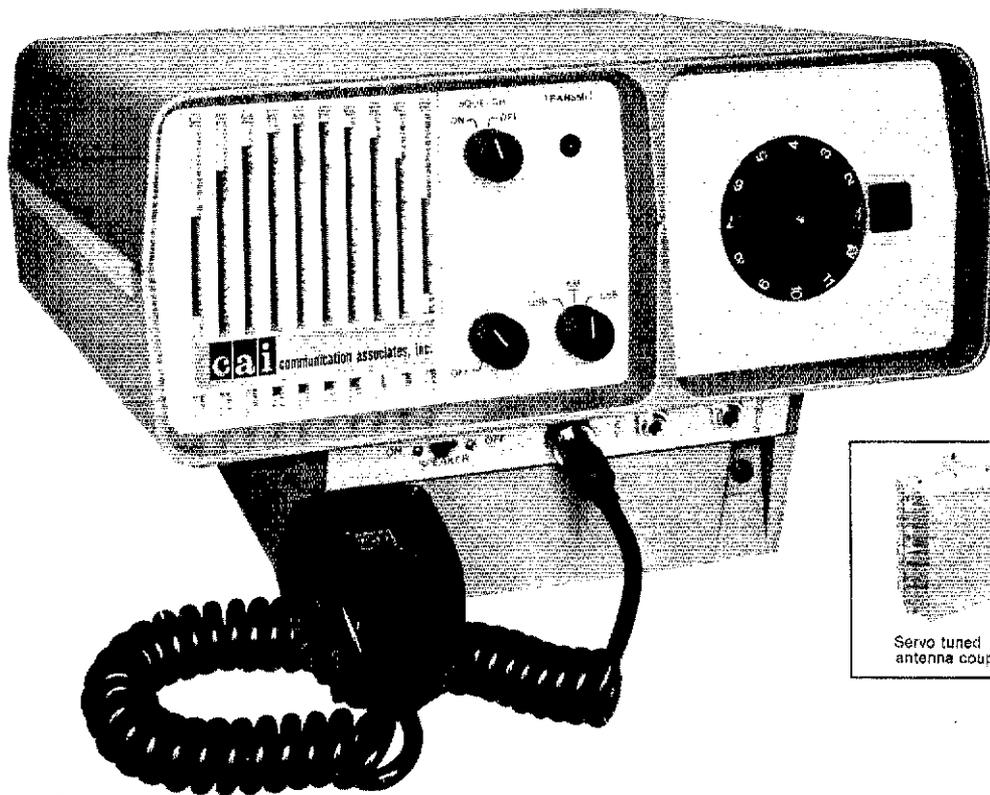
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Paperbound \$3.25, hardbound \$6.25, postpaid  
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Powell, Ohio 43065



## 12 reasons why this 150-watt, automatically tuned, solid-state SSB system is the leader in its class:

**1. More performance, more reliability.** The new CA-38 SSB from CAI has highly innovative solid state circuitry that enables its 150-watt power to be used to utmost advantage. The system makes long distance SSB communication more dependable and far easier than ever before.

**2. Pre-programmed channels.** The fully solid state 20-watt transceiver has 12 pre-programmed channels. They can be spread across the entire 2-18 MHz frequency range, or grouped in any band without restriction. A back-lighted display window shows channel selected.

**3. Operation is extremely simple.** Turn it on and select a precisely tuned channel. The rest is automatic. There are no band selectors, no tuning knobs, meters, manual squelches or voice clarifiers. Channels can be programmed for SSB, compatible AM, or telegraph (CW) modes. In short, it doesn't require an experienced operator.

**4. Expandable to 24 channels.** The CA-38 is also available with 24 channels and semi-duplex capabilities. This may either be specified or installed in the field at a later date. Display window is easily changed to show the additional channels.

**5. Amplifier protected against burnout.** The separate 150-watt linear amplifier is solid state and completely broad-banded. It enables any 2-18 MHz frequency to be programmed without adjustments or mod-

ifications. Overload circuits protect it against high VSWR loads, excessive heat, and damaged antennas.

**6. Continuously tuned in any environment.** The companion servo tuned antenna coupler automatically and continuously fine-tunes the antenna to the exact frequency being used. It also compensates for changing weather conditions and movement of nearby metal objects.

**7. Exceptional stability.** Precisely controlled crystal ovens provide  $\pm 20$  Hz or better frequency stability and optimum clarity of communication. Six automatically switched low pass filters provide -62dB harmonic suppression. It's also available with a highly effective automatic noise compensated squelch.

**8. Easily re-tuned in the field.** Most transceivers have separate coils for each channel, but the CA-38 uses electronically tuned circuits over its entire frequency range. This means channel frequencies can be re-tuned with minimal test equipment in a few minutes. Its integrated solid state circuitry means lower maintenance costs.

**9. Obsolescence proof.** Because channel changes are easily accomplished and its 12 channels can be placed anywhere on any band, the CA-38 cannot be made obsolete by changing frequency regulations. The system exceeds most international requirements.

**10. Three power supplies available.** The CA-38's separate amplifier/power supply unit is available for either 12 VDC, 24-32 VDC, or 115/230 VAC operation.

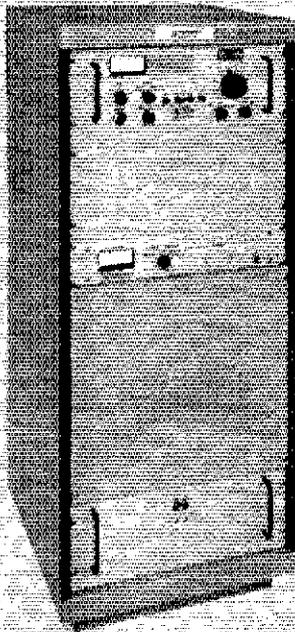
**11. A rugged, go-anywhere system.** Components are housed in tough, lightweight Lexan® Cabinets. The CA-38 is flexible. It's designed to be a base station, land mobile, marine, or portable SSB station. It provides dependable long distance communications in any environment. There's a 20-watt SSB—the CA-39—for applications that don't require 150-watts. The CA-39 (which is identical to the CA-38's transceiver) can function independently, or be part of a CA-38/39 network.

**12. The SSB only CAI could build.** The system was created by Communication Associates, Inc.—the world's most respected name in SSB. For performance, easy operation, simplified maintenance and reliability, the CA-38 establishes a new standard of comparison. Like all SSB from CAI it comes with a 3 year guarantee. For more information and the name of a nearby dealer, write:

