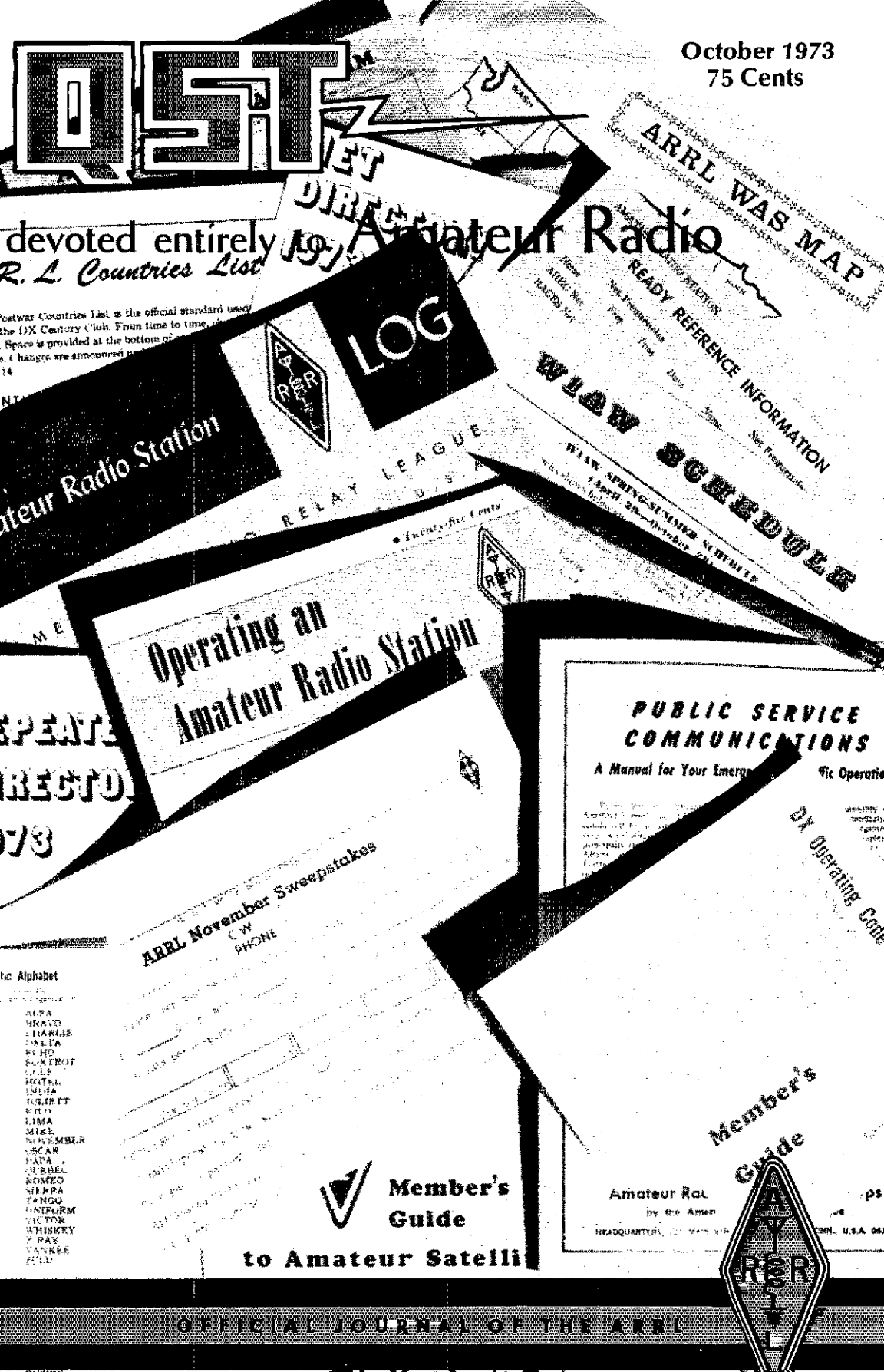
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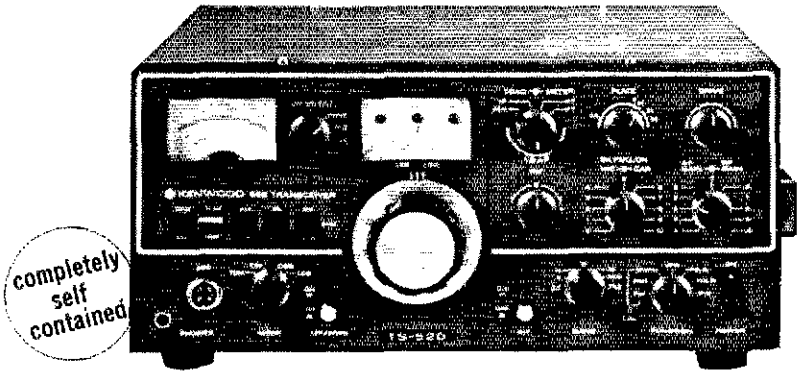
an exciting addition to the magnificent Kenwood line...



The New TS-520 Transceiver

The new TS-520 is the tranceiver you have wanted, but could not buy until now A no-compromise, do everything, go everywhere 5 band transceiver for SSB o CW that performs equally well at home, in an automobile, airplane, boat or trailer The top of the line TS-900 and the superb R-599A Receiver and T-599A Transmitter are already well known to all amateurs. Now the TS-520 fills out the line offering the famous Kenwood quality and reliability at a price most amateurs can afford.

☆ **Here are 30 special reasons you will want to own a TS-520. After you have operated one, you will doubtless give us 30 more why you're glad you own one.** ☆

1. **Built-in AC power supply**
2. **Built-in 12 volt DC power supply**
3. Built-in VOX with adjustable gain, delay and anti VOX
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5. Ultra stable FET linear VFO
6. Built-in noise blanker
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11. Break-in CW with sidetone
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15. Built-in speaker
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17. Amplified ALC
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19. Maximum TVI protection
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21. Provisions for use with a VHF transverter
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23. Selectable SSB
24. Selectable AGC operation for different modes
25. VFO indicator light
26. Built-in selectable ALC action for speech processing
27. Carrying handle
28. Rugged 6146 type final tubes
29. Internal cross-channel operation.
30. Push button WWV reception

Proven Kenwood quality and reliability
The Price: $599.00
subject to change without notice.

Accessories: External VFO-(VFO-520), External speaker - (SP-520), CW Filter - (CW-520)

Available from Kenwood dealers throughout the U.S.

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MODEL DGA-2M

$29.50 postpaid in U.S.A.

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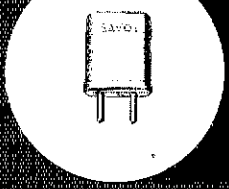

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FOR OVER 30 YEARS

Either type for amateur VHF in Regency, Swan, Standard, Drake, Varitronics, Tempo, Yaesu, Galaxy, Trio, Sonar, Clegg, SBE, Genave.

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Complete packaged multi-band antenna systems employing the famous Bassett Sealed Resonators and Balun from which air has been removed and replaced with pure helium at one atmosphere. Operating bands are indicated by model designation.

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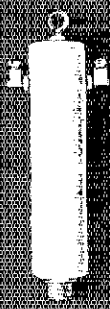
BASSETT VACUUM BALUN



The famous sealed helium filled Balun employed with the DGA Series Antenna Systems. Solderless center insulator and easily handles more than full legal power while reducing unwanted coax radiation. Equipped with a special SO 239 type coax connector and available either 1:1 or 4:1.

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P.O. Box 5727 - Fort Lauderdale, Florida - 33310

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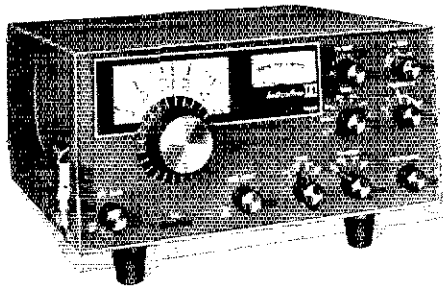
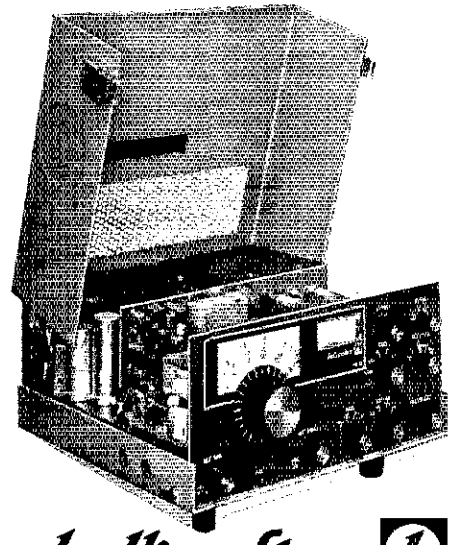
Hallicrafters' all-american made FPM-300, Mark II "Safari" SSB/CW transceiver is Q5... from the Mauritania solar eclipse expeditions to a famous raft adventure in the Atlantic.

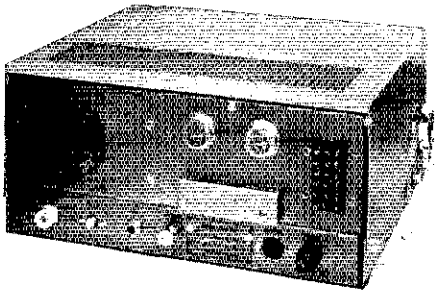


Proven design in the tradition of the HT-37 and solid-state dependability are combined in this compact transceiver featuring state-of-the-art FET's, hot carrier diodes and bi-polar transistors for peak, reliable performance for only $625.

Some of the high performance specifications are:

- Designed for fixed, portable and mobile use
- Equipped with a self-contained Universal AC and DC power supply system
- Compact dimensions (HWD) 5½ x 12 x 11 inches
- Weight: 25 pounds
- Tuning ranges: 8-600 kHz Bands, 80-10 meters
- Built-in speaker
- Power requirements: 117 V or 234 V 50/60 AC; 13.4 VDC negative ground
- Modes: Selectable Upper or Lower Sideband-CW or RTTY
- Type of service: continuous operation with 2-tone S SB-CW-RTTY (50% duty cycle)
- Power Output: 125 Watts P.E.P. (Nominal) into 50 ohms
- Receiver Sensitivity: Less than 1 uV for 15 db SN Ratio
- Selectivity: 2.0 kHz
- Receiver IM: 60 db below 2 equal 10MV signals
- Receiver Image and IF Rejection: Greater than 60 db.
- Internal Receiver Spurious: Less than equivalent 1 Microvolt Signal
- Transmitter IM: 30 db below P.E.P. (26db below one of two equal tones)
- Adjacent Channel Desensitizing: 3 db with greater than 10,000 MV
- Sideband Suppression: -50 db minimum @ 1 kHz
- AF Power Output: 2 watts
- Stability: 100 Hz after warmup. Max. 100 with 10% line voltage change
- Frequency Readout: Within 1 kHz ± 100 kHz of Cal. Point not more than 3 kHz across entire 500 KC Band
- Break-In CW: Semi-Automatic
- CW Sidetone
- Audio Frequency Response: 500-2500 Hz Nominal
- AALC: 12 db Compression
- AGC Figure of Merit: 60 db minimum
- Crystal Calibrator: Provides 25 kHz Calibration Signals
- Optional Accessories: MR-300 Mobile Installation Kit; HA-60 Blower Fan Kit, works on AC or 12VDC





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OCTOBER 1973

VOLUME LVII NUMBER 10

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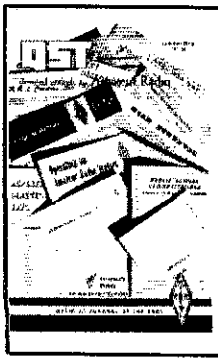

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SP101-P $59.00
SP101 19.00

FV101 $99.00
160M THROUGH 10M

FT101 $649.00
TRANSCVR 260W PEP

FL2100B $339.00
8MM THROUGH 10M
1200W PEP

The SP101-P Landliner provides phone patch operation as well as speaker. Front panel: Patch switch, meter, TX and RX gain controls. Rear apron: Receiver 4 ohm output, receiver 600 ohm output, monitor null switch, balance control, line jack, transmitter high Z jack.

The FV-101 permits split frequency operation and control from either the FT-101 or FTDX401.

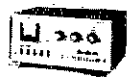
The FT-101 exciter covers 160, 80, 40, 20, 15, (CB), and 10 meters and comes complete with microphone cable and plug, fused DC power cable and plug. AC cable with plugs and all necessary plugs are furnished. AC and DC supplies are internal.

The FL-2100 linear amplifier needs only 3 wire cable and coax cable. Connectors are furnished.

FTDX401 $599.00
TRANSCVR 560W PEP

FV401 $99.00
EXTERNAL VFO
80M THROUGH 10M

FL2000B $399.00
LINEAR AMP
1200W PEP



FRDX400 $299.00
RECEIVER
160M THROUGH 10M

FTdx401 features high power, super sensitivity and sharp selectivity. The FTdx401 includes: AC power supply, noise blanker, 100 KC and 25 KC calibrators, VOX break-in, phone patch terminal, cooling fan. Covers 3.5 through 10 MHz plus WWV. 560 watts PEP. All that is required to get on the air is a microphone and speaker.

The FV-401 permits split frequency operation for the DX chaser or net operator. Covers 80 through 10 meters.

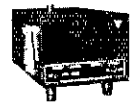
FL 2000 B 1200 watts PEP, 1000 watts CW, 600 watts AM. Drive power required 100 watts. Has two cooling fans and uses two 572 B tubes.

FLDX400 $399.00
EXCITER
80M THROUGH 10M

FL2000B $399.00
LINEAR AMP
1200W PEP

SP401-P $59.00
SP401 19.00
SPEAKER/PATCH

FP-2
AC POWER SUPPLY



FRdx400 includes 2 mechanical filters plus "T" notch rejection tuning, and clarifier for easy zero set for SSB. Crystal control 1st mixer and tunable 1st I.F. provides stable operation and high spurious rejection. 100 KC and 25 KC calibrators. VFO can be used in transceive operation in conjunction with F series transmitter.

FLdx400 operates SSB, (USB LSB selectable), AM, CW and FSK. Circuitry can be built in for RTTY operation. 240 watts PEP. VOX, PTT, and break-in CW.

FL-2000B grounded grid linear uses a pair of 572 B tubes. Plate meter VSWR monitor, 2 fans, built-in power supply. 80 through 10 meters, 1200 watts PEP with distortion product in excess of 30 DB down.

FP-2 AC power supply specifications: Output - 13.5 volts, 2 amps. AC input - 100/117/220/234 volts. Speaker - 5" x 3-1/5". Portable or home base operation can be achieved with the addition of the optional FP-2 power pack. This AC power pack provides regulated DC power for the transceiver and charging voltage for optional leak proof rechargeable colloidal type batteries. In addition, a high fidelity elliptical style speaker is built into the pack.

FT-2FB $239.00
144-148Mhz
10W HIGH 1W LOW

FT2-AUTO $379.00
144-148Mhz

The FT-2FB opens the door to noise free broadcast quality 2 meter operation, and thanks to the repeater stations throughout the country, the 2 meter band is no longer restricted to line of sight. General coverage 144 to 148 MHz, 12 channels (3 supplied). Push to talk. Receiver .3 amps, transmit 1.7 amps, power source 13.5 volts + 10%. Dimensions 6-3/8" w. x 2-1/2" h. x 10" d., weight 4 lbs. Comes with dynamic microphone, connector plug, DC cord, fuse and mobile mount.

YC355 D $289.00
DIGITAL COUNTER BUILT IN PRESCALER

Complete with
A.C. Power Cord 6 Ft.
D.C. Power Cord 6 Ft.
Signal Test Lead with
BNC Connector 3 Ft.

The FT-2 auto is a compact base or mobile VHF/FM transceiver, covering 146 to 148 MHz, featuring electronic scanning up to 8 stations between 146-148 MHz with priority channel sampling while locked on another channel. Adjustable tone burst push-button lock on for repeater actuation. The FT-2 auto is self-contained. Two power cables are supplied with the transceiver, including all mounting hardware, cables, connectors, and accessories required for both mobile and base installation, as well as dynamic push to talk microphone. Operates from various AC voltages or 13.5 DC. Dimensions 8-3/4" w. x 4-1/4" h. x 11-5/8" d. Weight 9 lbs.

SPECIFICATIONS

	YC-355D		YC-355D		YC-355D
Frequency range	5Hz to 35MHz (50Hz to 200MHz)	MAX Input Voltage	50Vp-p, less than 10 sec 15V p-p		220(W)×60(H)×270(D) (8 3/4 W × 3 3/4 H 10 1/2 inches)
Accuracy	Time base stability ± 1 count	Input Impedance	HIGH 1 M ohm Low 50 ohms	Weight	
Display	5 Digit	Input Capacity	Less than 20pF	Tube Display tube	5
Sampling Time	1 multi sec or 1 sec	Time base Frequency	1 MHz Crystal controlled	Semi-conductors Silicon diode	12
Display time	0.1 sec 2 sec	Stability	0.0005% at 25° C 0.0025% at 0° ~ 40° C	Silicon transistor	9
Frequency Unit	KHz, MHz	Power Requirements A.C.	100/110/117/200/220/234V 50/60Hz 18V A	FET	1
Display	Display tube	D.C.	12~14.5V 1A	IC	36
Input Voltage	20mV~20Vp-p (0.15V~5Vp-p)				

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

FACTORY SERVICE IS AVAILABLE WHERE WARRANTY HAS EXPIRED. MK-160 (160M) KIT $16.00 WITH XTAL PLUS LABOR. MODERNIZATION KIT MIR-1 FOR OLDER MODEL FT101 $70.00 FACTORY INSTALLATION ONLY.

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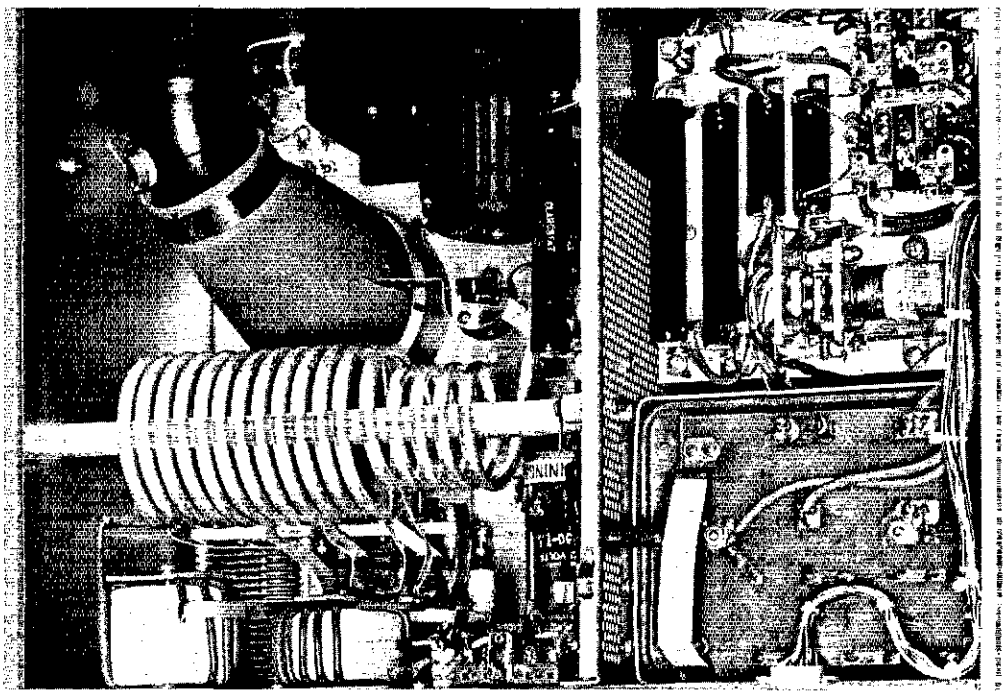

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Section Communications Managers of the ARRL

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 licensees or higher may be appointed ORS, OVS, OPS, OO and OBS. Technicians may be appointed OVS, OBS or V.H.F. PAM. SCMs desire application leadership posts of SEC, EC, RM and PAM where vacancies exist.

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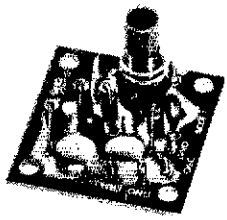

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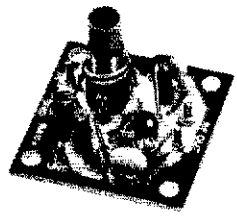

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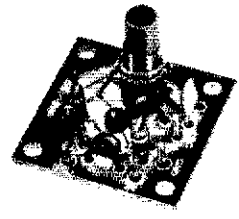

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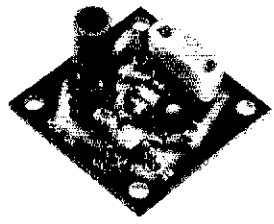

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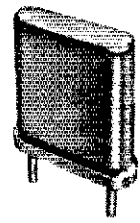

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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. 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.

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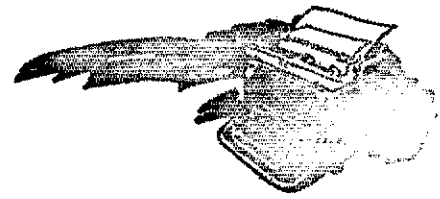


REPEATER EXTENSION

A MORE COMPLETE understanding and recognition of problems facing the repeater clan seem to be apparent in an Order released in late August by the Federal Communications Commission. The text, received just hours before several hundred stations would otherwise have had to shut down because of expiration of an earlier extension, is in "Happenings" this issue. It was first disseminated to amateurs by means of a WIAW bulletin on Thursday, August 30.

Actually, the Order was issued on delegated authority by the new Acting Chief of the Safety & Special Radio Services Bureau, who had earlier indicated to ARRL officials that another petition for extension, say by the League, would not be necessary. It was obvious he had fully recognized the depth of difficulties which would arise if continued operations were not authorized. The Order was issued, therefore, on FCC initiative. It effectively granted continued operating authority to those repeaters (and remotely-controlled stations) licensed prior to last October, and which had an application for renewal (or modification) on file with FCC prior to August 30.

At the same time, the Commission released a public notice (again, see "Haps") pointing out the need for all licensees to comply with the new repeater rules, adopted a year ago. These involve such matters as subbands of operation, permitted power for antenna height and gain involved, and the like. The notice underscored that the aforementioned Order in effect extended only the license term, and did not postpone the requirement for compliance with the rules.

A mountain of application paperwork is backlogged at the Commission; necessary processing time per application is much more extensive than anticipated. Reasons? New and extensive regulations were being applied for the first time, and there was uncertainty on the part of amateurs as to precisely what was meant or required; this must have plagued FCC's staff as well, indicated by occasional later interpretations and administrative procedural changes. Few applications met the mark the first time; the great majority had to go back at least once for additional information or clarification.

It is especially reassuring, therefore, to note the creation of forms, worksheets and supplementary instructions designed to eliminate the errors most frequently encountered in processing repeater-type applications. One deals with the basic repeater; others with auxiliary links, control stations, remote control, system network diagrams. Federal budgetary red tape may prevent formal government use, but the materials have been made publicly available as examples of required information in the proper format, and ARRL will produce them in quantity for general distribution. New applicants, as well as those required to furnish additional information for a returned application, should find the material helpful. If it at all reduces the time involved in processing applications, and thus the FCC workload, it will be a major step forward. Business-size, 8-cent s.a.s.e. to Hq., please, with the words, "Repeater application forms."

DIRECTOR ELECTIONS

THE PAST TWO issues of *QST* have contained a call for nominations for director and vice director from the Canadian, Atlantic, Dakota, Delta, Great Lakes, Midwest, Pacific and Southeastern Divisions. Though our press time is long before the deadline for receipt of nominations, it appears at this writing that many of these offices will have only one candidate, who will then be declared elected without membership balloting. Some speculation on this produces three possible reasons: (1) The members just don't care – apathy has set in; (2) The incumbent is doing a terrific job and the members want to keep him in there; or (3) The members feel that ARRL is a closed corporation – you can't beat City Hall anyway, so why try?

We hope that (2) is the reason for most of the non-contests! And we hope that no significant percentage of members are indifferent to these elections, or are so uninformed as to feel that they are futile.

Frankly, though the election process is expensive of both time and money, we'd like to see balloting in *every* division in every

(Continued on page 75)

League Lines . . .

Earlier in the year, new study questions for Novice and the Technician-Conditional-General classes of license were released by FCC (see June QST). Actual test questions for the General exam, however, were not revised until August. Though based on the same Element 3 sample questions, the written test for General differs from that for Tech or Conditional.

The ARRL Board of Directors strongly believes that Congressional adoption of a bill to require the incorporation of interference filters in home entertainment equipment would be most helpful to amateurs. Amen! And such a bill is H.R. 3516, introduced by the Hon. Charles M. Teague, of California. See page 80, April QST, for details and proposed action to support the measure.

Next year in April, the International Telecommunication Union will hold a World Administrative Radio Conference dealing specifically with maritime radio rules and practices. While matters on the agenda do not affect the amateur service, the proceedings nevertheless will be monitored by observers from the Region I Division of the International Amateur Radio Union. G2BVN and SP5FM expect to attend, with OH5NW a possible third.

Lessee now . . . a meter is a bit more than a yard . . . and it takes about two and a half centimeters to equal an inch . . . In the future we'll need to be more accurate than those high-school physics class recollections, as the U. S. moves closer to full adoption of the metric system. Meanwhile, you'll see both measuring systems used from time to time in QST articles -- which hopefully will help ease the transition.

ITU's Twelfth Report (1973) on the Peaceful Uses of Outer Space includes a section describing Oscar 6's launch, electronic features, and general results -- another recognition of the accomplishments of the new Amateur Satellite Service.

A Moscow-Havana circuit using some exotic emissions has for some time been putting RTTY-like signals in many parts of the spectrum, and in recent weeks seems to have settled down in or near our 14-MHz band. Extensive monitoring has furnished adequate backup for protests by FCC and DOC in Canada; interference from the Moscow end to European 20-meter activities has produced similar cooperative action in the form of complaints by administrations there, notably U.K. and Germany.

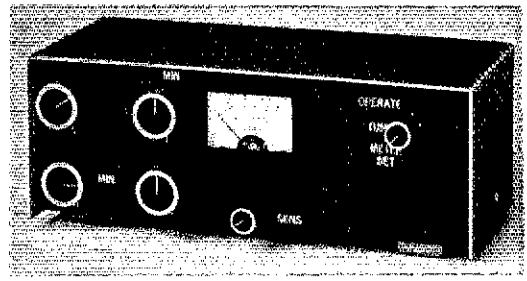
Not earthshaking, admittedly, but we report that FCC has decided to drop the signature of the secretary of the Commission from its license forms. We suspect this was expediency rather than logic, since the action coincided with the retirement of the FCC secretary. But it is another small mark in the passing of an era; we can recall when the bold, personal signature of "J. B. Beadle" was the most prominent and impressive part of an amateur license.

W7KV sent us a clipping reporting a survey showing that 85% of the population feel the postal service is good, very good, or even excellent. Only 3% said it was poor. They must not have asked many League members!

For some years now, several hundreds (674 at last count) of copies of each issue of QST were reproduced by the Soviet Union and distributed there at an annual subscription rate of 12 rubles (about $16). U.S.S.R. has now joined the Universal Copyright Convention, however, and permission will be required (and granted). ARRL has, separately, 16 members in U-land.

WB2JWA called our attention to a design magazine item reporting a technological breakthrough by IBM -- a "stable, broadband radiating source" to test shielding effectiveness and such. The ingenious development? -- two spark plugs!

Quote of the Month: "We believe there is a significant potential for mischief in developing cumbersome procedures without . . . analysis of the substantive problems to which the procedures are supposed to be related." -- MCI Carriers, reply brief in Docket 19555.



Exterior view of the QRP Transmatch. The cabinet is homemade from solid sheet and perforated aluminum stock. The two controls at the far left are 365-pF variables, as is the one at the lower left of the Simpson meter. At the upper left of the meter is the variable-inductance control. Directly under the meter is the meter-sensitivity potentiometer. The bridge function switch is visible at the upper right of the panel. Kurz-Kasch aluminum knobs are used on the controls.

A Poor Ham's QRP Transmatch

BY DOUG DEMAW,* W1CER

THINGS have been going to ruination in the proverbial hand basket for some time . . . at least when it comes to obtaining small parts. Even when some of the common items needed by home constructors are located, the unit costs are so high that the desired project is scarcely worth the expenditure. This turned out to be true with respect to the QRP Transmatch described in February, 1973, *QST*. Two split-stator variable capacitors were specified, and much to the chagrin of the author (and a great many *QST* readers) the manufacturer announced after publication that his stock was depleted and that no new production run was planned in the immediate future. With QRP operation becoming the pastime of the hour, owing in part to products being sold by at least two manufacturers of amateur equipment, something had to be done to help get the train back on the tracks so that those needing a micropower Transmatch could proceed with the project. The Ultimate Transmatch configuration (used in the earlier model) seemed like the best choice again, at least in the interest of being able to match the transmitter output to a wide variety of end-fed antenna or feed-line impedances. Furthermore, the W1ICP-popularized circuit requires no adjustment of clip leads and taps to change bands. Rather, a simple system for switching in various amounts of inductance is practical.

Low-cost, readily available components were selected for the model illustrated here. The rf power bridge used in the previous QRP Transmatch has been replaced by a less complicated "old standard" resistance bridge which was described some years ago by former ARRL Technical Editor W1DF. A version of the bridge shown here has been used for some time by QRP enthusiast Wes Hayward, W7ZOI, in combination with various low-power Transmatches of his choice. It is, therefore, the writer's intention to take the curse off the previous W1CER Transmatch circuit by describing this modified version.

* *QST* Technical Editor.

Circuit Basics

For many years the ARRL *Handbook* carried details on building a simple 50-ohm resistance bridge for use in adjusting matching sections in antenna systems (chapter on measurements). If careful layout is used (short leads) the circuit works nicely from 160 through 10 meters. It is more sensitive than is the Bruene rf bridge[1] and will provide full-scale deflection at 50 mW when using a 0- to 1-mA meter. The need for balancing the bridge with trimmer capacitors is eliminated, and one need not wind a toroidal transformer. Eliminating the cost of a microammeter is still another highlight to consider! Only one boulder in the pathway exists – this resistance bridge has limited power-handling ability. With the resistor wattage ratings specified in Fig. 1 the safe upper rf power limit is approximately five watts. Most bona fide QRP rigs operate under that power-output figure, especially the HW-7, PM series, and the more recent Argonaut, none of which exceed the safe limit of the bridge.

A small bonus feature provided by this circuit is enjoyed during initial adjustment of the Transmatch. While the resistance bridge is switched into

[1] Bruene, "An Inside Picture of Directional Wattmeters," *QST*, April, 1959. Also, DeMaw, "A QRP Man's RF Power Meter," *QST*, June, 1973.

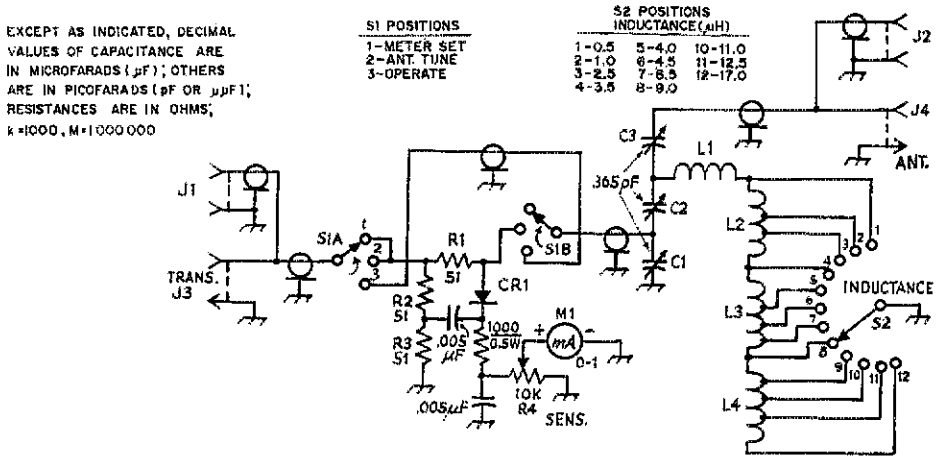


Fig. 1 — Schematic diagram of the Transmatch. Fixed-value capacitors are disk ceramic. Fixed-value resistors are composition types.

C1-C3, incl. — Miniature 365-pF variable (Archer/Radio Shack No. 272-1341 or equiv.).

CR1 — IN34A or equiv.

J1, J2 — Phono connector, single-hole chassis mount.

J3, J4 — SO-239 style coax connector.

L1 — 15 turns No. 24 enam. wire, close-wound on 1/4-inch ID form. Remove form after winding.

L2 — 28 turns No. 24 enam. wire on Amidon T-50-6 toroid core. Tap 7 turns from each end. (Amidon Associates, 12033 Otsego St., N. Hollywood, CA 91607.)

L3 — 28 turns No. 24 enam. wire on Amidon T-50-2 toroid core. Tap at 5, 10 and 15 turns from L2 end.

L4 — 36 turns No. 24 enam. wire on Amidon T-68-2 toroid core. Tap at 6, 12 and 18 turns from L3 end.

M1 — 0 to 1-mA dc meter, 1-1/2 inches square. See text.

R1-R3, incl. — 51-ohm, 2-watt, 5-percent tolerance.

R4 — Miniature 10,000-ohm control, audio or linear taper suitable.

S1 — Two-pole, three-position, shorting-type rotary wafer switch. See text.

S2 — Single-pole, 12-position, rotary wafer switch, shorting type (Radio Shack No. 277-1385 or Calectro No. E-2-162).

the line the transmitter looks into a relatively constant load. This desirable condition helps to prevent damage to solid-state final amplifier stages while the process of impedance matching is underway.

Component Selection

In place of the usual split-stator capacitor used at the input of the classic Ultimate Transmatch there are two imported subminiature 365-pF-per-section variable capacitors. The units specified measured 400 pF maximum capacitance when checked on the ARRL's *RCL* bridge. Minimum capacitance was measured as 15 pF. Thus, it appears that the manufacturer threw in a few extra pF to provide a baker's dozen. The use of separate capacitors at C1 and C2, Fig. 1, requires slightly more manipulation during tune-up than would be the case with ganged capacitors, but once ball-park settings are found for each operating band it is a simple matter to log them for future use. This writer simply notes the knob settings in o'clock fashion. . . 1 o'clock, 8 o'clock, and so on. C2 and C3 must be mounted so that their rotor and stator sections are above chassis ground. This was accomplished easily by assembling them on a small piece of phenolic insulating board and using insulating shaft couplers (Allied Electronics No. 920-0130).

Three small toroidal inductors and one air-wound coil comprise the variable-inductor leg of the circuit, L1-L4, inclusive, and S2. With the constants specified for the circuit of Fig. 1 the tuner will give good performance from 80 through 10 meters. S2 is a low-cost imported component.

M1 can be any 1-mA instrument. A Simpson No. 2121 is shown in the photos, but may be a trifle too dear in terms of cost for those wishing to do the job at minimum investment. Many imported meters (Radio Shack No. 22-018 for one) can be purchased at a fraction of the cost common to high-quality American made instruments. Builder's choice!

S1, in the unit pictured in this article, is a double-pole, four-position, two-section ceramic wafer switch of the subminiature species. It was gleaned for 25 cents at a flea market. Brand new, the cost would be a bit sobering perhaps. It was placed in service simply because it was on hand when the project got underway. A piece of double-clad pc board is visible between the wafer sections. It was added to function as an rf shield between the two sections of S1, thereby helping to isolate the input and output ports of the resistance bridge. Chances are that this represents an exercise in "over-engineering," and need not be done. Any shorting-type double-pole, three-position switch should be suitable, ceramic or phenolic insulation. S1 and S2 are the shorting variety, thus preventing

momentary no-load conditions from being seen by the transmitter.

Anatomy of the Transmatch

Whether the finished product looks like some grotesque Ugly Duckling or a masterly work of commercial art, the performance should be the same. Here again it's the builder's option. We elected to create an "original" by making use of some sheet aluminum that was left over from a previous project. A chassis was formed to assure more than ample room for the parts. As a matter of fact there is wasted space, so the prospective builder may decide wisely to "scrunch" things slightly to realize greater compactness. The package dimensions are 7-1/2 × 2-3/4 × 2-3/4 inches (18 × 6-1/2 × 6-1/2 cm). A cover was made from a section of surplus perforated-aluminum stock which was garnered at another flea market. Solid aluminum stock would be just as good. In fact, the entire enclosure could be constructed from galvanized furnace ducting, often available in scrap sizes from furnace repair shops. Rf shielding is not imperative when building housings for Transmatches, so the innovator may simply use a wooden or plastic box of his choosing.

Our knobs are the Kurz-Kasch aluminum type. Kinda "cushy," admittedly, but they were chosen to match the decor of the remainder of our QRP station. Imported knobs come in many styles from flashy to blase in appearance. Again, it's the builder's option, consistent with his personal tastes.

Battleship gray spray-on paint was used to supply the final touches to the box, and white press-on decals were added to identify the controls. There is some redundancy exhibited by the dual input and output terminals. Type SO-239 connectors are wired in parallel with phono jacks to assure flexibility when mating the Transmatch to the other station equipment. Only one style of connector need be used.

Preparation for Use

It will be noted that the components for the resistance bridge are mounted on a piece of single-sided pc board. This is not mandatory. Point-to-point wiring (keeping the leads ultra short) can be used if desired. Multilug terminal strips should be fine for the latter. Whatever technique is adopted, the completed bridge should be tested prior to attaching it to the rf section of the Transmatch. This can be done easily by placing S1 in the METER SET position, adjusting R4 for minimum meter sensitivity (arm near ground), then applying rf power from the transmitter at J1. Adjust the transmitter for peak output (5 watts maximum!), then advance R4 until full-scale deflection occurs on M1. Now, connect a 50-ohm resistive load between the CR1-R1 junction and ground. If all is well, the meter reading should drop to zero, indicating a null at 50 ohms. Values of load resistance above and below 50 ohms will cause the meter to deflect in accordance with the SWR that prevails.

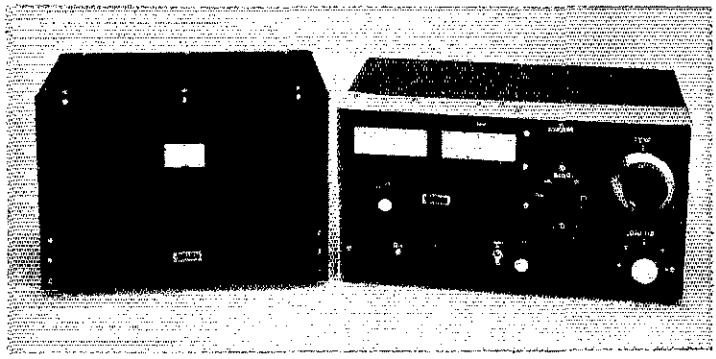
Connect the output port of the bridge to the remainder of the circuit. Attach a 50-ohm load at J2. Place S1 in the ANT. TUNE position and juggle the settings of C1, C2, C3 and S2 until zero deflection is indicated at M1. Repeat this process for each band of interest, jotting down the o'clock settings for each control. If the meter can be made to read zero on each band, all is as it should be. Tuning the circuit with the antenna or feed line connected to J2 is done in the same manner as with a dummy load. After the load is matched to the transmitter, turn S1 to the OPERATE position. This bypasses the bridge, which, if left in the line, will consume precious rf power. *A word of caution:* Always use the least amount of tuned-circuit inductance (L1 through L4) that will provide an SWR of 1. This will assure maximum power transfer to the antenna. A matched condition can be realized at several settings of the controls, but only the foregoing procedure should be followed in tuning the system.

Summarization

Rf connections within the box should be made with RG-174/U subminiature coax cable to assure satisfactory isolation between the input and output ports of the bridge. Be sure to ground the shield braid at each end of each length of cable. Leads less than one inch in length need not be shielded.