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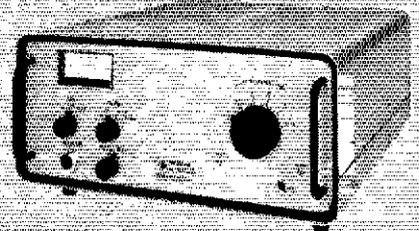
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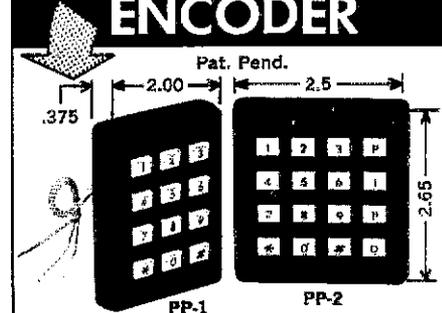
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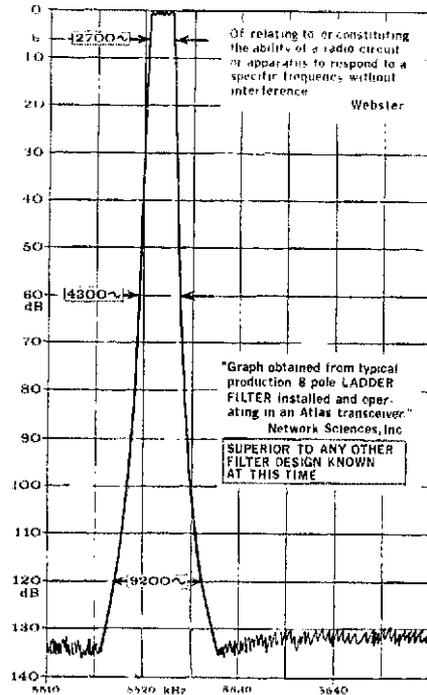
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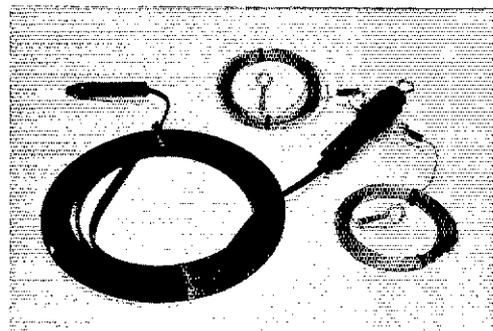
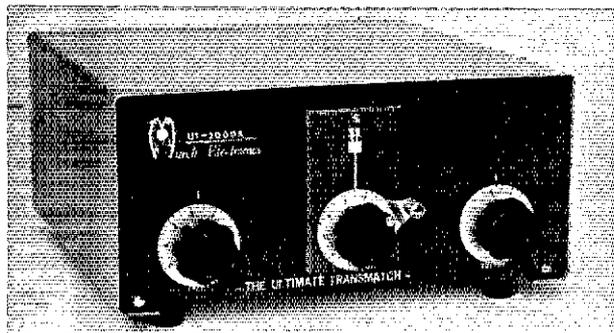
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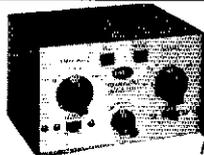
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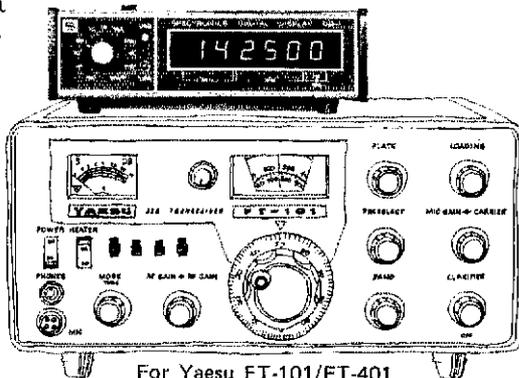
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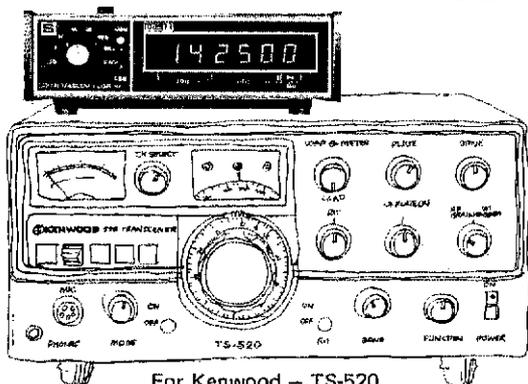
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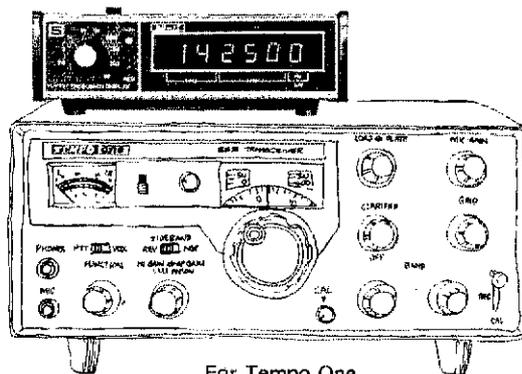
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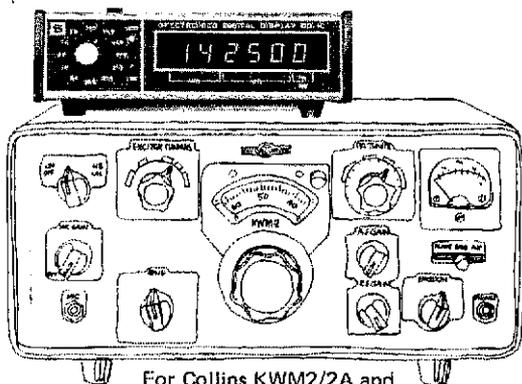
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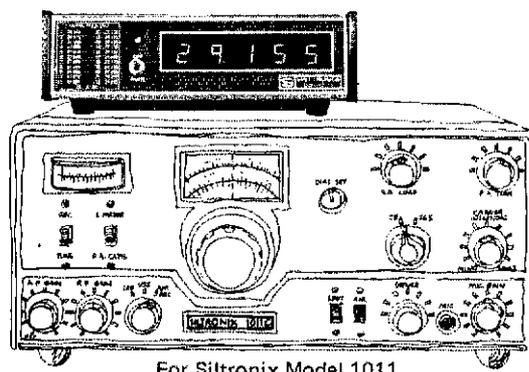
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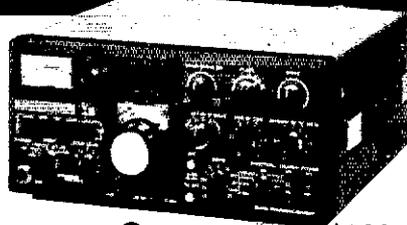
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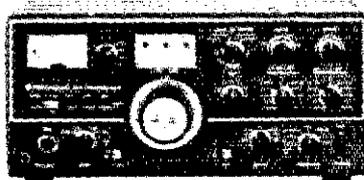
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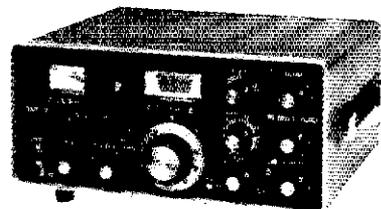
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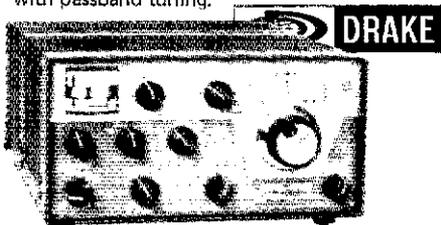
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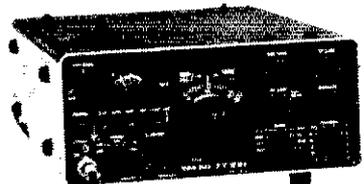
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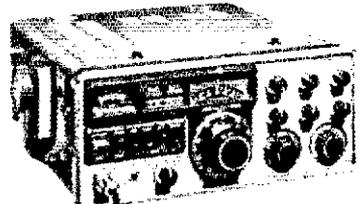
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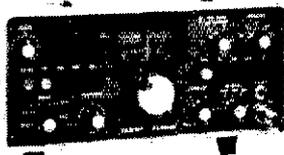
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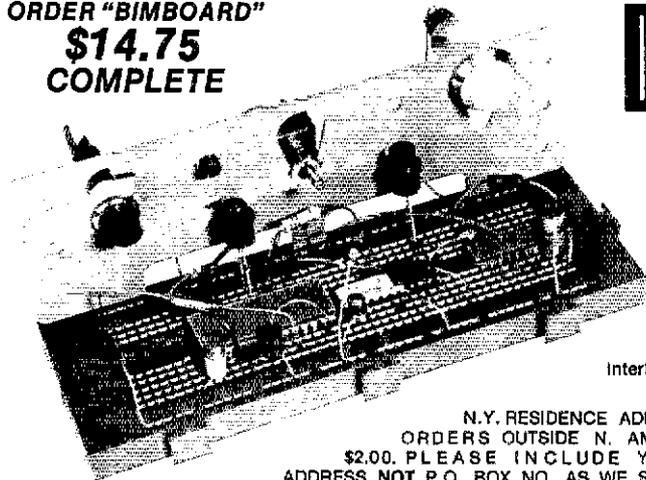
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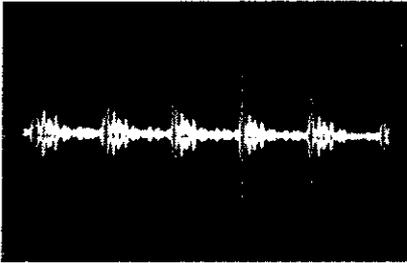
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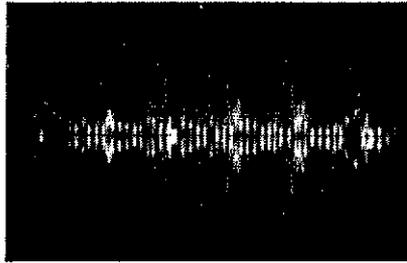
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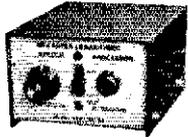


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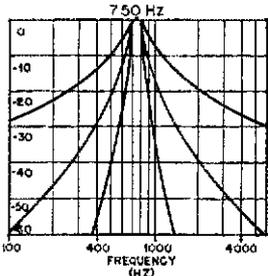


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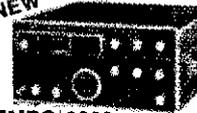
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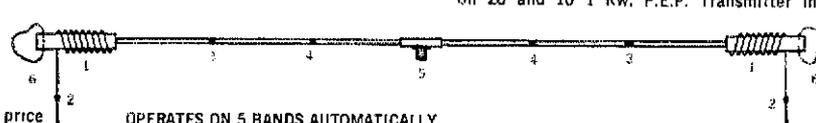
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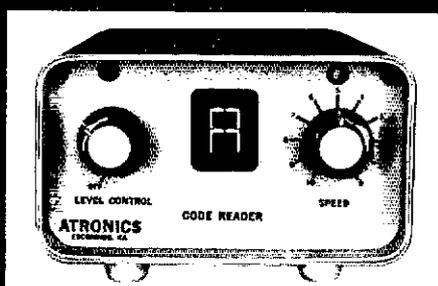
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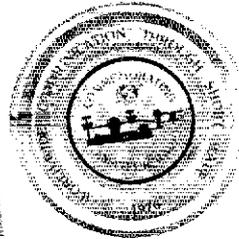
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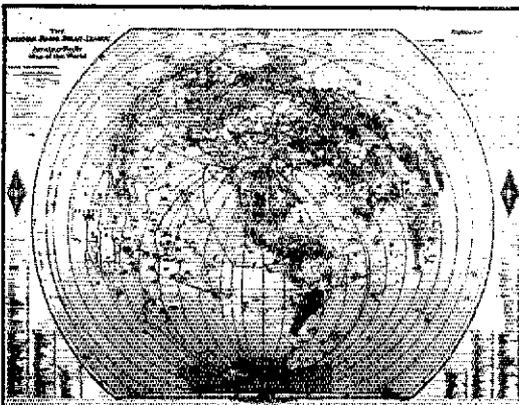
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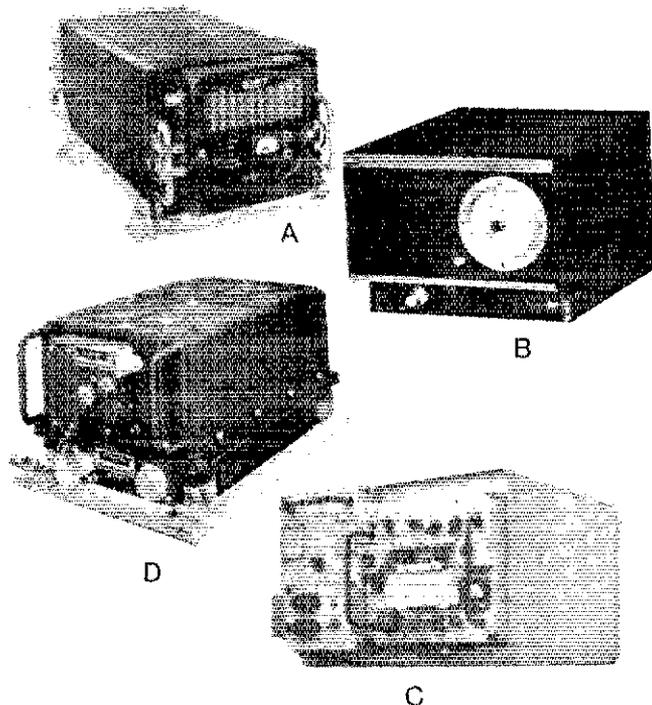
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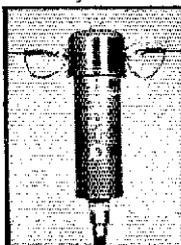
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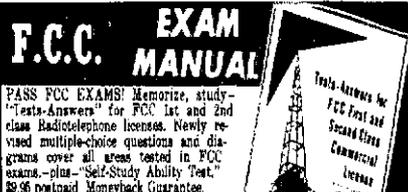
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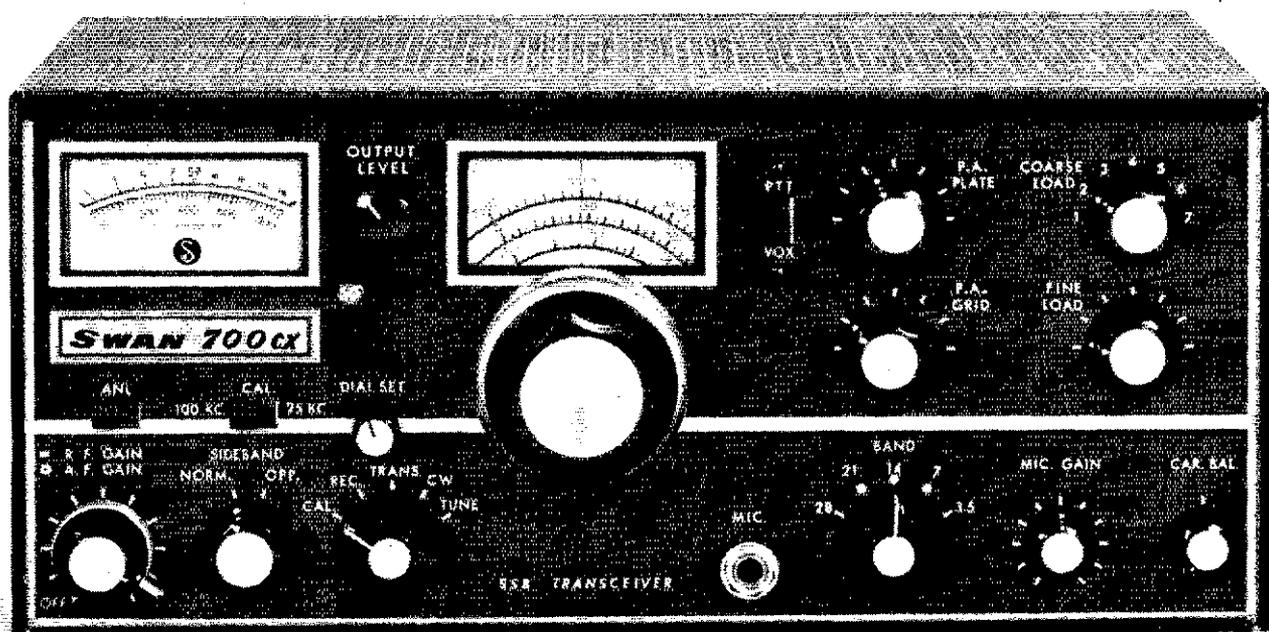
700CX Champion Transceiver.....	\$649.95
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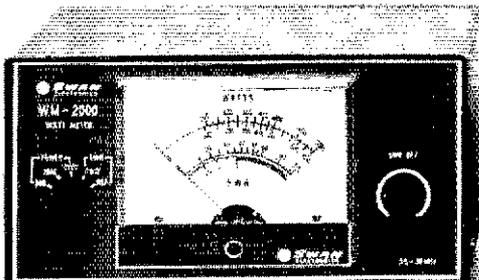


# SWAN METERS HELP YOU GET IT ALL TOGETHER

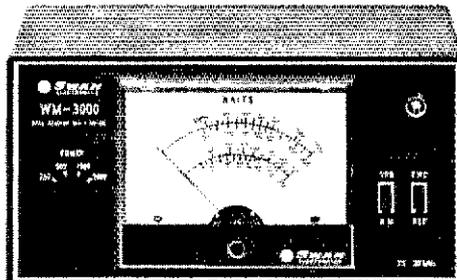
These wattmeters tell you what's going on.