Those wishing to utilize the bridge portion of this unit for adjusting antenna matching sections can add a coax connector on the rear panel and connect it to the middle terminal of S1B. This will permit the bridge to operate independently of the rf-matching network which attaches to the arm of S1B. The function switch would be placed in the METER SET position for independent use of the bridge. Similarly, with S1 in that position, the impedance-matching portion of the Transmatch can be used separately by connecting the open terminal of S1B to still another coax jack. The estimated cost of the parts used in this project is $12, provided low-priced imported components are used where applicable. QST

Interior view of the Transmatch. The three variable capacitors are grouped at the right. Note that two of them are mounted on insulating board. Just to the right of the meter one can see the inductance switch on which three toroids and one air-wound coil are mounted. The resistance bridge and function switch are located at the far left of the chassis.



8873s in a Two-Kilowatt Amplifier

BY ROBERT M. MYERS,* W1FBY AND GUS WILSON,** W1NPG

TODAY, an amateur has a wide choice of amplifiers when there is a need to increase the power of a "barefoot" station. One only has to check the advertisements to note that there are many approaches to high-power linear-amplifier design for use on the hf bands. Some of the questions which come up: are two kilowatts sufficiently more effective than one kilowatt to justify the added expense? Can sweep tubes handle the power levels encountered? Is a pi-*L* network useful? Does the station exciter have sufficient (or too much) drive power? Is one large tube (high-dissipation capability) better than two small ones? Should the amateur purchase a factory-built model or build his own? The answers to these questions, of course, depend primarily upon individual circumstances.

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** Lab Assistant, ARRL.

Of all the large station accessories, the final amplifier many times is the easiest to construct in the home workshop. Although parts procurement can be a very frustrating experience, the total number of components necessary to build an amplifier is substantially less than for a receiver or ssb transmitter. The amplifier described here is designed to operate at two-kilowatts pep on ssb and one kilowatt on cw. This is accomplished with the simplest circuitry known to the authors, in keeping with good engineering practice.

The amplifier shown in the photographs and schematically in Fig. 1 uses a pair of recently designed 8873 conduction-cooled triode tubes. The circuit configuration is grounded grid and uses no tuned-input tank components. When properly adjusted, the amplifier is capable of IMD characteristics which are better than can be achieved by a typical exciter, therefore the added complexity

Most high-power linear amplifiers available today have one characteristic in common — they're noisy. But until recently, there has been no convenient way to eliminate the racket generated by a large fan or blower. Exotic systems have resorted to quieting techniques like mounting the blower in a closet, or even in the next room. One way to handle the problem is to install a large air-circulation system and run it at reduced speed and capability. But this is inefficient. Eimac, however, has developed a very effective solution to this problem with the 8873 conduction-cooled triode tube. A pair of these tubes, when coupled to an adequate heat sink, can be operated at two-kilowatts input for ssb service. The cost of the heat sink is on par with the price of a complete air cooling set of components (blower, special sockets, and glass chimneys), but the sink is a passive element — it's quiet. Why blow it when you can conduct it?!

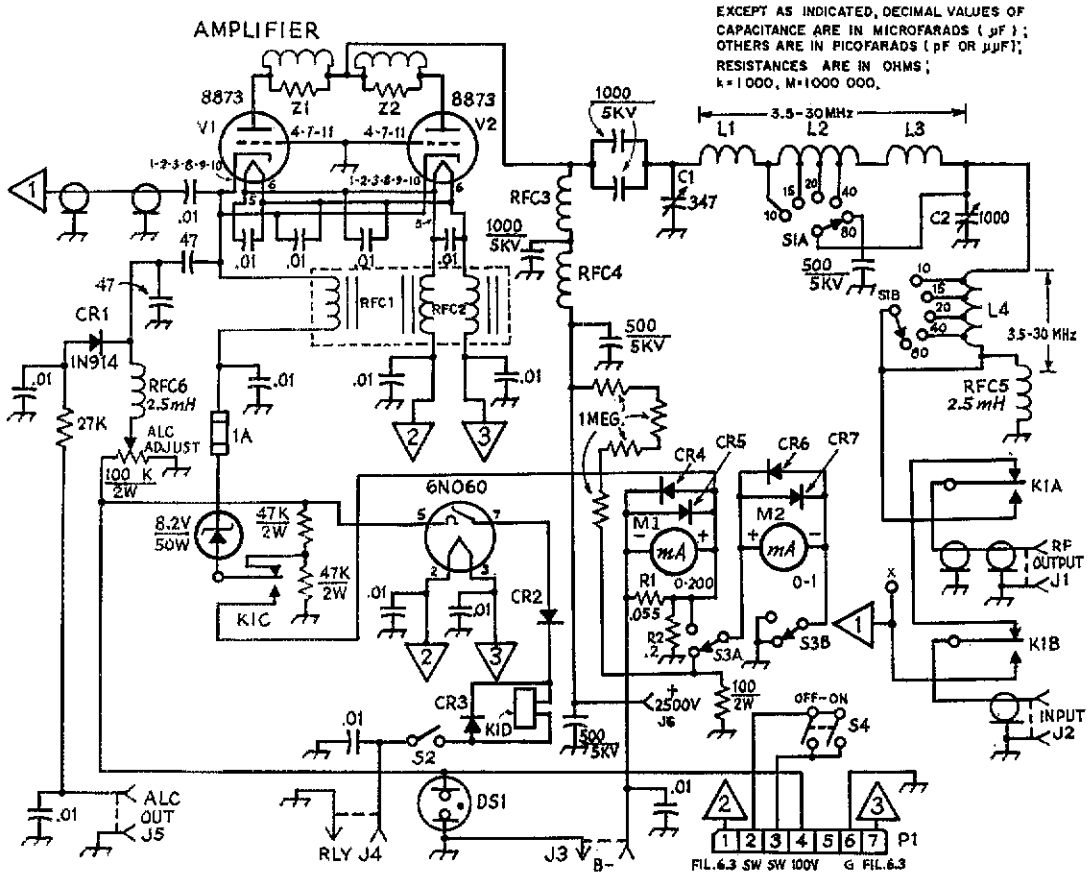


Fig. 1 — Circuit diagram for the 8873 conduction-cooled amplifier. Component designations not listed below are for text reference. RFC1 and RFC2 are wound on the same ferrite rod in the same direction; three wires are wound together (Amidon MU-125 kit). Tube sockets for V1 and V2 are E.F. Johnson 124-0311-100. The thermal links are available from Eimac with the tubes. The heat sink is part number 2559-080-A000 from Astrodyne Inc., 353 Middlesex Ave., Wilmington, MA 01887, and costs approximately $20.

C1 — Transmitting air variable, 347 pF (E.F. Johnson 154-0010-001).

C2 — Transmitting air variable, 1000 pF (E.F. Johnson 154-30).

CR2-CR7, incl. — 1000 PRV, 2.5 A (Motorola HEP170).

J1 — SO-239 chassis mounted coaxial connector.

J3, J4, J5 — Phono jack, panel mount.

J6 — High-voltage connection (Millen 37001).

K1 — Enclosed, three-pole relay, 110-volt dc coil (Potter and Brumfield KUP14D15).

L1 — 4-3/4 turns of 1/4-inch copper tubing, 1-3/4-inch inside diameter, 2-1/4 inches long.

L2 — 12-1/2 turns, 1/4-inch copper tubing, 2-3/4-inch inside diameter, tap at one turn from connection point with L1, 2-1/2 inches for 20 meters, 7-3/4 turns for 40 meters.

L3 — 11-1/2 turns, 2-inch diameter, 6 tpi (Barker and Williamson 3025).

L4 — 10 turns, 2-inch diameter, 6 tpi, with taps at 3 turns for 10 meters, 3-1/2 turns for 15 meters, 4-3/4 turns for 20 meters, 6-3/4 turns for 40 meters; all taps made from junction of L3 (Barker and Williamson 3025).

M1 — 200 mA full scale, 0.5-ohm internal resistance (Simpson Electric Designer Series Model 523).

M2 — 1 mA full scale, 43 ohms internal resistance (Simpson Electric, same series as M1).

R1 — Meter shunt, .05555 ohms constructed from 3.375 feet of No. 22 enam. wire wound over the body of any 2-watt resistor higher than 100 ohms in value.

R2 — Meter shunt, 0.2 ohms made from five 1-ohm, 1-watt resistors connected in parallel.

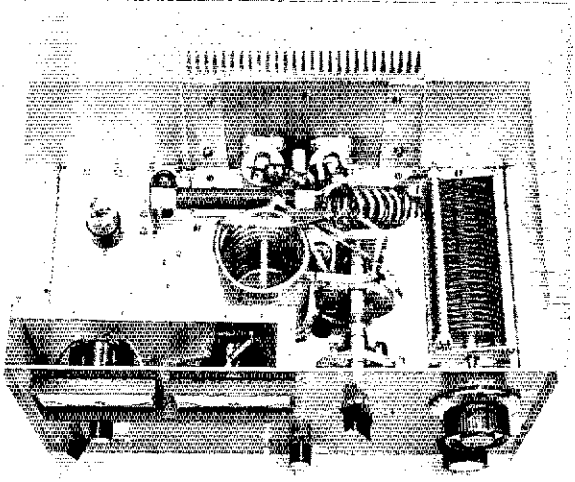
RFC1, RFC5, RFC6 — 2.5 mH (Millen 34300-2500).

RFC3 — Rf choke (Barker and Williamson Model 800 with 10 turns removed from the bottom end).

RFC4 — 22 μH (Millen 34300).

S1 — High-voltage band-selector style, double pole, six position (James Millen 51001 style).

Z1, Z2 — 2 turns 3/8-inch-wide copper strap wound over three 100-ohm, 2-watt resistors connected in parallel.



Top view of the 80- through 10-meter conduction-cooled amplifier. The chassis is 17 × 12 × 3 inches (43.2 × 30.5 × 7.6 cm) and is totally enclosed in a shield. A separate partition was fabricated to prevent rf leakage through the meter holes in the front panel. An old National Radio Company vernier dial is used in conjunction with the plate tuning capacitor to provide ease of adjustment (especially on 10 meters). The position of the dial for each band is marked on the dial skirt with a black pen and india ink.

of band switching a tuned-input circuit was deemed unnecessary. The purist can include a tuned-cathode arrangement if he feels it is necessary. Certainly, if this amplifier is driven by *any* sweep-tube output modern-day exciter, it would be useless to add the extra components. IMD figures are given in Fig. 3.

Construction

Building an amplifier such as this is often an exercise in adapting readily available components to a published circuit. For this reason, a blow-by-blow description of this phase of the project will not be given. An effort was made, however, to use parts which are available generally, and should the builder desire, this model could be copied verbatim.

The most difficult constructional problem is that of aligning the tube sockets correctly. It is imperative that the sockets be aligned so that when the tubes are mounted in place, the flat surfaces of the anodes fit smoothly and snugly against the thermal-link heat-transfer material. Any misalignment here could destroy the tubes (or tube) the first time full power is applied. The mounting holes for the tube sockets are enlarged to allow final positioning after the tubes are "socked" in place with the clamping hardware. Pressure must be applied to the anodes so that they are always snug against the thermal link. The hardware used to perform this function must be a nonconducting material capable of withstanding as much as 250°C. The pressure bracket used here was fabricated from several Millen jack-bar strips (metal clips removed) mounted in back-to-back fashion. The entire assembly is held in place by means of a long piece of No. 10 threaded brass rod which passes through a small hole in the center of the heat sink. An attempt to give meaningful comments about how tight the tubes should be pressured to the copper and aluminum sink will not be given. Suffice it to say that the tubes should fit flat and snugly against the thermal hardware. The heat sink was purchased from Astrodyne and is connected to a 1/4-inch thick piece of ordinary copper plate. The total cost for the copper and the aluminum sink is somewhat more than the price of a good centrifugal blower ($30) but the savings offered by not having to purchase special tube sockets and glass chimneys overcomes the cost differential.

The power supply is built on a separate chassis because the plate transformer is bulky and cumbersome. A special transformer was designed for this amplifier by Hammond Transformer Co. Ltd., of Guelph, Ont. Canada. The transformer contains two windings, one is for the plate supply to be used in a voltage-doubler circuit and the other is for the tube filaments. The power supply produces 2200 volts under a load of 500 mA, and is rated for 2000 watts. The Hammond part number is given in Fig. 2. All of the interconnections for

Top view of the power supply built by WA1JZC showing the technique for mounting the filter-capacitor bank. The diodes are mounted on a printed-circuit board which is fastened to the rear of the cabinet with cone insulators and suitable hardware.

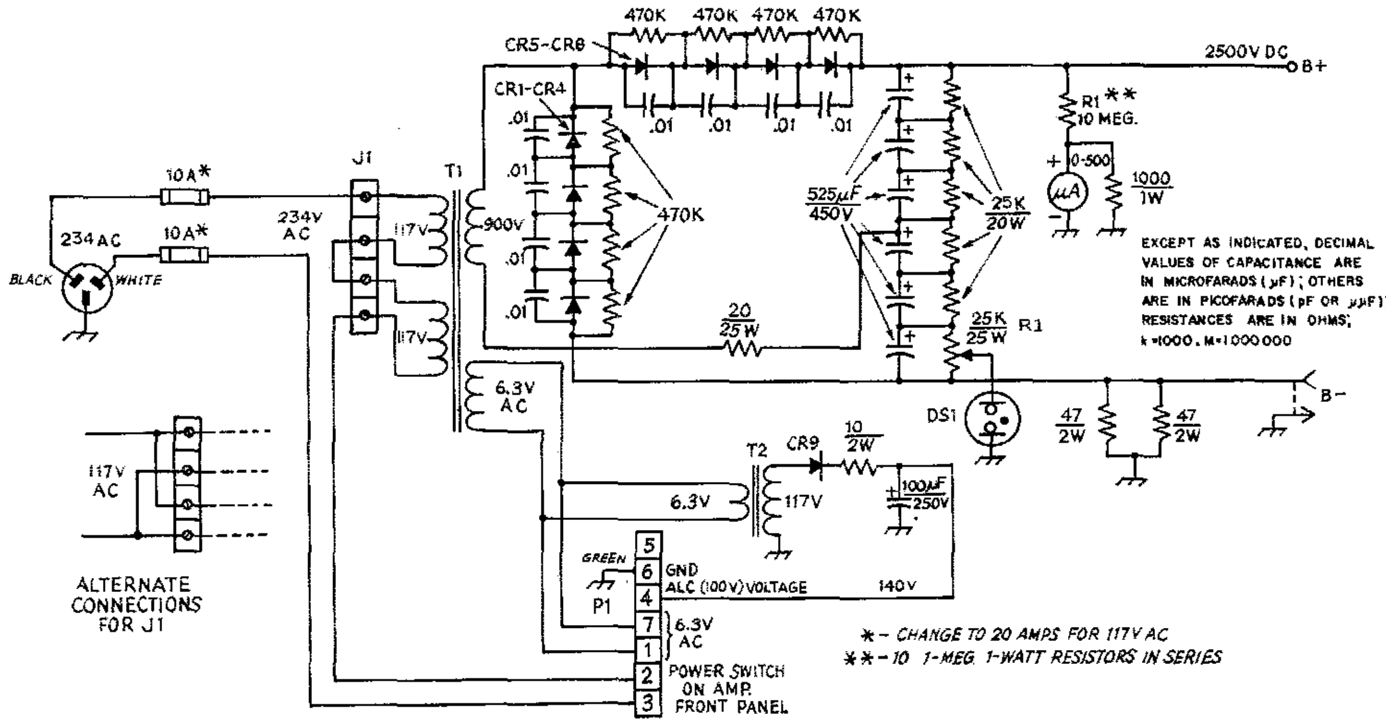
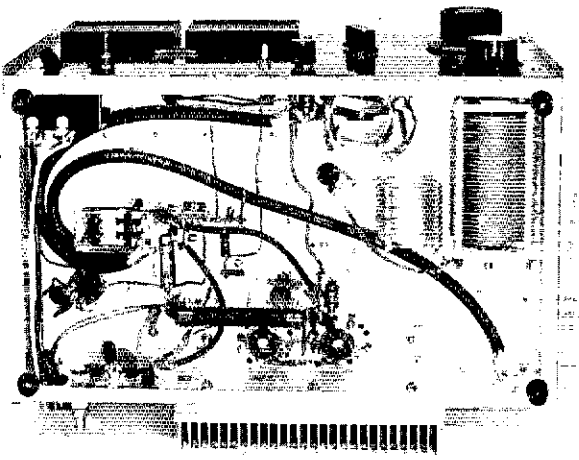


Fig. 2 — Circuit diagram for the power supply. The power transformer is available from Hammond; type no. 101165. CR1 through CR9 are 2.5 A, 1000 PRV; see Fig. 1 for suitable part number. T2 is Stancor part number P-8190 and is rated for 6.3 volts at 1.2 amperes. DS1 is a 117-volt neon pilot lamp assembly. The tap at R1 should be set for 5000 ohms to the B minus lead. Adjustments to this tap cannot be made while voltage is applied to the power supply. *If the pilot lamp does not glow properly, remove the ac cord, allow suitable time for the high-voltage to bleed to zero, and apply a screwdriver between the B-plus line and ground before making any adjustments!*



Bottom view of the 8873 amplifier. See text for constructional details. The large cutout in the chassis at the top of the photograph is necessary to pass the leads from the coil to the band switch.

power-supply control and the operating voltages needed by the amplifier are carried by a seven-conductor cable. This excludes the B plus, however, which is connected between the units by means of a piece of test-probe wire (5-kV rating) with Millen high-voltage connectors mounted at both ends. The seven-conductor cable is made from several pieces of two-conductor household wire (No. 10) available at most hardware stores. Since the main power switch is mounted on the front panel of the amplifier, the power supply may be placed in some remote position, out of the way from the operator (not a bad idea!). A high-voltage meter was included with the power supply so that it could be used with other amplifiers. It serves no purpose with this system. The main amplifier deck has provisions for monitoring the plate voltage.

A conventional household light switch may be used for S4. If the switch is to be mounted horizontally, be sure to use a contactor device and not a mercury type (which operates in a vertical position only). A double-pole switch was used with both poles connected in parallel. The rating is 220 V at 10 A per section.

The RF Deck

The two sections of the pi-*L* network are isolated from each other by placing one of them under the chassis. Although not shown in the photograph, a shield was added to prevent rf energy from entering the control section underneath the chassis. The shield divides the chassis between the tube sockets and the inductors. The loading capacitor is mounted directly beneath the plate-tuning capacitor. This scheme provides an excellent mechanical arrangement as well as a neat front-panel layout.

The 8873s require a 60-second warmup time, and accordingly, a one-minute time-delay circuit is included in the design. The amplifier IN/OUT switch is independent of the main power switch and the time delay. Once the delay circuit "times out," the amplifier may be placed in or out of the line to the antenna, whenever desired. *A safety problem exists here:* there is no large blower running, and there are no brightly illuminated tubes to warn the operator that the amplifier is turned on. Except for the pilot lamp on the front panel, one might be fooled into believing the amplifier is turned off! And if the pilot lamp should burn out, there is *absolutely* no way to tell if the power is turned on (with the resultant high voltage at the anodes of the 8873s). *Beware!*

Operation

One of the main features of this amplifier is the ability to perform efficiently at both phone and cw power levels. When the pi-*L* network is adjusted correctly, efficiency percentages on the order of 60 and better are easily obtained.

Tuning a pi-*L*-output circuit is somewhat different than tuning a conventional pi-network because the grid current should be monitored closely. Grid current depends on two items, drive power and amplifier loading. The procedure found to be most effective is to tune for maximum power output with the loading sufficiently heavy to keep the grid current below the maximum level while adjusting the drive power for the proper amount of plate current. The plate current for cw operation should be 450 mA and approximately 900 mA under single-tone tuning conditions for ssb. This presents a problem since it is not legal to operate an amplifier on the air with more than a kilowatt

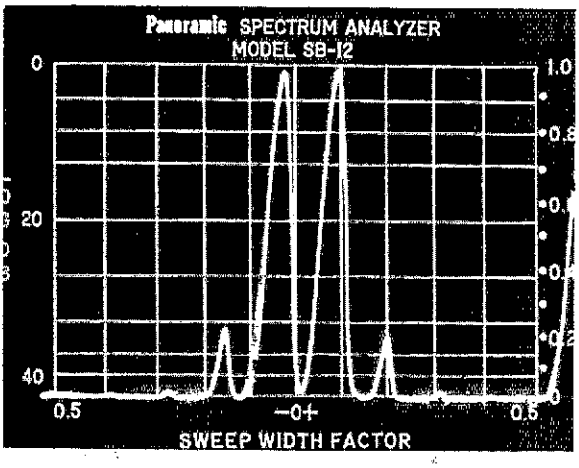
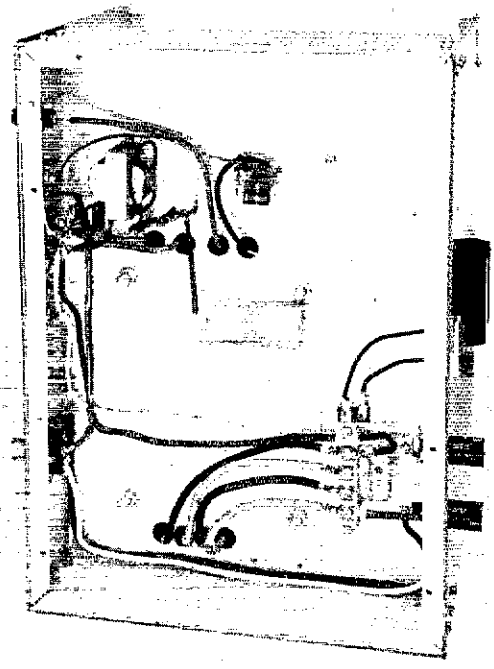


Fig. 3 — Spectral analysis of the conduction-cooled 8873 amplifier output under two-tone test conditions. The third-order distortion products are 36 dB below the two-tone PEP output. (The Panoramic scale is calibrated in dB below a single tone. To convert this scale for a two-tone test, increase the value 6 dB from figures indicated at the left side of the scale.)

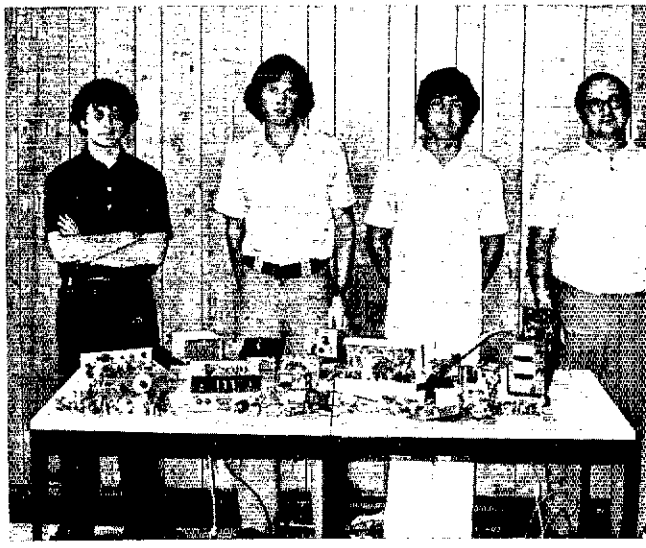
The ceramic terminal strip at the lower right contains jumpers for 234-V operation. It is a simple matter to rewire the jumpers for 117-V service.



input. For this reason, a dummy load should be used when making adjustments. The plate voltage under load conditions for ssb will be approximately 2 kV. The levels of plate current mentioned above are in keeping with the requirement that the *combined* exciter and amplifier input power be kept below 1 kW. The drive power needed for cw operation is 60 watts and is about 80 watts for 2-kW pep input conditions. Exciters of the 300-watt category present somewhat of a problem here. Keeping the drive power low is a bit difficult. An attenuator is one way to reduce the exciter power level. This amplifier was field tested by WA1JZC who uses a 200-watt-output transceiver as the station transmitter (Kenwood TS-511S). An effective method for reducing the power transferred to the cathodes of the 8873s consisted of connecting a 50-ohm dummy load to the tube side of K1B (point X, Fig. 1) so that when the amplifier relay is activated, the exciter dissipates half of its power in the dummy load. Connecting the dummy load to the opposite point on K1B would place the load across the transceiver antenna terminals during receive conditions and is certainly undesirable.

During normal operation, the amplifier heat sink runs warm to the touch. During contest operation, the sink runs hot. The authors found that propping a small Whisper Fan in a position to circulate air across the heat sink during heavy contest operating periods to be very worthwhile. The fan does not generate any significant mechanical noise in keeping with the quiet-as-a-receiver overall operation. QST

Strays



Here's the lineup (pun?) of Hq. lab staffers that worked all summer to build the goodies you'll find in both *QST* and the 1974 edition of *The Radio Amateur's Handbook*. From the left: Ed Kalin, WA1JZC; Bob Wright, WA7ISP; Clarke Greene, WA1JLD; and Bill Lowry, W1RML. Three of the fellows are third-year college students, one is a professor. The projects include a 10-watt 40- and 20-meter cw transmitter, an electronic keyer, a 160-meter ssb transceiver and an all-band solid-state receiver. The photo was taken by WA1JZC.

Novi-Loop

A Wire Antenna for 40-Meter DXing

ONE OF THE sad facts of life for many beginners is the matter of poor antenna performance. Many enthusiastic Novices have fallen behind in their efforts to work DX because of bitter disappointment caused by poor performance in the antenna department. All too often it is suggested that a simple end-fed hunk of wire is ample for all-around Novice band operation, or that a dipole will suffice for most Novice operation. Sure, almost any kind of radiator that can be tuned to the operating frequency and matched to the impedance of the feed line and transmitter will enable the operator of a 75-watt (or less) station to make *some* contacts from time to time. It depends on how high the system is above ground, how free and clear it is of surrounding objects that can detune the radiator and absorb the energy radiated from it, and upon the condition of the band at a given time. It should stand as a firm rule, then, that any amateur who wants good results should erect the best antenna system he can, consistent with available space, finances, and structural practicality. It is possible to advance beyond the plateau of simple dipoles and random-length wires in the quest for better performance, and without going to the expense and effort of erecting large directional beams such as the cubical quad or Yagi.

What will be described here can be applied to any of the high-frequency amateur bands. However, the example given relates to only the 40-meter Novice band. The antenna is a full-wave loop of wire, mounted through necessity at WICER in a rectangular format, and matched with a simple quarter-wavelength coaxial transformer. It has given excellent performance in DX work and for making "solid" stateside contacts. Total cost for the antenna system (wire, matching transformer and insulators) is approximately $8, exclusive of the feed line used to connect the antenna to the rig.

Antenna Features

Full-wave, closed-loop antennas are broadband, low-*Q* devices; This is a handy feature because it permits the operator to move his transmitter frequency within a particular band without need to compensate for an increase in standing-wave ratio (SWR) which might otherwise occur if other types of antennas were used. (The higher the *Q* of an antenna, the narrower its bandwidth, even though an SWR of 1 can be obtained at some frequency within the band for which it is built.) The foregoing rules out the need for a Transmatch with the loop antenna, provided the feed method recommended here is applied.

Another interesting feature of this kind of antenna is the theoretical gain of approximately 2 dB it exhibits over a half-wave dipole. The angle of radiation from a properly erected full-wave loop is considered to be lower than that of a dipole when both are less than one half wavelength above ground. This feature suggests the superiority of the loop in situations where significant height above ground is not a practical goal for the chap wishing to put up a 40-meter antenna.

A full-wavelength closed loop need not be square. It can be trapezoidal, rectangular, circular, or some distorted configuration in between those shapes. For best results, however, the builder should attempt to make the loop as square as possible. The more rectangular the shape the greater the cancellation of energy in the system, and the less effective it will be. The effect is similar to that of a dipole whose effectiveness becomes impaired as the ends of the dipole are brought closer and closer together. The practial limit can be seen in the "inverted-V" antenna, where a 90-degree apex angle between the legs is the minimum value used. Angles that are less than 90 degrees cause serious cancellation of the rf energy.

The loop can be fed in the center of one of the vertical sides if vertical polarization is desired. For horizontal polarization it is necessary to feed either of the horizontal sides at the center. At the time of this writing there has been no data compiled to provide a comparison between the performance, vertical *versus* horizontal. Such an experiment could be interesting (and possibly productive) for the Novice.

Erecting the Antenna

Optimum directivity occurs at right angles to the plane of the loop, or in more simple terms,

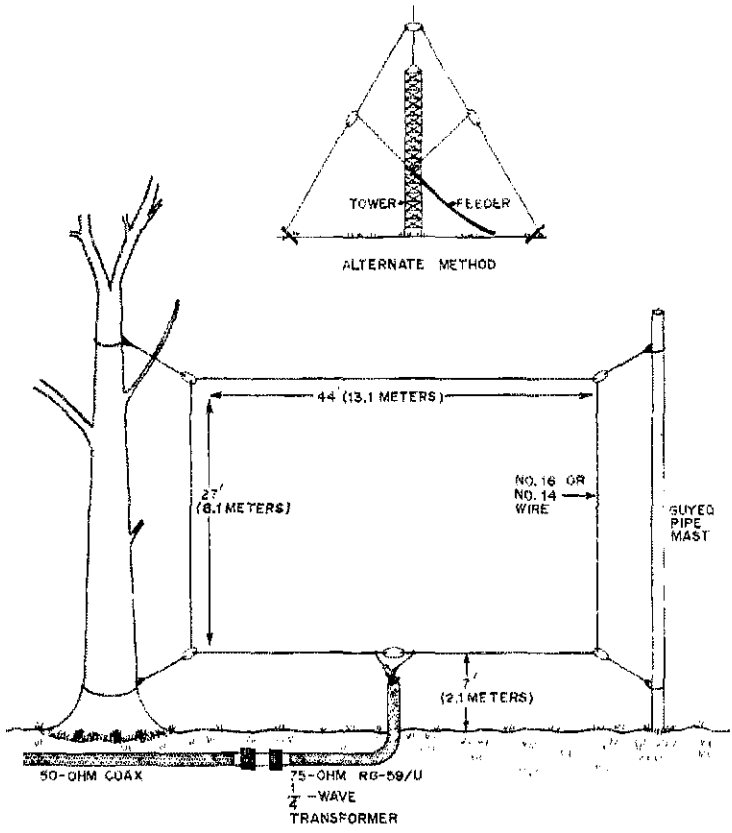


Fig. 1 — Details of the full-wave loop used as the basis for this article. The dimensions given are for operation at the low end of 40 meters (7050 kHz). The height above ground was 7 feet in this instance, though improved performance should result if the builder can install the loop higher above ground without sacrificing length on the vertical sides. The inset illustrates how a single supporting structure can be used to hold the loop in a diamond-shaped configuration. Feeding the diamond at the lower tip provides radiation in the horizontal plane. Feeding the system at either side will result in vertical polarization of the radiated signal.

broadside from the loop. Therefore, one should try to hang the system from available supports which will enable the antenna to radiate the maximum amount in some favored direction. The bidirectional pattern is maximized NE and SW at the writer's QTH. This gives good results in working Europeans and the stations "down under." Excellent signal reports have been obtained off the sides of the loop when working within the U.S.A.

Just how the wire is erected will depend on what is available in one's yard. Trees are always handy for supporting antennas, and in many instances the house is high enough to be included in the lineup of solid objects from which to hang a radiator. If only one supporting structure is available it should be a simple matter to put up an A frame or pipe mast to use as a remaining support. (Also, tower owners see Fig. 1 inset.)

The overall length of the wire used in a loop is determined from the formula $\frac{1005}{f\ (\text{MHz})}$. Hence, for operation at 7125 kHz the overall wire length will be 141 feet. The matching transformer, an electrical quarter wavelength of 75-ohm coax cable, can be computed by dividing 234 by the operating frequency in MHz, then multiplying that number by the velocity factor of the cable being used. Thus, for operation at 7125 kHz:

$$\frac{234}{7.125\ (\text{MHz})} = 32.84 \text{ feet.}$$

If coax with solid polyethelene insulation is used a velocity factor of 0.66 must be employed. Foam-polyethelene coax has a velocity factor of 0.80. Assuming we are to use the solid dielectric coax, RG-59/U, the length of the matching transformer becomes 32.84 (feet) × 0.66 = 21.67 feet, or 21 feet and 8 inches. The transformer will convert the 100-ohm feed-point impedance of the loop to 50 ohms . . . a convenient value for connecting the system to the transmitter. The loop described here was measured with the KIPLP Macromatcher[1] and found to exhibit an impedance of 110 ohms. Some inductive reactance was indicated. By removing one foot of wire from the overall loop the reactance dropped to zero, though the antenna loaded up fine prior to the final trimming. The feed impedance at 21 MHz

(Continued on page 32)

[1] Hall, "The Macromatcher," *QST* for January, 1972.

Part I of this series of articles appeared in the April 1973 issue of QST, *Part II in the June 1973 issue, and Part III in the August 1973 issue.*

Another Look at Reflections

Part IV — A View into the Conjugate Mirror

BY M. WALTER MAXWELL,* W2DU/W8KHK

IN PART III some basic concepts were presented concerning reflection generation, wave propagation along the line, and the development of standing waves. Then it was shown mathematically how net power is separated into its incident and reflected components (on lossless and low-loss lines), after which it followed logically to explain how the power separation is physically realized by directional devices, such as a directional wattmeter. While learning about wattmeter operation and how to interpret the indications, we saw that the incident or forward power in the line between the matching point and the load is greater than the power supplied by the source generator when the line is terminated in a mismatched load. In this part we will explore this situation in detail, because it is of considerable importance to the amateur since it relates directly to the operational flexibility of his antenna system. Appreciation of the fundamentals involved in this seemingly anomalous situation will free him from the prevalent notion that he is restricted to operating with little or no mismatch at the antenna/transmission-line terminals.

The explanation of directional wattmeter operation in Part III should help in understanding why the incident power appearing on the line between the matching point (such as a line-matching network) and the mismatched load can be higher than what the transmitter can supply. This is a normal condition which *must* exist in order for a mismatched load to absorb *all the power delivered* by the source,[20] while at the same time reflecting a percentage of the total power it receives. To do this, the load must receive more incident power than what is supplied by the transmitter. The basis for understanding this rather subtle concept lies in the wave mechanics behind the principles of conjugate matching introduced in Part I and defined in Part II. The wave aspect of this subject has been presented in the literature (known to the author) only by Slater *(ref. 35)* and Alford *(ref. 39)*.† Perhaps this restricted exposure may account for some of the confusion in this area among engineers and amateurs alike. For example, the many "cook book" recipes and graphical directions for stub-matching a mismatched line tell "how" to do it, but offer little insight toward visualizing the wave mechanics through which the match is accomplished. This insight, however, goes to the heart of the transmitter-to-line coupling problem. It clarifies how the reflected wave becomes rereflected at the matching point. If the matching did not produce this effect, the reflected wave would travel back to the generator, and would thus reduce the amount of the power made available by the source generator *(ref. 19, p. 37)*.

Reflection Mechanics of Stub Matching

An introduction to the reflection mechanics involved in conjugate matching concerns concepts of line-input impedance and angle of reflection coefficient, which will be explored in detail in a later section. (The reflection coefficient angle was introduced briefly in Part III, para. 1, and footnote 15.) As stated with the definition of the conjugate match in Part II, the matching is accomplished by inserting a nondissipative mismatch at the match point; this produces a complementary reflection with which to compensate, and cancel, the wave reflected from the mismatched load. It was also stated that conjugate matching conditions can be satisfied by a correct adjustment of either the final tank tuning circuit *(ref. 4, Part III)*, or of a line-matching network if one is used. Because stub matching uses the identical principles and is easier to visualize, we will use its technique to demonstrate the wave mechanics. In stub matching, the

[20] See point 3, Part I of this series (p. 38 of *QST* for April, 1973).

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† These and all subsequent references in italics refer to the bibliography which appeared at the end of Part I of this series, with supplemental listings at the end of Part III.

stub provides what seems like an anomaly – a nondissipative discontinuity, or mismatch. While we usually think of the stub as providing a *match*, rather than a mismatch, we will discover that the conjugate match results from the mutual cancellation of two complementary reflected waves generated by two complementary mismatches. One wave is that reflected from the terminating load mismatch, and the other is a new reflected wave generated by the stub mismatch, equal to the load-reflected wave in both magnitude and phase, but of *opposite phase sign*. Wave interference between these two complementary waves at the stub point causes a cancellation of energy flow, or a null in the generator direction resulting from the *difference* between the two reflected waves, and an energy maximum in the load direction comprising the *sum* of the two reflected waves and the source wave. The effect of the wave-interference cancellation presents a virtual one-way open-circuit[21] to waves traveling toward the generator, which blocks both the load-reflected wave and the stub-reflected wave at the stub point from any further rearward travel. These waves are totally reflected toward the load, being in phase with the incident wave. Thus, there is complete cancellation of the effect of discontinuities (such as the stub) and the reflections of waves traveling toward the load.

This wave-interference mechanism which accomplishes the matching will become more evident as we investigate the reflection coefficients of the two mismatches with the aid of examples using the Vector Graph (Fig. 4, Part III). There we show a load of $3 + j0$, which gives a three-to-one standing wave ratio along the whole line.[22] The VSWR of 3 is shown by the dark concentric circle, which is the locus of impedances anywhere on the line for a load of $3 + j0$. This circle intersects the resistance circle marked 1.0 at the two points, A and D. Therefore at these points along the line the resistive component of the impedance equals 1.0 times Zc, which is the desired point for attaching a matching stub. Points A and D are also intersected by a reactance circle. At point A the reactance is negative, 1.15 times Zc, and at point D the reactance is positive, also 1.15 times Zc. The conditions for obtaining reflected-wave cancellation by wave interference are the well-known stub-matching requirements as follows: (1) a stub is placed where the line resistance component equals the line characteristic impedance Zc (such as at points A and D), and (2) the stub reactance is made equal in magnitude and opposite in sign to the line reactance (resulting from the phase relationship between the incident and reflected waves at the stub point) so that the reactances cancel to zero *(refs. 2, p. 116; 19, p. 97)*. This sounds almost like the conjugate-match definition itself, doesn't it? The correct point for inserting a stub in series with the line nearest the load is at point A or D on the VSWR circle; any half-wave interval from these points further from the load may also be used since the impedances are repeated every half wave on the diagram (and on the line). These examples show series stubs to permit *impedance* treatment for clarity. (While parallel or shunt stubs are used more prevalently, analysis using the shunt form would require *admittance* treatment.)

We will now see how reflections add at a matching point to produce the matching effect. We'll also see why a directional wattmeter will give a true reading of incident power between the matching point and the load which is greater than the power supplied by the transmitter, when the line is terminated with a mismatched load. A little later we'll also see how these principles apply to practical feed-line matching networks.

At point A, which is 30 degrees from the load (at $L = 30°$), the unmatched voltage reflection coefficient is $\rho_E = 0.5 \angle -60°$. This means that the phase of the reflected voltage wave lags the incident wave by 60 degrees at point A. The line impedance E/I at this point is $1 - j1.15$. A match can be effected by connecting an inductive reactance, such as a stub or a lumped inductance of $0 + j1.15$ in series with the line at point A. Now, the reactance-cancellation effect of the positive-reactance stub on the equally negative reactance of the line is generally understood, but several points are not always clear regarding the effect on the component waves: What characteristics of the stub cause it to counteract the reflections from the load; also, why does the stub cause the incident power to rise between the matching point and load?

In answer to these questions, let's determine first the reflection coefficient produced by the stub if it were inserted in a perfectly matched line. In this condition we may analyze the stub-generated reflection in the absence of any other disturbance or reflection on the line. If we station ourselves just on the load side of the stub point with the stub attached and look into the line toward the matched termination, we will see a pure resistance equal to the line characteristic impedance, Zc. We know from matched-line theory that if we remove the line portion extending from the stub to the load and insert the terminating resistance R = Zc directly in series with the stub across the open-ended line, we may look into the line toward the stub from the generator and see the same conditions of reflection as were present

[21] Alternatively it may be a short-circuit, depending on line and load conditions, which will be explained later.

[22] We are rather accustomed to thinking of 50 ohms as a standard system impedance because of the preponderance of rf components and coaxial lines for that impedance. However, many calculations are greatly simplified by using *normalized* impedances, in which all impedance values have been divided by the system impedance. The system impedance is usually taken as the characteristic impedance of the transmission line, Zc. Normalizing an impedance by dividing it by Zc amounts to a change of scale such that the unit of impedance is Zc ohms, rather than 1 ohm. The Smith chart Vector Graph, Fig. 4, uses the normalized system to take advantage of the simplification in the calculations. To obtain normalized values occurring in a system of any impedance, simply divide all impedances by the system impedance. For example, in a 50-ohm system, simply reverse the process and multiply the normalized values by 50. For example, the normalized impedance $z = 0.6 - j0.8$, found at $L = 45°$, becomes $Z = 30 - j40$.