With one of these in-line wattmeters you'll know if you're getting it all together all the time. Need high accuracy? High power handling? Peak

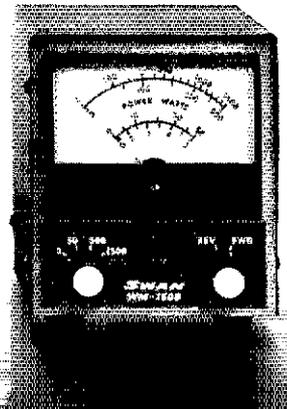
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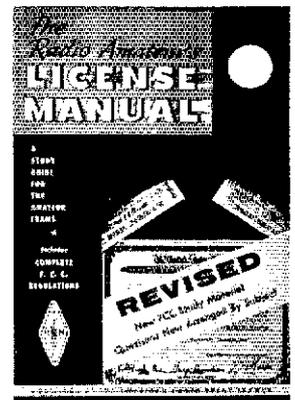


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621 VHF VFO	TR-4C/NB Xcvr	459	FPM-300 Xcvr	349
<b>ATLAS</b>	RV-6 Remote VFO	69	P-26 AC supply	45
180 160-20m Xcvr	T-4X Transmitter	339	SR-42A 2m Xcvr	89
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144 2m FM Xcvr	WV-4 VHF wattmeter	59	HQ-145XC SW Rcvr	179
<b>CENTRAL ELECTRONICS</b>	TR-22 2m FM Xcvr	149	HQ-170 Ham Rcvr	149
10A Exciter	TR-72 2m FM Xcvr	175	HQ-170C Ham Rcvr	159
20A Exciter	<b>DYCOMM</b>		HQ-180 SW Rcvr	259
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22'er 2m AM Xcvr	500E 2m FM amp	39	HX-50A Transmitter	199
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418 DC supply/mod	720 Transmitter	\$ 49	HR-20 Ham Rcvr	69
Zeus VHF Xcvt	730 Modulator	39	HR-20 Ham Rcvr	149
Interceptor VHF Rcvr	753 Xcvr	129	SB-300 Ham Rcvr	199
Interceptor B VHF Rcvr	717 Keyer	49	SB-301 Ham Rcvr	229
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75A-4 Ham Rcvr 2973	GT-550A Xcvr	299	SB-401 Transmitter	249
75S-1 Ham Rcvr	AC-35 AC supply	69	HA-10 Linear	175
75S-2 Ham Rcvr	AC-400 AC supply	75	HW-10 6m Xcvt	99
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75S-3B Ham Rcvr	RV-1 Remote VFO	59	SB-100 Xcvt	299
75S-38 Rcvr (round)	RV-550 Remote VFO	69	SB-650 Freq display	149
32S-1 Transmitter	VX-35C VOX	15	HW-30 2w'er Xcvt	34
32S-3 Xcvt (round)	CA-25 Xtal cal	15	HW-17 2m AM Xcvt	89
30L-1 Linear	SC-35 Speaker	12	HWA-17-1 DC supply	9
312B-4 Station control	SC-550 Speaker	12	HW-17-2 FM adaptor	24
KWM-1 20-10m Xcvt	DAC-35 Deluxe console	75	HP-10 DC supply	24
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516F-2 AC supply	R-1530 SW Rcvr	1195	HP-20 AC supply	54
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361D-2 Mount	Ham-Pak	19	HP-23B AC supply	54
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<b>COMM TECH</b>	Comm IV 6m Xcvt	119	IC-22 2m FM Xcvt	149
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R-4 Ham Rcvr	SX-111 Ham Rcvr	139	6N2 VFO VHF VFO	39
R-4A Ham Rcvr	SX-122 Ham Rcvr	225	<b>KLM</b>	
R-4B Ham Rcvr	HT-32 Transmitter	179	Multi-2000A 2m Xcvt	\$450
FL-6000 Filter	HT-40 Transmitter	49	Echo II 2m SSB Xcvt	279
MS-4 Speaker	HT-44 Transmitter	159	<b>KENWOOD</b>	
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SCC-4 Xtal cal	SR-160 80-20m Xcvt	169	PS 900 AC supply	89
SC-6 6m conv	PS-150 120 AC supply	75	TS-700A 2m Xcvt	525
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Mk II Linear	\$275		1200X Linear	199	Triton II Xcvt	449	
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HR-2B 2m FM Xcvt	169		500CX Xcvt	369	262 AC supply/VOX	99	
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HR-2MS 2m FM Xcvt	199		117X AC supply	65	315 Ham Rcvr	169	
HRT-2 2m FM HT	129		117XC AC supply/spkr	95	<b>VARITRONICS</b>		
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SBZ-CW Codaptor	29		FM-1210A 2m FM, ps	229			
SB-450 450 FM Xcvt	199		VX-2 VOX	34			

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144 2m FM Xcvt NEW	\$650 499	300B 80-10m Xcvt w/ps	\$569 469
<b>CLEGG</b>	reg. NOW	300B/SS16 16-pole filter	639 539
031 8A 12v supply, spkr	\$ 89 69	500CX 80-10m Xcvt	529 439
<b>COLLINS</b>	reg. NOW	508 Remote VFO	269 169
30L-1 1kw PEP linear	\$973 681	160X 160m Xcvt	469 369
<b>COMCRAFT</b>	reg. NOW	117XC AC supply/spkr	159 129
CS1-50 2m/220 FM Xcvt	\$869 699	117X Basic AC supply	114 89
<b>DRAKE</b>	reg. NOW	SS-100 80-10m Xcvt	599 489
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L-4B 80-10m linear	895 749	SS-208 Remote VFO	269 169
TR-72 10w 2m FM Xcvt	320 189	MB-80 80m Xcvt	299 225
TR-22C 1w 2m FM Xcvt	229 179	MB-80A 80m Xcvt	329 249
RV-6 Remote VFO for TR-6	110 89	MB-40A 40m Xcvt	329 249
SCC-1 VHF calibrator	26 19	P.1215A AC supply	75 69
CC-1 Converter console	49 39	600R 80-10m Rcvr	439 349
TR-22M 1w Marine Xcvt	249 149	600R Custom Rcvr	599 449
SSR-1 Shortwave Rcvr	350 299	600R Custom USE0*	599 399
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500D 2m FM amp, 12/50w	99 75	600T 80-10m Xcvt	649 449
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10-0 2m FM amp, 10/100w	209 149	FM-2XA 2m FM Xcvt/ps	249 159
P-1405 6A 12V supply	65 49	FM-1210A 2m FM Xcvt	319 199
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<b>KLM</b>	reg. NOW	*Factory reconditioned - with new warranty.	
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274 80-10m linear	\$995 795	PM-2 QRP CW Xcvt	69 39
770 160-10m linear	2995 2495	RX-10 80-15m Rcvr	59 29
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752K DC supply kit	79 39	Triton I 80-10m Xcvt	579 449
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<b>REGENCY</b>	reg. NOW	FM-20M Mobile 10w 2m amp	150 39
HR-212 2m FM Xcvt	\$259 199	FM-208M As above, but AC	235 59
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<b>STANDARD</b>	reg. NOW	FV-101 Remote VFO	99 89
146A 2w 2m FM HT	\$298 229	FT-2FB 2m FM Xcvt	239 159
146 1w 2m FM HT DEMO	279 179	FT-2 Auto 2m FM Xcvt/scan	479 229
Horizon 2 2m FM Xcvt	298 199	FR-101S 160-10m Rcvr	489 425
		FR 101 Digital Rcvr	629 575
		FL-101 160 10m Xcvt	545 499

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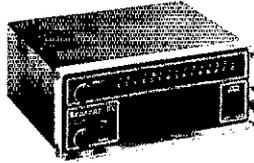
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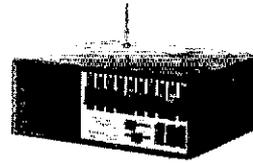
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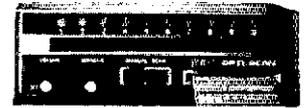
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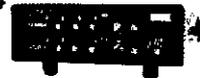
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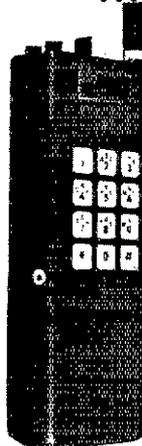


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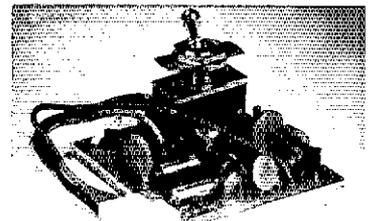
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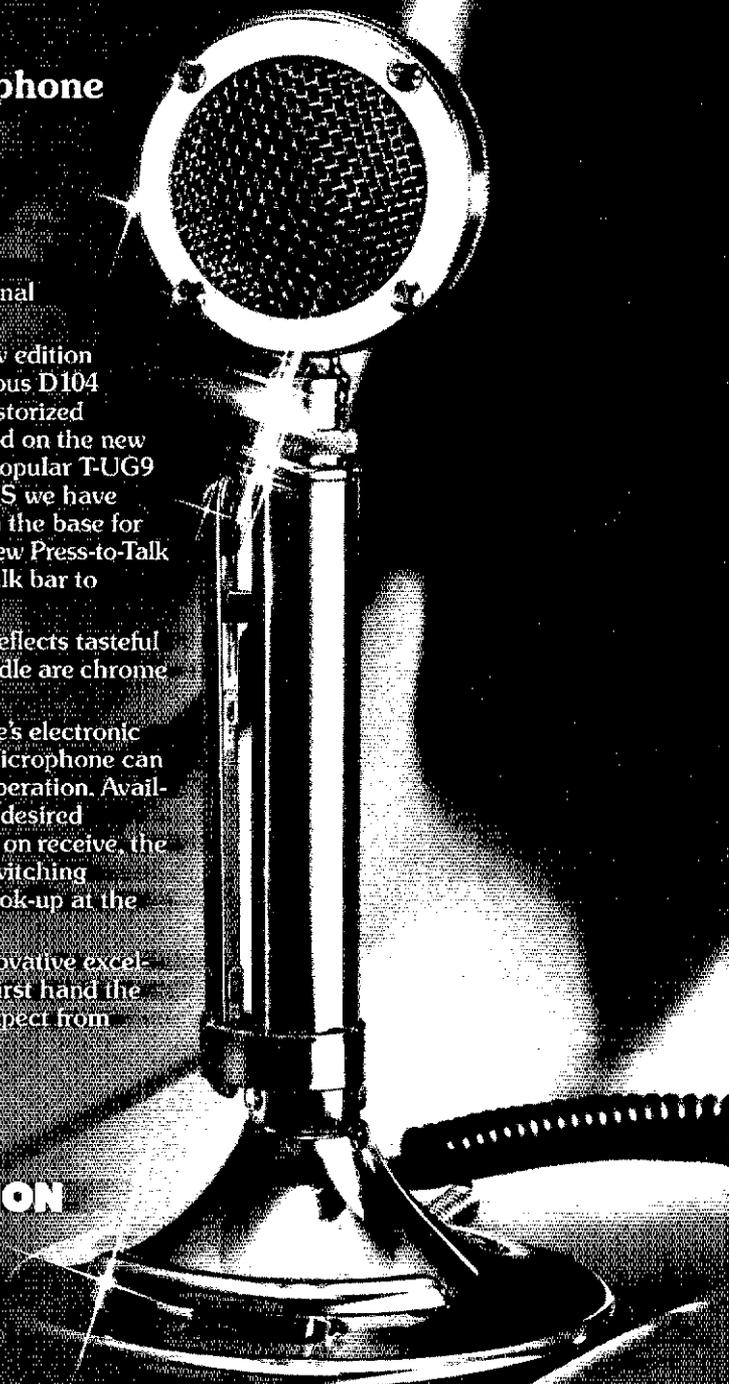
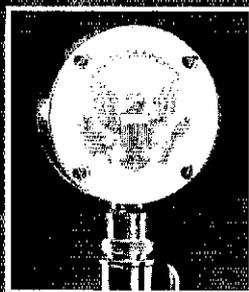
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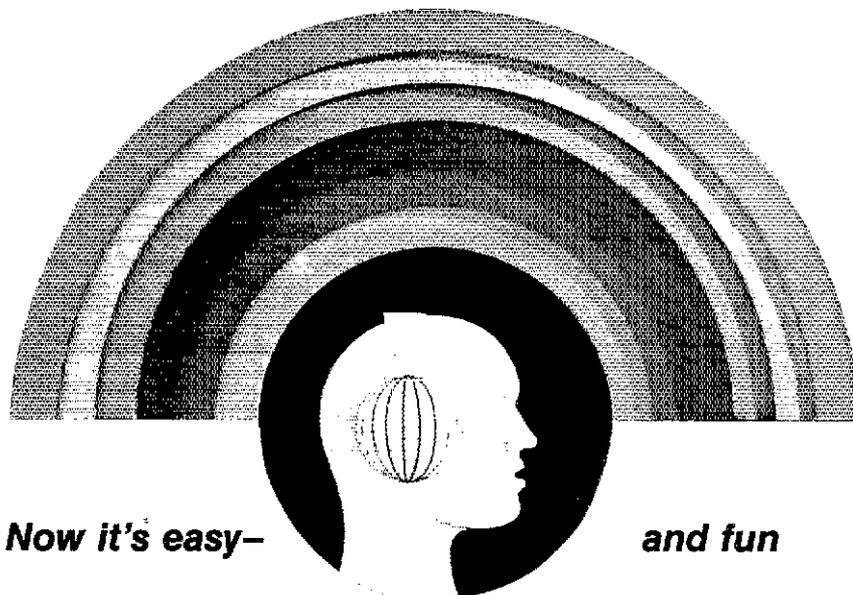


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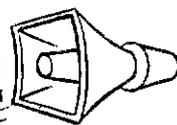
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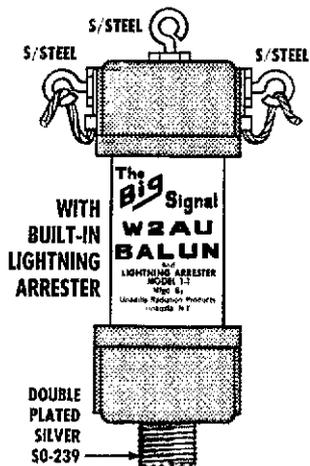
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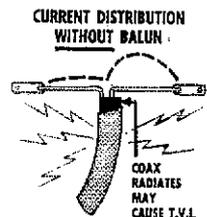
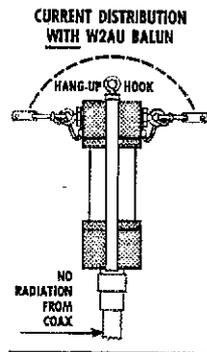
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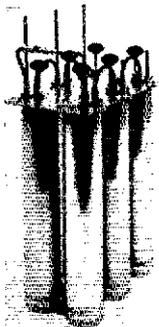
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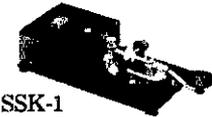
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310-003



322-001



SSK-1

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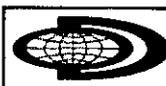
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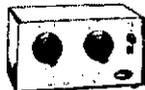
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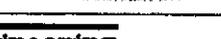
## why waste watts?