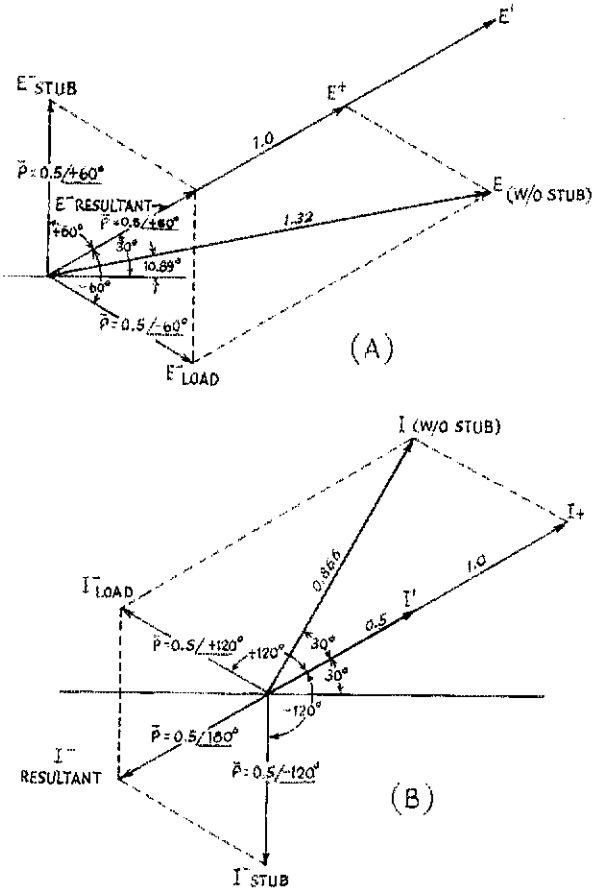


Fig. 6 — At A, various voltage-vector relationships, and at B, various current-vector relationships at L = 30°.

before the line section was removed. Thus the series circuit comprising the matching resistor and the stub performs as a 1 + *j*1.15-ohm mismatched load terminating the line. Precisely this same reflection will be produced no matter where the stub is inserted in a matched line. The Vector Graph shows this impedance of 1 + *j*1.15 to appear at point *D*, for which the voltage reflection coefficient is $\bar{\rho}_E = 0.5 \angle +60°$. Note that this is the same magnitude and phase *but of opposite phase sign* to the reflection appearing at point *A* resulting from the load mismatch (3 + *j*0).

Thus the stub mismatch produces the same magnitude of reflection (and the same SWR) as was produced by the load mismatch, but the stub-reflected voltage wave *leads* the incident wave by 60 degrees, while the load-mismatch wave *lags* by 60 degrees. If the stub is now attached at the matching point (corresponding to L = 30° on the Vector Graph) with the 3 + *j*0 load terminating the line, both the stub- and load-mismatch reflections will be produced simultaneously. As a result of their opposite-sign phase relationship, the *leading* stub-reflected wave and the *lagging* load-reflected wave cancel each other at the match point. The voltage reflection coefficients of load and stub thus add vectorially to zero degrees ($\bar{\rho}_E = 0.5 \angle 0°$), which tells us that the resultant of the two reflections is exactly in phase with the incident voltage wave at the match point as shown in Fig. 6A. (The amplitude resulting from this trigonometric addition will be considered later, but knowledge of these angular relationships should add to the appreciation of the mechanics of line-reactance cancellation by the stub.)

Now that we know what is happening with the voltage waves we also want to investigate the current waves to learn about the impedance relationship at the matching point. As defined earlier, reflected current is 180 degrees out of phase with reflected voltage, so the current coefficient is found on the Vector Graph 180 degrees away or diametrically opposite the corresponding voltage-coefficient point. Thus we find the current reflection coefficient for the load mismatch at point *C* with $\bar{\rho}_I = 0.5 \angle +120°$. Similarly, the stub-mismatch current coefficient found at point *B* is $\bar{\rho}_I = 0.5 \angle -120°$. Note that the current coefficients of load and stub are also of equal magnitude and phase, but of opposite phase sign. But while the voltage angles add to 0 degrees, the current coefficients add vectorially to $\bar{\rho}_I = 0.5 \angle 180°$. The resultant current reflected wave is then 180 degrees out of phase with the incident current as shown in Fig. 6B. So we have incident and reflected voltages in phase, and incident and reflected currents out of phase — and the wave arriving at the match point from the generator sees a perfect match.

These facts portray a significant message. In the opening paragraphs of Part III the wave mechanics involved in a line terminated by an open circuit were described. There we learned that the reflection coefficient angle of the voltage is 0 degrees and of the current is 180 degrees. With an open-circuit condition, the unabsorbed voltage wave which is incident on the termination is reflected with no change in phase, while the unabsorbed current wave is reflected with a phase change of 180 degrees, a complete reversal of polarity. The reflected-wave phase relationships at the match point which we established above (by the voltage and current resultants of the stub- and load-mismatch waves) indicate precisely the same conditions that prevail in a line terminated in an open circuit, so far as the reflected waves are concerned (but not the incident wave.) Therefore, the effect of the two reflected waves arriving at the match point is to establish an open circuit to the waves generated by the two mismatches. Thus, these waves become totally reflected at the match point and undergo open-circuit phase-change relationships as described above. The resultant reflected voltage wave thus does not change phase during this reflection; remember that it was already in phase with the incident wave prior to its reflection. The resultant current wave changes phase by 180 degrees on reflection, and because it was 180 degrees out of phase with the incident current wave just prior to its reflection, the present 180-degree reversal now places it also in phase with

the incident current wave. Now that both voltage and current rereflected waves are *in phase* with their corresponding incident waves, addition of the voltages and currents occurs at the reflection point. Thus the conclusion: *The power contained in the reflected waves adds to the incident power.*

Before we proceed any further, let us consider that the above conclusion was based on the assumption that an open-circuit condition exists at the match point for the reflected waves trave'ing toward the generator. The assumption was based on the similarity between the reflection coefficients which we established at the match point by wave interference and those known to exist at an open-circuit termination. We can verify this assumption by an alternate method, based, for example, on the open-circuit magnetic-field theory from Part III.

Let us first observe the net value of *all* currents flowing at the match point at the instant the two reflected currents form their resultant $\theta = 180°$; at this instant we will see an initial sudden drop in resultant line current I because of wave cancellation as the reflected-wave resultant becomes aligned exactly out of phase with the incident current. This drop is shown graphically in Fig. 6B, where the original resultant current I (as with no matching stub present) suddenly drops to the new *instantaneous* resultant value I' from the effect of the stub discontinuity. Now recalling briefly from the open-circuit field theory presented in Part III, para. 2, we know that when current drops, the *magnetic field also drops. The changing magnetic* field produces an electric field equal to the energy reduction in the magnetic field. The new electric field adds in phase to the existing electric field, producing an increase of voltage at the match point. This increase in voltage now starts a wave traveling in the opposite direction, which is actually now in the same direction as the incident wave, thus adding to it. The increased electric field (now an enlarged *incident* electric field), as it moves toward the load, produces a new magnetic field equal in magnitude but of polarity opposite to that of the original field. This new magnetic field now causes current to build up again to the same magnitude as the original reflected current, but of opposite polarity and direction. Thus the new current wave is now also traveling in the same direction with the same polarity as the incident current wave, adding to it and enlarging it just as the rereflected voltage wave added to and enlarged the incident voltage wave.

By following these field-current-voltage reactions through their natural sequence of events, it can be seen that we have obtained the same conclusions as those previosly obtained, thus justifying the assumption that the resultant reflection coefficients at the match point have defined an open circuit to the reflected waves. The existence of the reflectance at the matching point is therefore verified, with the result that both the reflected voltage and current have indeed been rereflected and the power associated with them has thus been effectively added to the power contained in the incident wave. Thus when the line is terminated in a mismatch, causing reflected power to exist on the line, the *sum* of the source and rereflected powers (which is traveling only toward the load) must be greater than the power delivered by the generator alone. And since we have shown how the stub acts to counteract reflections from *the load, our original questions concerning the stub* characteristics have been answered.

With a 3:1 SWR, where $\rho = 0.5$, 100 watts supplied by the transmitter will yield 133.3 watts of incident and 33.3 watts of reflected power. Neglecting losses, 100 watts will also be absorbed in the load. From Fig. 4, reflected power $\rho^2 = 0.25$, or 25 percent of the incident power, leaving 75 percent absorbed by the load ($1 - \rho^2 = 0.75$). Incident power is $1/(1 - \rho^2)$ times the supplied power, so $1/0.75 = 1.333$, and 1.333 times 100 *watts equals* 133.3 *watts.*

In a typical realistic case where the flat-line attenuation is 0.50 dB (corresponding to 175 feet of RG-8/U at 4 MHz, 85 feet at 14 MHz, or 85 feet of RG-59/U at 4 MHz), if the load were perfectly matched to the line (1.0 SWR) the 100 watts delivered would be attenuated to 89.13 watts during travel to the load. But with a 3:1 mismatched load the additional one-way line attenuation (because of the SWR) is 0.288 dB. The incident power at the conjugate-match point would then be 124.78 watts (0.288 dB below 133.33 watts), and 111.21 watts of power (0.5 dB below 124.78 watts) reach the load; 27.80 watts (25 percent) are reflected, leaving 83.41 watts to be *absorbed. Of the 27.80 watts reflected,* 24.78 watts arrive back at the input to join the 100 watts of source power to develop the 124.78 watts of incident power. The 5.72 watts difference between the power absorbed in the matched and the 3:1 mismatched load (0.288 dB) is insignificant. Information on calculating these values will be presented later. These values are typical of data obtained during actual routine measurements in a professional laboratory. They provide additional evidence that reflected power is real and not ficticious; if it were ficticious power, no more than 66.85 watts (75 percent of 89.13 watts) would be available to the 3:1 mismatched load. But the 83.41 watts actually absorbed is 93.58 percent of the amount absorbed in the matched load, the loss of 6.42 percent being completely accounted for in line attenuation alone.

Matching Networks and Reflection Mechanics

We now wish to delve further into the wave-interference principles demonstrated using the stub technique, to learn how the principles also apply to both resonant quarter-wave series matching-transformer operation and the typical amateur "antenna tuner" (line-matching network) or Transmatch. In order to visualize the inherent generality of these principles we need to develop some additional concepts concerning stub matching and embark on a somewhat different line of reasoning. As may be surmised from the example presented above, the fundamental principle behind the elimination of reflections is to have each reflected wave canceled at the point

where the elimination of the reflection is desired by interference from another wave of equal magnitude and phase but opposite phase sign *(ref. 35, p. 58)*. A transmission line of the appropriate length which has one end effectively open circuited and the other end short circuited possesses the reflection-producing characteristics required to develop canceling waves of the correct phase in relation to the wave to be canceled.

Canceling waves can be developed by using other line arrangements, but for the purpose of demonstrating the principle, we will use the arrangement just stated, which, as shown in Fig. 7, shows how a stub performs the matching function in practice. Fig. 7A is the conventional representation of a typical series-stub circuit (using the values of our previous SWR = 3 example), in which section F is called the *feed line*, section S is the *stub*, and section T is an impedance-transforming section which we will call the *transformer*. We'll now discuss these in greater detail. To clarify the approach, Fig. 7A is redrawn in Fig. 7B, with the stub and transformer shown as one continuous straight-line section. This straight-line section will presently come to life as the heart of the wave-interference-producing mechanism found in all stub-matching operations. This is because its physical length will be adjusted arbitrarily so that waves reflected at each end will return to the feed point with equal magnitude and phase, but with opposite phase sign.

We have seen earlier that a voltage wave is reflected with zero phase change from an open circuit (or from any resistive termination greater than a matched load), and is reflected with 180 degrees of phase change from a short circuit (or from any resistive termination less than a matched load). With a current wave the inverse is true. So from the viewpoint of reflection behavior, one end of the straight-line section will be considered as being open circuited and the other end short circuited; which end will be open and which end short circuited will depend on the character of the load. In our example in Fig. 7B the load end behaves like an open circuit as far as wave reflection is concerned, while the other end (the stub) is short circuited. The action occurring in this line section in the process of developing the interfering wave-canceling relationship is as follows. Either a voltage or current wave is assumed to enter the line section at the feed-line entry point. The energy divides, one portion of the wave traveling toward one end of the section, and the other wave portion traveling toward the opposite end. After each wave portion encounters *one* reflection the returning waves will each have the same absolute value of phase but opposite sign, or polarity, on return to the point of entry.

The opposite phase polarity between the two reflected waves (arriving from opposite directions) results because reflection at one end is accompanied by a 180-degree phase reversal, while reflection from the other end is not. As stated above, the phase reversal of one wave but not the other is caused by the opposite conditions of reflection at the two ends of the line, one end open- and the other end short-circuited. Note in Fig. 7 that in each case, the phase of the reflected waves (of both voltage and current) is of opposite polarity on opposite sides of the feed line as they return from the stub and load directions. The wave entry point, where the feed line is attached, is the matching point, and divides the line section into its two complementary portions: the *stub* portion, S, and the *impedance-transformer* portion, T. Electrically, each portion is the complement of the other, because the waves reflected from the end of each portion returning to the match point are complementary in phase relationship and equal in magnitude. Herein lies the basis for the term *complementary mismatches* as used earlier, because each portion presents a complementary mismatch to the feed line.

We will see a little later that this complementary mismatch concept is of great importance to matching in general, because the complementary relationship holds no matter where the feed-line entry point is positioned on the stub-transformer line section. The importance prevails because the canceling wave and the reflected wave to be canceled will be of the same magnitude and phase but opposite phase sign at whatever point on the quarter-wave line section the feed line is attached. This is true with two provisions: (1) the characteristic impedance Zc of the feed line F must be the same as the resistive component of the transformed impedance appearing on the transformer line at the feed point, and (2) the length of the stub portion S must be adjusted to produce a reactance equal and opposite in polarity to the line reactance appearing at the feed point. The length may be found from the expression

$$S_L = \text{arc tan} \left| \frac{jX}{Zc} \right| \qquad \text{(Eq. 10)}$$

where S_L is the stub length in electrical degrees
jX is the line reactance (obtained from the Vector Graph)
Zc is the characteristic impedance of the stub section. (Zc = 1.0 here, because we are using normalized impedances. See footnote 22.)

The transformer section T transforms the load to varying values along the line. Hence, for a proper match, the magnitude of the F feed line impedance, Zc, depends on the location of the feed point and vice versa. This concept is not generally appreciated, and it is certainly not readily apparent from the usual stub-length and position-indicating graphs appearing in many publications.

Stub Matching Versus Network Matching

We are now getting closer to seeing how stub-matching principles extend to line-matching-network operation. If we look further into the reflection characteristics of what have generally been considered to be *different* techniques of matching, a fascinating revelation of the similarity between all of these various techniques will emerge; stub, hairpin, λ/4-series transformer, Transmatch, *L* network, and so on, are all in this

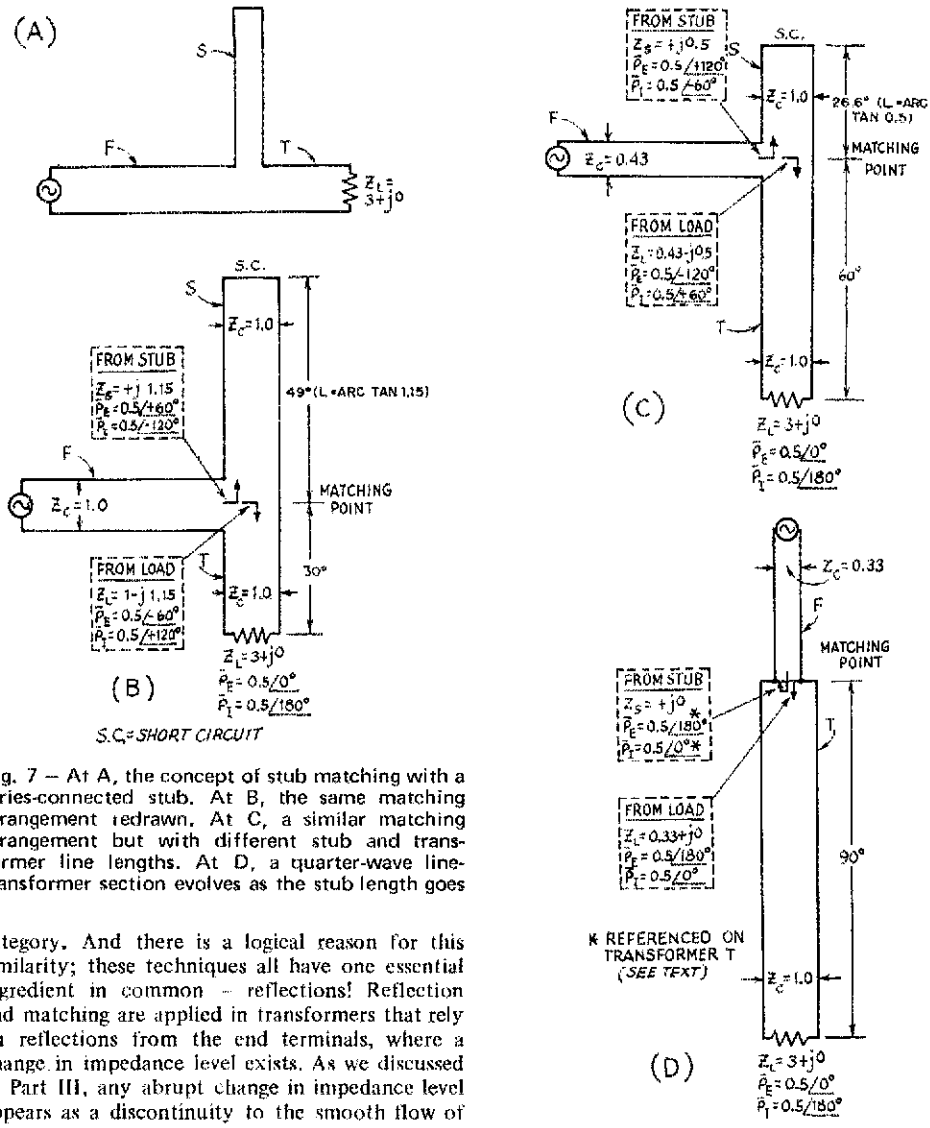


Fig. 7 — At A, the concept of stub matching with a series-connected stub. At B, the same matching arrangement redrawn. At C, a similar matching arrangement but with different stub and transformer line lengths. At D, a quarter-wave line-transformer section evolves as the stub length goes

category. And there is a logical reason for this similarity; these techniques all have one essential ingredient in common – reflections! Reflection and matching are applied in transformers that rely on reflections from the end terminals, where a change in impedance level exists. As we discussed in Part III, any abrupt change in impedance level appears as a discontinuity to the smooth flow of the electromagnetic wave, and results in producing a reflection. The transformer accomplishes the task of matching its input and output impedances by controlling the phase and magnitude of the waves produced by reflection at its boundaries, or end terminals, so that all the reflections produced at either end are canceled by those arriving from the other end *(ref. 35, p. 58)*. This is what was meant in the reference to "controlled reflections" in Part I, para. 3. A corollary to the seeming anomaly of the stub producing a *mismatch*, instead of a match, is that we match to avoid reflections, but we can't match without them when different impedance levels are involved.

From Eq. 1, Part III, we know that the load-reflection magnitude is determined by the ratio between the load impedance Z_L and the line impedance Zc of the transformer. So in furthering the understanding of the role played by reflections in the process of impedance matching, it is interesting to make two additional observations on the Vector Graph. First, the reflection magnitude, or SWR, determines the position on the transformer section T where the resistance component of line impedance *E/I* equals the line Zc. This position, we recall, is the matching point, and fixes the length of the transformer section T. In making this observation remember that the diameter of the SWR circle is proportional to the VSWR. By tracing along the R = 1.0 circle we can see that as the diameter of the SWR circle changes, the point where the R = 1.0 circle and the SWR circle intersect moves accordingly. A radial line drawn through this intersection point, and extending to the line-length scale *L*, will thus indicate the angular distance (T) from the load to the matching point for a given SWR. We recognize this observation as simply the conventional method of using the Smith Chart for determining the stub position

when the transformer and feed-line impedance Zc are equal. But second, using a radial indicating line in a similar fashion while tracing along the SWR = 3.0 circle as it intersects the various other resistance circles, we see that for a given SWR the resistance component of the line impedance E/I changes with position along the transformer. These two observations together reveal a flexibility available in the approach to a matching design that provides a step toward visualizing the fundamental similarity of the different matching techniques. This flexibility includes the following three conditions, which will be explained in more detail:

1) There is no restriction on the characteristic impedance Zc of the transformer section T that requires it to be of the same value as the F feed-line impedance Zc – it can range from low (coax) to high (open-wire line).

2) The *length* of the transformer section having a given Zc can be found which will transform the resistance component of the impedance to the value of a matching F feed-line impedance Zc which differs from the transformer Zc. However, the transformer section can have a length which is not limited to the distance from the load to the first point at which the resistance component equals the feed-line Zc. The transformer can extend from the load to either of the two points where the resistance component is seen to equal the feed-line Zc on the SWR circle, or any electrical length extending beyond these points by an integral multiple of a half wavelength. (We will see later how the use of the Transmatch or an *L* network assists in obtaining the required electrical length, and thus *removes all restrictions from any specified physical length of transformer, i.e., from the load all the way to the operating position.)*

3) The action of the stub portion can be performed by any nondissipative reactance of the proper value, whether by a lumped-constant component, or by a separate line section of any reasonable Zc value which has the proper length to present the required value of reactance. The *electrical* length of the stub is always directly related to its reactance. Now we will see in terms of wave or reflection mechanics how matching obtained by the various techniques recited previously is described by these three parameters: transformer impedance, transformer length, and stub reactive elements.

In our earlier example using the stub technique the magnitude of the reflections appearing at each end of the *transformer* section was the same (0.5, or an SWR of 3:1 for the load at one end and the stub at the other). In other words, the magnitudes of each complementary mismatch were identical. For the present, we will retain the characteristic impedance Zc = 1.0 for the entire stub-transformer line section, but based on conditions 1 and 2 above, we may change the feed-line impedance as conditions dictate. Consider now the effect of increasing the length of the transformer section and shortening the stub section in accordance with equation 10. For example, while referring to Fig. 7C and the Vector Graph, let us move the feed-line entry point farther away from the load, from $L = 30°$ to $L = 60°$. This increases the transformer length to 60 degrees and reduces the stub length to 26.6 degrees. From observing the radial line extending from the $L = 60°$ point (where $\theta = -120°$) through point *B*, where the SWR = 3.0 and the R = 0.43 circles intersect on the Vector Graph, we see that the corresponding movement along the SWR circle results in a change in the resistance component at the feed point from R = 1.0 to a new resistance R = 0.43.

Recalling from the earlier statement that the complementary mismatch relation holds constant wherever the feed line is attached, a feed line having a characteristic impedance Zc = 0.43 will be perfectly matched when attached at the $L = 60°$ point. The load-mismatch voltage reflection coefficient is now read as $\rho_B = 0.5\angle -120°$ at point *B* with the same magnitude as before, but with a larger phase angle because we are farther from the load. And applying the complementary-mismatch principle we see that the voltage reflection from the stub mismatch becomes $\rho_B = 0.5\angle +120°$, as read at point *C*. So we ask the question, how does this new combination produce a canceling wave having the same magnitude as before? We will recall that previously, when the line-characteristic impedances of sections F, S and T were each Zc = 1.0 as in Figure 7B, the canceling reflection was generated by the stub alone, because no line-junction mismatch existed between the feed line F and the transformer T. But now that the impedance of the feed line differs from the impedance of the transformer, we have an additional discontinuity at the feed point, which also generates a reflection. And the *shorter* (series) stub portion now generates a reflection which is smaller than when all the line sections had a Zc = 1.0, the stub-reflection magnitude being reduced by the amount of the reflection presently being generated by the feed-line to transformer mismatch. Thus by the complementary mismatch principle the resulting canceling wave still retains the correct magnitude and phase to cancel the load-mismatch reflected wave at this new feed point on the transformer. This canceling wave is evidently generated by the *combined* discontinuities of both the differing line impedances at the junction, and of the stub with the corrected length. We have thus matched a feed line of Zc = 0.43 to a load of $Z_L = 3 + j0$ through a transformer of Zc = 1.0.

Using this same line of reasoning we may, conversely, shorten the transformer section and change the stub section according to the tangent relation in Eq. 10 to obtain a match for feed lines of higher impedance. We need merely to position the feed-line entry point where the resistance component of impedance in the transformer T has been transformed to the value of the feed-line impedance Zc that we wish to use and then adjust the stub length to cancel the line reactance. As explained above, the resistance circle which is intersected by the SWR circle for a given transformer length indicates the feed-point resistance component. This is also the Zc value of the feed line which will be perfectly matched when attached at the feed point. The data presented in Table I, taken from points along the SWR = 3.0 circle on the Vector Graph, show a few selected

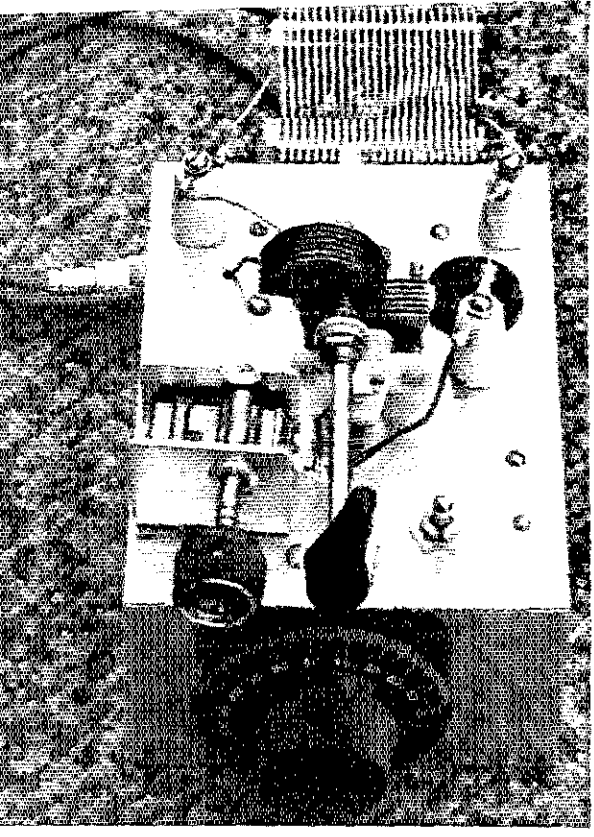
Table I — Matching characteristics with various transformer- and stub-section lengths.

				Angle of Reflection Coefficient			
				Voltage		Current	
Transformer length	*Stub length*	*Resistance component*	*Stub reactance*	*Load mismatch*	*Stub & line mismatch*	*Load mismatch*	*Stub & line mismatch*
$L°$	$S_L°$	R	jX	$\theta°$	$\theta°$	$\theta°$	$\theta°$
0	0	3.0	0.0	0	0	180	180
10	48.2	2.42	+1.12	−20	+20	+160	−160
22.5	52.9	1.38	+1.32	−45	+45	+135	−135
30	49.0	1.00	+1.15	−60	+60	+120	−120
45	38;7	0.60	+0.80	−90	+90	+90	−90
52	33.0	0.50	+0.65	−104	+104	+76	−76
60	26.6	0.43	+0.50	−120	+120	+60	−60
67.5	19.8	0.38	+0.36	−135	+135	+45	−45
90	0	0.333	0.0	180	180	0	0

transformer-length examples and pinpoint some of the pertinent information for clarity. Notice especially that the resistance component decreases as the transformer length increases. It is interesting to discover that when the feed point goes beyond the L = 45° position, the θ angles of the voltage- and current-reflection coefficients pass through 90 degrees from opposite directions, respectively. The result of this is that their respective resultants shift 180 degrees. Thus the resultant reflection-coefficient angles interchange, the voltage-coefficient resultant angle θ now becoming 180 degrees and the current angle becoming 0 degrees. This means that the effective reflecting termination at the match point shifts from an open circuit to a short circuit when the feed line is attached more than 45 degrees away from the E_{max} position at L = 0° on the transformer.

Consider now the effect of increasing the length of the transformer section still further, until the reactance component of the line impedance disappears by itself without requiring a stub to cancel it. The Vector Graph shows this condition to occur at L = 90°. At this point the load-mismatch reflected voltage wave is exactly 180 degrees out of phase with the incident wave and therefore no reactance component is developed here. The resistance component of the line impedance at this point is 0.33 × Zo on the chart. Based on our present reasoning, we may at this point connect a feed line F having an impedance Zc = 0.33 (see Fig. 7D) and obtain a perfect match. No reflections will appear on the 0.33-ohm feed line. How come? Again, because of the canceling reflections in the transformer section! Note the present length of the transformer section — 90 degrees, or a quarter wavelength. The transformer section alone is now using the *entire length* of the line section, and the *stub section has disappeared. Simply by moving* the feed point along the transformer to the point where the line reactance vanishes, the resistance component becomes Zc/SWR = 1/3, and we slip smoothly from the stub form into the series quarter-wave transformer form of matching. (See Table I.) Remember, the characteristic impedance of the transformer is still Zc = 1.0, which has become the geometric mean between the input and output impedances that it is matching $\sqrt{0.33 \times 3.0}$ = 1.0. Looking from inside the transformer, the impedance level at the input terminals is stepped down 3:1 (giving us short-circuit reflection behavior), just as the output impedance (load) is stepped up 1:3 (for an open-circuit behavior at the output terminals). It is therefore evident that a λ/4-transformer section of line having a Zc equal to the geometric mean of its two end-terminal impedances has equal mismatches at both ends, and thus produces reflections of equal magnitude at both ends. These reflections from each end cancel each other out at the feed-line transformer-input junction, because waves reflected at the output mismatch return to the input junction exactly 180 degrees out of phase with the waves reflected at the input mismatch. This is because the load-mismatch reflected wave has traveled 90 degrees from the input point to the load mismatch, and an additional 90 degrees in returning to the input. To clarify further what is happening here, we recall that previously, when the feedline F and transformer T were of equal impedance Zc (Fig. 7B), the canceling reflected wave was generated entirely by the stub mismatch. In the present case where the stub length is zero, the canceling reflected wave is generated entirely by the 3:1 feed-line transformer-junction mismatch. The voltage reflection coefficient angle of this feed-line junction-mismatch reflected wave is θ = 0° referenced to the feed-line Zc because the transformer Zc is three times greater. However, after both the load- and input-junction-mismatch reflected waves have joined to cancel one another, the input-junction reflection no longer travels toward the generator, but is rereflected into the transformer toward the load in the same manner as with the previous stub-reflected wave. Therefore, referenced from within the transformer, the reflection coefficient angle of the junction reflection is θ = 180°, as indicated in Table I. In a later section we will see why the λ/4 series transformer is an impedance inverter for any complex terminating load, and is not restricted to purely resistive loads.

Part V of this series will appear in a subsequent issue of *QST*.



An experimental VXO used to test various circuit configurations. Despite the haywire appearance, excellent stability could be obtained.

The Tunable Crystal Oscillator

BY LARRY LISLE,* K9KZT

OF ALL THE beasties in ye electronics woodes, one of the most fascinating to this writer, is the variable frequency crystal oscillator or VXO. Consider: stability unmatched by many conventional *LC* oscillators, simple circuitry, reduced mechanical requirements and – best of all for the amateur – there is still plenty of room for experimentation and improvement!

Illustrated in Fig. 1 is the diagram of the electrical equivalent of a piezo-electric crystal. *L* is very large, C is very small, and together they form a series-resonant circuit with an extremely high *Q*. If the crystal could be operated without any extraneous circuitry attached, it would oscillate at this series-resonant frequency. For practical purposes though, we have to put it in some kind of holder and attach it to a circuit – both of which add capacitance across the series-resonant combination. Consequently, if the crystal is going to oscillate, it must compensate for this added capacitance by becoming slightly inductive; the only way it can do this is by oscillating at a slightly *higher* frequency. Since we now have an inductive reactance in parallel with an equal capacitive reactance, the network is the equivalent of a parallel-resonant circuit. To raise the frequency of a parallel-resonant circuit, either the capacitance or the inductance must be reduced. Decreasing the capacitance substantially is somewhat difficult, but decreasing the inductance is easy – just place another inductance in parallel, as shown in Fig. 2.

* 326 N. First St., Rockford, IL 61107.

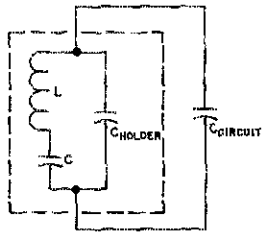


Fig. 1 – Electrical equivalent of a piezo-electric crystal and circuit.

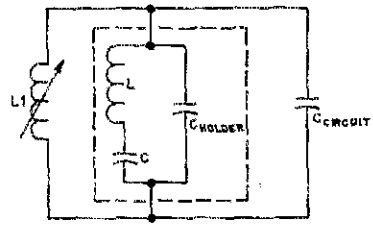


Fig. 2 – The configuration can be modified by placing an inductance in parallel with the circuit and crystal to raise the frequency of operation.

Increasing the Frequency

Adding inductance in parallel in this case will cause the oscillator frequency to increase. This is because the inductive branch of the network must remain in equilibrium with the capacitive:

$$(-1) \times X_C = X_{L\text{total}} = \frac{X_{L\text{xtal}} \times X_{L1}}{X_{L\text{xtal}} + X_{L1}}$$

As can be seen from the equation above, when the inductive reactance of L1 decreases, the inductive reactance of the crystal must increase.

Substituting numbers for letters will show that the inductive reactance of L1 must be variable over a considerable range, which can lead to difficult mechanical problems. Fortunately, the same effect can be realized by replacing L1 with a parallel-resonant circuit tuned slightly above the crystal frequency. The inductive reactance of the crystal and its frequency of oscillation can now be controlled by adjusting C1 – decreasing the capacitance raises the frequency.

Some plated crystals work better than others in this circuit, (third-overtone types working on their fundamentals were among the best tried) so particular attention should be directed to any sudden jumps in frequency as C1 is decreased. This would indicate a change in the mode of oscillation, or that the crystal has stopped oscillating and the circuit is operating as a conventional *LC* oscillator.

Operation Below the Crystal Frequency

To lower the frequency of oscillation, we have to make the crystal act as a *capacitive* reactance, *below* its series-resonant frequency. The easiest way to do this is to add an inductance *in series* with the crystal, Fig. 4.

Going just one step further, we have a Clapp oscillator, Fig. 5, in which the network between points A and B acts as a capacitor in series resonance with the coil L2. Since L2 and C_{AB} are series resonant, their reactances must be equal but opposite and:

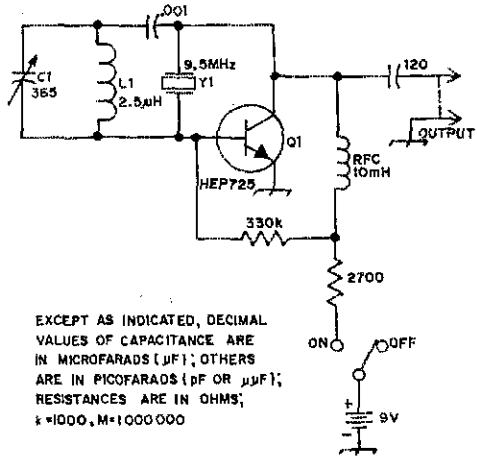
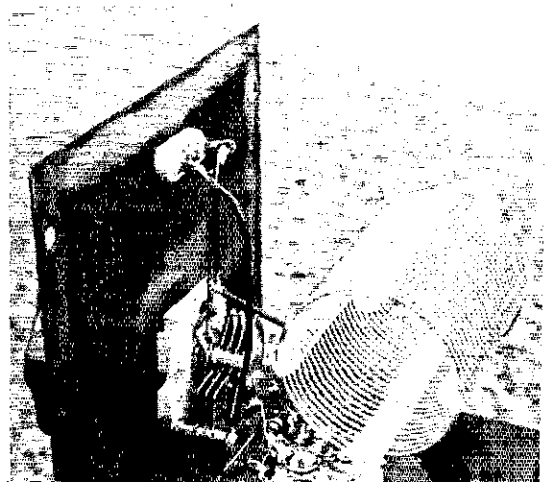


Fig. 3 – In a practical VXO, the operation may be above the crystal frequency by placing a tuned circuit across the crystal.

$$(-1) \times X_{C\text{AB}} = \frac{1}{\frac{1}{X_{C\text{holder}}} + \frac{1}{X_{C\text{xtal}}} + \frac{1}{X_{C2}}}$$

Since the total capacitive reactance of the network AB must remain in equilibrium with the inductive reactance of L2, as the capacitive reactance of C2 decreases, the capacitive reactance of the crystal (and downward frequency shift) increases. In other words, the frequency of oscillation of the crystal is primarily determined by C2 within limits set by L2.

In reality, the feedback capacitors also affect the situation, as does stray capacitance, but the effect is slight compared to that of C2. Again, care must be taken to assure that the crystal is controlling the frequency and that the circuit hasn't "taken off" on its own. The oscillator illustrated in Fig. 5 is very stable within 100 kHz of the crystal frequency. Though the values given are for the 9.5-MHz range for tripling to 10 meters, either circuit can be adapted to other bands by



No "build it like a battleship" blues here! Since stray capacitances can affect the performance of different VXOs using the same circuit, some pruning of the coil may be necessary to obtain the desired bandspread. Substituting a good-quality slug-tuned coil may make the job easier. Don't forget to insulate C2 from the chassis.

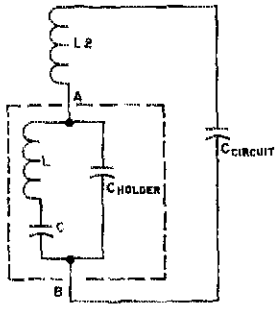
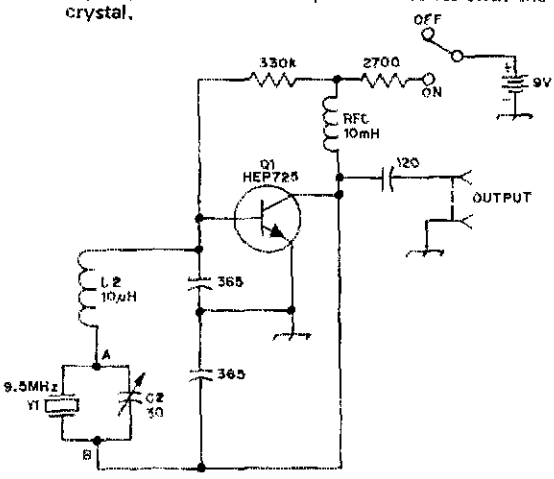


Fig. 4 — To obtain a frequency below that of the crystal, an inductance is placed in series with the crystal.



EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μF); OTHERS ARE IN PICOFARADS (pF OR μμF); RESISTANCES ARE IN OHMS; k = 1000, M = 1000 000.

Fig. 5 — A Clapp-oscillator version of a VXO. The frequency was chosen to be tripled to 10 meters, but the circuit may be adapted to other bands.

keeping the reactances of the various components approximately the same. If difficulty is experienced in obtaining adequate frequency deviation below the crystal frequency, the first thing to suspect is that L2 is too small. Also, crystals mounted in the FT-243 pressure-type holders worked rather poorly compared to plated crystals. For maximum stability all voltages should be regulated, temperature compensation should be used, and the VXO should be isolated as much as possible from the load and operated at a low power level.

The field of variable-frequency crystal oscillators is still wide open for experimentation. Among the things needed are a single circuit for operation both above and below the crystal frequency, a linear tuning system, and a thorough mathematical treatment.

The author hopes this brief article will lead to further development and use of the VXO in transmitter frequency control, receiver local oscillators, secondary frequency standards and other areas where an ultrastable tunable oscillator is required. QST

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[1] Shall, "VXO — A Variable Crystal Oscillator," *QST*, January, 1958.

[2] Saborsky, "A VHF Variable-Frequency Crystal Exciter," *QST*, November, 1960.

[3] Tilton, "A Stable But Variable Frequency-Control System for the VHF Bands," *QST*, July, 1963.

[4] Rogers, "Transistorized VXO," *Technical Correspondence, QST*, November, 1962.

[5] Rowe, "Transistor VXO for VHF Transmitters," *Hints and Kinks, QST*, January, 1970.

[6] Cassey, "The Clapp Oscillator — And How!" *QST*, February, 1953.

[7] Cady, *Piezoelectricity* (two volumes), Dover Publications, New York, 1964.

[8] DeMaw, "Some Practical Aspects of VXO Design," *QST*, May, 1972.

Novi Loop

(Continued from page 21)

was also 110 ohms, but considerable inductive reactance was observed. Most certainly one could use the antenna on 15 meters with reasonable success, despite the SWR which might be present.

Results

During two weeks of testing the loop gave an excellent account of itself. It was compared with the writer's two-element short beam for 40 meters, and the results indicated that the loop was better than the beam on some occasions. At other times the beam provided better performance, or was at least equal to the loop. The differences noted were the result of band conditions and the time of day. High-angle signals can cause misleading results when comparing antennas for hf-band use. More meaningful tests can be made on ground-wave contacts, however, and several checks made between the loop and the beam indicated that radiation at right angles to the plane of the loop compared closely with that from the front of the beam. The beam is rotatable and installed 40 feet above ground.

With 150 watts dc input to the transmitter PA, and operating at the low end of 40 meters (loop was cut for 7050 kHz), the first night of operation resulted in the logging of three Russian stations, two Polish ones, two Yugoslavians, one Italian station and two English ones. The lowest report was RST 549. The highest report was RST 599. Generally speaking, the loop has outperformed the beam during most long-haul contacts. Though no effort has yet been made to work South American stations (off the side of the loop), they have been heard loud and clear, as have some VK stations via long path at approximately 2300 GMT.

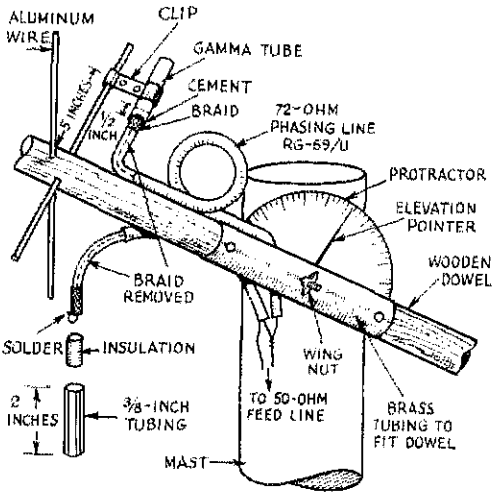
It is quite likely that the Novice who chooses to erect his own Novi-Loop will have a commanding signal on 40 meters. If back-yard space permits, it should be a worthwhile venture. Don't forget, the formulas and guidelines given here are applicable to the other hf Novice bands as well. — *WICER*

Hints and Kinks For the Experimenter

INSTANT OSCAR ANTENNA

Field Day rule changes allowing credit for Oscar 6 contacts made a simple portable antenna system a necessity. Using KH6IJ's information on crossed-Yagi antennas (*QST*, January, 1973), engineers K1HTV and W1YNC came up with a suitable design. They then turned the whole thing over to chief technician, W1FTX to make it work. This he did and some of the ideas incorporated into the antenna may be of interest to other Oscar users.

The boom consisted of wooden-dowel stock approximately 3/4-inch in diameter. Two sections were used and were connected by inserting them into a short piece of brass pipe and then pinned.



The brass pipe also provided a means for making a good mechanical connection to the mast with a bolt and wing-nut combination. A pointer was attached to the boom in order to set the elevation on a protractor fastened to the mast. Wire elements of approximately 1/8-inch diameter then were inserted through holes in the boom at appropriate points for each 6-element Yagi.

The gamma-matching section presented the most difficult problem since there were no elaborate shop facilities available. Details of the solution are shown in the drawing. A short section of braid is slipped over the dielectric of the cable and soldered to the inner conductor. This forms one plate of a coaxial-type capacitor. A thin layer of some suitable insulating material such as plastic tape is then placed over the braid and the assembly is inserted into a short section of aluminum tubing. It was found that only a short capacitor length (1/2 inch) was needed. This was cemented in place with silicone rubber sealer (bathtub caulking compound). The clip was positioned until a minimum SWR reading was found. The process was repeated for the other Yagi.

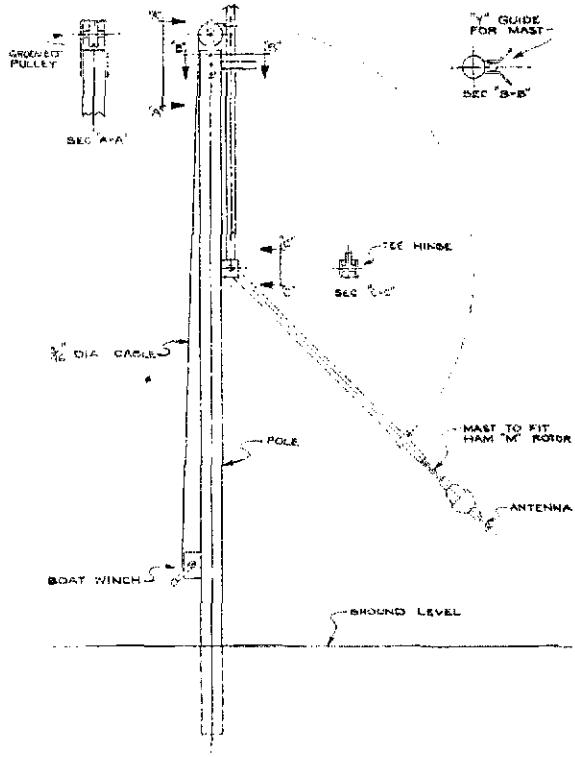
Performance of the antenna was adequate for its intended purpose. Little difficulty was encountered in working through the satellite and contacts were made during most passes, even some of the less favorable ones. – *W1YNC*

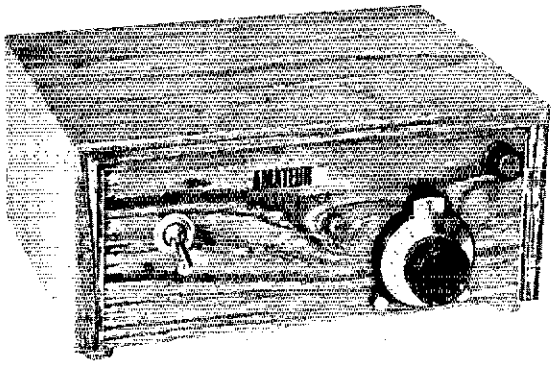
PORTABLE CW OPERATION WITH COMFORT

When operating mobile or QRP portable in the wilds, finding a good place to put the key might be difficult. But if the key is tied or strapped to the thigh, just above the knee, it has a stable base and there is a comfortable rest for the forearm. A good way to mount the key is to use a piece of Masonite with slots to accept straps – *Tim Crossett, WB9LPD*

HOMEMADE TIP-OVER TOWER

A simple tip-over tower can be constructed from 2-inch steel pipe as shown in the drawing. The total height is 60 feet, but anything up to this height could be used. – *Walter Roberts W4KTD*





A Tuner for ATV Applications

BY PETER J. BERTINI,* K1ZJH

RECENTLY, a group of amateurs in the Springfield, Mass., area decided it was high time to get going on fast-scan amateur TV. Almost everyone in the group already possessed the necessary camera, so in this case half the battle was won. Surplus Motorola T-44 uhf transmitters, long retired from active duty in the two-way commercial field, were paired with the solid-state modulator described by WØMZL[1] to produce the high-resolution transmission system we desired. Several models of the 48-element collinear array presented in the *VHF Manual*[2] were mass produced "antenna-bee fashion." These would give us the wideband, directive high-gain antennas required for strong, ghost-free pictures in our hilly and heavily wooded New England area.

The one remaining problem left to be solved was the receiving converter, needed to convert our 439.25-MHz signals down to a locally unused vhf TV channel for use with a common TV set. The use of 439.25 MHz, which is the national ATV channel, made it practical to consider the use of a modified uhf TV tuner for the heart of this portion of the system. The end result is described here, and represents the efforts of several evening's work by the author.

It is unfortunate that in the past many amateurs have modified uhf tuners for this purpose by simply padding down the three tuner lines. At best, this approach yields only mediocre performance, and has given modified uhf tuners the reputation of being a quick, but generally third-rate, method. This is unfortunate, for in our opinion with a little additional effort these tuners can be reworked to give outstanding performance. The basis for this modification comes from an earlier *QST* article by the author.[3] This article dealt with a tunable 440-MHz fm monitor receiver built around a uhf tuner front end.

Construction

A Sickles model 228 tuner construction was used, and these are readily obtained from discarded TV sets, or from various surplus outlets. The prospective builder should not despair if the exact tuner is not available. The majority of uhf tuners are enough alike in design and physical layout so as to give results similar to those obtained by the author.

The tuner to be used should be modified first according to the directions given in the author's *QST* article. The modified tuners provide around 12 MHz of coverage at 440 MHz. Unlike the tuner in the aforementioned article, in which an externally mounted preamplifier was used, the preamp used with the ATV version forms an integral part of the tuner assembly. The circuit diagram of the preamp is shown in Fig. 1. By using the antenna line in the tuner as the collector output network for the preamp, a lower noise figure and increased sensitivity were realized over that of a remote preamp stage. With 14 dB of mixer noise being typical for these tuners, it is quite obvious *what* the rf stage is expected to overcome and improve upon!

Some of the later model 228 uhf tuners utilize biased hot-carrier diodes in the mixer. These are readily identifiable by the clear glass diode package which has a single black band, and by locating the resistor from the emitter of the local oscillator transistor, which provides the dc biasing for the diode. The lower noise figure of the hot-carrier diodes allowed these tuners to produce pictures with a better degree of "quieting," or less snow, at comparably lower signal levels than with tuners

* 20 Patsun Rd., Somers, CT 06071.

[1] McLeod, "ATV with the Motorola T44 UHF Transmitter," *QST* for December, 1972, and February, 1973.

[2] *The Radio Amateur's VHF Manual*, third edition, p. 213.

[3] Bertini, "A Tunable 440-MHz FM Receiver," *QST* for July, 1973.

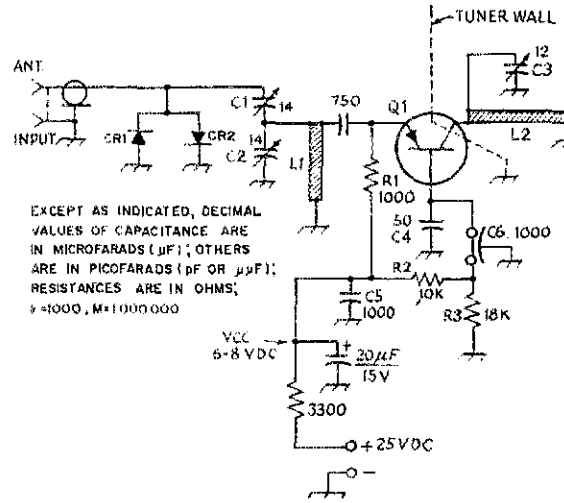


Fig. 1 — Schematic diagram of the 439-MHz preamp. Resistors are 1/4- and 1/2-watt composition.
C1, C2 — 14-pF trimmer, E. F. Johnson pc-type mount.
C3 — 12-pF glass trimmer.
C4 — 50-pF button mica.
C5 — .001-μF button mica.
C6 — .001-μF feed-through.
VR1, VR2 — 1N914. (May be eliminated in receive-only applications.)
Q1 —TIXM101. (See text.)
L1 — 1.5-inch (3.81 cm) length of No. 16 wire in a "U"-shaped coil.
L2 — 1.5-inch (3.81 cm) length of No. 14 wire. Antenna line in tuner rf cavity.

using the conventional germanium mixer diodes. These are generally 1N82 diodes in the Sickles tuners, and are identified by a clear glass diode package with a single gray and a single red band. The overall weak-signal detection ability was the same with both mixer types.

A slight improvement in sensitivity is possible by increasing the coupling between the mixer and antenna cavities of the tuner. The removal of the Faraday shield (if present) as described in the previous *QST* article, partially achieves this, and the coupling can be further improved by moving the antenna line closer to the coupling port. This is best done by the removal of the rigid line originally used, and by substituting an equal length of No. 14 bus wire in its place.

The preamp in this converter uses a Texas Instrument TIXM101 germanium uhf transistor, designed for low-noise amplifier applications up to 1200 MHz. They are, unfortunately, expensive and difficult to obtain, and were used only because several were residing in the junkbox at the time. However, any of the more common uhf pnp *transistors will work equally well, with usually* only a small change in base biasing being required.

The transistor body is mounted in a 3/8-inch (9.52 mm) hole drilled through the left side-wall of the antenna tuner cavity, just below the glass trimmer used to pad the antenna tuning line. This provides a convenient, ready-made shield for the preamp, and the shield lead of the transistor should be directly soldered to the tuner sidewall. For stable operation, the 50-pF base bypass capacitor is soldered as close to the transistor body (on the base lead) as is physically possible, and to the tuner wall, using extremely short leads. The collector lead is too short to reach the glass trimmer, and is *lengthened with a short piece of 1/8-inch (3.18* mm) copper strap. It is possible for this rf stage to become regenerative under certain conditions of tuning in the presence of a reactive antenna load.

The tuner is mounted on a piece of heavy double-sided pc board. The tuner sidewall associated with the rf stage is seam soldered to the pc board where the two meet at right angles. The pc board surrounding the tuner case provides a convenient surface on which to build the remaining converter circuitry.

*A noticeable improvement in overall perfor*mance was obtained with the inclusion of an i-f

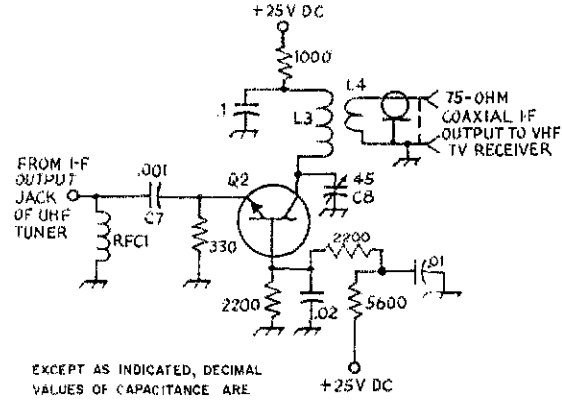
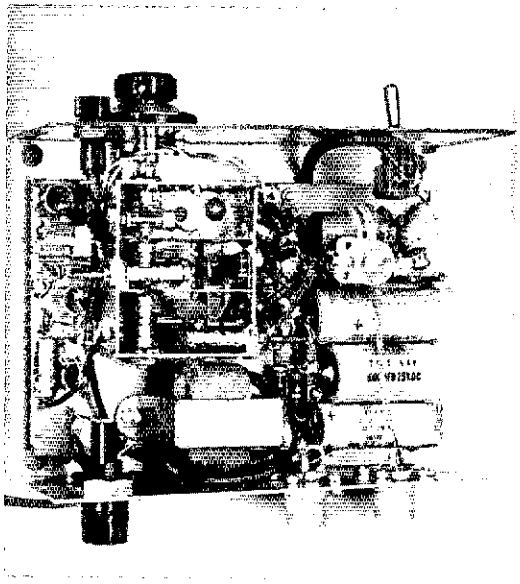


Fig. 2 — Schematic diagram of the i-f preamp. Resistors are 1/4- or 1/2-watt composition.
C7 — .001-μF disk ceramic.
C8 — 7 to 45-pF trimmer.
L3 — 5 turns No. 24 enameled wire on 0.5-inch (12.7 mm) OD toroid (red "E" core).
L4 — 3 turns No. 24 enam. over L3 cold end.
Q1 — 2N2222.
RFC1 — 330 μH.



Layout of the ATV tuner. The preamp compartment is visible in the upper left-hand portion of the photograph. Q1 is mounted in the side wall between the glass trimmer and the air trimmer. Leads to Q1 should be kept as short as possible.

amplifier stage. The circuit diagram is shown in Fig. 2. A 2N2222 transistor was used as a grounded-base amplifier. The input to the i-f stage is untuned, and the purpose of the 330-μH choke is to provide a dc-return path for the mixer diode current. Any i-f between Channel 2 through 6 may be obtained, dependent upon the tuning of the i-f output and the operating frequency of the local oscillator. The coil information shown is for an i-f which corresponds to Channel 5. The i-f output is designed to feed an unbalanced 75-ohm line, and vhf TV sets equipped with only a 300-ohm input will require a 4:1 balun.

Conclusions

This article is written under the assumption that the reader has had some experience working with uhf circuitry. So far, six converters have been assembled with identical results, and the experienced builder should have little or no difficulty in making the necessary modifications.

For a basis of comparison, several conventionally padded-down tuners were obtained. These were tried using the i-f amplifier, and with externally mounted preamplifiers. Both homemade and well known commercially made preamps were tried in these tests. The results showed that while some combinations could approach the performance of the author's unit, none could surpass it. Preamps tried in front of the author's converter gave varying results. Some caused little or no worthwhile improvement over the basic unit, while others actually caused a degradation in picture fidelity because of the increased selectivity.

These conclusions were drawn from on-the-air comparisons made with local ATV buffs, and by bench measurements using the author's Measurements Corp. model 84 signal generator. This tuner will provide a quick, practical and economical approach for the reception of ATV signals. QST

Strays

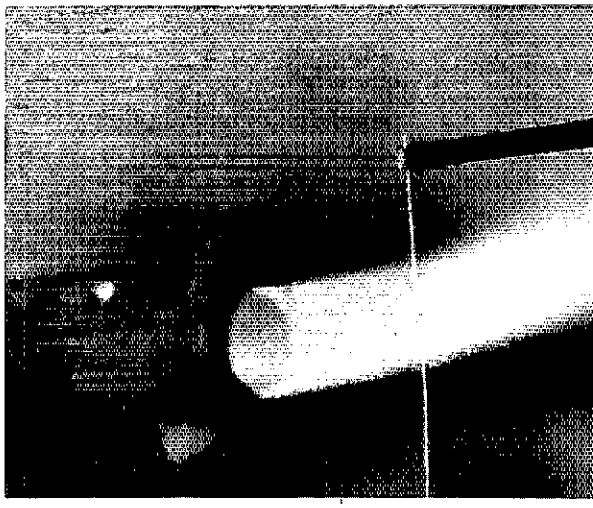
WAØKVU shows off the license plates on his two cars. The call letter plate was ordered but Sam says the other one "just happened." A nice bit of serendipity!

FEEDBACK

Jim Garrett, WB4VVF, designer of the Accu-Keyer (*QST* for August 1973, p. 19), reports that it is rapidly becoming a very popular item. More than 300 circuit boards were ordered within 2-1/2 weeks after the appearance of the issue. Some operators may note a quirk in operation of the keyer with the automatic character-spacing feature in use, especially at slow code speeds if they "lead" the keyer by a fair amount. If a character that starts with a dot followed by a dash (such as the letter A or J) is squeeze keyed during the automatic spacing interval, the initial dot appears to be lost. (Actually, the keying of the dot and dash are simultaneous.) The quirk may be remedied simply. Insert a 150-ohm resistor between pin 8 of U1C and pin 1 of U3A, in place of the direct connection shown in Fig. 2, and bypass pin 1 of U3A with a .001-μF capacitor. The pattern for ready-made boards offered by Garrett has been altered from that shown in Fig. 4 of the article to provide for inclusion of these components.

Technical Topics

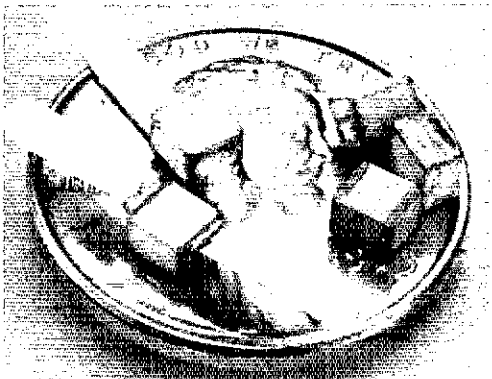
CHIP CAPACITORS



The ability to withstand temperature extremes is evidenced by heating an ATC 100 chip capacitor to a nice glow in the flame of a blowtorch.

Many amateurs have been aware of the shortcomings in the garden variety capacitor when used at vhf and uhf. Some experimenters have found that these deficiencies are even worse at shf. A few have sought to overcome the inductance of the connecting wires by removing the wires and encapsulation material from disk-ceramic units, then making connections by soldering directly to the plating which forms part of the capacitance element. This can be a laborious process, and more often than not the ceramic body breaks in one or more places before the job is done. Assuming that one is successful in keeping the capacitor in one piece, bad things happen in the ceramic substrate or dielectric during the heating and soldering operation. The value of capacitance is no longer what it should be, and losses through the dielectric can increase dramatically.

A line of capacitors is available that will circumvent these problems, and in many cases improve performance of the circuit because of increased coupling, lower losses, and greater thermal stability. This line is called Uhf/microwave porcelain and ceramic capacitors, produced by American Technical Ceramics, 1 Norden Lane, Huntington Sta., NY 11746. An illustration of the size and of the temperature tolerance of their ATC 100 series of capacitor is shown in the photographs.



Even though those shown here are not the smallest available, several would be needed to cover the one-cent piece.

A variety of mounting styles is available, those without leads being called a chip or pellet. One style of microstrip lead is shown here, and there are several variations of that method of mounting listed in ATC's literature. One item worth mentioning the ATC 100 units pictured on the coin are *large* by comparison with some of those available from American Technical Ceramics. About the best way to convey an impression of the size of the smaller chips is to point out that they came packaged in a plastic capsule such as that containing a popular cold remedy. Except for the difference in coloring, the contents of both capsules would appear similar.

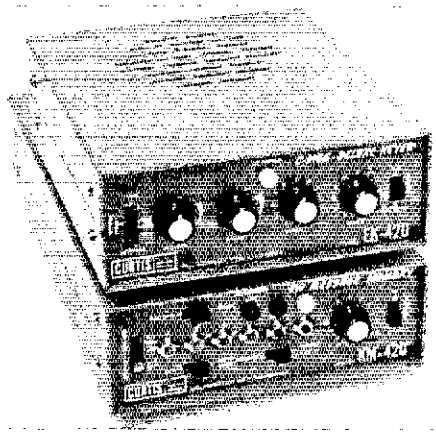
The ATC 100 series is available from 0.1 pF to 1000 pF. An ultrastable ceramic version, called ATC 700, is available in values up to 5100 pF. The ATC 200 is a high-capacitance line, available up to 0.1 μF (100,000 pF). Dc working voltage ratings as high as 1000 are available for some of the smaller capacitance values. However, for the larger values of capacitance the dc voltage rating is 50.

ATC has also published an *RF Capacitor Handbook* that contains much useful information about the design of rf circuits and the important part that capacitors can play in the success of vhf or microwave equipment. The price is $4.95. Those interested should write to the address given above.

It is not recommended that you assemble your next project with the heat from a blow torch. ATC capacitors could stand it, but the heat might curl your pc board! – *WISL*

Recent Equipment

To acquaint you with the technical features of current amateur gear.



Curtis EK-420 and KM-420 Programmable Electronic Keyer

THE ERA OF the simple keyer may be gone! With new developments in solid-state technology, it is possible to build a rather sophisticated circuit for sending dots and dashes simply and economically. A single integrated circuit and a few capacitors and resistors will do the trick. But many radio amateurs are not satisfied with simple devices when, with a bit more effort (and at an increase in cost) more features can be added. But what is the logical extreme to which an amateur can go in order to obtain maximum flexibility for his cw keying machine? Has that extreme been reached with the development of the new Curtis EK-420 and KM-420 combination keyer and message memory? One might even wonder whether the new system can be called a keyer at all. Perhaps the name should be minicomputer or something of that nature.

The EK-420 Keyer

The basic circuit philosophy for each of the previous models from Curtis is essentially the same as for the newer model. The reader is referred to earlier reviews for a complete description.[1]

[1] Recent Equipment, *QST*, March, 1972 and March, 1971.

Table I — Organization selection for the KM-420

	PROGRAM BUTTON			
Organization	A	B	C	D
1	first half	second half	full memory	unused
2	first quarter	second quarter	last half	unused
3	first quarter	second quarter	third quarter	fourth quarter

The '420 has some features which are not available on the earlier models. These features include:

1) low-profile cabinet (gray in color).
2) reduced power consumption.
3) sockets for all transistors, ICs, and the reed relay.
4) a rear-panel socket for interconnection of the KM-420 message memory.

Perhaps the most significant feature of the '420 is the extremely low power consumption of the circuit which is ideally suited to portable operation. The entire unit (including the sidetone oscillator and speaker) will operate approximately 20 hours from a single type 006P 9-volt transistor radio battery. The use of an alkaline or mercury battery would increase the operating time well beyond 20 hours, however no lab tests were made to determine just how long the keyer would operate from one of those. The operational voltage range of the keyer is from plus 6 to plus 12 volts; an automobile storage battery would provide extremely long life for the keyer. Of course, a 117-V ac supply is built into the '420, and for home-station use, a battery is not required at all.

The keyer is available as a complete functioning unit and does not need to be interconnected to the message memory (KM-420) for operation. Although the total cost of the keyer and memory is somewhat beyond what a casual cw operator would be willing to invest, the keyer is priced in the range of many station accessories.

The KM-420 Message Memory

The KM-420 is an optional item which can be added to the EK-420 electronic keyer (it will not function with any of the earlier Curtis keyer

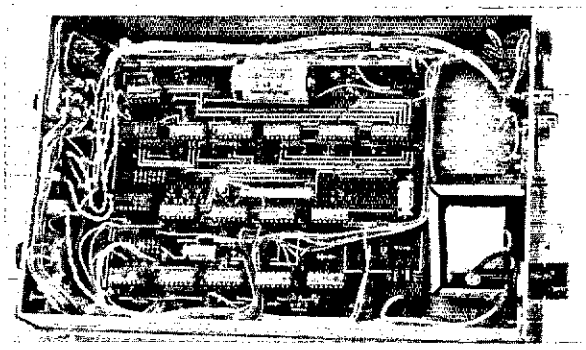
models) to provide automatic letter sequences at the operator's command. The format and organization of the memory are similar to that of the EK-402 described earlier.[2] However, some interesting variations have been incorporated into the original design philosophy which will be described later. The front panels of the units are nearly identical (except for the differences in operating controls); the KM-420 cabinet is nearly three inches deeper, however. Curtis recommends the keyer be placed on top of the memory cabinet during operation. This stacked package occupies about 5-1/2 × 6-1/2 × 10-1/2 inches (HWD) of space in the amateur station and should be placed in a position where the hand *not* being used to manipulate the keyer paddle can reach the controls conveniently. Connecting cable for use between the units is provided. Additionally, an ac cord, several plugs, and transmitter interconnection cables are supplied as part of a hardware package with the keyer.

The circuit consists of 18 ICs, three transistors, another 18 diodes, and two 1024-bit, read-write, random-access, N-Channel MOS computer memories. These memories are steered by three synchronous four-stage counters to provide sequential programming and readout. One bit is generated for a dot or space, three sequential bits make up a dash. A 256-bit read-only memory plus a two-bit, four-input multiplexer provides steering and control for the different memory organizations.

The basic KM-420 comes equipped with a 1024-bit message memory which is capable of replaying approximately 100 code characters. An optional plug-in memory IC can be added to the device for increasing the playback capability to 200 letters and provides sufficient space in the memory to allow programming of a complete routine QSO consisting of RST, QTH, name, call, rig, antenna, weather, and perhaps a few other trivial points of interest.

The memory circuit is operative only when power is applied to it. During home station use this presents no problem since the circuit is designed to keep power applied to the memory whether or not the power switch is turned on. As long as the line voltage does not terminate (and no one pulls out the plug!) the memory will store a message indefinitely. There are times, however, when it is necessary to interrupt the power. If it is desirable to keep the message programmed during a period when the plug must be removed from the wall socket, a six-volt dry-cell battery may be connected to a jack on the rear panel. The dc-current requirements to keep the memory intact are about 50 mA (with the optional plug-in extra memory). A typical lantern battery will last about 60 hours under these conditions. Memory erasure caused by a temporary power company line failure may be eliminated by connecting a battery to the KM-420 during normal operation. Since most of the memory power will be supplied by the keyer power supply, the life of the battery increases substantially. This style of hookup could be put to

[2] See footnote 1.



Inside view of the Curtis KM-420 memory unit.

good use during portable or temporary operation, such as Field Day participation where the power is likely (!) to fail at some point in time, and where reprogramming of the memory is undesirable. The unit described here was programmed by this reviewer two days before the 1973 Field Day event commenced, to replay automatically the following messages:

A) CQ FD CQ FD DE W1ARR/1 W1ARR/1 FD K

B) CQ FD CQ FD CQ FD DE W1ARR/1 W1ARR/1 W1ARR/1 FD K

C) 599 CONN DE W1ARR/1

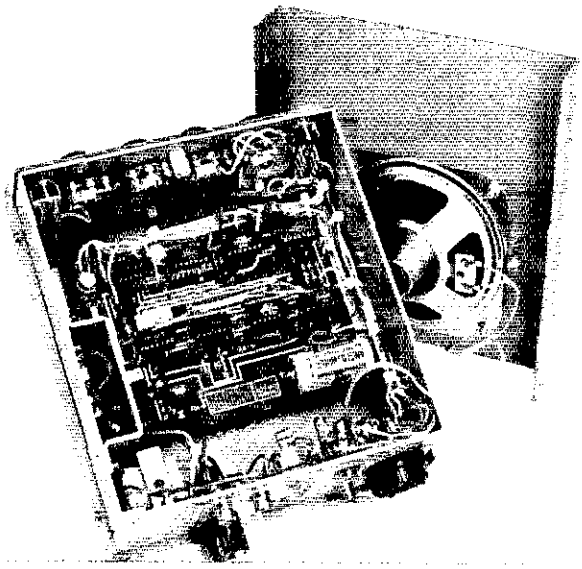
D) TU QRZ FD DE W1ARR/1 FD K

It was then transported to the operation location (battery connected) and connected to the 40-meter cw transmitting equipment. The keyer system performed just as accurately for the final FD QSO as it did when it was programmed initially. More than 600 contacts were made by simply sending the other stations call sign and depressing the proper memory button. When the QSO exchange was received, a tap of button "D" usually generated the next entry for the log.

Memory Organization

The positioning of material within the memory system of the KM-420 depends on several factors. Table I gives the basic organizational format and playback selection for various recorded quadrants. The memory is divided into four sections (called quadrants above) which may be set up sequentially in three different ways. The ORGANIZATION selector determines which sequence of quadrants will respond to each PROGRAM button. The length of the message is the primary factor in determining how to record a particular group of letters or words. Table I shows that to replay an extremely long message, the KM-420 should be programmed in ORGANIZATION ONE under push-button selector C. Two reasonably long word groupings can be placed in each half of ORGANIZATION ONE and can be selected by either PROGRAM A or PROGRAM B. In the event two short messages and one longer one are needed, ORGANIZATION TWO is selected. ORGANIZATION THREE provides a capability for recording four short sections of text or letter/

it is rapidly becoming a very popular item. More



The top and bottom covers may be removed from the units separately. The top lid for the EK-420 keyer contains a large speaker for monitoring the operation of the device. A volume control on the EK-420 front panel allows the operator to set the amplitude and pitch of the monitor signal. Or if he wishes, the speaker may be turned off completely.

number groupings. Each quadrant will handle approximately 50 code characters (letters) which is sufficiently large for most CQing and routine QSO functions. Even a long address, such as 225 Main Street, Newington, Connecticut 06111, can be written into the message memory *first quadrant!*

Message Recording

As a message is "written" into the memory, any previously recorded material is erased automatically. To record a word grouping, the RECORD-NORMAL switch is placed in the RECORD position and the letters are sent on the keyer paddle. Since the memory system uses a free-running clock as a time base, the "feel" of the keyer *is quite different when recording than when* normally keying the transmitter. For this reason, the instruction manual recommends that the keyer speed be reduced from a normal operating level of 15 to 25 wpm to as low as five or 10 wpm. This writer found the propensity for making mistakes in the record mode at the lower speeds far less than at the higher ones. An operator accustomed to a free-running clock keyer will, however, have no difficulty programming the memory at 20 or 25 wpm.

An AUTO STOP switch provides for selection of an automatic termination to messages, either being recorded or replayed, if there is a pause in time equal to 1-1/2 word spaces. This feature allows the operator to use only that portion of any quadrant needed to replay the material. In actual operation any pause of the length just mentioned will cause the memory to reset to the beginning. The purpose of this feature is to eliminate the necessity for playing out the entire memory (time saving) if it is not filled with letter groupings. If a sequence were programmed, like 579 CT, and a time equivalent to 1-1/2 word spaces elapsed, the same message could again be replayed immediately. When replaying a message, the use of the stopping *feature is desirable since it eliminates any random* dots and dashes in the unused portion of the quadrant from playing out. One must be careful during recording sessions, however, not to make any unscheduled pauses of 1-1/2 word spaces or the memory circuitry will revert to the beginning. For any message consisting of more than a few words, it is best to write out the text on paper before proceeding. The AUTO STOP feature does not allow time for the operator to stop and *think* about what the next word is going to be! The OFF position of the AUTO-STOP selector disables the automatic reset function and allows the memory to complete the replay of the entire quadrant (or sequence of quadrants). The purpose is to allow spaces to be plugged into the message without the memory reverting to the starting point. A SELF-TEST position of the mode switch disables the keyer reed relay and can be used to eliminate unwanted interference in the bands during recording sessions, without the need for turning off the transmitter. Another position of the switch, labeled TUNE, serves that obvious function.

Message Repeat and Message Hold

Two features of the Curtis memory keyer *which add greatly to the overall effectiveness of* the operation are provisions to repeat any message automatically after a predetermined period of time expires, and a capability for stopping the message before the end without reverting to the beginning. The REPEAT CYCLE mode of operation is used when there is a need to replay a sequence a few moments after the original material has played. If, for instance, one programmed CQ DX CQ DX DE WA1ABV/1 WA1ABV/1 K and activated the REPEAT CYCLE switch, the CQ call and identification would replay at intervals preset by front-panel control without the need for the operator to "repunch" the program button. The *time lag between cycles is adjustable from* immediately following the original message to about ten seconds. The recycle feature will continue to operate the keyer until the recycle function is stopped by either actuating the keyer paddle or returning the RECYCLE switch to SINGLE CYCLE position. If an answer to a CQ call is received, for instance, when the operator begins sending on the keyer, the recycle operation will terminate. It will not restart until a PROGRAM button is selected again. This writer found a nifty use for this feature during an evening's bout with a case of TVI. The keyer was programmed to send a "V" approximately every ten seconds. It was possible to make adjustments to the TV set and antenna during each interval and then wait for the "invisible op" to send another "V." The procedure outlined here surely has advantages over placing a "rock" on the key and dashing (no pun intended!) away to the TV set to check for interference, hoping that when one returns there is no smoke pouring from any station equipment!

QST for

The message HOLD button, when depressed during a replay, prepares the memory to stop the message immediately when the keyer paddle is actuated. The operator can initiate a message and then immediately depress the HOLD button. When he wants to interject some information, it can be sent on the paddle. This procedure stops the memory replay and holds it in place. When the operator has completed the inserted material, the program button relating to the quadrant being used is depressed to complete the message. It is very simple to insert a signal report into a routine QSO program of "Thanks for the call OM, your RST is (insert number) here in Newington, Conn., and the name is Frank."

Other Features

One item not mentioned yet is how to terminate a program after it has been initiated. It's simple; just tap the keyer paddle. Either a dot or a dash will reposition the memory to rest.

Whenever the memory is not playing out a message, a green lamp on the KM-420 front panel illuminates brightly. Another lamp placed nearby indicates when the end of a quadrant is coming up. This feature gives the operator warning that there is space available in the quadrant for only a few more letters. If the operator overflows the quadrant, the KM-420 will reset to the beginning and then program over what is stored there. This misprogramming technique will destroy the usefulness of the message and require it to be resent in a modified form to allow everything to fit. If the organization selector is positioned to use more than one quadrant, then the overflow misprogram happens only when the end of the sequence occurs.

Another accessory available from Curtis Electro Devices is a remote control for the memory-unit operation. The row of buttons and their functions are identical to those on the KM-420 and can be mounted to the bottom of a Brown Bros. keyer paddle. The system allows the operator to manipulate the keyer paddle or depress the memory buttons with the same hand.

During the testing period, Curtis issued a field modification for the EK-420 keyer consisting of a Mylar capacitor to replace a ceramic unit which came as an original component. The modification was to improve the regulation of the keyer clock (the speed); it was reported that the keyer would run a bit faster at the beginning of a series of letters than at the end. After careful examination, it was determined that Curtis Electro Devices was correct. But the speed change was essentially undetectable by ear and no further tests were made. The modification was made only to determine the relative difficulty. No problems were encountered.

A second modification (a bit more complicated) was issued just prior to press time for this review. Many keyers and paddles on the market today suffer from contact bounce which causes the keyer circuitry to generate incorrect code elements even though the operator may have correctly handled the key. This second modification completely eliminates contact-bounce problems if they are present. The modification can be done by the owner if he feels competent in printed-circuit wiring techniques. Otherwise, the owner may return the EK-420 to Curtis Electro Devices for installation. The circuit change was made by this writer but there was no apparent improvement in performance (it worked fine in the first place!). Contact bounce, however, is something which cannot be detected readily. The operator is more apt to blame his skill if mistakes occur, when, in reality, the keyer or perhaps the paddle is at fault.

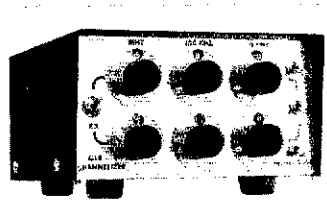
The remote control may be added to the KM-420 for convenient operation of the memory package. It may be attached to the bottom of a Brown Bros. paddle.

Immunity to interference caused by rf is always of concern. This model, complete with remote control head, was operated over a six-month period on all of the hf bands at power levels from well under 100 watts to a kilowatt. In one test, the remote-control cables were wrapped around the coax for the antenna system. This writer was unable to cause the keyer to make mistakes under any conditions. The memory was upset only once — it happened one winter afternoon when a snow squall passed through central Connecticut. An unusually high amount of precipitation static, as evidenced by capacitor flashover within the antenna coupler, caused a small portion of the programmed message to be lost. It was a simple matter to reprogram it, and there was no damage to the unit. In fact, it is only speculation that snow static caused the problem. There could have been a power line interruption, even though one was not noticed.

Nothing detracts more from the pleasure of operating cw than a keyer that doesn't operate correctly. And nothing adds more fun to cw operating than a keyer which performs flawlessly. The Curtis device certainly fits the last category. *WIFBY*

Curtis EK-420 and KM-420
Programmable Electronic Keyer

Dimensions (HWD) and Weight:
EK-420, 2-1/2 × 6-1/2 × 7-1/2-inches; 2-1/2 pounds. KM-420, 2-1/2 × 6-1/2 × 10-1/2-inches; 3-1/2 pounds.
Color: Gray.
Price class: EK-420, $140. KM-420, $300.
Manufacturer: Curtis Electro Devices, Box 4090, Mountain View, CA 94040.



A neat and compact appearance is evidence of a well-planned unit. Frequency selection is independent for transmitting and receiving. Rotary BCD switches perform the programming function for channel selection. Either row of switches may be used for either function, or one row may be selected for simplex operation. The two toggle switches in the right-hand corners are to select an additional 5-kHz step.

GLB Electronics Model 400 B Channelizer

A FREQUENT technical item discussed by fm and repeater groups is the synthesizer. As is usual in most such discussions, there is little agreement about which type of modulation to use – direct or indirect, what frequency increment is best, or many of the other features that amateurs can always bring up to stimulate the conversation.