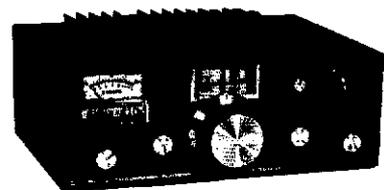
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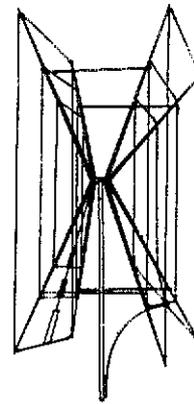
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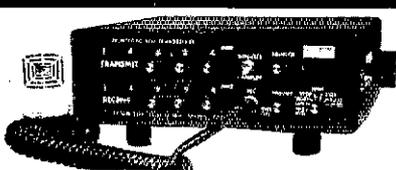
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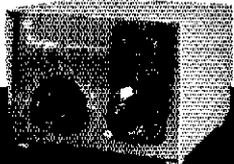
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**1995**

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SN7402	.22 .23	SN7496	.86 .87
SN7403	.22 .23	SN74125	1.29 1.30
SN7404	.24 .28	SN74126	1.29 1.30
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SN7408	.22 .23	SN74141	1.12 1.13
SN7409	.52 .53	SN74145	1.93 1.94
SN7410	.22 .23	SN74146	3.25 3.26
SN7411	.27 .28	SN74150	1.12 1.13
SN7417	.62 .63	SN74152	1.10 1.11
SN7420	.22 .23	SN74154	1.53 1.54
SN7422	.32 .33	SN74175	1.45 1.46
SN7423	.47 .48	SN74176	1.59 1.60
SN7426	.37 .38	SN74180	1.59 1.60
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SN7432	.32 .33	SN74184	1.79 1.80
SN7440	.22 .23	SN74186	2.75 2.76
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SN7446	1.10 1.11	SN74198	.89 .90
SN7447	1.10 1.11	SN74199	2.19 2.20
SN7448	1.10 1.11	SN74199A	2.25 2.26
SN7450	.22 .23	SN74199B	2.25 2.26
SN7451	.27 .28		
SN7457	.64 .65		
SN7475	1.00 1.01		
SN7483	.99 1.00		
SN7485	1.41 1.42		
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10M2989	1103	1.50	1.51
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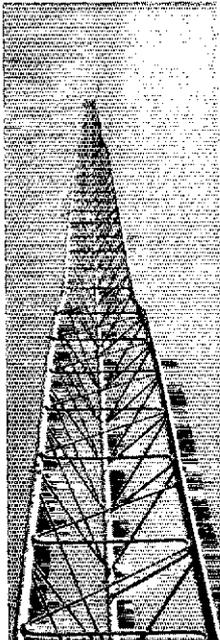
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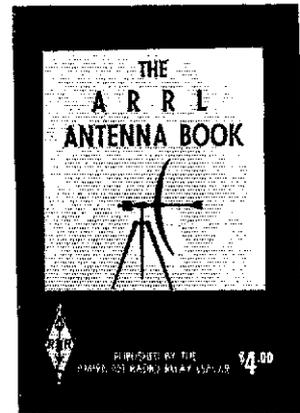
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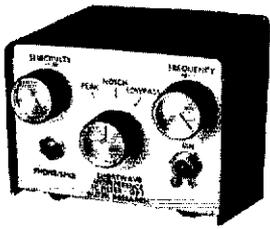
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WIDOW'S Sale (late W9DFM). Near new complete Yaseu station. Consists of FT-101 (10 to 80 meters including CB band), one FV-101 remote VFO, and one FL-2000 (1200-watt) linear. Mint condition, used less than two hours total use. In original cartons. First certified check for \$749.50 gets the complete station. Will pay up to \$10 on shipping charges. For more details call 477-3225, or write W9BOB Box 82209, Lincoln NE 68501.

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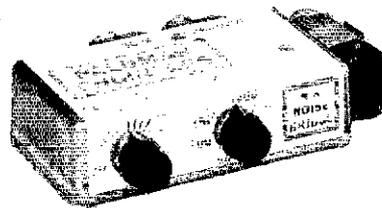
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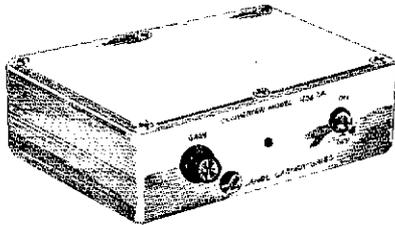
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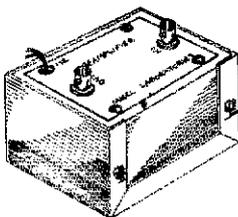
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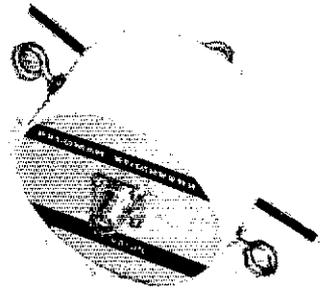
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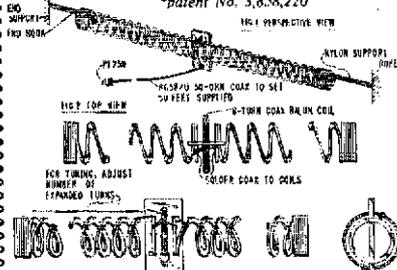
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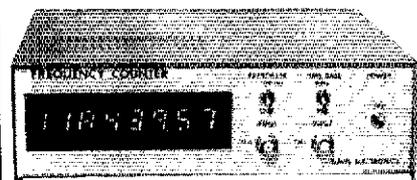
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GONSET Sidewinter — \$150, KLH Echo II, new — \$295; Polycomm 2 — \$110. All mint condition in original cartons. 209-477-0536, Milne.

WANTED: Allied SX-190 receiver SB200/FL2100B. WA50XK, 504-394-8851.

FOR SALE: Drake R-4C, 4NB Noise Blanker, 500 and 1500 cycles crystal filters — \$475; Drake T-4XC, DX Engineering plus in Speech Processor, spare set new matched finals, spare new plug in relay — \$460; Drake AC-4 power supply — \$75. All excellent condition. Certified or cashiers check, I'll pay shipping via UPS. Allan Moser, W7GYR, Rt. 1, Box 16, Samuels ID 83862, 208-263-3726.

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HEATH 1M11 FET VOM bench & port, factory cal., wide range — \$55; RCA W091C oscilloscope 5 in. direct inputs, never used — \$65; Heath GR78 SWL receiver, fact. aligned, great buy must go — \$110. All units new cond. Neil, WB6CRP, 415-326-0705.

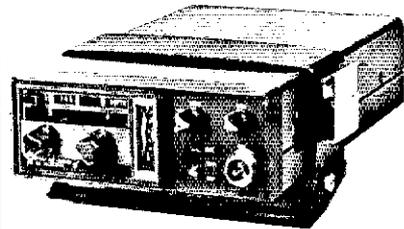
NEED Collins help — have R388, needs VFO help, also need info on product detector. Neil, WB6CRP, 415-326-0705, leave number.