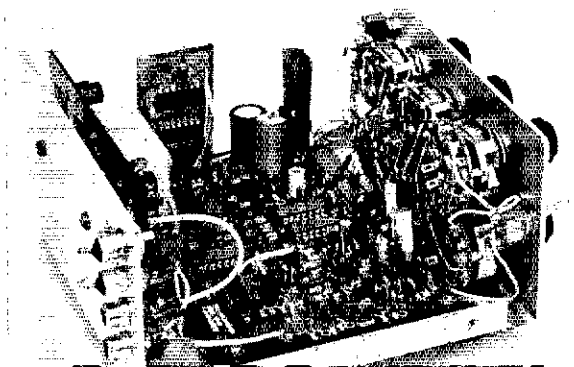
There is agreement in one area, however, and that is about how hard it is to do without a synthesizer once you have used one. To return to the limited-channel rig, even with a full bank of crystals, seems like a definite step backward.

After following the development of the GLB Channelizer for some time, this writer was very anxious to connect the 400B to the mobile rig and check on the convenience of operation first hand. First impressions are often lasting ones, and this unit presented a good image from the start. It is not merely fitted into a convenient and flimsy enclosure, but rather the housing is of heavy-gauge aluminum, formed for the purpose. The slight overhang of the cover at the top and sides lends a modern appearance to the cowl-type enclosure of the unit.

There was one early impression that did not stand up, however. When it comes to the method of selecting the operating frequency, thumbwheel switches and synthesizers have been almost synonymous. With that background in mind, there was some uncertainty about the rotary switches used in the 400B.

The switches worked fine, of course, and there was no trick to getting the hang of changing channels as needed. The real merit to this type of switch became apparent the first time that it was necessary to change frequency in the dark. You do not need to see the unit to select the frequency you want! This is a very important factor in driver safety. At one end of the switch range is 0 and at the other end is 9; simply count the clicks from either end to set the frequency. There are stops to prevent out-of-band excursions, so it is hard to go wrong.

In addition to the convenience of being able to switch to a different "machine" at any time, it is also great fun to shop around to see what is available when band conditions are good, while hill-topping, or if you are traveling. This latter feature of synthesizer operation caused a few repeater operators some consternation when the author made a trip along the eastern seaboard in the early summer. A few repeater users were quite cool to the strange call that dared to appear on "their" frequency. Most were very friendly and extended warm greetings, and some were curious about "how did you find this (split) channel, and what are you using for a rig?" While this type of operation can certainly add to the enjoyment of a mobile fm-er, it can be overdone. The synthesizer owner should be aware of the wishes of the repeater users. Trying to break in and hog the



Assembly is aided by component position and identification printed on the etched board. The small vertical board with two ICs is the 5-kHz step adapter. The bypass feedthrough capacitors are connection points for +12 volts and push-to-talk keying. Phono connectors are used for output to the transmitter and receiver.

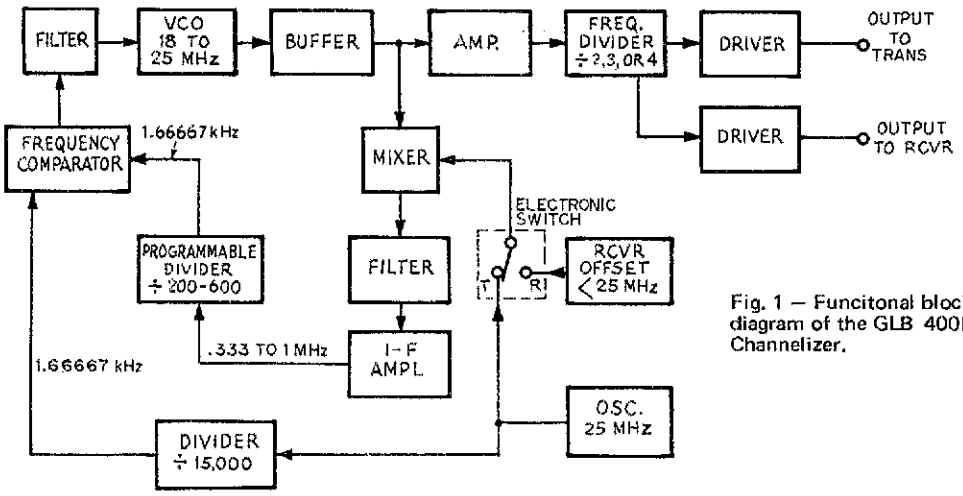


Fig. 1 — Funcitonal block diagram of the GLB 400B Channelizer.

channel of a "closed" machine can only ruffle feathers and cause a switch to tone access or other means of ensuring privacy. Any repeater group will react properly to an emergency call, but if the input is tone access the call may never be heard. As has been pointed out many times, a generous measure of common sense and courtesy is the best lubricant, always.

Enough of the sermon — back to the equipment at hand. The GLB 400B Channelizer is available in either kit form or as a completed unit. Assembly instructions are quite detailed and well thought out. If you have had experience at assembly of solid-state equipment on finely detailed printed boards, the construction should not be difficult. One available option is a subassembly that will provide a 5-kHz increment in addition to the normal steps of the Channelizer. It is advisable to obtain this feature, since there are many repeaters using 15-kHz "splits" in some of the heavily populated areas.

Circuit Highlights

The functional block diagram of the 400B, Fig. 1, shows that the reference oscillator is at 25 MHz. The output from this oscillator is mixed with that from the VCO (voltage-controlled oscillator) to obtain an i-f between 0.333 and 1 MHz. This frequency is divided down to 1.6667 kHz through a programmable divider. The output from the 25-MHz reference oscillator is also processed by a divide-by-15,000 chain to obtain a 1.6667-kHz reference. The output of the programmable divider and the output from the reference divider is compared in a frequency-comparator circuit. Any resultant output from the comparator is filtered and applied to the VCO circuitry, causing the frequency to remain locked to the reference.

The VCO operates near 24 MHz, but not many transceivers can accept that for an input. To obtain the frequency needed for the popular equipment in use today, the VCO output is processed by a frequency divider. This divider may be programmed by connecting jumpers, as indicated in the instructions, to divide by 2, 3, or 4. Thus the output may be 12, 8, or 6 MHz, as needed.

To obtain an output for local oscillator injection in the receiver, a separate reference oscillator is electronically switched into the circuit, replacing the 25-MHz signal to the mixer. The exact frequency of this oscillator is determined by the "offset" required by the receiver i-f system. The equipment to be used with the Channelizer must be specified when ordering, and the proper jumper connections for the output divider will be indicated, as well as the correct "offset" crystal furnished with the unit. It is not difficult to change either the crystal or the jumpers if the owner changes transceivers at a later date.

A kit of parts is supplied to enable the user to match the output from the 400B to the input of the transceiver. Also included is a discussion of the method of connecting to some of the more common rigs in use, and a warning about some of the troubles that may result from improper connection and matching. Separate jacks are provided for the output to the receiver and transmitter.

Power for the unit may be obtained from any +12-volt source in the mobile installation. The connection to the Channelizer is via a feedthrough capacitor. Another feedthrough capacitor serves as a means of connecting to the push-to-talk circuitry in the transceiver. An "on-card" regulator provides stable voltage for the more sensitive parts of the circuit as well as for the ICs used in the frequency dividers and PLL.

Operation

The unit reviewed here was connected to a Tempo CL-146 transceiver during several thousand miles of mobile use. Frequency stability was excellent, and no problems from spurious responses or "birdies" appeared. Phase-jitter noise was so low in level that most amateurs receiving the signal were not aware that a synthesizer was being used for frequency control at the transmitter.

The instructions with the Channelizer include warnings about overdriving the first stage of the transceiver (either tube type or solid state) with too much rf energy. This can lead to the generation of spurious output frequencies. When used with the Tempo transceiver, excess drive did not cause that type of trouble, but it did have an effect. The phase modulator was being saturated, with a consequent shift in bias, so that it was no longer linear. The audio was muffled and distorted to say the least. Reducing the output level from the Channelizer brought back the good sound.

Another source of spurious output can be the *failure to disable the transceiver crystal oscillator* when the synthesizer is connected to that stage. Fortunately the instructions make this point very clear, with suggestions for circuit changes where necessary.

Good grounding of the Channelizer and the transceiver is a must. If the installation is in a modern car with a plastic dashboard, a heavy braid or copper strap should be connected from the equipment to a good ground by the shortest practical route. Instances of noise pickup, instability, and rf feedback problems have been traced to the lack of grounding. The braid of the coaxial cable to the antenna is not a trustworthy ground.

The ease of operation with the Channelizer can be summed up with one word: "Great." Perhaps that television cliche about trying it and liking it should not be dragged up again, but if the expression fits, adopt it! – *WISL*

GLB Electronics
Model 400B Channelizer

Dimensions (HWD) and Weight: 3 × 5-5/8 × 6 inches, 2-1/4 pounds.*

Power requirements: +11 to 15 V dc, 350 to 400 mA.*

Frequency range: 144.000 to 147.990 MHz in 10-kHz steps at the transmitter output frequency. Modification available for 5-kHz selection.*

Channelizer fundamental output range: 24.0 to 24.665 MHz. *Can be modified* with internal jumpers to 12, 8, or 6 MHz.

Receiver injection: On low side of signal, any i-f up to 40 MHz.

Noise on carrier: At least 30 dB below 5-kHz deviation at transmitter output frequency.*

Carrier lock in time: 10 to 20 ms typical, 100 ms worst case. At normal channel spacing, 20 to 28 ms.*

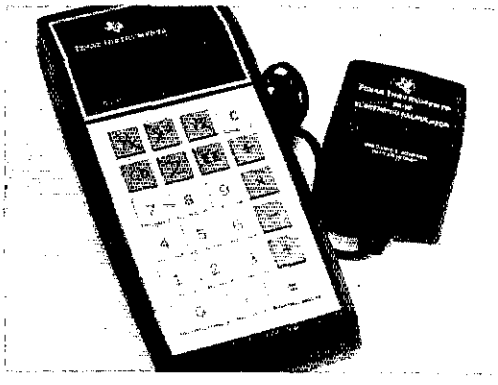
Output power: 10 milliwatts minimum into a 50-ohm load.*

Price class: $130 as a kit, $190 wired. 5-kHz step adapter: $15 as a kit, $25 wired.

Manufacturer: GLB Electronics, 404 Cayuga Creek Rd., So. Cheektowaga, NY 14227.

* Measurements made in ARRL lab.

QST —— QST —— QST



Texas Instruments SR-10 Electronic Slide Rule Calculator

ELECTRONIC COMPUTING and data-processing equipment as well as desk calculators are either oriented toward business or else science. The SR-10 falls into the latter group and should appeal to the radio amateur interested in network design, antennas, and other technical areas. This unit eliminates the drudgery of pencil-and-paper calculations and, of course, the chances for error are greatly reduced. With a simple table of logarithmic and trigonometric functions, just about any problem commonly encountered in amateur radio experimentation can be solved in a few minutes.

Basic Features

Along with the normal functions of addition, subtraction, multiplication and division, the SR-10 has provisions for taking the square root, reciprocal, and the square of a number. It also allows the operator to use exponential notation if desired. (Large numbers such as the speed of light are easily expressed using exponential notation. For example, instead of writing 300,000,000 meters per second, the speed of light can be written as 3×10^8 meters per second. Likewise, very small numbers such as .00002 μF would be written as 2×10^{-5} μF.) The capacity of the SR-10 is sufficient to handle numbers between 10^{-99} and 10^{99} which means no operation that results in a number outside of these limits is permitted. An error light

comes on if overflow occurs, or if division by zero or taking the square root of a negative number are attempted.

Some Sample Problems

The dividing line between calculators such as the SR-10 and its bigger brothers, the computers, is often fine indeed. Ironically enough, the SR-10 is more efficient in handling many of the small problems that an amateur encounters than is a full-sized computer. The analogy of trying to level a mole hole with a steam shovel is rather apropos. The basic limitation of the SR-10 is the lack of memory storage and the fewer number of functions available when compared with a computer. Some rearranging of equations can often offset these disadvantages as the following problems illustrate. The important thing to keep in mind is that the operator has to make up for the limitations of the calculator, and the simpler the operations that he has to remember and perform, the better. Using previous computations immediately rather than writing them down for later use is advisable. As an example, let's take the case of an *L*-matching network. The formulas, as given in recent editions of *The Radio Amateur's Handbook* are:

$$\text{For } R_{in} > R$$

$$XL = \sqrt{RR_{in} - R^2}$$

$$XC = \frac{RR_{in}}{X_L}$$

As they stand, the formulas aren't too cumbersome but considerable simplification of the operations involved is possible. While multiplication-like functions such as division, square, square root and reciprocal can be intermingled freely with each other, they cannot be conveniently mixed in with addition and subtraction. Since there is only one subtraction involved in the matching formulas, getting it out of the way first will be a real step saver. It is also convenient to only enter the input and output resistances (R_{in} and R respectively without writing down intermediate steps). This can be accomplished by rewriting

$$RR_{in} - R^2$$

as

$$R(R_{in} - R)$$

Now a "program" can be written to tell the operator what quantity to enter, which button to push, and which quantity to read out. The following sequence of brackets illustrates how the *L*-matching network can be programmed: (enter R_{in}), (−), (enter R), (=), (×), (enter R), ($\sqrt{x}$), (read out XL), (1/x), (×), (enter R), (×), (enter R_{in}), (=), (read out XC). Suppose R_{in} is 50 ohms, and R is 11.2 ohms. The above program would then become: (50), (−), (11.2), (=), (×), (11.2), ($\sqrt{x}$), (XL = 20.846 ohms), (1/x), (×), (11.2), (×), (50), (=), (XC = 26.862 ohms). Once a program is written and given a test run (and "debugged" if necessary), it may be filed away for future reference.

The example above illustrates one method for getting around the lack of memory-storage capability. In the next example, a problem that might involve functions not on the calculator is reduced to one that uses those available.

It is much more convenient to use the reciprocal of the impedance (or the admittance often denoted by Y) where a number of parallel elements are involved. For instance, a series RL circuit shunted by a capacitor is best handled by finding the admittance of the series RL circuit first. Unfortunately, since the impedance is often a complex number, finding the reciprocal is not a simple chore. It can be done on a slide rule using a brutal method involving sine and cosine functions. However, another approach eliminates the need for such functions and is given in the following formulas:

$$G\ (conductance) = \frac{R\ (series\ resistance)}{R^2 + X^2}$$

$$B\ (susceptance) = \frac{-X\ (series\ reactance)}{R^2 + X^2}$$

Note: inductive reactance is positive and capacitive reactance is negative.

Here again, a simpler program is possible by rearranging the formulas slightly, than by solving them as they stand. The simplified program can be written: (enter X), (x^2), (÷), (enter R), (=), (+), (enter R), (=), (1/x), (read the conductance G), (×), (enter X), (÷), (enter R), (=), If X is a positive number, push the +/− button; the sign of the reactance X should be ignored until this step (read the susceptance B).

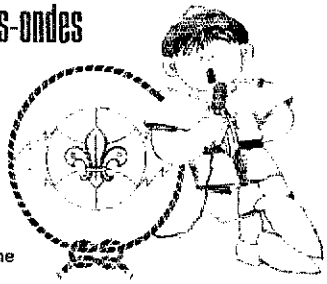
As the saying goes, the proof is left up to the student but an important fact should be pointed out here. One does not have to be a mathematical wizard to use a calculator such as the SR-10. It may help in streamlining problems for the minimum number of steps, but the above examples could be solved once the basic formulas were obtained from a reference book. While owning one's private computer is out of the realm of possibility for most of us, buying an SR-10 is not. It also can be used for more mundane tasks such as adding up the grocery bill, and it certainly would be a great asset to any student. Perhaps some not-so-subtle hints to the appropriate parties concerned *may* be in order. — *WIYNC*

Texas Instruments SR-10
Electronic Slide Rule Calculator

Dimensions (HWD) and Weight:
1-1/2 × 3 × 6-1/8 inches, 8 ounces.
Power requirements: 117/235 volts ac with battery charger.
Price class: $120 with battery charger and carrying pouch.
Read-out indicator: LED.
Distributor: Olson Electronics, 260 S. Forge Street, Akron, OH 44308.

16 jamboree-on-the-air
jamboree-sur-les-ondes

october 20-21 octobre 1973



JOTA 1973

Boy Scouts World Bureau
Bureau Mondial du Scoutisme

Case postale 78 1211 Geneva 4 Switzerland

This certificate, designed by a Brazilian Scout, will be sent to all stations reporting participation in this year's Boy Scout Jamboree-on-the-Air

K2BSA, permanent station at BSA national headquarters in North Brunswick, N.J., will soon be moving to new quarters. Here's how it looked during last year's JOTA.

CT2AZ's participation in the 15th JOTA attracted this crowd of youngsters to his station in The Azores.

The 1973 Boy Scout Jamboree-On-The-Air (JOTA the 16th) will be October 19 to 21, 1800 Friday to midnight Sunday, local time. Best chance of the year to interest youngsters in ham radio — get in touch with the Boy Scouts, either someone you know, or through the Boy Scout office listed in the telephone book, and invite the boys to visit your station during the time. Gathering points on the air include: 3590, 3740, 3940, 7030, 7090, 7290, 14070, 14290, 21140, 21360, 28190, 28990 kHz, and 6 and 2 meters.

K2BSA, at BSA national headquarters in North Brunswick, N.J., will be on the air from 1800 hours, October 19, to 1800 hours, October 21, EDST.

For an official 16th JOTA certificate, send your participation report to the Boys' Life Radio Club, North Brunswick, N.J. 08902. For an amateur station and/or a Scout group to qualify for a certificate, the following information is needed for a report to the World Scout Bureau:

1) A list of all stations contacted in JOTA participation, with the date and time. Indicate whether the other operator was a Scout or Scouter, and how many Scouting visitors were present at the other station.

2) Indicate the: (a) Total number of JOTA contacts; (b) Number of other stations contacted with operators who are or who have been Scouters; (c) Number of Scout visitors to your station during the 16th Jamboree-On-The-Air. — *W2DU, JOTA Coordinator for the USA*

No uniforms in sight, but Scouts nonetheless: Troop 61 of Wales, Alaska, at WB5BUQ/KL7 during the 1972 JOTA.

JAMBOREE RADIO KJ3BSA AND KJ7BSA

or, *Is This the Broadcast Station?*

League staffers WA1PID and K1ZND were trustees and managers of the special ham stations KJ7BSA and KJ3BSA, which operated in late July and early August from the two sites of the 1973 National Scout Jamboree: Farragut State Park, Idaho, and Moraine State Park, Pennsylvania. With over 70,000 Scouts and 10,000 Scouters in attendance, plus untold hundreds of thousands of visitors to the sites, the Jamboree presented a unique opportunity for demonstrating ham radio to an enthusiastic and receptive audience. About 110 different operators made contacts from the stations, which were both equipped for operation on at least three bands simultaneously. A typical day found the equipment in use for fourteen to sixteen hours. Over six thousand contacts were made using the special call signs, and all states and over 60 countries were worked from each location.

The display stations did encounter some problems, but none that couldn't be solved. In Idaho, it took a couple of extra days to get the station connected to the power lines. In Pennsylvania, the 4-element monoband Yagis for 20 and 15 meters which had been ordered, failed to arrive. (It was later discovered that the 20-meter beam had been shipped to Idaho by mistake!) Thanks to W3BWU of Tydings Electronics in Pittsburgh, a substitute tribander was obtained which worked sufficiently well to account for over two thousand of KJ3BSA's 3800 contacts.

A message service was available at both stations, and over 800 pieces of traffic were originated. Some incoming traffic was handled, but delivery was uncertain due to the limited internal communication facilities available at such a temporary installation. (At Jamboree East, the telephone serving the ham station was over 100 yards away; it was a half-mile hike to an outside line.) Most incoming traffic was posted on bulletin boards in front of the stations, and a surprising amount was picked up by the addressees.

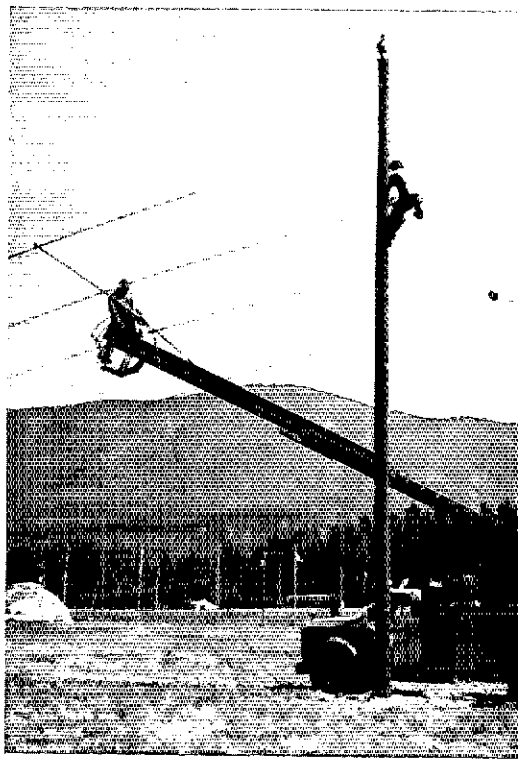
Interest in the ham radio activities was very high among the Scouts, even though we were competing with such features as sailing, canoeing,

One feature of the KJ3BSA display was a working Oscar 6 ground station. All of the satellite contacts were on cw, but overall the ratio of phone to cw contacts was about two to one. *(Photo courtesy K3KGX and the Beaver County Times.)*

The KJ3BSA gang: (l-r) top WA3OVH, WB2OKF, W3DDC/W1WLU, W2GON; bottom K1ZND, WA3RQB, WB4TCD.

The staff at KJ7BSA: (l-r) WØJHY/CT2AZ, WA1PID/WA8VRB, WØOOF, W7BES.

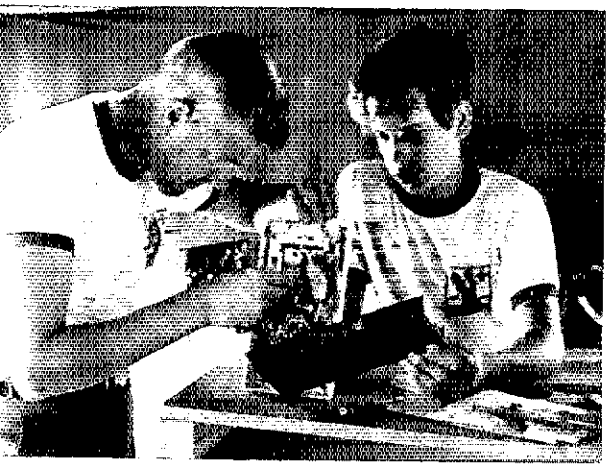
The KJ7BSA 20-meter beam rode into place courtesy of the local utilities company. At East, similar cooperation was had, making installation of all antennas a 45-minute operation.



hiking trails, and archery for their attention. Many brought their code speed up to five words per minute by taking part in special code classes taught at each location. A handful of Scouts completed the requirements for the radio merit badge while at the Jamboree, and several dozen earned partial certification.

The two ham stations were located right in the center of the Jamboree's busiest areas. Special temporary broadcast stations were set up to service the Jamboree and were widely listened to, but were deliberately located away from the stream of traffic. This resulted in the question most frequently asked of us by visitors and Scouts: "Is this the broadcast station?" We didn't mind answering a bit, since it gave us a chance to explain what we were doing — and why it was so much more interesting than one-way broadcast radio!

QSL requests should be sent to ARRL headquarters. If accompanied by s.a.s.e., you'll receive a direct reply; otherwise, by special arrangement, the card will be sent via the ARRL QSL Bureau in your call area. *K1ZND*



Demonstrating and counseling in radio merit badge skills were an important part of the program. Troubleshooting was a common "demonstration" at both sites — here Jake, WØJHY/CT2AZ repairs the cassette recorder used at West for morse code instruction.

The substitute antenna at the Pennsylvania location was equal to the task, as indicated by the contact total!

Organized — sort of — confusion: with several dozen different operators using the gear on any given day, along with a few thousand visitors, the ham radio tents were among the busiest places at the Jamboree! This is a typical scene at KJ7BSA.

OSCAR NEWS

Satellite DXing – Caribbean Style

Given the long lifetime of Oscar 6 (nearly a year at this writing) it isn't surprising that enthusiastic users have been heard from several locations where regular ham activity is minimal. When Dave Dorson, K8PKN, learned that he was going to Grand Turk Island in the Caribbean during June to operate an underwater listening station for the Woods Hole Oceanographic Institution, it didn't take him long to pack his two and ten meter gear and obtain the call VP5DD with an eye to activating the first amateur satellite ground station in the Turks and Caicos group. Dave reports that the operation was quite a success: 123 contacts were made with 59 different stations, the first being K2ZRO, VE3HD, VE2BYG, W3TUW, and VP9GR. The best DX contacts were with 8P6DR, W6DMN, and K6DS. QSLs go to Box 131, Hiram, Ohio 44234; appreciated.

Dave's antennas for Oscar 6 work from VP5DD illustrate once again that nothing elaborate is needed to join the fun. For uplink, two half waves in phase excited by about 40 watts from a homebrew transverter did the trick. For downlink, switching between a vertical and two half waves in phase (horizontally polarized) proved to be effective. Dave feels that many stations could benefit by the addition of a preamp on their ten meter receivers.

VP5DD kept several schedules via Oscar with his brother W1GBO in Massachusetts, showing that satellite work has its practical side!

ZK1TA Correction

Last month, we reported that the expedition to Tongareva, ZK1TA, worked W6OAL and WA6GUY via Oscar. WA6GUY tells us that he did work Tongareva, but that the only other ZK1TA contact was with KH6HLK. Our apologies to all concerned.

WAS No. 2 – K4TI

K4TI of Weaverville, N.C., has submitted his claim to the second Amsat Worked All States award. Once again, KH6HLK provided the last contact. Bill was active in the Oscar program for many years as W6YK before moving to the mountains of North Carolina.

Several others are said to be within a couple of contacts of satellite WAS, but activity in several states – especially Idaho – is needed. How about it, W7s?

OSCAR 6 TWO-WAYS

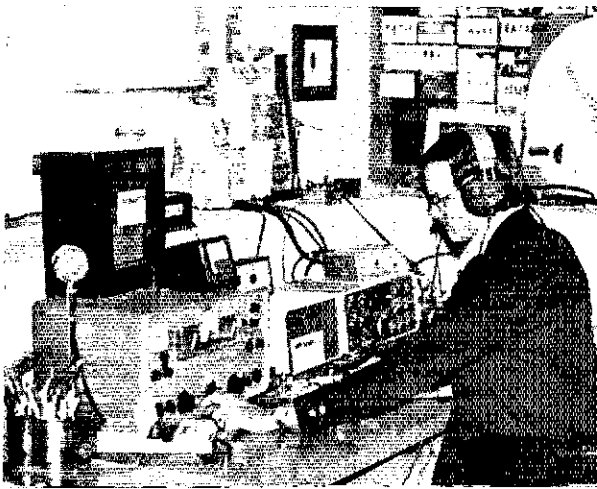
	Stations	*States*	*Countries*
KL7MF	143	30	18
PJ7VL	26	—	2
PJ9JT	56	—	2
VP5DD	59	—	4
K1HTV	510	48	39
W1JSM	313	40	24
K2KNV	342	48	31
WB2VKZ	286	46	27
K2ZRO	162	43	15
W3BWU	107	34	12
W3TMZ	405	50	31
K4MSG	51	24	3
WB4RUA	165	42	14
K4ZCP	115	32	6
W6BGJ	193	47	8
W6DMN	200	45	9
WA6GUY	201	33	8
W7ZC	258	34	2
DJ6RD/W9	194	41	14
W9OII	220	47	17
KØDDA	203	39	15
WAØTAQ	263	33	9

* Total contacts.

First Maritime Mobile?

W6OAL, first to work through Oscar from on board an aircraft, loaded his trusty Gonset Sidewinder into a friend's boat on August 23 and set out to make the first Oscar contacts from the high seas. (Was he the first? We won't know until we hear from OZ7DX – see last month's *QST*, p. 96.) Dave says, "I heard a W5 on sideband on orbit 3900 but he had my call wrong and didn't seem to care that he was on the other end of the first Oscar maritime mobile contact. At 0315 I worked W1JSM for the first complete QSO. We had to keep moving so the swells wouldn't do us in. Talk about poor cw, sometimes I couldn't understand

(Continued on page 70)



The easiest way to work Connecticut by satellite is to find K1HTV. Rich is blessed with a work schedule which has allowed him to catch a good percentage of morning passes. He also serves as an Amsat bulletin station.

40th ARRL November Sweepstakes Announcement

IT'S TIME TO GET plenty of sleep, buy lots of coffee company stock, fix antennas and rigs and persuade the XYL to let you stay cooped up in the shack for a few weekends because the SS is upon us.

So as to minimize QRM to non-contest stations, *suggested operating frequencies are as follows:*

CW	PHONE
3550-3650	3850-3950
7050-7100	7225-7275
14050-14100	14250-14300
21050-21100	21300-21400
28050-28100	28600-28800

Read the rules thoroughly, then send for our "SS Package": log-sheets, summary-sheet, Op Aid 6. Be sure to specify approximately how many log-sheets you will need and whether you intend to participate on both modes. Unless first-class postage is included with your request, log sheets will be sent by third-class mail.

Your entry (and, for clubs, the Secretary's letter) must be postmarked no later than December 17, 1973 *to be eligible for QST listings and awards.*

Go to it. – *WA1PID*

Rules

1) *Eligibility*: The contest is open to all radio amateurs in (or officially attached to) sections listed on page 6 of this issue of *QST*.

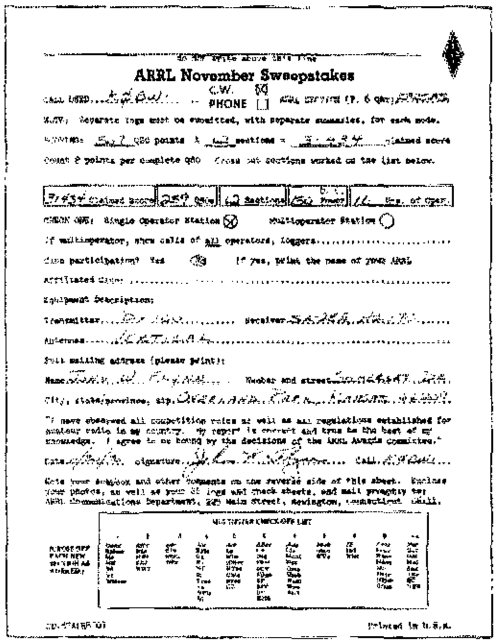
2) *Time*: All contacts must be made during the contest period indicated elsewhere in this announcement and between amateurs in (or officially attached to) the 74 sections. Yukon-N.W.T. (VE8) counts as a separate multiplier, for a possible total of 75 multipliers. Time spent in listening counts as operating time. No more than 24 hours of operation are permitted during the 30 hour period. "Off" periods may not be less than 15 minutes at a time. Times on and off must be entered in your log.

3) *QSO*: 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 scored by contacting stations not working in the contest, upon acceptance of your preamble and/or receipt of a preamble.

4) *Scoring*: Each preamble sent and acknowledged counts one point. Each preamble received counts one point. Only two points can be earned by contacting any one station, regardless of the *frequency band. The total number of* ARRL sections (plus VE8) worked during the contest is the "section multiplier." It is not necessary for preambles to be sent both ways before a contact may count, but one must be received, or send and acknowledged, before credit is claimed for either point(s) or multiplier. If your power is 200 watts or less, send "A" as your precedence; otherwise, send "B."

The final score equals the total "points" X the "sections multiplier."

5) *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-check sheets (Op Aid 6 or similar) attached. To aid us in getting these forms to you as fast as possible, please be sure to include with each request a self-addressed and stamped legal-size envelope containing: your


ARRL November Sweepstakes
C.W.
PHONE

The log-sheets and summary sheets are now available without charge from your ARRL Headquarters. (Ask for Op. Aid 6, too.) *Unless first-class postage is included with your request, log sheets will be sent by third-class mail.*

CONTEST PERIODS

Starts		*Ends*
Saturday, Nov. 10 2100 GMT	PHONE	Monday, Nov. 12 0300 GMT
Saturday, Nov. 17 2100 GMT	CW	Monday, Nov. 19 0300 GMT

EXPLANATION OF "SS" CONTEST EXCHANGE

	Nr	*Precedence*	*Call*	*CK*	*Place*
Exchanges	Consecutive Serial Number	Power input less than 200 watts dc	Send your station call	CK (Last two digits of year first licensed)	Your ARRL section
Sample	NR 1	A	WA3FHB	65	MDC

full name, call and mailing address complete with zip code. We suggest a minimum of 16c postage attached. This will assure your receiving 1 summary sheet, 1 Op Aid 6, and 4 log sheets, enough for 400 QSOs. Using this as a guide-line you can adjust the postage according to your needs. **ANY LOG OMITTING TIMES ON AND OFF, 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 processed accordingly. Entries must be postmarked no later than December 17, 1973 in order to be eligible for *QST* listings and awards. All entries become the property of ARRL and none can be returned.

There are no objections to one's obtaining assistance from logging, "spotting" or relief operators, but their use places the entrant in the multiple-operator class, and it must be so reported.

A single-operator station is one manned by an individual amateur who receives no assistance from other persons during the contest periods. He may not have assistance in any manner in keeping the station log and records, or in spotting stations during a contest period. The operation of two or more transmitters simultaneously, is not allowed.

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).

6) *Awards*: Certificates will be awarded to the highest-scoring cw entrant and to the highest-scoring phone entrant in each ARRL section, provided that *either* (1) there are at least three single-operator competing entrants from that section, *or* (2) the top single-operator score is 10,000 points or more. Similarly, a certificate will be awarded to the highest-scoring Novice or Technician licensee in a section if (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*.

A gavel will be awarded to the highest affiliated club entry. The aggregate scores of phone and cw reported by club secretaries and confirmed by the receipt at ARRL of contest logs constitute a club entry. Segregate club entries into phone and cw totals. Both single and multiple-operator scores may be counted, but only the score of a bonafide club member, operating a station (his or another club member's) in local club territory, may be included in club entries.

The highest single-operator cw score and the highest single-operator phone score in any club entry will be rewarded with a "club" certificate where at least three single operator phone and/or three single-operator cw scores are submitted.

7) *Disqualification:* If the claimed score of a participant is reduced by 2 percent or more, the log may be disqualified. Score reduction does not include correction of arithmetic errors.

Score reductions may be made for taking credit for unconfirmed QSOs and/or multipliers, duplicate contacts, banned countries, and/or other scoring discrepancies.

If a participant is disqualified, he will be barred from submitting an entry in the next annual running of that specific contest, (e.g., disqualification from the 1972 phone SS prohibits submission of an entry for the 1973 phone SS, but 1973 cw SS participation is okay).

The calls of all disqualified participants will be listed in the *QST* report of the contest.

Any participant on the borderline of disqualification but not actually disqualified may receive a warning letter from the Communications Manager.

For each duplicate contact that is removed from the log by Hq., a penalty of 3 additional contacts will be exacted. The penalty will not, however, be considered as part of the 2% disqualification criteria.

In all cases of question, the decisions of the ARRL Awards Committee are final. QST

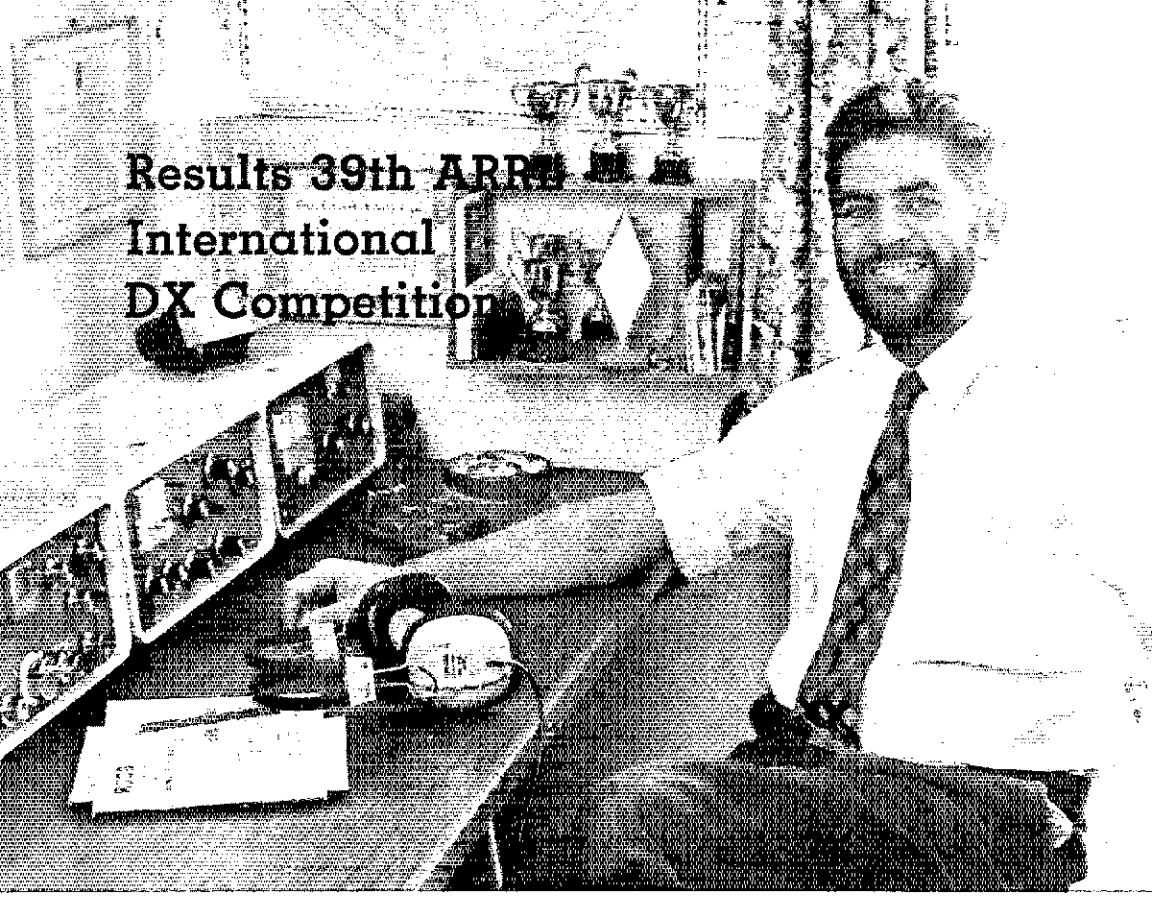
Strays

Who Said It's Impossible

I just got back from Miami
After taking the "Extra" exam.
I suffered a jumbo headache,
But I was one Happy Ham.
The questions they asked me, I answered,
Correctly, Oh!, more than a few!
But why didn't I get questions
The answers to which I knew?
For three long years, I've studied;
I've practiced the code by the hour.
But on several previous efforts,
My code speed proved to be sour.
But now, I've got something to offer
Some Ham who wants "Extra" so much.
It's a dog-eared, disreputable copy
Of the Manual for License, and such.
The test, I passed with no problems.
Bow low, and give me respect!
For I have an Extra Class License
Much sooner than one might expect.
Arthritis and gnarled-up knuckles
Made practicing code quite rough.
But W1AW gets credit from me, kids
And I'm not trying to bluff.

An Ex-Advanced Licensee (W9MC/WB4OFE)

Results 39th ARRL International DX Competition



G3KMO

Reported by Rick Niswander,* WA1PID/WA8VRB

Webster's defines alligator as, "Either of two crocodilians (genus Alligator*) having broad heads not tapering to the snout. . . ." However he fails to mention the one definition of alligator that applies to radio contests, especially phone contests. We are, of course, cognizant of the fact that Webster wrote his book of words years prior to the advent of spark so we will forgive him his momentary clairvoyant lapse and present here another definition of alligator. From V. Y. Senny Tree's Diminutive Dictionary of Radio Terms comes, "Alligator: Those individuals that, during a contest, are all mouth and no ears." Surely each one of us has run across an alligator or two (or more) in our DX Contest endeavors. Most of us, at one point or another during our lifetime, could be classified as an alligator, albeit a small one. It is the big alligators, those that constantly call out of turn or while the DX is transmitting, those that, in effect, cause general consternation (this is a family magazine) on the air, that we need to work on. It is only by a large infusion of good operating practice that these types can be toned down. If we all try to shed our alligator image and replace it with one of. . . well. . . an "all ears" elephant, the piles will be better for all. Are you an alligator?*

*Asst. Communications Mgr., ARRL.

THE 39th INTERNATIONAL DX Competition, held in February and March 3-4 on phone and 17-18 on cw, was marked by good openings on cw and horrible conditions on phone. When was the last time that a U.S. station with slightly less than one megapoint would have placed in the Top Ten on phone? Last year he would have snagged 25th with a score like that. The second phone weekend seemed to suffer the most although the first was nothing to jump-up-and-down about. On cw the opposite was true. The March merry-go-round provided some nice openings. Things are slowing down. Oh,how I long for release from the valley of the 11-year heartbreak, kid – a return to the days of wine and sunspots. Don't you?

There were three items of major import that merit comment on the DX front. On phone, XE1HJ (disguised as 6J9AA) fortified himself with ice water, cough drops and an understanding wife to obliterate the DX phone record in another one of his normal outstanding performances. Scott had over 10,600 QSOs before dupes. After duping he just missed 10K QSOs and 9 million points . . . Gad! That record should stay around for awhile. How does he do it, you say, when conditions are so bad? Well, when Europe and JA don't come in very well people turn their antennas

The crew of the top German multiop, DLØWW, got together away from the rigs for this group shot. Standing (l to r) DC6FF, DA1NL, DJ6DU, DL6NK and DJ4OU. Sitting (l to r) DL3ZA and DA1ED. Another one of the ops, DK7FO, is not shown. The group produced a fine third place phone showing among DX multiops.

south and, lo and behold, there is 6J9AA (or whatever) – 40 over 9.

On cw KH6RS (with K2SIL at the paddle) broke the 5 million point barrier for the first time to set a new mark for those in future years to shoot at. Numerous antenna improvements over the past few years have helped increase Bill's totals.

Aided by a multiplier of 38 on 160, KV4HW, operated by W6OAT, set a new DX multiplier high of 316. Not bad for only dipoles and a vertical. Only two others have broken the 300 mark – KP4AST on phone in 1970 and KH6RS on cw this year – both with a total of 302. When you consider that DX can only count states and provinces, not sections, making 56 the highest total obtainable on any band his multiplier total looks better and better.

Other notable-notes. . .

HZ1HZ surprised many a contester (your scribe included) by showing up for considerably more than a token effort. Ahmed racked up a fine second place Asian showing.

With the movement of TI2DX to more southerly DX-pastures you might think that TI would become a rare cw-type multiplier. Ah, not so. TI2WX, who has rattled the DX Contest airwaves for a number of years with his 75 watts, will be around to gladden the hearts of many.

If you have ever wondered who LU5HFI is, never fear – the answer is here (ouch). That's Fred Laun who has stirred the DX Test ether from other spots such as HI8XAL, HS3AL and HS5ABD. Fred always seems to do quite nicely (that's putting it mildly) but can't quite compete in signal strength (he's over 4000 miles away) with those in the northern reaches of South America.

W9PNE is continuing his cw QRP contesting. Brice used five watts during the first weekend to the tune of 12 countries and 4 continents. During the March fling he employed a 6AU6 running ½ watt input with a 536 foot center-fed at 45 feet and knocked off 27 QSOs in 17 countries and all continents with his QRPp sand squasher.

After retiring a short while ago GM6RV, with a little more time on his hands, continued the country topping performance that he had abandoned after his GM-winning scores in 1934-35-36.

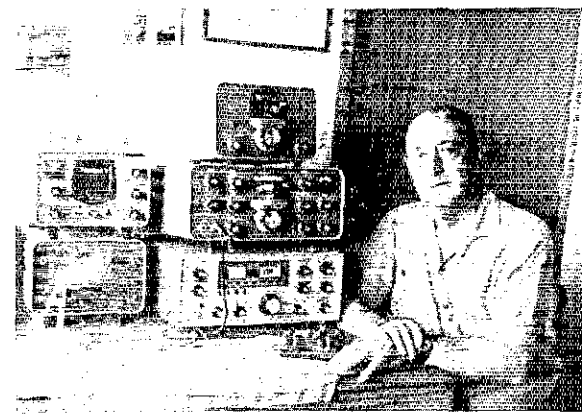
Speaking of old-timers, F8VJ, active since 1927 and a member of the ARRL since 1935, submitted his 29th DX contest log this year. Anyone beat that?

The group that went to 6Y5EE made a nice one weekend cw showing. That marks the first time a major effort was put on from Jamaica since the big multi-multi 6YØA operation a few years ago. The two 6Y5EE ops must have been real dedicated contest-types. Look at their card and you'll see what I mean. Those aren't radios, guys.

Megathanks to all the hard working DX stations that get on for a few hours or travel to rare locations to give DX hungry operators on this side a chance for a new country or two. Your efforts are much appreciated.

Returns followed the downward conditions, dropping to 2107. Phone logs, as was to be expected with the poor conditions, dropped over 250 to 819. Cw logs dropped only slightly to 1150.

1974 ARRL DX COMPETITION
Phone: Feb. 2-3, Mar. 2-3
CW: Feb. 16-17, Mar. 16-17



YV5KL, who snags a cw Top Ten spot almost every time out. Gregorio, who grabbed fourth worldwide this time around, had to settle for second place South American honors. He won the South American plaque in 1964 and 65 as YV1DP, in 1971 as YV5KL and in 1972 as 4M5KL. Keep up the good work, Gregorio.

TOP TEN

Single Operator CW				Single Operator Phone			
W/VE			*DX*	*W/VE*			*DX*
K1NOL	2,020,977	KH6RS	5,074,506	W7RM	2,523,456	6J9AA	8,937,708
K1LPL/3	2,004,966	KV4HW	4,601,592	W6RR	2,104,290	4M4AGP	5,972,763
W1BPW	1,985,568	PJ2VD	3,456,810	W1YK	1,662,210	KZ5JF	4,186,470
W1YK	1,927,002	YV5KL	3,143,265	K1JHX	1,440,656	XG1J	3,855,996
K1DIR	1,802,808	KH6IJ	3,072,456	K1VTM	1,314,240	LU5HFI	3,447,048
K1VTM	1,754,784	LU5HFI	2,915,634	K1THQ	1,159,191	VP2MY	3,166,380
W2GXD	1,716,639	TI2DX	2,690,019	W4ZCY	1,141,200	KH6IJ	3,085,638
WA1RCP	1,637,808	KH6IAB	2,482,944	K6SVL	1,108,665	KH6BZF	2,868,478
WB4YOJ	1,605,240	9Y4VU	1,978,362	WB4YOJ	1,095,342	9Y4VU	2,826,456
W2DXL	1,528,866	EA2IA	1,615,700	WAØCVS	969,918	CE3AQW	2,751,972

Check logs numbered 138. Awards are scheduled for an October 15 mailing.

Choosing the "Log-checkers Friend" award, commonly known as "The Golden Pencil," was a most difficult task this year. Many recopied their logs to make them extra-readable. Some included dupe sheets and other such helpful aids for crosschecking. However one log, that of 8P6DR, comes out on top in the final analysis. Richard retyped his log, enclosed dupesheets and recap sheets and made a clean, clear and attractive entry. This will be Richard's last year in Barbados. By now he has packed up his radios and trotted on back to Ye Olde Englande. Next year he will be around at G3RWL or some other DXØTIC spot.

A few have asked, and many must have wondered, what "The Golden Pencil" award is all about. It was an idea cooked up in my fertile mind while watching a particularly dull ad on the TVI machine. Why not, I said, give those hard working DX stations that make oodles of QSOs and spend even more oodles of time making a neat entry something for their effort? How do you get it? Glad you asked. Since this is not an official League award and is done by yours truly when a particular log strikes my fancy the requirements for the

AFFILIATED CLUB SCORES

Club Scores		*Entries*	*CW Winner*	*Phone Winner*
Frankford Radio Club(Pa.)	42,610,394	78	W2GXD	W2EHB
Murphy's Marauders(Ct.)	39,266,912	82	W1YK	W1YK
Potomac Valley Radio Club(Md.)	37,048,163	91	K1LPL/3	W4ZCY
Southern California DX Club	14,346,861	35	W6RR	W6RR
Western Washington DX Club	13,360,785	46	W7SFA	W7RM
Northern California DX Club	12,549,039	66	WA6CXK	WA6NYV
Richardson Wireless Klub(Tex.)	9,389,709	19	W5EQT	W5SZ
Northern Illinois DX Association	6,845,427	22	W9BZW	W9OHH
North Jersey DX Association	5,432,180	23	W2YT	W2HTI
Northern California Contest Club	4,589,775	8	W6NUT	. . . . .
Golden Triangle DX Club(Fla.)	3,826,728	9	K4THA	W4YK
Indy DXers(Ind.)	3,801,318	14	WB9BPG	K9CUY
Oak Park Amateur Radio Club(Mich.)	2,867,148	5	W8ROF	. . . . .
Texas DX Society	2,844,246	6	. . . . .	W5SBX
Central Virginia Contest Club	2,490,171	13	W4ZSH	W4QCW
Nights of the Roundtable(Md.)	2,477,631	7	WA3LHG	. . . . .
South Jersey Radio Association	2,420,025	19	W2FYS	K2AA/2
Twin Cities DX Association(Minn.)	2,227,926	6	WØHP	. . . . .
Minnesota Wireless Association	1,665,846	8	. . . . .	WAØPRS
Southeastern DX Club(Ga.)	1,523,593	21	W4DXI	K4EZ
Columbus AR Association(Ohio)	1,142,337	15	W8ZCK	W8ZCQ
Southern Counties AR Association(NJ)	684,903	7	W2HBT	W2GOF
North Alabama DX Club	514,266	6	. . . . .	K4BYM
Delta DX Association(La.)	474,546	7	W5OB	W4SYL/5
Westpark Radiops(Ohio)	430,038	5	. . . . .	WA8YWX
Buffalo Area DX Club(NY)	350,427	14	WA2MBP	WB2AIO
ARINC Amateur Radio Club(Md.)	319,296	7	. . . . .	W3PWO
Sharon AR Association(Mass.)	166,578	5	WA1MYK	. . . . .
Steel City Amateur Radio Club(Pa.)	88,974	6	. . . . .	W3SDV
Parma Radio Club(Ohio)	46,074	9	. . . . .	W8SUS
Chicago Radio Traffic Association(Ill.)	22,032	4	W9REC	. . . . .
Lake Success Radio Club(NY)	6081	3	. . . . .	W2YKO

Still smiling (for some strange reason) is W6OAT, operator of KV4HW, who racked up 4.6 million cw points — top North America and second spot worldwide. The stick in the background is the 40/15 meter vertical. Rusty used to sign K4BVD from Georgia a few years ago.

award are more stringent than required under the normal rules. My guidelines are:

1) Medium to large foreign logs are eligible.

2) QSO legibility is a must.

3) Clean logs with dupesheets, various summary sheets and other aids for the bleary-eyed contest checker will win over exquisite logs without same.

4) It must be plainly obvious that a large helping of time and effort went into the submission.

5) Only a completely duped log will be considered.

6) The eventual winner must have an entry that is outstanding in comparison to others.

There. . . you now have something to shoot for.

If you earn the big award you don't get extra points or win a free 10-year supply of logsheets but you do get our undying gratitude and your call printed more than once in *QST*. Now – isn't that enough?

SOAPBOX

599

I herniated an intervertebral disc which had me *pretty well crippled and therefore I couldn't travel* to Sint Maarten and there was no PJ8AA or VP2ES in this year's competition. So, please find enclosed my token log for operation from W2BBK to be known as the PJ8AA Memorial Log for 1973. Wait 'till next year. – (W2BBK). The contest was a real blast, especially when the electrolytics in the SB-200 exploded with enough force to bulge the top of the cabinet up over an inch. – (WAØEMS). The pileup after me on the first Sunday evening, on 20, was the biggest I've ever heard and, believe me, I've had some heavy ones in my time. Just one CQ at the beginning and it seemed as though every licences W and VE, and then some, were calling me. Felt like crawling away and hiding under the table. On the second Sunday a similar thing happened and then some thieving %+!†$%¾*@$ stole my pileup. One minute they were all there – next minute no one calling me. They were all up 5 after someone else. . .couldn't make out the call though. I wonder if this could be made a Federal, extraditable, offence? – (8P6DR). Enjoyed a few glimmers of hope to Europe on 80 but what happened to 10? – (W6ANN). As usual the XYLs birthday on the first weekend and our 28th anniversary on the 2nd weekend crimped my style. – (W6NKR). Many years of harping by you about DX stations signing more frequently and about W/VE stations giving both calls seems to have had little effect. – (VE5TT). Still lots of fun for *smaller guy on cw.* – (VE6AVO). *No new babies,* no broken 20 meter elements, no jammed rotator this year, Murphy must be saving it all for next year. – (W3YIK). It's great to be back in the DX Test. – (K3JGJ). I would have operated more hours but the weather turned good so I went out and enjoyed it. – (WA7CWM). It was a real bummer in the Novice bands. – (WN7TDZ). Very

Minimums	30	50	80	70	30
Band	80	40	20	15	10
VO1AW	35	29	51	53	33
VO1KE	35	42	44	37	
VE7NY	14	43	63	52	14
VE3CSZ	23	25	69	73	3
K1DIR	58	65	82	81	47
K1IPB	25	46	60	64	33
K1JHX	36	38	76	76	45
K1JYN	21	30	59	63	34
K1NOL	60	67	89	74	43
K1THQ	42	40	73	63	36
K1VTM	35	61	75	75	42
K1ZND*	59	71	85	82	46
W1BPW	61	66	82	84	51
W1FBY	48	41	65	66	34
W1FLM*	46	62	81	77	34
W1MX*	77	84	101	85	41
W1PL	30	7	32	46	
W1UUK	35	46	50	40	
W1YK	56	61	80	61	43
W1YML/1	38	56	71	70	31
WA1HON	42	12	52	38	11
WA1NRV*	43	53	84	65	22
WA1PID	56	53	76	74	37
WA1RBR*	52	58	83	72	26
WA1RCP	55	67	80	70	26
WB2CKS/1	59	57	41	33	17
K2BK	33	47	67	57	26
K2FL*	42	53	67	65	32
K2GT*	18	58	60	61	29
K2MME*	28	51	70	68	25
W2AO	56				
W2AZO	31	47	58	54	23
W2BQF	47	56	75	57	27
W2DXL	58	65	82	70	39
W2GUE	46	56	74	59	27
W2GXD	56	72	91	87	47
W2HN	34	21	12	11	13

Minimums	30	50	80	70	30
Band	80	40	20	15	10
W2HO	34	45	61	51	19
W2HTI	35	49	66	61	32
W2HUG	32	46	46	48	17
W2LWI	32	3	25	22	22
W2MB	36	30	3	7	8
W2PAU	31	40	52	51	19
W2YD*	54	71	81	57	38
W2YT	37	63	61	60	43
W1BGD/2	31	46	54	57	43
W8CQN/2	45	44	69	61	31
WA2BLV*	51	68	74	75	40
WA2CLQ*	44	60	74	64	26
WB2OEU*	30	55	81	55	11
K3BW*	51	74	74	76	24
K3HZL	40	65	75	76	32
K3JH	27	55	56	58	17
K3NPV	48	40	56	48	14
K3YUA	62	59	75	70	39
K1LPL/3	61	75	74	74	37
W3AFM			109		
W3DQG	34	46	80	72	31
W3EYF	40	57	69	64	24
W3FZT	49	57	79	61	36
W3FRY	67	81	105	90	53
W3GHD	38	10	26	22	16
W3GM*	67	78	82	94	52
W3GN	46	54	74	56	25
W3GPE*	74	76	86	99	50
W3GRF	47	59	74	73	29
W3GRS	41	52	75	54	19
W3KT*	13	46	72	70	34
W3MFW	79				
W3NX*	39	60	65	61	23
W3NZ*	52	67	66	71	33
W3OOR	34	50	47	59	37
W3SS*	54	70	98	93	31
W3TV*	30	42	77	76	49

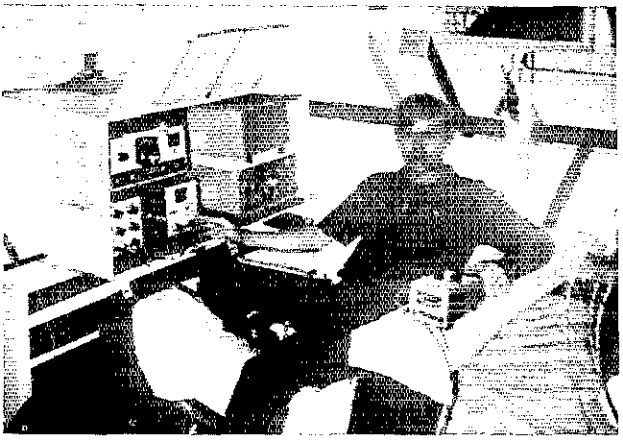
Minimums	30	50	80	70	30
Band	80	40	20	15	10
W3VT	55	62	68	78	45
W3YIK	44	48	71	67	38
W3YXM*	28	41	71	69	34
W3ZSR	8	10	56	74	13
WA3ATX*	44	57	84	77	30
WA3NNA	31	27	74	56	27
K4CEF	42	48	70	63	40
K4CFB	20	36	81	67	31
K4EZ	30				
K4II	24	42	69	68	30
K4OD	21	33	76	71	37
K4PY	36	41	49	60	30
K4SXD	14	48	72	71	25
K4THA	36	48	79	69	43
K4TIG	60				
W4HDS	38	18	42	49	23
W4HKK	12	53	60	51	34
W4KFC	47	50	76	63	41
W4NQA	30	30	38	37	13
W4OZF	46	35	33	34	24
W4UQ	62	48	60	47	16
W4ZM	22	80	100	100	23
W4ZSH	21	37	68	64	30
WB4AW/4	35	60	69	70	29
W9WKU/4	34	33	39	44	28
WB4BGY	59	52	77	41	6
WB4NRI	4	4	65	78	17
WB4SGV	30	34	55	61	27
WB4YQJ	56	62	74	79	41
K5ABV	47	35	39	48	21
K5RFJ	19	67	61	67	33
W5AO		75			
W5EQT	37	53	71	75	37
W5KFL*	67	80	98	80	48
W5LUJ*	43	69	76	74	32
W5SBX	42	58	66	72	43
W5WZQ	48	65	83	76	36

Minimums	30	50	80	70	30
Band	80	40	20	15	10
WA5JMK*	33	60	83	87	36
WA5LES*	56	69	83	86	48
WA5ZNY	23	30	70	66	32
WB5DIZ		60	12	34	
K6DC	6	55	49	34	6
K6EBB*	24	65	80	65	24
K6NA	29	65	78	64	27
K6SDR	29	71	73	71	24
W6ANN	40	68	89	80	32
W6BH		70			
W6DGH	26	51	58	61	17
W6KG*	18	37	83	63	25
W6MUR	43				
W6NUT	31	61	70	58	24
W6UA*	13	23	104	26	6
WA6IQM			81		
WB6KBK*	18	60	71	62	24
W7SFA	33	57	86	61	21
W7YTN	10	51	71	42	3
W8DB	34	52	61	65	29
W8ROF	46	66	78	60	27
W8SH*	60	69	94	87	34
WB8FOS	31	40	44	60	33
K9CUY	42	45	66	70	31
K9DWK	31	52	42	40	
W9BZW	23	44	77	78	18
W9DOB	19	51	47	62	28
W9EXE	52	50	70	65	21
W9HEH	26	38	65	72	30
W9LVH		58	13	24	1
W9QHH	20	40	69	70	34
W9WYB	20	16	60	71	32
WB9BPG	16	57	103	93	50
W9HP	33	63	78	68	24
WA9CVS	29	53	61	64	19
WA9ENP*	32	63	76	67	31

* Multioperator Station

DIVISION LEADERS

CW			Phone	
Single Op.	*Multiop.*		*Single Op.*	*Multiop.*
K1LPL/3	W3AU	Atlantic	W3EZT	W3AU
WB9BPG	W9EXE	Central	W9EWC	W9EXE
WØHP	WAØENP	Dakota	WØGYH	WØHZ
K4SXD	WB4LDT	Delta	W4SYL/5	WB4LDT
W8ROF	W8SH	Great Lakes	WB8DKB	K8HLR
W2GXD	W2YD	Hudson	W2MB	WA2CLQ
KØDDA	WAØEMS	Midwest	KØSGJ	WAØEMS
K1NOL	W1MX	New England	W1YK	W1MX
W7SFA	W7FR	Northwestern	W7RM	W7SFA
W6NUT	K6EBB	Pacific	WA6NYV	W6OAT
WB4YOJ	K4CFB	Roanoke	W4ZCY	W4BVV
WAØCVS	. . . .	Rocky Mt.	WAØCVS	WØMYN
K4THA	K4PY	Southeastern	W4YK	W4QBK
W6RR	W6ANN	Southwestern	W6RR	K6SDR
W5WZQ	W5KFL	West Gulf	W5SZ	WB5DTX
VO1AW	VE4JB	Canadian	VE2AYU	. . . .



Our only Thailand cw entry is HS3AII, Dennis, who signs WB4DVO when in the States.

sobering experience operating with dipoles after running things from W7RM on phone. Whew! – (K7VPF). Four equipment failures including a fire in the exciter during the first weekend. Thank goodness there are two weekends. – (WØIYP). Long live the 40 meter rhombic. . . now if it could only rotate. – (WAØENP). The second weekend coax to the beam was shorted, fixed that. Then the antenna caught fire, fixed that. Found bolts on the rotor were stripped. When I tried to go to the hardware store for new bolts my car battery was dead. Only in amateur radio. . . – (WA3NYU). Murphy took my new rotator down at end of first weekend. Worked like mad to get it going by second weekend but ice storm froze it solid. Does anyone have a tank turret engine for sale? – (WB9BPG). [If that doesn't give you a booming signal nothing will. – Ed.] Nothing like a DX Test to bring ones paranoia to the surface. – (W4UQ). I was surprised that my 2½ watts and simple receiver worked as well as they did on 20. – (W5JFB). Why do so many good operators on the HF bands become such lids on 80 meters? They never stop calling. – (W2AO). My opinion that the cw standard of operating in the U.S.A. is world-high was again my impression of this contest. Like your general driving ability and manners on the road, the discipline and good management was great to find. – (G3KMO). I like my regular night's sleep as well as the after lunch nap so will never make a big score. – (VO1AW). Hoped to spend

Minimums	30	50	80	70	30
Band	80	40	20	15	10
K1CPF	22	34	86	87	39
K1CSJ/1	19	51	87	83	21
K1HX	34	30	110	100	29
K1THQ	45	39	87	95	3
K1VTM	24	44	99	99	30
K2LQQ/1	10	14	86	38	6
W1ARR*	57	46	94	95	33
W1FBY*	51	45	111	90	39
W1MX*	70	52	121	89	76
W1YK	55	43	100	98	38
WA1ION	32	16	41	63	20
WA1KZE*	41	41	95	95	33
WA1PID	25	35	87	84	39
K2FL*	38	45	104	99	31
K2IT*	11	20	77	71	37
W2DT			36	72	16
W2EHB	20	17	79	88	32
W2EZI	56	22	8	16	11
W2GXD	2	24	62	54	32
W2HLL	37	35	89	85	29
W2MB	37	46	92	84	38
W2RAD	17	28	79	79	34
W2YD*	36	33	49	54	2
W2YT	34	40	65	79	43
W2YY	33	30	24	31	18
WA2BLV	21	43	29	56	38
WA2CLQ*	41	41	78	72	29
WA2LOZ	17	36	83	60	15
WB2AIO		12	63	73	16
K3BW*	52	62	108	108	39
K3HZL*	58	49	94	95	38

Minimums	30	50	80	70	30
Band	80	40	20	15	10
K3WUW*	14	17	101	61	28
K1LPL/3	22	34	78	88	25
WA4LB	6	32	48	71	25
W3AU*	72	92	160	139	61
W3BWZ*	23	39	108	91	40
W3CRE	32	19	83	67	34
W3DBT		32	93	74	36
W3DHM*	34	62	98	102	40
W3EZT	38	31	108	82	38
W3FRY	55	72	143	114	52
W3GM*	54	60	96	113	40
W3GPE*	68	62	117	114	39
W3GRS	20	36	57	79	14
W3KMV	31	32	34	44	32
W3KT*	3	37	74	92	24
W3NX*	44	41	74	69	21
W3QOR	23	30	60	71	26
W3SS*	18	20	94	89	
W3VT	39	48	83	93	28
W3WJD*	21	74	117	126	52
W3ZSR	8	12	62	28	12
WA3ATX*	60	41	93	91	37
WA3LHG*	37	36	101	86	40
WA3NNA	13	11	67	87	42
K4AFR			2	76	25
K4AUL			68	77	38
K4EKJ	6	11	69	78	38
K4EZ	23	21	65	80	31
K4TIG	35				
W4BVV*	62	73	119	102	44
W4JVN	2	11	33	74	25
W4KFC	3	11	78	96	38

Minimums	30	50	80	70	30
Band	80	40	20	15	10
W4KNW	5	3	36	75	25
W4ORT	22	33	53	83	33
W4OZF	6	15	27	46	38
W4ORK*	26	59	107	105	44
W4WSF	25	34	92	82	36
W4YK	40	27	62	114	61
W4ZCY	38	38	90	100	33
W4ZSH	11	6	64	77	33
WB4NRI	10	16	47	93	24
WB4SIJ	10	27	69	85	32
WB4TPU	16	29	83	78	17
WB4YOI	39	51	89	94	38
W5EQT	22	40	86	73	25
W5MYA		3	10	43	35
W5NMA	19	45	74	75	22
W5QBM	21	47	69	84	48
W5SZ	51	44	86	91	38
WA5JMK*	38	40	83	90	35
WA5SYX*	46	65	103	106	49
K6EUB	37	53	91	87	47
K6NDR*	29	38	58	65	33
K6SEN*	50	66	99	92	50
K6SSI	5	13	25	16	16
K6SVL	12	34	66	65	36
W6AEL	12	12	46	58	32
W6DGH	29	35	51	55	35
W6EI			42	48	22
W6KG*	19	26	71	52	39
W6KNC	4	18	20	47	30
W6MAR	30	15	16	11	4
W6OAT*	29	37	69	73	44
W6ONV*	18	32	74	70	35

Minimums	30	50	80	70	30
Band	80	40	20	15	10
W6RR	37	52	85	87	48
WA6AHF	3	18	31	38	33
WA6IQM			81		
W2RM	39	49	105	81	15
W7SFA*	53	60	113	73	46
W7VRO*	20	41	86	62	21
KBAXG	12	29	61	72	21
K8HLR*	53	67	113	98	30
W8KGG*	16	28	69	73	13
WB8DKB	8	8	81	54	25
WB8WIA	26	43	69	62	32
WA8GDU	2	14	20	52	30
WA8YWX	15	32	88	64	15
WB8DLR	24	30	78	93	4
WB8ICY*			24	3	37
K9CUY	33	41	70	74	27
W9DOR	17	50	68	76	26
W9EWC	22	43	88	72	20
W9EXE*	53	61	101	98	33
W9IRH	29	24	70	84	27
W9IY		23	87	56	26
W9OHH	26	50	85	87	23
W9RJR	15	7	48	74	23
W9YRA			98		
WA9NPM	2	27	55	30	23
WB9DRL	11	30		73	8
W9HZ*	15	36	78	70	23
WØMYN*	39	49	74	75	47
WAØCVS	27	58	70	76	32
WBØBCZ*	21	31	67	76	20

* Multioperator Station

DX CONTINENTAL CHAMPIONS

CW			Phone	
Single Op.	*Multiop.*		*Single Op.*	*Multiop.*
5T5CJ	. . . .	Africa	ZS6DW	. . . .
JA1CWZ	JA9YBA	Asia	JA2IYJ	JA9YBA
EA2IA	SK6CF	Europe	CT1BH	G4ANT
KV4HW	6Y5EE	N.America	6J9AA	KL7AIZ
KH6RS	. . . .	Oceania	KH6IJ	. . . .
PJ2VD	LU2DKG	S.America	4M4AGP	LU2DKG

more time but had inspectors from Washington who had to be wined and dined on the second weekend. – (LU5HFI). Many thanks for my first ARRL Test after 34 years of hamming. – (LU6EF). Modern Chinese torture – listen to power line leaks for 78 hours. – (KH6RS). Bands were only open 2 or 3 hours each day so conditions were rough. – (HS3AII). Very happy to catch new states on 40 meters. – (JR1BRV). I enjoyed it but my TX had a trouble. – (JA7KXD). Not only worked my first VE8 but also worked 7 new states. Really had a good time. – (OZ6PI). Nothing really worked except my 40 meter antenna. During this contest I made my 5000th stateside QSO. – (SM7EAN). Too many duplicates. Avoided many further ones by keeping a check list and telling the calling stations that we had worked before. Also, still many copy our call sign as SP5PW only. . . – (SP5PWK). So, once more, we have gone through the excitement of this wonderful contest which is, in my opinion, the best among the major international amateur contests. – (YV5KL). For my first contest I had a lot of fun. I tried both phone and cw but the bands were so poor and the competition from the Europeans so great that I was not able to work any stateside stations on phone; only on cw. – (5B4AM). I still wonder how you can pick the weekends when conditions are good. The one following March 17-18 was terrible and conditions remained poor for at least a week. – (VE7HQ).

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It is somewhat shattering to know how small your signal is when you get into a pileup and don't recover. – (W6BVN). I really do QSL 100%. How about the Ws sending some back? I sure need those counties and would like to dream of a 5BWAS. – (VK4VU). The bottom fell out on 10 meters this year. So did the XYLs patience with my operating both modes all four weekends. I'll be sticking to cw next year. – (WB4YOI). Nice little contest you people run. – (WA1JUY). The number of operating hours is inversely proportional to the attendance of Murphy. 62 out of 96 hours says it all. – (WA1JLD, opr. of W1YK). Struggled out of sick bed to give the second weekend a good effort and blew the diodes in the power supply. – (K9VQK). Boy, did Murphy hit this year! We even lost the 20 meter tower two hours into the first weekend due to a local freak storm. – (W3WJD). The high voltage supply started arcing over in a spectacular display of fireworks. After shutting off the amplifier I decided the trouble shouldn't be too hard to find because of the horrible smell. My deduction was correct. A close inspection showed a poor field mouse that came in to escape the rain storm had decided to take a walk on top of the electrolytics. This, needless to say, was a fatal mistake. – (K4BW). Blah, Blah, Blah. – (W6PM). No equipment failures for first time but spent one night handling emergency medical traffic. Murphy has devious ways. – (K6SVL). Imagine the nerve – working DX with 2½ watts amongst all those linears. – (K6CKU). Conditions were very poor making it very difficult to get through the European curtain. I'm afraid that Mauritius is no DX paradise. – (3B8CV). What a shambles (3,775 to 3,800). Continous CQ calling and listening up or down made direct contact impossible. I went to bed. – (GW3NWV). Lousy conditions both weekends. Worked W7RM on 21 as only West Coast station there with 44/33 sigs. – (SM6CKU). Running one watt DC input I was quite thrilled to receive a 56 from 6J9AA on 10 meters. – (WB2OIL). I sincerely hope that our brother hams will learn that ears are more important than a mouth in working DX. – (W2MOY). Would have liked more 21 MHz QSOs but most U.S. hams seemed intent on working Japan for quick score build up. – (VK2WD).

QRP CHAMPS

(150 Watts or Less at All Times)

CW		Phone	
K2MFY	398,076	W4WRY	162,966
WB4SGV	344,655	VE1ANZ	148,248
W2HUG	267,900	WA7QCC	142,500
W1FNW	237,888	WA1NII	77,256
K5ABV	214,809	K5YRK	75,516
WB8FOS	177,216	WA1KKM	54,372
WA2RJZ	175,980	K2MFY	48,594
WA2HAI	123,750	W1HWM	48,057
W3ARK	119,016	WBØFLT	22,260
WA3KOS	110,670	W6YKS	21,384

Thirty-Ninth ARRL International DX Competition

W/VE scores are listed by call area; DX scores are listed alphabetically by continent and prefix.

Awards: The operator of the first-listed single-operator station in each section or country is the winner for that area and receives a certificate award. The top-scoring multi-multi and multi-single in each area also receives a certificate award. Awards are scheduled for an October 15 mailing. The top-scoring single-operator DX entrant for each continent each mode, receives an engraved plaque. Affiliated-Club awards are shown elsewhere in this article.

Scores: In the list to follow, read (from left to right): call of entrant, final score, multiplier (total countries per band for W/VE; total states and Canadian call areas per band for DX), contacts, approximate dc power input (A represents power up to and including 150 watts; B, over 150 and up to and including 500; C, over 500; D, combination of A+B; E, A+C; F, B+C; G, A+B+C), total time of operation to the nearest hour. Example: A2CCY 1,064,049-161-2203-A-50 indicates final score of 1,064,049, multiplier of 161, contacts 2203, power up to and including 150 watts, operating time 50 hours.

An asterisk following a call denotes an ARRL Hq. staff member, ineligible for an award.

DX PHONE

AFRICA

Botswana

A2CCY 1,064,049-161-2203-A-50

Morocco

CN8BO 107,640- 78- 462-A-

Mozambique

CR7GJ 341,868-124- 919-C-
CR7RM 53,108- 68- 261-A-13

Canary Islands

EA8CR 326,457-113- 963-B-

South Africa

ZS6DW 1,656,600-200-2761-B-44
ZS3CJ 456,660-129-1180-A-
ZS6FN 158,400- 88- 600-B-12

Mauritius

3B8CV 75,465- 65- 387-C-15

ASIA

Thailand

HS5AFJ 72,930- 55- 442-C-31

Japan

JA2IYJ 371,385-105-1179-B-
JA1CG 216,744- 88- 821-D-
JA1ELY 137,550- 70- 655-B-
JA1FFC 45,936- 44- 348-C-22
JA2HGA 30,012- 41- 244-D-
JA8FBM 22,800- 38- 200-B-
JR1BRV 16,608- 32- 173-B-10
JA7YFY 14,877- 29- 171-B-10
JA3BUB 14,820- 26- 190-A- 8
JA8GO 4743- 17- 93-A-15
JA7JW 4080- 20- 68-A-
JH3FYW 3822- 14- 91-A- 8
JA7KXD 3792- 16- 79-B- 7
JA7HYS 3555- 15- 79-B-10
JH2GVN 3300- 11- 100-A- 7
JH1TNR 2847- 13- 73-B-10
JA1AAF 2475- 15- 55-B-
JA2KBB 1320- 5- 88-A-25
JA4FCR 1320- 8- 55-B-
JA1BUI 480- 8- 20-A-
JF1HCE 360- 5- 24-A- 6
JH2TYH 300- 4- 25-A- 9
JA7IBJ 270- 6- 15-A-
JH3BJN 36- 3- 4-A-
JA1EL 12- 2- 2-A- 1
JA9IWY 12- 2- 2-A-
JH2LUF 3- 1- 1-A-

Multi-Single

JA9YBA (JA3PYC JA9s BAIJ VLF FFN FLL JH1GUO)
127,836- 67- 636-C-

Asiatic R.S.F.S.R.

UAØFGM (UV3GM, opr.)
268,752- 88-1018-B-23

UA9MT 330- 10- 11-B-

Multi-Single

UK9CAE (UA9s CBF CBO)
2715- 15- 61-B-

UK9XAC (UA9s XAI XN XV)
1536- 16- 32-A-

Turkoman

UH8BO 54- 2- 9-B-

Afghanistan

YA1OS 2574- 22- 39-F-

Cyprus

5B4AO 294- 7- 14-A- 3

EUROPE

Portugal

CT1BH 1,436,130-197-2430-C-

Azores

CT2BG 1,049,028-172-2033-B-

Germany

DL8PC 350,262-122- 957-B-46
DL6WD 309,720-116- 890-B-
DJ6LV 291,224-118- 823-B-
DK5AI 40,851- 51- 267-B-
DJ2YE 4032- 24- 56-B-
DM2BFK 1530- 17- 30-B-

Multi-Single

DLØWW (DA1s ED NL DC6FF DJ4OQ DJ6DU DK7FO DL3ZA DL6NK)
1,048,302-162-2157-C-96

Multi-Multi

DL5AY (DA1s FE HF JR TW WX DA2LJ DK8FZ)
981,564-157-2084-F-48

Spain

EA5AX 98,955- 41- 733-C-12

France

F3KW 124,998- 83- 502-B- 6

Multi-Single

F6KAW (F1BLW F6s AOJ AUO BPW BPX UAW)
1,460,700-180-2714-B-96

England

G2QT 476,952-136-1169-A-48
G2FNK 108,204- 71- 508-C-20
G3VBH 53,694- 57- 314-B- 8
G5AWX 8748- 27- 108-A-10
G3YTU 3564- 18- 66-F-

Multi-Single

G4ANT (G3s IOR JOC LDI MPN SFM VZT)
1,821,232-196-3106-B-96

G3UBR (G3s UID UJE ZZI G4BTY)
1,177,344-168-2336-C-45

G4ALE (G3s SJX UFY WRR XJO)
410,880-128-1070-B-96

Scotland

GM5AXO 20,808- 34- 204-A- 6

Multi-Single

GM3ZRC (GM3s LYI XNJ)
24,960- 40- 208-B-28

Wales

GW3NWV 380,133-117-1083-B-

Multi-Single

GW3UCB (G3WKH G3WXS G4BRK)
3- 1- 1-A-

Hungary

HA9KOV (HA9PU, opr.)
1023- 11- 31-B- 3

Multi-Single

HA3KMA (HA3s ME PG)
38,916- 47- 276-B-25

HA5KAS (H-5-303 H-5-304)
5850- 30- 65-B-

Switzerland

HB9T 185,760- 80- 774-B-16
HB9DX 6162- 26- 79-B-
HB9KC 2886- 26- 37-B- 3

Italy

I3GRX 34,263- 47- 243-B-23
I4OAK 8466- 34- 83-B- 6

Multi-Single

IRCZW (+IRAJ)
911,250-150-2025-B-

I3MWP (+I3MAU)
504,390-115-1466-B-45

Norway

LA6HL 110,592- 72- 512-A-38
LA8RL 59,796- 66- 302-B-10
LA4ZP 9600- 32- 100-D-
LA3JQ 8217- 33- 83-A-
LA5KO 7623- 33- 77-A-14
LA5BF 452- 9- 16-A-

Austria

OE2FGL 333,840-107-1040-A-70

Finland

OH2FS 14,304- 32- 149-B-
OH3JR 2520- 21- 40-C-
OH8TP 1824- 16- 38-A-
OH7OQ 1386- 14- 33-B-
OH2BCD 528- 11- 16-B-
OH7NW 480- 10- 16-A-
OH7SC 360- 10- 12-B-
OH8SP 270- 9- 10-A-
OH3HD 18- 2- 3-B-
OH2BFX 3- 1- 1-B-

Multi-Multi

OH1AD (OHIs PS PV QP RU SH VQ VT XX OH2s BCP BO BX KK)
478,918-121-1320-B-

Czechoslovakia

OK2BBI 2907- 17- 57-D-
OK1KZ 105- 5- 7-A-

Belgium

ON4XG 13,464- 44- 102-B- 7

Denmark

OZ5MF 2958- 17- 58-A-10
OZ3PO 720- 12- 20-B-
OZ8T 390- 10- 13-A- 3

Netherlands

PAØLVK 10,998- 39- 94-B-
PAØVP 2040- 17- 40-B- 5

Sweden

SM6CKU 341,721-129- 883-B-48
SM5DIZ 66,990- 70- 319-B-16
SM6ADW 62,220- 61- 340-B-
SM7BXK 1674- 18- 31-B-

Multi-Single

SM5OAE (+SM6BJI)
283,176-108- 874-B-

SK6AW (SM6s CJK CKS CNX CPO CVE OD)
265,860-105- 844-B-

SK5AA (SM5s ACQ EFX ESP)
12,852- 34- 126-B- 9

Poland

SP6PZB (SP6FAF, opr.)
35,904- 44- 272-A-15

SP5EMM 1014- 13- 26-A-
SP5DZI 594- 11- 18-B-
SP3DOI 294- 7- 14-B- 1

Multi-Single

SP5PWK (SP5s BSV DZJ H.Kotowski)
128,568- 88- 487-B-96

SP9KRT (multiop)
231- 7- 11-A-

Crete

SVØWMM 35,784- 42- 284-B-10

European Russian S.F.S.R.