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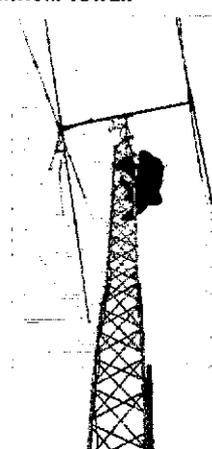
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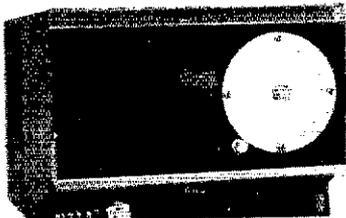
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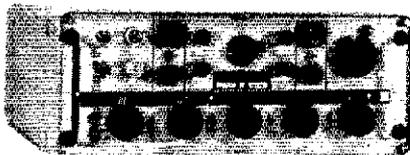
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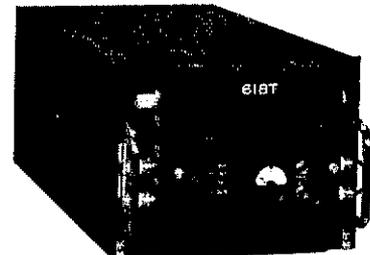
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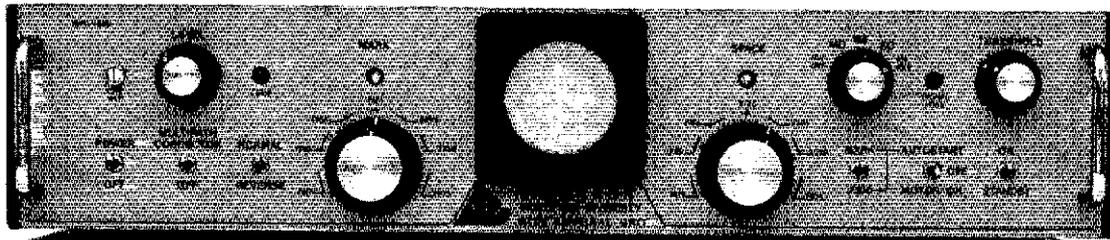
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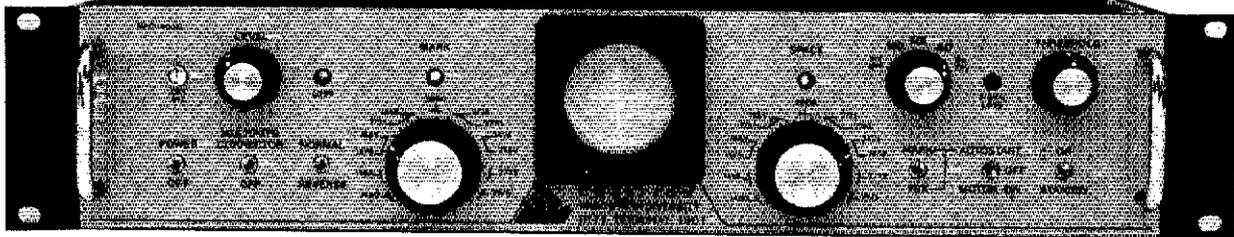
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# THE AUTOMATIC "E" BY DOVETRON



AMATEUR  
MPC-1000  
\$495.00\*



COMMERCIAL  
MPC-1000C  
\$795.00\*\*

Our sixth generation RTTY TERMINAL UNIT (E-Series) is truly automatic, whether it is the Amateur MPC-1000, the Commercial MPC-1000C or the latest MPC-1000R REGENERATIVE model.

MULTIPATH CORRECTION (a Dovetron exclusive) and IN-BAND DIVERSITY operation are fully automatic, as is the CRT dot deflection circuit and the new AUTO-THRESHOLD control.

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Another new feature, KEYBOARD ACTUATED AUTOSTART, provides local motor-start by merely depressing the keyboard's Break button, permitting fast message retrieval and full autostart operation even in split-site installations.

A Dovetron TSR-100 SPEED CONVERTER-REGENERATOR may be mounted inside to provide regeneration of all incoming and outgoing signals to less than 1% bias distortion. Its 80 character Ripple MEMORY provides a full line of storage, complete

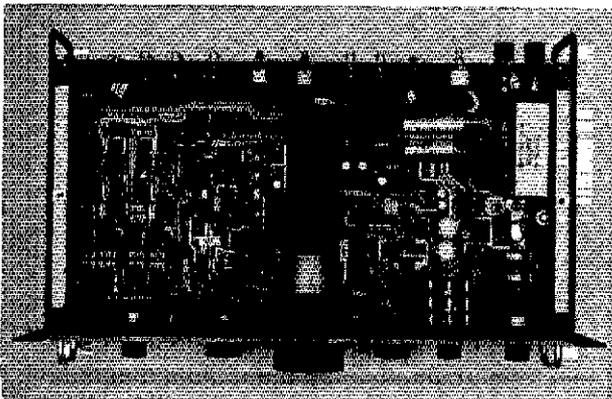
with Preload and Recirculate functions. The crystal-controlled Dual-Clock permits up-down speed conversion of 60, 67, 75, 100 WPM Baudot and 110 Baud ASCII signals.

A variable Stop-pulse control permits slower-than-machine-speed operation and a unique over-ride circuit prevents over-runs when down-converting from one Baud rate to another. Automatic Start-pulses may be generated for repetitious transmission of the BLANK character during long marking periods, and may be used for phasing crypto peripherals.

The MPC-1000R is the logical combination of the MPC-1000C and the TSR-100. Front panel controls are provided for speed selection, exercising the Memory functions and selecting one of three preset tone-shift combinations of the AFSK tone keyer. Two front panel LEDs indicate the status of the Ripple Memory.

The 12 month warranty applies on land, on sea or in the air.

An inquiry on your letterhead (or QSL card) will bring complete specifications, or call 213-682-3705.



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\*CIA to amateurs only.  
\*\*OEM discounts available.

Specifications and prices  
subject to change without notice.



# NEWS

# BULLETIN

## WE'VE GOT GOOD NEWS FOR YOU !!

**DEAR OM:** It has oftentimes been said that "NO NEWS IS GOOD NEWS" or that "THERE IS NO NEWS LIKE GOOD NEWS!" Whatever the case, if you haven't yet heard the "GOOD NEWS" about BURGHARDT AMATEUR CENTER in Watertown, South Dakota — of all places!! — then you don't know what you've been missing, and that could well be classified as BAD NEWS!!

To begin with, at BURGHARDT AMATEUR CENTER, our whole structure of business is built upon a solid foundation of FRIENDSHIP and PERSONAL SERVICE. We do not pretend to be "BIG OPERATORS" or "WHEELER DEALERS" as this would defeat our whole purpose in giving YOU — our customer — the kind of FAST, DEPENDABLE SERVICE that you would expect — AND YOU GET!! — from a company whose reputation as "AMERICA'S MOST RELIABLE AMATEUR RADIO DEALER" is on the line every day of the year.

On the otherhand, we are by no means a small nor inexperienced outfit dealing on the fringes of the amateur radio market. In fact, Stan Burghardt, WØIT, has been serving the nation as your DIRECT LINE to every major manufacturer of ham radio equipment since the fall of 1937 — offering his customers the LATEST and the BEST in new amateur gear from our central location here in the Midwest. And, today we are still STOCKING & SELLING and GUARANTEEING & SERVICING all of the familiar brand names that are a factor in the amateur market, and we carry a complete line of accessories to fill virtually every ham need as well — but then, WHO DOESN'T??? And, WHAT ELSE IS NEW???

### FAST DELIVERY

Others have surely claimed it — but do you get it??? We ALWAYS ship your order the SAME DAY it arrives — unless for some GOOD REASON we are unable to supply the item from stock. Factory back-orders in recent months have made it a real challenge to keep many of the fast-moving NEW MODELS on hand, but we're doing ALL WE CAN to stay on top of things and keep you advised as to probable delivery schedules based on what information we have. In the event of ANY delay — however slight — you can count on us to notify you promptly and advise you SPECIFICALLY when we can & WILL deliver your order.

### HONEST DEALING

We'll be honest with you RIGHT FROM THE START!! We ARE in this business to make a living — but we don't intend to make it at YOUR expense. Our prices on new & used equipment are "down to earth" and squarely reflect the REALISTIC VALUE of the merchandise. Remember, we're licensed ham operators too, and if we cannot "honestly" admit to ourselves that we'd pay so much for a particular item — then you won't have to pay that price either!! When a TRADE-IN is involved — YES!! WE DO TAKE TRADES (both on new & used gear)!! — you'll always receive OUR top-dollar allowance for your gear. We know what the various items of used gear are worth on the resale market, and our STRAIGHT-FORWARD quotes will always speak for themselves.

### WE'RE FOR REAL!!

There's No Doubt About It!

WRITE TODAY FOR OUR LATEST BULLETIN/USED EQUIPMENT LIST!!