UA3HR 11,088- 28- 132-B-
UK3YAB 6300- 25- 84-B-

Ukraine

UY5OO 13,959- 33- 141-B-

Multi-Single

UK5MAF (A.Galchinskiy A.Leshenko Y.Ruve)
33,810- 49- 230-B-

White R.S.S.R.

UC2BF 1344- 14- 32-B-

Latvia

Multi-Single

UK2GDZ (UQ2GA V.Bormanis A.Lawrov)
25,422- 38- 223-B-

Armenia

UG6GAF 480- 10- 16-A-

Rumania

YO2AFB 3672- 18- 68-A-

NORTH AMERICA

Dominican Republic

HI8LC 1,103,553-213-1727-B-60
HI8JDA 1260- 12- 35-B- 1

Alaska

KL7HNQ 52,836- 68- 259-B-22

Multi-Single

KL7A 1Z (WB4LEK WA7KJA WN7UQU)
243,726- 98- 829-C-14

Canal Zone

KZ5JF 4,186,470-265-5266-B-72

St.Maarten,Saba & St.Eustatius

PJ8DX 561,216-158-1184-B-19

Costa Rica

TI2WX 731,271-173-1409-A-
TI2AAC 20,295- 33- 205-C-

Montserrat

VP2MY 3,166,380-245-4308-B-52

Bahama Islands

K4VMA/VP7 310,500-125- 828-A-

Bermuda Islands

W4EV/VP92,506,500-250-3342-A-73
WA3KOS/VP9

Cayman Islands

ZF1BR 132,210-113- 39
ZF1JS 12,255- 43- 9

Mexico

6J9AA 8,937,708-299-996
XGIJ 3,855,996-276-465
XE1LLS 2,486,055-247-33

Barbados

8P6CY 366,903-107-114

OCEANIA

Guam

KG6JBO 886,854-158-187

Hawaiian Islands

KH6IJ 3,072,456-278-36
KH6BZB 2,868,478-239-40
KH6IAB 2,056,188-244-28
KH6RS (K2SIL, opr.)
247,983-131- 6
WØBWJ/KH6 2304- 16-

Marshall Islands

KX6BB 245,025-121- 6
KX6JS 702- 9-

Australia

VK4VU 599,886-138-14
VK2WD 11,742- 38- 1

SOUTH AMERICA

Chile

CE3AQW 2,751,972-212-43
CE8AO 157,183-113- 4
CE5GO 10,710- 34- 1

Bolivia

CP1EU 995,553-201-16

Colombia

HK3LT 194,346-118- 5

Argentina

LU5HF1 3,447,048-242-47

Multi-Single

LU2DKG (+LU1DAY LU6DKX LU8DLK)
894,708-174-17

Peru

OA4AHA 961,422-154-20
OA4CBU (K1YKT, opr.)
723,168-144-16
OA4AIW 540,540-143-12

Brazil

PY3APH 419,133-143- 9
PT2EYO 138,150- 50- 9
PY6OA 51,129- 39- 4
PY5YC 19,440- 45- 1
PY1BOL 13,689- 39- 1

Multi-Single

PY1CEJ (+PY1s BAR CH ZAE)
388,395-135- 9

Venezuela

4M4AGP (WØYVA, opr.)
5,972,763-289-68
YV5DLO 11,811- 31- 1
4M5CUZ 4968- 24-

Trinidad & Tobago

9Y4VU 2,826,456-248-37

W/VE PHONE

CANADIAN

Maritime

VE1ANZ 148,248-142- 3
VE1EK 6480- 36-
VO1AW 741- 13-

Quebec

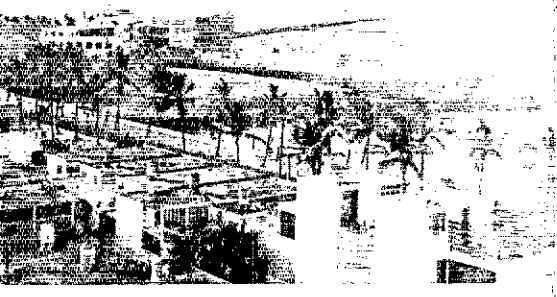
VE2AYU 153,900-135- 3
VE2WA 75,396-122- 2

Ontario

W5ONY/VE3
110,922-139- 2
VE3DMC 2208- 23-

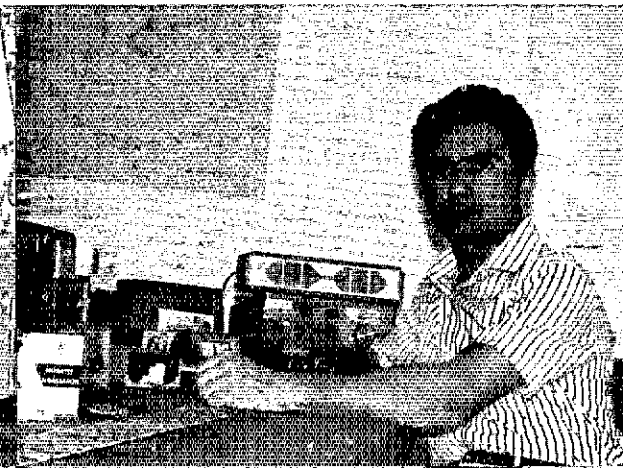
Manitoba

VE4KE 96,690-110- 2
VE4RP 23,424- 61- 1



We all know the signal strength of 6J9AA (XE1IIJ, KØDQI, etc.) and now we see why he is so strong. Above: The Veracruz viper's shot to the U.S.A. taken from the top of the tower. Nothing but sea water between us and overload. Top right: The antenna farm (things grow better in tropical climates). The big tower holds 2 elements for 40 at 80 feet, 4 elements for 20 at 75 feet and assorted slopers for 75/80. The short tower supports an interlaced 10/15 meter beam at 60 feet. During the contest this was changed to separate monobanders. Antennas don't stay up too long at this site. Winds of 100 MPH are common and on December 15 they had a gusty one of 159 MPH. Right: The Veracruz viper in the flesh (almost) during the calm before the storm (I know it's before because his eyes are open). Scott uses a Drake-Line and L4-B plus an SB-101. Anyone that can sit thru 10K QSOs and dupe the log *deserves* to get his picture in *QST*. FB job indeed by the Scott-ish Terrorier of the airwaves.

Left: TI2DX, who put in a nice 6th place cw showing in 44 hours. Chuck (K8UDJ in disguise) has, by now, moved on to HC-land where he hopes to make all us deserving contest-types happy with a few Ecuadorian multipliers. Below left: Top cw European and number 10 in the DX listings is EA2IA. Ignacio fed his 300 watts into a TH3-Jr. and dipoles for 40 and 80. Nice job, OM. Below: Second in Europe and 11th in the DX cw listings is I6BQI. Angelo's southern latitude helped him make over 250 QSOs on 10 meters. Not bad, eh?



Saskatchewan

VE5RA 50,568- 86- 196-I-
VE5TT 1488- 16- 31-A- 8
VE5FK 966- 14- 23-B- 4

Alberta

VE6AGV 94,752- 96- 329-C-30
VE6MP 83,232- 96- 289-C-32
VE6AHH 126- 6- 7-A- 1

British Columbia

VE7BLF 36,018- 58- 207-D-22
VE7VP 15,594- 46- 113-C-42
VE7AZG 13,410- 30- 149-C-15
VE7BBL 4872- 29- 56-A-

U.S.A.

1

Connecticut

K1JHX 1,440,656-303-1580-C-63
K1VTM 1,314,240-296-1480-C-68
K1THO 1,159,191-297-1301-B-65
WA1PID* 846,450-270-1045-B-63
WA1KID 366,680-188- 650-C-51
WA1POA 202,776-142- 476-E-50
K1GUD 168,432-121- 464-C-38
WA1MAO 117,786-134- 293-B-35
WIRML 90,396-108- 279-C-33
WA1JBN 55,332- 87- 212-C-25
WA1KKM 54,372- 92- 197-A-48
WA1PHF (WB2CHO, opr.)
47,475- 75- 211-B-13
W1AB 42,768- 99- 144-C-
WA1NRG 37,848- 83- 152-C-21
WA1KOC 26,838- 71- 126-E-12
W1BIH 20,493- 69- 99-C-
W1DGL 13,728- 52- 88-D-10
W1GNC* 13,200- 55- 80-C- 5
K1ZND* 9396- 54- 58-C- 3
W1DBP 8892- 38- 78-B-16
K1TZD 6750- 45- 50-C- 8
W7QV 1848 22- 28-C- 2
K1WVX 1242- 18- 23-C-14
W1ECH 912- 16- 19-A- 1
K1MUJ/1 (WA1HYN, opr.)
300- 10- 10-B-

Multi-Single

W1FBY (+K1DPB K1RLU WA1KOJ)
1,574,496-336-1562-C-92
W1ARR (+K1ZND W1RM1)
1,180,800-328-1200-B-90
W1FLM (+WA1NFS)
342,000-200- 570-C-42
W1FFG (+WA1LVW)
300,852-183- 548-C-65
WA1PMA (+WB2QYR)
45,600- 76- 200-B-32

Eastern Massachusetts

K1CPF 939,876-268-1169-C-65
WA1ION 160,476-172- 311-C-30
WA1MCY 147,960-120- 411-C-37
WA1NII 77,256-111- 232-A-55
WA1RBR (WA1ABV, opr.)
73,830-107- 230-C-10
W1HWM 48,057- 83- 193-A-29
W1WXZ 35,532- 84- 141-B-20
W1EJI 26,400- 80- 110-C-
W1PLJ 10,800- 45- 80-B-22
W1IAU 6435- 39- 55-A-23
WA1JYY 1650- 22- 25-A-
K1OMF 660- 11- 20-B- 2
WA1KSF 48- 4- 4-B- 1
WA1LAI 18- 2- 3-B- 3
WA1IUY (WA1ABV, opr.)
12 2 2-A- 1
WA1NRT 12 2 2-A- 1

Multi-Single

WA1KZE (+WA1NRV WA8WNU)
1,228,284-306-1338-C-96
W1AE (+WA1JOJ WA2MYY WA3GOJ WA8NRO)
175,560-154- 380-C-50
WA1MYK (+WA1NRT WN1s OWI RFF)
11,214- 42- 89-A-

Multi-Multi

W1MX (K1OMF WA1s ABV COW IVY IZC WB2IYM K3QDD WB4SMA)
1,803,246-358-1679-E-96

Maine

WA1EUO 268,320-130- 688-E-43
W1VP 31,276- 94- 118-B-30

New Hampshire

W7TML/1 942,834-274-1147-C-72
K1CSJ/1 773,784-264- 977-B-69
W1EHT 145,152-144- 336-B-34
W1BPW 93,906-141- 222-C-20
W1CHA 30,456- 72- 141-C-17
W1LQO 4935- 35- 47-A-14

Rhode Island

K2LQO/1 175,098-154- 379-C-55
W1AWE 7104- 37- 64-
W1RFQ 4836- 26- 62-C- 4

Vermont

WB2CKS/1 40,050- 89- 150-C-23
W1HGA 23,718- 59- 134-B-16

Western Massachusetts

W1YK (WA1JLD, opr.)
1,662,210-330-1679-C-62
W1MQK 82,584-111- 248-C-44
W1HRV 15,228- 54- 94-A-10
W1EZD 7824- 38- 66-C- 5

2

Eastern New York

WA2AUB 46,740- 95- 164-B-30
W2AZO 37,536- 92- 136-C- 9
WA2ROH 16,695- 53- 105-C-15
WB2OLQ 13,923- 51- 91-A- 6
W2SZ (WA2FBI, opr.)
4452- 28- 53-C- 3
W2UL 1296- 18- 24-A-11

Multi-Single

WA2CLQ (+WA2s BWF KJT WB2JAM)
532,440-261- 680-C-96
K2BK (+WB2BXL)
232,686-186- 417-C-46

Multi-Multi

WA2DNR (W2KZN WA2TUJ WB2LWY)
2106- 18- 39-F- 4

New York City-Long Island

WA2LQZ 421,578-211- 666-C-47
W2YY 75,600-126- 200-C-27
W2GKZ 65,772-116- 189-C-17
K2MFY 48,594- 91- 178-A-15
W2LEJ 41,076- 84- 163-C-27
WB2TSB 27,375- 73- 125-F-12
W2MOY 26,532- 66- 134-C-22
W2IVS 18,900- 63- 100-B-
WA2YJN 18,300- 61- 100-G-14
W2CKR 17,922- 58- 103-A-21
K2OVS 6138- 33- 62-A-18
W2YKQ (W2OTS, opr.)
5643- 33- 57-C- 9
WB2ZIN 1638- 21- 26-A- 4
WB2NXF 396- 11- 12-C- 5
W2TUK 330- 10- 11-C- 1
W2CZZ 108- 6- 6-A- 1
WA2RJZ 48- 4- 4-A- 1

Northern New Jersey

W2MB 896,346-297-1006-C-80
W2HTI 697,125-275- 845-F-66
W2VT 631,098-261- 806-C-69
W2RAD 450,774-237- 634-C-76
W2GXD 224,982-174- 431-C-
W8CQN/2 176,946-154- 383-F-28
WA2DNY 171,864-154- 372-C-48
W2ZZ 130,980-148- 295-C-27
WA2ETH 84,816-114- 248-B-46
W2BHM 75,222-126- 199-C-30
WB2VFT 72,615-103- 235-D-30
W2QT 55,404-108- 171-F-24
W2KXD 35,862- 86- 139-C-19
W2RGV 22,620- 65- 116-C-40
K6SE/2 18,000- 60- 100-E-40
WA2DIG 15,834- 58- 91-C-16
W2GZZ 14,940- 60- 83-C-20
W2JVU 8580- 52- 55-C- 9
W2FZY 8052- 44- 61-A-14
W2MS 7770- 37- 70-C- 5
WA2WBE 2700- 25- 36-B-12
WA2IPS 2244- 22- 34-B-

Multi-Single

W2YD (+K2OJD W2QT)
187,398-174- 389-E-48
W2JLH (multiop)
34,944- 91- 128-C-25

Southern New Jersey

W2EHB 489,228-236- 691-B-59
K2QIE 190,008-174- 364-C-50
K2AA/2 (W2EYS, opr.)
169,683-163- 347-C-47
W2GOF 138,159-153- 301-C-30
W2EPA 125,697-143- 293-E-41
W2PAU 100,233-129- 259-C-46
W2DT 94,488-124- 254-C-
WA2BLV 74,613-133- 187-E-15
K2PZF 71,250-125- 190-C-29
W2ITG 65,340-110- 198-C-25
W2FHY 65,010-110- 197-E-36
W2PEO 44,322- 89- 166-B-
W2HBT 44,274- 94- 157-C-21
W2EGY 23,100- 70- 110-B-35
WB2GPH 15,900- 53- 100-C-12
W2SDB 3654- 29- 42-C- 6
WA2YSW 1716- 22- 26-B- 5
W2OWA 1305- 31- 23-C-20
WA2TRK 918- 17- 18-B- 2
W2BP 18- 2- 3-A- 1

Multi-Single

K2FT (+W2s GFY ORA PSY)
147,934-206- 563-C-69

Multi-Multi

K2FL (+W2UJ K3KNH)
775,065-317- 815-C-96

Western New York

WB2AIO 133,184-164- 352-C-33
W2QIP 110,040-131- 280-C-32
K2DBB 81,396-119- 228-C-41
W2FZJ 77,280-115- 234-C-40
WA2MBP 36,846- 89- 138-E-11
WB2OIL 21,735- 63- 115-B-20
WA2BCK 17,160- 65- 88-C-
WA2MPC 10,098- 51- 66-A- 6
WB2YQH 8883- 47- 63-C- 7
WA2CDV 5550- 37- 50-C- 7
WB2JNA 1104- 16- 23-B-10
W2FXA 972- 18- 18-C-
WA2AOG 396- 11- 12-B- 2

Multi-Single

K2ZRO (+WA2s HGS LOG WB2ZOW)
259,200-192- 450-C-96
W2CXM (WA1LKX WA2DHS)
27,690- 65- 142-C-20

3

Delaware

WA3TVS 6552- 39- 56-C-22

Multi-Single

W3NX (+W3DRD)
444,774-253- 586-C-90

Eastern Pennsylvania

WA3NNA 412,560-240- 573-C-60
W3QOR 269,010-210- 427-C-33
W3GRS 216,300-206- 350-C-
W3ALB 206,820-180- 383-C-33
W3CGS 73,140-115- 212-C-22
W3GID 66,339-117- 189-C-34
W3EVW 65,826-106- 207-C-35
W3KFO 64,893- 97- 223-C-
W3GHM 51,156- 98- 174-C-15
W3FTG 49,976-106- 157-E-24
W3GHD 33,264- 88- 126-B-
W3KV 25,515- 81- 105-C-10
K3ZOL 23,184- 69- 112-C-
WA3QLG 19,152- 56- 114-A-20
W3NOH 18,117- 61- 99-C- 6
K3DPQ 15,300- 51- 100-C-12
W3MFW 5814- 34- 57-C- 4
W3QLW 3441- 31- 37-C-26
WA3OSJ 1980- 20- 33-B-12
W3CBF 168- 7- 8-B- 3
W3FAN 90- 5- 6-C- 1

Multi-Single

W3KT (multiop)
316,710-230- 459-C-
WA3TUW (K3HYT K3ZRW WA3BRW) 71,868-106-226-C-29
K3MBF (+K3LJZ)
39,780- 78- 170-C-20

Multi-Multi

W3WJD (+K3YUA W3s BGN DQG PSM)
3,186,480-440-2414-C-96
W3GPF (+K3s QIO WJV W3BGN WA3s FER KZO OVC)
2,472,000-400-2060-C-96
W3ERY (K3s DZB HTZ W3WPG WA3s LNM NQX)
2,373,246-426-1857-C-96
WA3ATP (+W3GHD WA3s LRN LRO)
2,079,768-386-1796-C-96
K3BW (+K3JLK K3TGM W
1,530,408-374-13
W3GM (+K3LWR K3ZOL W
1,483,218-363-13
W3DHM (+W3GL)
937,440-336- 9
WA3ATX (+W3FHR WA
GJZ MME MPH)
768,222-294- 8
W3SS (+K3SME W3YCT)
344,097-271- 5
W3BYX (+WA3KRD)
294,354-207- 4
WA3OAY (+WA3SYO)
210,120-170- 4

Maryland-D.C.

W3EZT 913,545-303-10
K1LPL/3 (W3GRM, opr.)
597,246-247- 8
W3DBT 387,045-235- 5
W3ZSR 224,082-177- 4
W3PWO 155,142-153- 3
W3GN 131,931-137- 3
W3AXW 131,865-149- 2
W3MEJ 126,270-138- 3
K3GKU 101,304-126- 2
WA3AFQ 95,202-129- 2
W3KMV 90,573-133- 2
W3ZNH 87,360-130- 2
WA3TOE/3 86,016-128- 2
WA3GZT 78,975-117- 2
W3JPT 43,350- 85- 1
WA3NUH 43,320- 95- 1
W3HVM 31,746- 74- 1
W3YHR 26,568- 72- 1
WA3THD 25,272- 78- 1
W3KF 24,003- 63- 1
W3FA 19,950- 70-
K3CBW 19,404- 66-
W3HH 4056- 26-
W3BVO 3567- 29-
W3QHC 2346- 23-
W3WD 1980- 22-
W3AWN 1539- 19-
WA3ENM 1449- 21-
W2DW/3 1242- 18-
W3ML 1020- 17-

Multi-Single

W3BWZ (+W4IDG)
753,960-305- 8
K3WUW (multiop)
777,910-221- 5
W3YXM (WA2ZRG WA3s ECY MNN QYM TAC)
29,568- 77- 1
K2QBW/3 (+WN3UHO)
9417- 43-

Multi-Multi

W3AU (K3EST W3s AZD I
WA3s AMH HRV IAQ
C.Madeline)
5,701,347-531-3
WA3LHG (+WA3s LJP NQ
PEU QDH QIA LU2DC)
988,200-300-1

Western Pennsylvania

W3VT 625,086-287- 7
W3SDV 35,760- 80- 1
W3KPI 23,100- 70- 1
W3PIX 21,390- 63- 1
W3ZDW 20,274- 62- 1
WA3PBL 18,939- 59- 1
W3YX 15,714- 54-
W3KVS 10,251- 51-
WA3KOS 1080- 18-
K3YVN 168- 7-
W3SVJ 84- 4-

Multi-Single

K3BZL (+WA3GJU)
773,955-314- 8
K3CR (WA2JHT WB4BLJ
H2IT)
5406- 34-

Multi-Multi

W3TV (+K2ZMA W3AOH W
307,020-172- 5

4

Alabama

K4MG 171,360-160- 3
K4AEB 87,447-103- 2
K4GJD 28,638- 74- 1
K4UWS 15,792- 56-
WA4KYI/4 2652- 26-

Multi-Single

BYM (+W8FAW)
209,862-178- 393-C-40

Georgia

I-Z 364,981-220- 553-F-
IGIW 163,986-181- 302-C-50
IWRY 162,966-157- 346-A-
IDXI 148,444-148- 335-C-58
IKNW 140,400-144- 325-C-35
IBOI 131,670-154- 285-C-50
IGTS 33,048- 81- 136-B-16
I4NVH 22,326- 61- 122-F- 9
IGKF 20,400- 68- 100-F-21
IBFR 8640- 45- 64-C-10
I4WMG 4752- 36- 44-F- 9
IJLD 4488- 34- 44-A-12
IMCM 3663- 33- 37-C- 5
IBAI 1827- 21- 29-C- 3
I4WXX 1080- 18- 20-C- 2
IUYC 756- 14- 18-B-12

Kentucky

I4TPU 380,661-223- 569-C-63
I4SIJ 313,761-223- 469-C-62

North Carolina

I4YOI 1,095,342-311-1174-C-67
4TMR 135,315-155- 291-B-41
4IP 2475- 25- 33-C- 4

Northern Florida

4ORT 402,528-224- 599-G-70
A4UFW 14,145- 41- 115-C-10
4TIC 7350- 35- 70-B-19
4DFU (WB4ADT, opr.)
5880- 35- 56-B- 3
4EEO 3072- 32- 32-A-20

Multi-Single

4QBK (+W4LBP W4ZCB
, Brandt)
1,686,288-344-1634-C-95

South Carolina

'B4NRI 190,380-190- 334-F-64
4II 156,420-158- 330-C-35

Southern Florida

'4YK 438,672-304- 481-G-35
4CEF 178,971-169- 353-C-30
/4OZF 124,740-132- 315-C-18
.4CL 98,631-117- 281-C-35
/9WKU/4 93,522-143- 218-C-43
/4HOS 59,064-107- 184-B-21
4DXL 30,670- 65- 106-B-29
VA4SDK 4785- 29- 55-A-20

Tennessee

VB4KZX 9045- 45- 67-A- 8
VR4WHE 5100- 34- 50-F-15
4PR 75- 5- 5-C- 1

Multi-Single

VB4LDT (+WB4SEZ)
16,107- 59- 91-F-35

Virginia

/4ZCY 1,141,200-300-1268-C-76
/4WSF 642,372-269- 796-C-47
/4KFC 427,818-226- 631-C-36
/4QCW 313,236-231- 452-E-41
/4ZSH 243,288-186- 436-F-41
'4AUL 236,028-178- 442-C-49
4EKJ 233,856-192- 406-C-34
VA4YBV 211,752-173- 408-C-43
(@CME/4
187,434-178- 351-C-55
VB4TBO 152,640-159- 320-C-39
.4OD 150,732-158- 318-C-28
/4NQA 141,300-157- 300-C-21
/4JVN 119,625-145- 275-C-38
.4BFO 118,584-122- 324-C-20
/4JHK 102,999-139- 247-C-27
VB4BGY 99,396-132- 251-C-25
/4DM 91,035-119- 255-C-35
4JYM 75,570-110- 229-C-35
/2GHK/4 63,237-107- 197-C-18
/4FZ 55,968-106- 176-C-12
/4DSW 48,597- 97- 167-C-15
/4WBC 47,025- 95- 165-C-15
VB4OXD 37,230- 85- 146-C-12
VB4HQE 36,636- 86- 142-C-17
4ZA 33,915- 85- 133-C-22
/4KMS 27,489- 77- 119-F-20
VB4RDV 25,347- 71- 119-C-24
VB4SGV 10,878- 49- 74-G- 7
/4GF 8241- 41- 67-C- 6
4KA 3755- 31- 35-B- 5
@LVS/4 1395- 15- 31-D-11
4IAE 1020- 17- 20-A- 4
4YZC 816- 16- 17-B- 1
VA4BAU 495- 11- 15-C- 3

Multi-Single

K4CFB (multiop)
518,160-254- 680-C-67

Multi-Multi

W4BVV (+K3s CQ NPV OAE
W3BQV K4GKD WB4SGV)
3,336,858-426-2611-E-96

5

Louisiana

W4SYL/5
239,397-199- 401-F-
WA5WEY 23,760- 60- 132-C-23
K5LVZ 22,644- 68- 111-C-40
W5OB 12,636- 54- 78-C-13
WB5CKR 1827- 21- 29-A- 6

Mississippi

W5PWW 83,700-124- 225-B-47
W5MUG 64,584-104- 207-B-25
K5RFJ 49,536- 96- 172-C-15
W5AO 1950- 25- 26-C-16

New Mexico

WB5HAE 56,160- 78- 240-C-44

Northern Texas

W5SZ (WA5RXT, opr.)
952,593-311-1021-E-74
W5QBM 742,014-273- 906-C-80
W5EOT 529,815-247- 715-C-58
K5HTM 154,836-132- 391-C-60
WA5YAS 86,250-125- 230-C-29
W5MYA 83,811- 91- 307-C-17
K5YRK 75,516-124- 203-A-42
W5KYD 34,425- 85- 135-C- 6
W5KZN 32,160- 80- 134-C-39
WA5ALB 30,336- 79- 128-C-16
WA5ILU 26,199- 71- 123-B-30
W5QGZ 17,496- 54- 108-C- 9
WA5STI 4830- 35- 46-C-12
W5SOD 2553- 23- 37-A-21

Multi-Multi

WB5DTX (W5s BJA MYA QWP
WA5s LMG QXD UCT WB5s AAR
AOF BFZ FUN)
2,139,372-372-1917-E-96
WA5JMK (+WA3GBU WA5EEM
WB5s AAR DQE EBEI
1,037,322-286-1209-C-96

Oklahoma

W5ZWQ 4278- 31- 46-B-10
K5DEC 624- 13- 16-B-15
WA7LKI/5 540- 12- 15-D- 4

Southern Texas

W5NMA 537,030-234- 788-C-90
WA5ZWC 94,419-117- 269-C-20
W5SRX 66,054-109- 202-C-14
K5PFL 12,096- 56- 72-C- 8
WA5ACA/5 12,006- 46- 87-A-16
WA5LES 11,928- 56- 71-C- 6
WB5DIZ 2652- 26- 34-A-13

Multi-Single

WA5OOS (W5VIM WA5QCW)
181,467-141- 429-B-72

6

East Bay

K6HIH 394,212-133- 988-C-60
W6ABJ 372,000-160- 775-C-79
WA6CXK 313,908-148- 707-F-42
W6PM 156,003-149- 349-C-35
WB6YLG 151,455-115- 439-E-48
WA6AHE 118,449-123- 321-C-50
K6UJS 105,360- 80- 439-F-24
WA6IQM 64,395- 81- 265-B-
W6UFX 34,038- 61- 186-C-20
K6DYQ 19,350- 50- 129-C-48
K6AN 9486- 34- 93-C- 7
W6BH 3075- 25- 41-C-
W6LJA 1125- 15- 25-B- 3

Multi-Single

W6KG (+W6DOD)
807,576-209-1288-C-44
WB6CQV (+K6AUC)
283,140-132- 715-C-48
WA6NGG (+K6PJY)
245,916-132- 621-C-60

Los Angeles

W6RR 2,104,290-309-2270-C-80
K6SVL 1,108,665-213-1745-C-76
W6DGH 639,630-207-1030-E-55
W6DQX 158,115-127- 415-E-45
W6NJU 158,004-133- 396-C-18
W6BVN 132,804-119- 373-C-41
K6MP 70,680- 95- 248-C-24
WA6DPQ 21,996- 52- 141-D- 7
W6EHA 18,666- 51- 122-F-35
WA6QEY 17,484- 47- 124-B-36
W6APW 7584- 32- 79-C- 6
WA6RVK 3498- 22- 53-B-10
W6JKR 2016- 24- 28-F- 5

Multi-Single

W6KNC (+K6JGV WB6VQN)
283,101-119- 793-E-63
W6VPZ (K6s HRT KH W6s CFM
LYY YOJ WA6s BIL UCT)
106,959-101- 353-C-49
W6YRA (WA6NQK WB6GJO)
77,112- 68- 378-C-13

Orange

W6YMV 118,701-121- 327-C-40
W6HF 17,442- 34- 171-C-

Santa Barbara

K6OW 193,884-151- 428-C-50
WA6KAC 91,512- 82- 372-C-40
K6QPH 85,593-103- 277-C-20
WB6PUU/6 42,009- 67- 109-B-40
W6GEB 2205- 21- 35-C- 5

Santa Clara Valley

W6EYY 220,110-110- 667-C-24
W6OKK 141,480-120- 393-C-35
W6BJB 120,684- 89- 452-C-35
K6ITL 115,092- 92- 417-D-29
WA6ETW 107,835- 91- 395-E-30
WA1ABW/6 86,190- 85- 338-C-26
W6YVK 80,580- 85- 316-B-60
K6SSI 71,877- 97- 247-C-16
W6EJ 46,848-122- 128-C-20
W6KHS 30,492- 77- 132-C-17
W6ISQ 19,431- 51- 127-C- 8
WB6UOM 17,250- 50- 115-B- 8
W6JKJ 9768- 44- 74-E-
K6UXV 9546- 43- 74-E-19
W6LV 9045- 45- 67-B-18
K6QX 7104- 32- 74-C-
K6WD 3402- 27- 42-C-
K6CN 2376- 24- 33-C- 4
W6GBY 1836- 18- 34-B-13
K6WR 27- 3- 3-B- 1
WA6WUI 27- 3- 3-B- 2

Multi-Single

W6OAT (W6s HQN OAT WA6s DIL
PMK QGW WB6GFJ)
1,257,510-251-1670-C-90
WB6KBK (+WA6PGB)
1,011,582-234-1441-C-90
WA6HCI (+WB6PYI)
109,305-105- 347-F-47
W6ZBS (+W6ZTJ)
88,506- 99- 298-G-34

San Diego

W6MAR 42,600- 71- 200-E- 8
K6GKU 4212- 26- 54-A-27
W6FET 3600- 25- 48-C- 9

Multi-Single

K6SDR (+W6QOW)
1,021,563-223-1527-C-85
W6ONV (+WA9UCE)
887,604-229-1292-C-85

San Francisco

Multi-Single

W6BIP (+K6OSO WA6DJI)
331,545-155- 713-C-79

San Joaquin Valley

WB6JAX 30,225- 65- 155-D-23
W6YKS 21,384- 54- 132-A-18
WB6PZW 8541- 39- 73-A-10
K6COD/6 8385- 43- 65-C-10
W6MYP 540- 10- 18-B- 4

Sacramento Valley

WA6NYV 425,700-172- 825-C-60
W6KYA 64,068- 76- 281-B-19
W6BIL 8568- 42- 68-B-29

Multi-Single

WB6SRA/6 (+WA6GMR WA7FQW)
661,824-192-1149-D-

7

Arizona

W7AYY 179,214-119- 502-C-32
K3VXE/7 28,272- 62- 152-C-20
WA9MGV/7 25,200- 56- 150-B-32
W7AWH 4290- 26- 55-A-12
WB4OGW/7 966- 14- 23-B- 5

Idaho

W7DV 41,082- 82- 167-C-30
K7NHV/7 1200- 16- 25-C- 3

Montana

W7GKF 356,307-133- 893-E-48
W7EIN 13,524- 46- 98-B-40

Nevada

WA7CWM 23,940- 60- 155-C-18
W7YKN 20,838- 46- 151-B-12

Oregon

WA7QCC 142,500- 95- 500-A-54
WA7HHN 101,616- 73- 464-C-68
W7GUR 21,948- 59- 124-D-32
W7HWZ 550- 11- 25-B-12

Utah

W7HS 191,700-142- 450-C-50

Washington

W7RM (K7VPF, opr.)
2,523,456-312-2696-E-86
W7YTN 458,850-175- 874-E-65
W7YBX 324,324-132- 819-C-37
K7RSC 296,832-128- 773-C-48
W7BJ 256,962-113- 758-C-40
K7GEX 181,383-103- 587-C-36
W7HRU 154,164-116- 443-C-47
WA7JCB 150,480- 95- 528-C-29
W7GYP 101,088-108- 312-C-60
K7IRU 65,766- 97- 226-C-24
W7OE 54,144- 96- 188-C-20
W7LZF 53,325- 75- 237-C-34
K7PRU 44,472- 68- 218-C-18
WA7PAB 22,575- 43- 175-B-17
K7UWT 10,440- 40- 87-B- 6
W7APN 10,200- 34- 100-C- 2
W7APA 8487- 41- 69-C-12
W7UBA 8256- 32- 86-C-20
WA7GRE 5766- 31- 62-C-12
K7CVL 5040- 30- 56-A- 4
WA7TWG 4662- 21- 74-B- 7
WA7GYR 3102- 22- 47-A- 4
W7HD 1287- 13- 33-B-12
WA7TBF 240- 8- 10-C- 4
WA7IOF 147- 7- 7-B- 3

Multi-Single

W7VRO (+W7DQM W7EKM)
907,350-230-1315-C-92
WA7RUY (+WA7KVA)
9801- 27- 121-A-20

Multi-Multi

W7SFA (+K7JCA W7FXM WA7s
MEO OTT OXO VE7s AZT ZZ)
3,497,472-352-3312-E-96

Wyoming

W7INH 53,766-103- 174-G-40
K7ORN 41,832- 83- 168-B-39

8

Michigan

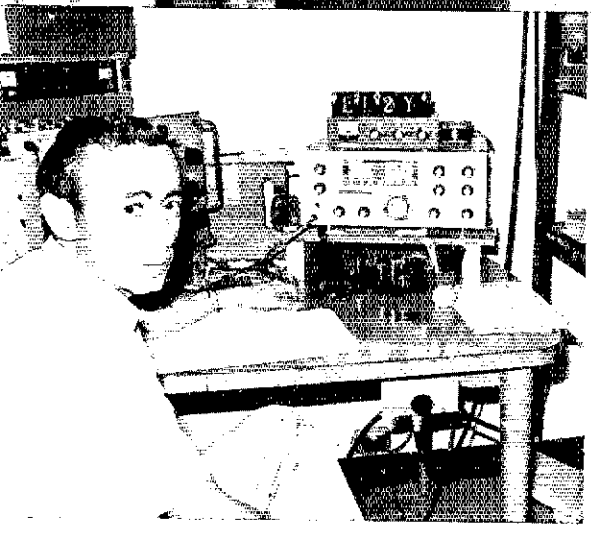
WB8DKB 460,977-229- 671-C-84
W8TWA 352,590-230- 511-C-85
W8DQI 184,338-154- 399-C-20
W8JWN 120,888-146- 276-D-60
WA8GUB 76,110-118- 215-C-
WB8CKW 13,104- 56- 78-A-23
WA8URF 7995- 41- 65-C- 8
WB8DSG 330- 10- 11-B- 4
WB8JUP 189- 7- 9-B- 4
WB8IBP 147- 7- 7-B- 5

Multi-Single

K8HLR (+K8IDE WB8OGF WA8s
JUN OWU UUQ VMQ)
1,482,627-361-1369-C-96
WB8KGG (K8NNU W8HST WA8OPC
WB8s BOI CIN DQA EOU HZG
IRE)
358,797-199- 601-F-96
K8MXC (+WA8ZPF)
45,135- 85- 177-F-41

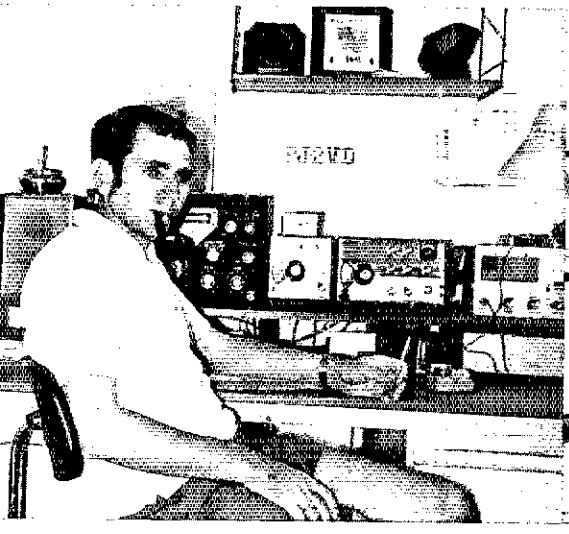
Ohio

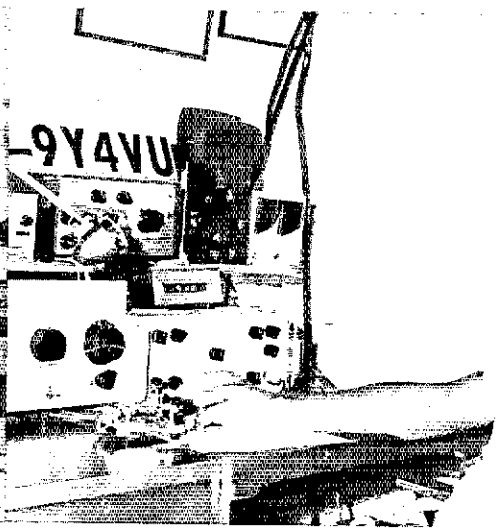
WA8YWX 422,940-212- 665-F-72
K8AXG 252,720-198- 432-C-72
W8OKE 200,853-173- 387-C-30
W8ZCQ 108,030-130- 277-C-20
W8GLZ 63,945-105- 203-C-29
W8BKO 59,976-102- 196-B-18
W8ZCK 46,800-104- 150-C-50
WB8FOS 38,703- 97- 133-B-
W8NPE 33,930- 78- 145-C-26
WB8OSC 27,258- 77- 118-B-15



Top: The multiop crew of WA5LES. From l to r: The man himself WA5LES, W5ARJ, W5VQ, K5PFL and K5LZO. W5JAW was also an operator but is not pictured. The gang put together a fine second place nationwide cw showing. Some of you may remember LZO and LES as the big Sweepstakes multiop of a few years back. Left: EL2Y often makes his presence known in our yearly bashes. Gaspar collected second spot in Africa with a fine 1.3 million score in a tight race with 5T5CJ. Outside, Gaspar employs a 14-AVQ and 80 meter dipole.

Left: PJ2VD, back again after a DX Test layoff of a few years. Number three worldwide and top South American cw honors go to Joeke this time. In addition to a first place worldwide cw finish in 1970 he has obtained 5BWAS number 23, only the third one to be given to someone outside of W/VE. Right: One never has to worry about 9Y4 when 9Y4VU is around. Frank has been making bunches of DX Test noise for three years in a row on both modes but this is the first year he has broken into the Top Ten. FB 9th place finishes on both modes.