### DEPENDABLE SERVICE

We service WHAT WE SELL — and many that we don't!! OUR POLICY on the handling of defective merchandise is well known to those who have dealt with us before. Any and ALL complaints are handled PROMPTLY and EFFICIENTLY by our well-staffed SERVICE department with your COMPLETE SATISFACTION in mind. We are only human, and admittedly, we DO make mistakes — but failing to correct any errors for which we are responsible, is the one mistake we NEVER make. When we say "SERVICE with a smile" — we MEAN IT!!! — and it's YOUR smile that we're after.

### PERSONAL TOUCH

When you deal with us, you ALWAYS receive our prompt, PERSONAL ATTENTION and INDIVIDUAL CONCERN!! Each and every letter and phone call puts you in INSTANT TOUCH with someone who is ready, willing and able to give your order or inquiry his undivided attention — not put you on "HOLD!" We approach every transaction with a fresh frame of mind, and you'll never catch us using any stereotyped methods to handle your requests. We know that Watertown "ain't exactly the cornerstone of civilization — but we are ON THE MAP, and we'll go a LONG-LONG way to take VERY GOOD care of you and make you feel "WELCOME!" Remember, OM, ham radio is our only business and we're here to serve YOU!!!

### "THE BEST DEAL"

We realize that we will no doubt be "undersold" most of the time — insofar as the "price" goes — but we want you to be AWARE (before you buy!!) that there is much, much more to a "GOOD DEAL" than just the lowest price. In the final analysis, it's the reputation of the dealer standing behind your purchase that's worth as much or more than the quality of the product itself. And that is WHY at BURGHARDT AMATEUR CENTER . . . "S-E-R-V-I-C-E" is our MOST IMPORTANT product — both technical service that you can RELY ON, and PERSONAL service that you can COUNT ON — and in terms of dollars & cents, these will NEVER be discounted.

In conclusion, your CONFIDENCE in us is our MOST IMPORTANT asset. We APPRECIATE the opportunity to serve YOU, and we look forward to each & every opportunity to do so. When it comes to FAST DELIVERY, HONEST DEALING and DEPENDABLE SERVICE, we don't just "advertise it" — WE GIVE IT!!

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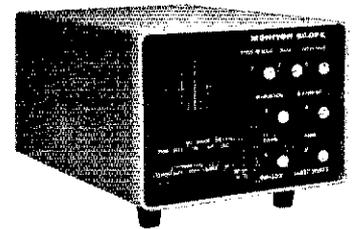
## Total Spectrum Coverage from 160 thru 2 Meters



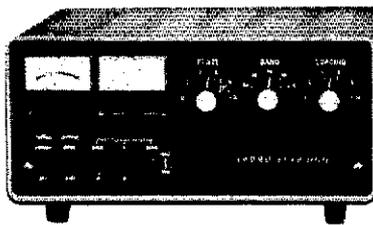
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DIGITAL DISPLAY UNIT



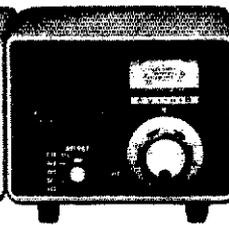
FT-101E  
TRANSCEIVER



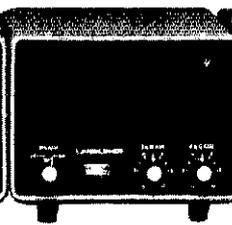
YO-100  
MONITOR SCOPE



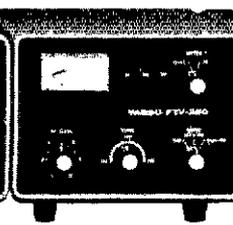
FL-2100B  
LINEAR AMPLIFIER



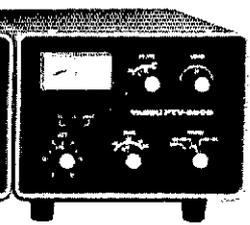
FV-101B  
EXTERNAL VFO



SP-101PB  
PHONE PATCH SPKR.



FTV-250  
2-M TRANSVERTER

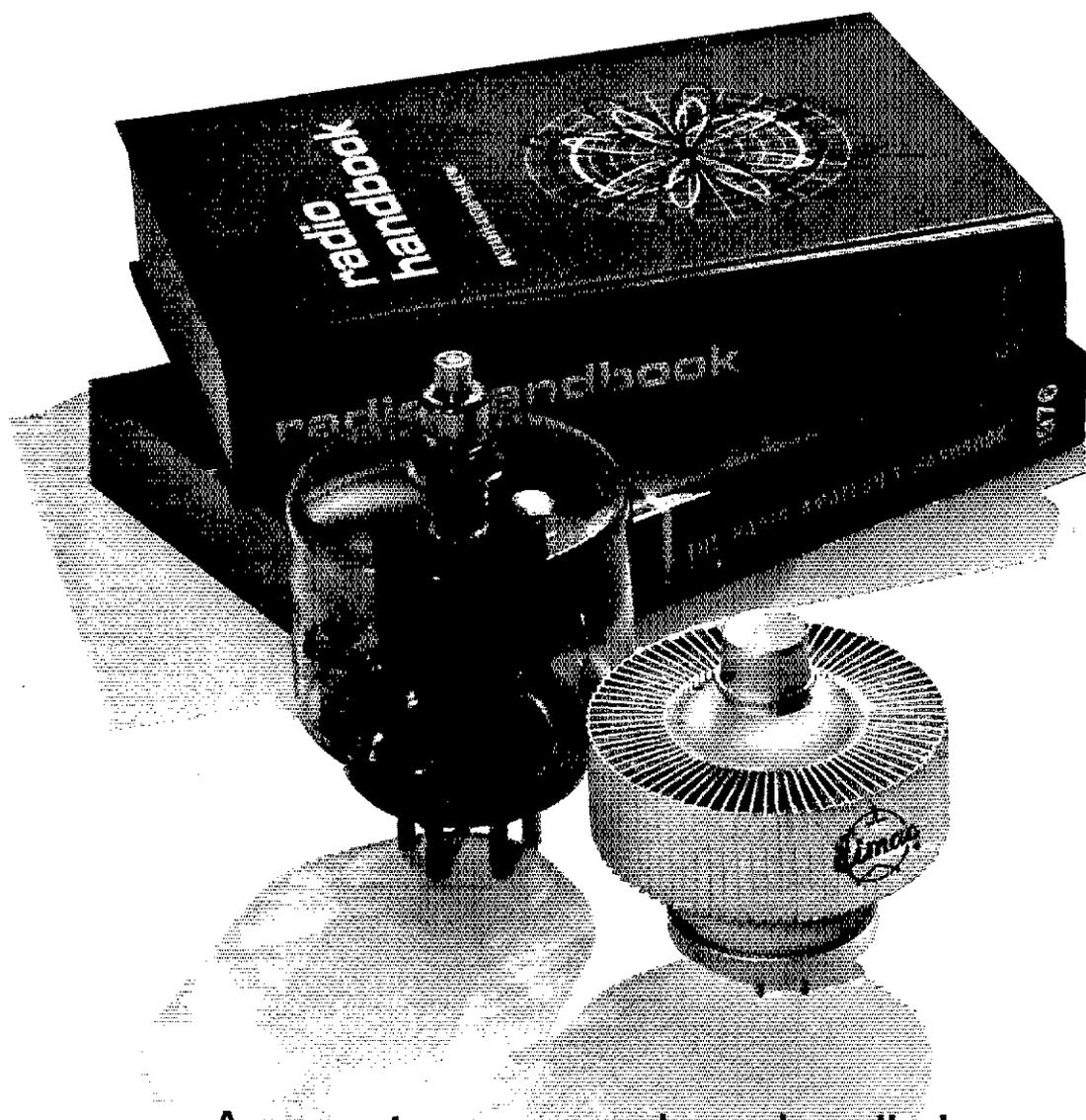


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ing the 3-500Z, 8873, 4CX250B and 3CX100A5. And there's plenty of information about design and construction of transmitting equipment using EIMAC power tubes in both handbooks.

For tube information, contact Varian, EIMAC Division, 301 Industrial Way, San Carlos, California 94070. Or contact any of the more than 30 Varian Electron Device Group Sales Offices throughout the world.