KØD 25,536- 76- 112-D-39
A1LKU/8 15,045- 59- 85-A-12
8SUS 13,884- 52- 89-C-17
8FJS 11,520- 48- 80-B-50
8KLC 8505- 45- 63-B-12
8DFL 8190- 42- 65-C-14
A8OYR 7380- 41- 60-C-15
8ACK 6903- 39- 59-B-21
8BOR 6840- 40- 57-B-18
8ZAH 5994- 37- 54-B-12
8NXV 5472- 38- 48-B-10
8PJN 4032- 32- 42-A-20
8VZE 2415- 23- 35-B-
8IRG 2232- 24- 31-B-16
8EPP 1620- 20- 27-A- 3
88FVY 1440- 20- 24-B- 7
A8MEM 378- 9- 14-B- 2
88FWQ 60- 4- 5-A-

Multi-Single

8EDU (WA2THV WA3s BGE MSZ A8RXM)
73,584-112-219-C-18

West Virginia

B8HEY 28,182- 77- 122-B-13
8PV 75- 5- 5-B- 2

Multi-Single

A8UUY (+WB8IAY)
147,840-140-352-C-62
B8ICY (+WB8LPF)
25,536- 64- 133-E-43

9

Illinois

9IY 507,528-212-798-C-65
9OHH 471,822-263-598-E-
9DOB 408,114-237-574-C-
9IRH 400,527-233-573-C-55
9MLG 252,006-194-433-C-75
9WYB 201,249-177-379-C-40
9DWQ 173,250-175-330-C-18
9YRA 160,230-198-545-C-44
9LF 157,458-161-326-C-55
9BZW 140,304-158-296-C-21
9IVG 97,104-136-238-F-29
9KQF 59,670-117-170-C-18
9RER 37,548- 84-149-C-10
WA9SLD 26,640- 74-120-C-25
9YYG 24,723- 67-123-C- 7
WB9DDR 18,600- 62-100-G-25
9QLD 16,368- 62- 88-G-22
K9VLQ 11,094- 43- 86-B-37
9JIU 10,800- 36- 60-B-16
K9UQN 4950- 33- 50-C- 4
9LVH 1914- 22- 29-C- 3
9REC 378- 9- 14-B- 9
9UDK 3- 1- 1-B- 1

Multi-Single

9EXE (+W9ICE WA9RAT)
1,060,896-344-1028-C-92
WA9IVL (+WA9s FWY QAL WB9EBO)
352,191-217-541-C-82
9DY (+VU2JV)
63,135-115-183-C-19
W9QCD (+WB9HAD)
61,746- 82-251-C-30

Indiana

K9CUY 472,140-244-645-C-72
WA9NPM 254,436-182-466-C-73
W9SFR 214,929-167-429-C-40
W9ZTD 95,064-136-233-C-28
K9ODF 93,366-126-247-C-45
K9VQK 57,528-102-188-C-26
K9CLO 34,293- 71-161-C-47
WA9BWY/9 23,052- 68-113-C-
WB9EEF 15,810- 62- 85- -10
K5LZT/9 36- 3- 4-A- 2

Wisconsin

W9EWC (W9AQW, opr.)
588,984-253-776-C-55
WB9DRE 98,820-122-270-D-44
W9GIL 51,192- 79-216-C-30
W9PIT 15,900- 53-100-C-
WA9VCK 14,094- 54- 87-C-16
W9RQM 7380- 42- 60-B- 5
WA9PUN 5550- 37- 50-B- 8

Ø

Colorado

WAØCVS (WBØDJY, opr.)
969,918-257-1258-C-86
WBØGXU 84,357-103-273-E-51
WØBWJ 24,522- 61-134-C-18
KØTMM 22,842- 47-162-F- 9
KØZFL 18,240- 64- 95-A-13
KØDWZ 15,048- 57- 88-B-30
WØLBP 13,965- 49- 95-E-11
WA5ZKQ/Ø 663- 13- 17-B-15

Multi-Single

WØMYN (+WA2WMT WBØCMM)
1,061,202-274-1291-C-96

Iowa

KØDDA 174,849-167-349-C-27
WAØATY 10,656- 48- 74-B- 8
WØEGI 5250- 35- 50-B-11
WBØBPH 120- 5- 8-A- 2

Multi-Single

WØWSV (WAØYGJ WBØBPH)
390- 10- 13-C- 4

Kansas

WØIUB 19,260- 60-107-C-16
WAØDOZ 7524- 38- 66-A-31

Multi-Single

KØKU (WAØTKJ WBØFGV)
87,846-121-242-C-48

Minnesota

WØGYH 151,044-164-307-C-
WAØPRS 115,872-136-284-C-45
WØFDK 54,096- 98-184-C-34
WBØHAI 29,184- 64-152-C-31
WAØNAA 28,140- 70-134-C-40
WØIYP 14,280- 56- 85-C- 6
WØLP 6660- 37- 60-A-15
WØFWN 4872- 28- 58-C-30
WBØCLY 4257- 33- 43-C- 3
WAØMHJ 4059- 33- 41-B- 2
WØUYZ 3690- 30- 41-C-12
WØPAN 90- 5- 6-A- 1

Multi-Single

WØHZ (+KØWWX WØNAR WØPAN)
539,847-231-779-C-
WBØBQG (K9OXY KØWPK WØs CYH FCO FDK GIB ILK JIE KSI MR MSL ROR SBO SEI WVU YHE WAØs BIX DCJ GMX OOU QQW WBØs CHW CLC B.Hanson D.Hiller G.Meier)
167,400-150-372-C-96
WAØENP (+WAØWEZ)
88,236-114-258-C-42

Missouri

KØSGJ 229,635-189-405-C-57
WAØTLT 138,618-151-306-C-50
WØHBH 66,456-104-213-C-25
WBØFUT 22,260- 70-106-A-40
WBØFLM 11,376- 48- 79-A-20
WBØFMT 5145- 35- 49-B- 9
WAØFBQ 264- 8- 11-B-20

Multi-Single

WAØEMS (+KØUTX WBØs EDD FLT WNØs ERF GCP HQH CP3BY T.Campbell)
172,380-169-340-E-66

Nebraska

WØWLO 12,972- 47- 92-C-18
WØKK 1425- 19- 25-C- 7

Multi-Single

WAØZPM (+WAØYPY)
20,280- 65-104-C-30

North Dakota

KØALL 36,900- 82-150-C-16
WØRRW 19,968- 64-104-C-

Multi-Single

WBØBCZ (WAØGQJ GQJ OVW)
291,000-200-485-C-70

South Dakota

WØWUU 5460- 35- 52-B-

DX CW

AFRICA

Morocco

CN8BQ 52,032- 48-362-A-

Angola

CR6AI 1,197,711-219-1823-B-60

Liberia

EL2Y 1,295,118-211-2046-B-70

Ethiopia

ET3USE 344,250-125-918-A-60

Ivory Coast

TU2DV 62,208- 54-384-C-

South Africa

ZS6FN 300,300-143-700-A-13
ZS6ZE 113,490- 97-390-A-12

Mauritania

5T5CJ 1,359,072-208-2178-B-63

ASIA

Thailand

HS3AII 3315- 17- 65-D- 6

Saudi Arabia

HZ1HZ 264,596-116-761-A-44

Japan

JA1CWZ 1,218,225-185-2195-E-71
JA1OMH 246,288-112-733-B-
JA1JKG 224,400-110-680-D-
JH1BNC 208,215-105-661-B-
JA8FBM 186,912- 96-649-B-
JR1BRV 146,955-101-485-B-30
JA7YFY (JA7HQP, opr.)
141,240- 88-535-D-25
JA1SJV 140,505- 95-493-B-72
JA2A1R 117,117- 91-429-D-37
JA1SR 113,160- 92-410-E-48
JA2MGE 111,972- 86-434-D-30
JR1FVW 98,280- 78-420-B-22
JA2HGA 98,106- 83-394-D-
JH1WIX 91,698- 62-493-A-28
JA8DFB 53,382- 62-287-A-
JA1ISA 49,938- 58-287-B-
JA7KXD 47,436- 59-268-D-18
JA2IU 46,197- 59-261-A-30
JA5BLF 35,640- 54-220-B-
JH1GTQ 29,223- 51-191-B-
JA3FYC 23,865- 43-185-B-
JA7YOJ (JA7GQB, opr.)
22,800- 40-190-A-
JA1BNW 20,760- 40-173-B-
JA7ARW 18,204- 37-164-A-13
JA2NNQ 17,934- 26-153-A-20
JA8ENX 11,550- 25-154-A-23
JA7IKH 11,250- 30-125-A-20
JA1OLT 10,296- 26-132-A-14
JA7JW 10,170- 30-113-A-
JA9SC 7476- 28- 89-B-10
JA2VSS 6552- 24- 91-A- 7
JA8GR 6552- 21-104-A-
JA7IBJ 3723- 17- 73-A-
JA1WL 3655- 15- 59-D- 7
JA1BFN 540- 5- 36-B-
JA3ARM 414- 6- 23-B- 3
JA1EL 168- 4- 14-A- 4
JA2GXD 102- 2- 17-A-
JH3BJN 96- 4- 8-A- 2
JE1UPC 78- 2- 13-A- 5
JA2JNA 36- 3- 4-B-

Multi-Single

JA9YBA (JA9s BAU FFN GLL)
667,260-165-1348-C-
JA1YHA (JA3VOV JAØND JH1s BRM CST)
256,326-119-718-B-

Multi-Multi

JH1YVW/1 (WA6URY K8HVT)
19,026- 42-151-A-17

Mongolia

JTØAE 38,430- 42-305-A-

Lebanon

OD5EJ 223,443-111-671-A-28

Asiatic R.S.F.S.R.

UAØKAN 173,676- 82-706-A-
UW9WL 62,514- 69-302-B-
UAØAG 59,700- 50-398-B-12
UAØLJ 56,448- 64-294-B-
UWØFB 34,950- 50-233-B-
UV9OC 28,782- 41-234-A-
UKØSAA (UAØSBQ, opr.)
26,865- 45-199-A-
UA9CAL 22,496- 38-198-B-
UW9PT 20,826- 39-178-B-
UAØBAC 16,512- 32-172-A-
DAØCBR 15,168- 32-158-A-
UAØBAR 14,934- 38-131-A-
UAØTD 9672- 31-104-A-
UA9NX 7392- 32- 77-D-
UA9CBM 5772- 26- 74-A-
UAØAAS 4956- 28- 59-A-
UA9NV 3975- 25- 53-A-
UA9UGA 1584- 16- 33-A-
UA9MT 429- 11- 13-B-
UW9PT 105- 5- 7-B-

Multi-Single

UKØCAB (Val Vlad Tolij)
606,567-151-1339-B-
UKØZAA (UAØs XAB ZAZ ZZ 128-3 V.Horoshilov)
413,658-134-1029-B-
UK9XAC (UA1UG UA9s XN XV)
103,920- 80-433-A-
UK9HAB (V.Artamonov V.Majkov M.Shustov V.Sidorkin)
63,630- 55-422-B-
UK9HAC (V.Bogatov N.Mazur V.Usov)
48,750- 50-325-A-
UK9CAN (UA9s CBW CDT)
37,418- 53-238-B-
UK9YAM (Y.Chonecharov V.Tyulyupin)
29,736- 42-236-A-
UKØCAE (P.Bulach A.Cikunov K.Viacheslav)
27,429- 41-223-A-
UKØIAC (E.Miroljubov A.Nikiforov M.Oseledchic)
11,658- 29-134-A-
UK9CAE (UA9s 15498 154365)
5216- 32- 55-B-
UK9FFC (UV9FN UA9-140005)
3960- 22- 60-B-
UK9MAA (A.Buharin W.Fater A.Shadiozkin)
2160- 20- 36-B-
UK9CCC (multiop)
855- 15- 19-A-

Turkoman

UH8BO 18,720- 40-156-B-

Uzbek

Multi-Single

UK8IAA (UI8s 1M IP UQ2PP)
33,852- 52-217-B-

Tadzhik

UI8AB 1824- 16- 38-B-

Kazakh

UL7GW 5742- 29- 66-B-
UL7NAA 720- 10- 24-A-
UK7NAA 360- 8- 15-B-

India

VU2DX 22,944- 48-160-A-

Laos

XW8EV 20,988- 33-212-A-10

Afghanistan

YA1OS 1408- 11- 43-E-

Cyprus

5B4AM 3450- 23- 50-A- 9

EUROPE

Germany

DM4YFL 98,494- 74-444-B-
DM3YBF 76,368- 74-344-A-
DM2BZN 61,035- 65-314-A-
DM3BE 46,200- 70-220-A-
DM2CLM 27,360- 48-190-A-
DL1YA 26,469- 51-173-B-
DK8FZ 18,492- 46-134-B-17
DL1TH 13,671- 31-147-B-
DM5UUL 11,400- 40- 95-A-
DL1IP 5694- 26- 73-A-
DL1GN 4602- 26- 59-D-
DM2FBL 4284- 21- 68-A-
DJ7JJ 4125- 25- 55-B-
DM5SDL 2880- 20- 48-B-
DM2FBN 2460- 20- 41-A-
DM2DEN 1620- 18- 30-B-
DM2DRN 990- 15- 22-B-
DM2BPF 726- 11- 22-A-
DJ2YE 162- 6- 9-B-

Multi-Single

DL1VU (+DJ5IW DL7AV DL9PT)
827,376-176-1567-B-64

Spain

EA2IA 1,615,700-214-2517-B-61
EA5BS 868,491-169-1713-A-
EA2CR 38,656- 64-202-A-

Republic of Ireland

EI9J 1,034,841-197-1751-A-36
EI5F 10,440- 30-116-A-

France

F5IN 518,541-127-1361-B-68

F8VI 475,200-165- 960-A-45
F8ZF 280,500-110- 850-B-30
F8TM 94,518- 89- 354-A-25
F8TQ 85,557- 79- 361-A-17
F3KW 76,500-102- 250-B- 8
F3TZ 58,956- 68- 289-A-
F6BHK 50,813- 49- 347-B-
F9BB 40,128- 64- 209-A-41
F9KP 39,825- 59- 225-A-
F6BPI 23,838- 58- 137-B-
F8VO 6039- 33- 61-A-
F6ACD 882- 14- 21-A- 4
F6ACD/P 480- 10- 16-A- 7

England

G3KMO 1,174,428-204-1919-A-57
G3MXJ 1,058,688-192-1838-A-58
G2OT 639,366-182-1171-A-45
G3APN 158,598- 99- 534-A-
G2RO 127,019- 71- 598-A-33
G3VDW 100,584- 72- 467-A-
G2AJB 27,900- 50- 186-A-17
G3KSH 11,664- 36- 109-A- 4
G3YBH 5904- 24- 82-A- 6
G3CWL 4599- 21- 73-A- 6

Multi-Single

G4ALE (G3s SJX UFY WRR XJO) 993,147-181-1829-A-96
G3TBK (+G3s SHY UVT YCT) 467,901-147-1061-A-81
G4BTI (G3PDL G3VIP) 370,722-137- 902-A-48

Guernsey & Dependencies

GC5BAU/P 20,868- 37- 188-A-15

Scotland

GM6RV 180,810-123- 490-A-
GM5AXO 54,441- 69- 263-A- 9

Wales

GW3JI 535,068-167-1068-A-
GW3SYL 369,438-134- 919-A-40

Multi-Single

GW3UCB (G3s WKH WXS XZK G4BRK) 225,000-125- 602-A-76

Hungary

HA5HS 227,919-109- 697-A-60
HA4XX 136,018- 94- 483-A-
HA3GI 135,156- 84- 537-B-54
HA7MC 63,504- 72- 294-A-35
HA6NN 55,476- 67- 276-B-27
HA0LM 28,106- 46- 204-B-27
HA9KOV 24,156- 44- 183-B-20

Multi-Single

HA5KBM (HA5s HE KZ) 648,900-150-1442-B-
HA8KUC (HA8s OD DI HH VI VY) 610,560-144-1416-B-
HA1KSA (K.Bujaki Gy.Felber L.Kovacs O.Kovacs Cs.Nyilas) 392,232-118-1108-B-63
HA3KMA (HA3s MA PG PI PN PO HA3-4.30 E.Egon) 229,632-104- 736-B-75
HA0KLF (HA0s LM LO LP LZ) 226,590-105- 721-B-96
HA8KVG (J.Csuos A.Keves L.Lakates L.Nagyapati L.Seres) 107,844- 86- 419-B-96
HA3KNA (HA3s JNG NA NS P.Hegedues L.Neumann) 36,036- 52- 231-B-
HA8KUA (multiop) 1436- 13- 38-B-

Switzerland

HB9KC 301,653-121- 831-D-26
HB9DX 80,073- 93- 287-B-

Italy

I6BOJ 1,531,227-211-2419-B-
I3ASF 1,173,554-178-2199-B-67
I2BJS 34,608- 56- 206-B-22
I3AXD 21,216- 52- 136-B-
I3MGN 19,800- 44- 150-B-22
I3EAD 17,340- 34- 170-A-26

Svalbard

JW5CI 357,561-123- 969-A-38

Norway

LA6HL 405,960-136- 995-A-57
LA7DJ 69,960- 88- 265-A-23
LA8CF 33,123- 61- 181-A-16
LA2Q 14,241- 47- 101-A-18
LA1P 6804- 27- 84-B- 8
LA6U 2592- 24- 36-A-

Bulgaria

LZ1KHB 28,656- 48- 199-B-
LZ2GS 10,200- 40- 85-A-
LZ1NJ 4977- 21- 79-B-
LZ2KAD 4320- 24- 60-B-
LZ1KBG 2655- 15- 59-C-
LZ2GS 1404- 13- 36-A-

Multi-Single

LZ1KDP (LZ1s GX IQ A-513 F-37 G-31 I.Pulev,Nike) 603,780-145-1388-B-
LZ1KRB (H.Melkonjan D.Zlabanov) 114,597- 51- 749-B-
LZ1KPG (I.Ivanov S.Goshev P.Duholov) 50,091- 59- 283-C-
LZ1KHB (A.Dimitzov A.Jehascov R.Kostov) 41,151- 43- 319-B-
LZ1KAU (K.Joncov S.Todorov N.Dimitrov) 14,400- 32- 150-B-
LZ2KSU (I.Petkov M.Shopov S.Vlajkov) 13,542- 37- 122-B-

Austria

OE4PWW 66,990- 77- 290-B-

Finland

OH1LX 902,496-158-1904-C-
OH2FS 228,420- 94- 810-B-
OH8SP 103,760- 80- 433-B-
OH7NW 32,542- 53- 205-A-25
OH1QB 25,194- 38- 221-B-
OH7OO 9876- 28- 114-B-
OH2YL 8547- 37- 77-B-
OH5ZH 7650- 25- 102-B-
OH2IO 6882- 31- 74-A-
OH6RC 5394- 29- 62-D-
OH2BCB 4233- 19- 75-B-
OH2BFX 3591- 19- 63-B-
OH6RA 2990- 23- 44-A-
OH7SC 1728- 18- 32-B-
OH2UU 900- 12- 25-A-
OH1PG 819- 13- 21-B-
OH3JR 624- 13- 16-C-
OH9TD 429- 11- 13-B-

Czechoslovakia

OK5BOB 559,350-150-1243-B-40
OK1TA 276,345-115- 801-B-
OK1ASJ 259,440-115- 752-A-
OK1DIM 98,472- 88- 373-A-
OK1DWA 68,904- 72- 319-A-
OK1VP 27,846- 42- 221-A-
OK2RO 27,368- 44- 208-A-
OK1DIT 20,628- 36- 191-A-
OK2PBM 20,445- 47- 145-B-
OK2PDL 18,768- 46- 136-A-
OK2PAW 15,498- 41- 126-A-
OK3ZBU 15,444- 33- 156-A-
OK1DVK 13,050- 30- 145-A-
OK1IAR 12,312- 36- 114-A-
OK2LN 12,138- 34- 119-D-
OK1AQR 8190- 30- 91-A-
OK3TFM 6318- 26- 81-A-
OK1FAM 5904- 24- 82-A-
OK5BEH 5904- 24- 82-B-
OK1XM 5103- 27- 63-B-
OK3TMF 4620- 22- 70-A-
OK1KRY 3696- 16- 77- A
OK1AQR 3402- 27- 42-A-
OK3TBC 2898- 23- 42-A-
OK1LW 2160- 20- 36-A-
OK1AIJ 1785- 17- 35-A-
OK2PEQ 1692- 12- 47-A-
OK1ATP 1536- 16- 32-A-
OK1FRF 1221- 11- 37-A-
OK1JCW 1209- 13- 31-A-
OK2SGW 1209- 13- 31-A-
OK2BEX 480- 8- 20-B-
OK5BOV 252- 6- 14-A-
OK1KZ 168- 7- 8-B- 2
OK1AFH 144- 6- 8-A-
OL5AOY 135- 5- 9-A-

Multi-Single

OK1KSO/P (OK1s AAU ADH AEZ AH AOC JJB TS WT) 706,437-159-1481-B-91
OK1KTL (multiop) 469,608-136-1151-C-

Belgium

ON4XG 373,428-138- 902-B-28

Denmark

OZ1LO 1,279,395-195-2187-B-
OZ6PI 178,155-107- 555-A-
OZ1W 175,168-112- 524-A-55
OZ5ME 80,688- 82- 328-A-50
OZ4HW 48,165- 65- 247-A-
OZ8HC 37,518- 74- 169-A-
OZ9OI 13,560- 40- 114-A- 7
OZ9QM 7800- 25- 100-A-
OZ2NU 7068- 31- 76-A-
OZ5CI 2592- 16- 54-A-
OZ7MJ 702- 13- 18-A-
OZ3PO 288- 8- 12-B-

Netherlands

PA0LOU 366,128-176-1451-A-39
PA0FA 95,328- 96- 331-A-30
PA0JR 58,548- 82- 238-A-
PA0VB 12,210- 37- 110-A-
PA0PHK 7227- 33- 73-A-10

Multi-Single

PA0GN (PA0GIN GNI NRA SPA TAW TUM) 466,323-145-1087-A-70

Sweden

SM0CCE 361,140-130- 926-B-
SM7EAN 284,988-127- 748-B-
SM5BNZ 284,202-114- 831-B-65
SM2COR 168,973-101- 558-B-50
SM5DIZ 157,722- 97- 542-B-
SM0BDS 89,667- 81- 369-A-
SM5BPP 60,996- 68- 299-B-49
SM2CTY 52,569- 59- 297-B-16
SM7ACN 46,332- 66- 234-A-
SM5CEU 44,622- 67- 222-B-
SM0TW 18,963- 49- 129-B-
SM0CGO 18,513- 51- 121-B-
SM0BVO 15,651- 47- 111-B-
SM5BRG 14,058- 33- 142-D-
SM0EFM 13,524- 49- 92-B-27
SM5DNI 10,098- 34- 99-A-
SM3DXC 7455- 35- 71-B-
SM5BAX 4725- 25- 63-B-
SM7BGA 3915- 29- 45-B-
SM0OV 3519- 23- 51-B-
SM5XX 1881- 19- 33-A- 8
SM6PF 1740- 20- 29-B-
SM7CYP 1596- 19- 84-B-
SM6JY 1560- 13- 30-B-
SM0KV 1316- 14- 32-A-

Multi-Single

SK6CF (SM6s ALF AOU CGY CKU DHU EBQ FYI NM) 1,118,073-187-1993-B-
SK5AL (SM5s BGK DFM DKH SM0s DSG GM) 651,651-143-1519-B-48
SM5AOF (+SM6BJI) 407,160-145- 936-B-
SM5DSF (+SM5DUL) 178,420-110- 541-D-

Poland

SP6DMJ 161,298-103- 522-A-60
SP8FDQ 158,382-126- 149-A-
SP5EXA 72,816- 82- 296-A-50
SP2AJO 41,360- 40- 346-B-
SP7BFC 30,915- 45- 229-A-30
SP9CDA 23,904- 48- 166-B-
SP8EMO 18,060- 43- 140-A-
SP9AGS 17,484- 47- 124-A-
SP2EPU 16,470- 45- 122-A-
SP3ACB 7812- 28- 93-A-
SP9MB 6604- 26- 85-A-15
SP9EEL 5887- 29- 68-A-
SP7CKF 5508- 27- 68-D-
SP3OOI 4680- 20- 78-B- 2
SP1BLE 4650- 25- 62-A-
SP9CDA 4020- 20- 67-B-
SP8KJY (SP8GOU, opr.) 2091- 17- 41-A- 6
SP1ETC 1782- 11- 54-A-
SP2BNJ 1485- 9- 55-A-
SP3GRJ 910- 13- 24-A-
SP6DXG 513- 9- 23-A-
SP3DWE 450- 6- 25-A-
SP8AVX 297- 9- 11-B-
SP9BRP 90- 5- 6-A-
SP9DH 60- 4- 5-B-

Multi-Single

SP5PWK (SP5AUY H.Kotowski) 521,565-145-1199-B-96
SP7PRC (SP7s EJS EOY FPA EPB FCX) 206,724- 92- 749-B-
SP9KRT (SP9s 2235 2236) 7590- 23- 110-A-

Greece

SV0WH 77,760- 72- 36
SV0WTT 25,272- 54- 15

Iceland

WA3GHC/TF 22,608- 48- 15
TF3AW 2208- 16- 4

European Russian S.F.S.

UA3HH 46,800- 52- 30
UA3GM 27,216- 54- 16
UA3UAC 21,771- 41- 17
UV3CQ 15,984- 37- 14
UV3WT 13,680- 40- 11
UA3GP 9588- 34- 9
UA4BI 8214- 37- 7
UA3ET 7308- 21- 11
UA6AAQ 6552- 24- 9
UA3FK 4272- 24- 6
UA4MZ 3450- 25- 4
UA6APP 1488- 16- 3
UW3UW 720- 12- 2
UA3DD 315- 7- 1
UA3IAK 288- 8- 1
UZ3RV 210- 7- 1

Multi-Single

UK1AAG (Chependjuk Kachin) 144,000-100- 480
UK3AAC (V.Isaikin,M.Vladin 45,024- 67- 224
UK1ZAL (A.Evstigneev,S.Ka 44,928- 48- 312
UK6AAU (A.Flagin,V.Mo V.Stzelechkij,A.Velikovskij) 37,944- 51- 248
UK4WAB (B.Baranov,V.Kisl V.Krylov) 21,016- 37- 192
UK4PAR (UA4s PAO PAX PA 17,316- 37- 156
UK3DCF (P.Kulitshe B.Makarenko,E.Worobyew) 1938- 19- 34

Ukraine

UB5VY 139,977-103- 453-
UY5OO 127,710- 86- 495-
UB5TR 55,878- 67- 278-
UB5RS 33,210- 54- 205-
UY5TE 21,168- 42- 168-
UB5OE 12,672- 33- 132-
UK5JBK 10,404- 34- 102-
UT5SY 5616- 26- 72-
UB5IU 5481- 29- 63-
UK5LBJ 3315- 17- 65-
UB5GX 2660- 19- 48-

Multi-Single

UK5UAL (G.Gnatuk,A.Kyz V.Malashkin,G.Mendru G.Oblasov,A.Shalemov 414,756-123-1124-
UK5FAY (S.Derevyow,V.Fo A.Savitshev) 126,318- 74- 369-
UK5VAA (P.Bondarer V.Dobrovolski) 113,160- 82- 460-
UK5KAA (W.Pavluk,B.Plate L.Zanuk) 104,931- 89- 393-
UK5IAZ (UB5s 073-202 073 (073-474) 34,235- 41- 279-
UK5EAO (V.Mahon V.Stdorenko) 25,254- 46- 183-
UK5ICD (A.Klchkine,M.Korsli ,A.Savenkov) 15,480- 30- 172-
UK5GAV (S.Ganin,L.Gora B.Gutsol) 12,882- 38- 113-

White R.S.S.R.

UC2IAM 5522- 22- 84-

Multi-Single

UK2WAE (B.Besnosk Dorozvkin,V.Eltcov) 142,641- 81- 587-
UK2QAA (V.Gordyenk Kazlovsky,A.Saulitch) 6256- 34- 63-
UK2WAM (A.Griadovsk Wolkovich) 4968- 24- 69-
UK2WAT (A.Antchinnyk Kotchetov,V.Sidorov) 4575- 25- 61-

CONTINENTAL LEADERS, QSO/BAND

CW

	80	40	20	15	10
AFRICA					
5T5CJ	409	336	507	513	413
EL2Y	239	266	633	556	352
CR6AI	113	360	464	533	353
ET3USE	4	50	303	431	130
ZS6FN	25	145	132	253	145
ZS6ZE	0	110	10	147	123
TU2DV	0	0	355	29	0
CN8BO	0	0	0	362	0
ASIA					
JA1CWZ	59	560	898	638	40
HZ1HZ	57	162	334	208	0
JA1OMH	7	68	380	259	19
JA1JKG	16	116	306	190	52
OD5EJ	0	91	207	335	38
JH1BNC	0	101	197	362	1
JA8FBM	2	65	342	234	6
UAØKAN	52	151	503	0	0
JR1BRV	11	151	81	231	11
JA7YFY	6	34	305	147	43
EUROPE					
EA2IA	213	362	876	970	96
I6BQI	275	396	788	705	255
OZ1LO	193	419	726	774	75
G3KMO	226	320	512	710	151
I3ASE	86	444	736	900	33
G3MXJ	173	422	705	460	78
EI9J	178	126	595	759	76
OH1LX	59	119	785	941	0
EA5BS	136	309	465	803	0
PAØLOU	184	285	639	312	31
NORTH AMERICA					
KV4HW	611	932	1074	1178	963
TI2DX	203	537	973	1078	698
8P6DR	329	255	418	525	491
TI2WX	118	351	482	644	461
OX3YY	111	324	983	405	2
OX3WQ	39	193	750	699	123
KZ5NG	72	411	115	210	141
HI8LC	176	141	178	163	142
KL7HNN	42	150	361	65	2
KL7AIZ	60	361	65	67	0
OCEANIA					
KH6RS	633	1202	1303	1489	925
KH6IJ	276	645	1022	1231	493
KH6IAB	319	598	761	889	666
KX6BB	278	359	493	583	191
KH6GJY	230	243	292	519	153
VK2GW	39	397	224	381	94
KH6HIZ	0	309	180	373	15
KG6JAR	0	192	134	257	56
VK4ZV	0	135	266	237	0
KX6JS	35	175	47	101	81
SOUTH AMERICA					
PJ2VD	480	552	952	1201	911
YV5KL	495	675	1201	834	690
LU5HFI	334	622	802	865	910
9Y4VU	355	388	559	576	639
OA4CBU	0	306	669	842	581
PJ9JT	0	90	400	483	402
PY7VNY	201	159	105	434	128
OA4AHA	28	33	226	417	271
PY1RG/1	27	123	332	427	74
PY2BBO	0	0	503	408	0

PHONE

	80	40	20	15	10
AFRICA					
ZS6DW	45	375	357	1621	383
A2CCY	23	2	809	1047	322
ZS3CJ	46	0	165	746	223
CR7GJ	7	22	339	480	71
EA8CR	26	127	324	486	0
ZS6FN	0	0	231	355	14
CN8BO	0	16	174	272	0
3B8CV	1	3	37	336	10
CR7RM	0	0	46	173	42
ASIA					
JA2IYJ	42	216	341	580	0
UAØFGM	74	163	368	412	1
JA1CG	9	98	335	375	4
JA1ELY	33	74	52	496	0
HS5AFJ	44	5	260	133	0
JA1FFC	4	50	113	181	0
JA2HGA	0	21	153	70	0
JA8FBM	0	4	69	127	0
JR1BRV	0	62	26	85	0
JA7YFY	0	6	96	69	0
EUROPE					
CT1BH	176	192	629	1179	254
CT2BG	229	368	669	748	19
G2QT	56	102	484	525	2
GW3NWV	19	18	366	632	48
DL8PC	54	65	295	543	0
SM6CKU	34	83	553	213	0
OE2EGL	27	47	560	406	0
DL6WD	40	54	304	492	0
DJ6LV	35	101	326	361	0
HB9T	0	0	213	561	0
NORTH AMERICA					
6J9AA	804	1406	2467	3003	2251
KZ5JF	634	529	978	1661	1464
XG1J	504	827	997	952	1377
VP2MY	611	501	947	1523	574
W4EV/VP9	389	513	853	1132	421
XE1LLS	350	677	814	1090	424
HI8LC	201	340	312	601	273
TI2WX	0	218	199	256	736
PJ8DX	49	193	429	199	314
8P6CY	0	0	417	548	178
OCEANIA					
KH6IJ	266	657	1024	1525	756
KH6BZF	319	491	984	1320	888
KH6IAB	323	473	478	936	599
KG6JBO	112	470	374	843	72
VK4VU	2	195	393	679	180
KH6RS	320	84	84	135	0
KX6BB	21	133	182	243	96
VK2WD	0	11	31	11	50
WØBWJ/KH6	0	0	35	13	0
SOUTH AMERICA					
4M4AGP	657	843	1890	1479	1992
LU5HFI	119	607	1192	1175	1655
9Y4VU	423	345	1028	1219	784
CE3AQW	8	290	1234	1660	1135
CP1EU	187	236	398	707	123
OA4AHA	29	3	847	533	669
OA4CBU	0	18	172	1131	353
OA4AIW	0	221	620	412	7
PY3APH	0	15	318	356	288
HK3LT	125	42	0	171	211

Azerbaijan

UD6AM 4224- 22- 64-D
UD6CN 108- 6- 6-B

Georgia

UF6CX 42,834- 59- 242-A
UF6HK 8748- 36- 81-D
UF6QAC 8100- 25- 108-A

Armenia

UG6GAF 8424- 24- 117-B

Moldavia

UO5SA 24,150- 50- 161-B
UO5AP 9702- 33- 98-A

Lithuania

UP2BAS 16,032- 32- 167-A

Multi-Single

UK2PAF (UP2s OX PAJ PAQ PAV) 660,942-146-1509-B
UK2PAT (A.Lieponis,G.Shaltupis, A.Vilijoshius) 8184- 31- 88-A

Latvia

UQ2OC 34,701- 43- 269-B
UQ2GBW 16,218- 34- 159-A

Multi-Single

UK2GDZ (UQ2s GA GDM GDW) 305,745-109- 935-B
UK2GBY (S.Balchov,A.Ivanov, 200,200- 104- 644- B
UK2GAA (UQ2s GBJ ON PJ) 96,174- 78- 411- B

Estonia

UR2QD 11,583- 39- 99-B

Rumania

YO8FZ 114,426- 78- 489-A
YO8KGA (YO8DD, opr.) 39,060- 60- 217-B
YO2AFB 28,614- 38- 251-A
YO6ADM 8640- 32- 90-A
YO2RA 4640- 29- 54-A
YO3JA 2790- 15- 62-A
YO6LG 2760- 23- 40-A
YO7AHR 696- 8- 29-A
YO3JR 585- 13- 15-A

Multi-Single

YO5KAU (YO5s AMF DH TO) 42,768- 54- 264-A

Yugoslavia

YU2RGB 106,560- 80- 445-B-52
YU4AAH 57,687- 41- 469-A
YU3WO 54,171- 39- 463-B-35
YU1SF 9894- 34- 97-A-20

Multi-Single

YU2ACD (+YU2s HH RJF RME RNT) 745,416-153-1627-B-95
YU4CFG (YU4VOY A.Kapetanovic) 81,852- 76- 359-B

NORTH AMERICA

Martinique

FM7WH 7896- 28- 94- A

St. Pierre & Miquelon Is.

FPØBG 12,753- 39- 109-A- 4

Dominican Republic

HI8LC 393,600-164- 800-B-50

Panama

HP1AC 49,680- 60- 276-B

Alaska

KL7HNN 221,340-119- 620-B-29
KL7AIZ (WB4LFK, opr.) 170,877-103- 553-B-13
KL7HNQ 87,723- 81- 361-C-24
KL7GDO 17,340- 34- 170-C
KL7EWA 15,840- 44- 120-A- 6

Virgin Islands

KV4HW (W6OAT, opr.) 4,601,592-316-4854-E-83

Canal Zone

KZ5NG (WA1LWS, opr.) 495,378-174- 949-C-19

Greenland

OX3YY 1,007,400-184-1825-D-
OX3WQ 925,452-171-1804-B-

Costa Rica

TI2DX 2,690,019-257-3489-C-44
TI2WX 1,400,136-227-2056-A-38

Montserrat

VP2MJ 16,986- 38- 149-B-10

Bermuda Islands

WA7SUN/VP9 32,589- 71- 153-A-14

Jamaica

Multi-Single

6Y5FF (VE3s FDC EDG) 1,571,832-228-2298-B-40

Barbados

8P6DR 1,545,750-250-2061-D-47

OCEANIA

Guam

KG6JAR 237,708-124- 639-F-

Hawaiian Islands

KH6RS (K2SIL, opr.) 5,074,506-302-5601-E-78
KH6IJ 3,072,456-278-3684-E-68
KH6IAB 2,482,944-256-3233-C-35
KH6GJY 922,554-214-1437-A-53
KH6HIZ 349,923-133- 877-A-36
KH6HOU 5832- 27- 72-A- 3

Marshall Islands

KX6BB 1,290,912-226-1904-B-30
KX6JS 129,066- 98- 439-B-19

Australia

VK2GW 589,065-173-1135-A-72
VK4ZV 210,540-110- 638-A-27
VK5FM 22,743- 57- 133-A- 6
VK2VN 15,750- 50- 105-A- 3
VK6WT 9918- 29- 114-A-
VK4XW 1755- 15- 39-A- 9

SOUTH AMERICA

Argentina

LU5HFI 2,915,634-274-3547-C-47
LU6EF 268,920-108- 830-A-
LU5DVO 241,707-113- 713-B-
LU2HI 90,270- 51- 590-B-

Multi-Single

LU2DKG (+LU1DAY LU4DTJ LU8s DLK DQ) 2,503,116-252-3311-C-85

Peru

OA4CBU (K1YKT, opr.) 1,474,770-205-2398-B-30
OA4AHA 468,000-160- 975-B-

Neth. Antilles

PJ2VD 3,456,810-279-4130-D-34
PJ9JT 672,212-163-1375-B-17

Brazil

PY7VNY 536,094-174-1027-B-
PY1RG/1 460,795-157- 983-A-67
PY2BBO 396,285-145- 911-B-15

Venezuela

YV5KL 3,143,265-269-3895-B-78
YV4MC 2508- 22- 38-B-

Trinidad & Tobago

9Y4VU 1,978,362-262-2517-C-48

W/VE CW

CANADIAN

Maritime

VO1AW 495,063-201- 821-C-48
VE1CD 380,148-158- 802-C-57
VO1KE 320,295-163- 655-E-62
VE1EK 51,660- 84- 205-A-24

Quebec

VE2AYU 409,932-193- 708-C-74
VE2NV 379,452-206- 614-E-40
VE2WA 374,463-207- 603-E-50

Ontario

VE3CSZ 285,447-193- 493-C-51
W5QNY/VE3 114,750-153- 250-C-30
VE3MZ 42,486- 73- 194-B-30
VE3BZ 38,868- 82- 158-A-17
VE3DMC 38,280- 58- 220-E-36
VE3EDC 26,676- 78- 114-B-10
VE3FAS 21,888- 61- 114-E-17
VE3GUL 1449- 21- 23-A- 7

Manitoba

VF4SL 11,934- 39- 102-A-

Multi-Single

VE4JB (+VE4MF) 366,444-174- 702-C-96

Saskatchewan

VE5RA 140,694-131- 358-E-
VE5TT 36,960- 70- 176-A-37
VE5PM 27,258- 77- 118-B-

Alberta

VE6MP 130,806- 86- 507-C-46
VE6AVO 12,870- 39- 110-D-16

British Columbia

VE7HQ 111,384- 91- 408-B-50
VE7AZT 34,752- 64- 181-C-29
VE7BBL 18,144- 54- 112-B-
VE7BEF 2538- 18- 47-G- 7
VE7AKJ 2451- 19- 43-B-
VE7BEZ 1440- 12- 40-B- 8

Multi-Single

VE7UBC (VE7s AAQ AFD AON BBQ BZA) 89,352- 73- 408-E-29

Yukon-NWT

VE8CE 44,361- 53- 279-D-31

U.S.A.

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Connecticut

K1VTM 1,754,784-288-2031-C-77
WA1PID* 1,228,992-296-1384-C-73
K1JHX 1,202,427-271-1479-C-47
W1FBY* 1,132,332-254-1486-C-65
K1THQ 1,096,758-258-1417-E-65
K1DPB 759,240-228-1110-C-63
K1GUD 559,944-168-1111-C-51
WA1NNC 507,615-215- 787-C-72
K1TZD (WA1IOJ, opr.) 362,664-184- 657-C-36
W1RML 276,660-174- 530-C-42
WA1KJD 261,900-150- 582-C-39
W1BIH 249,096-194- 428-C-
WA1MAO 231,552-144- 536-B-44
W1CNU 152,862-146- 349-B-33
W1GNC* 130,872-133- 328-C-30
W1AB 77,292-114- 226-C-28
W1VH 61,374-106- 193-C-39
WA1PMA 60,030- 87- 230-B-37
WA1CYT 17,574- 58- 101-D- 8
WA1KMP 17,157- 43- 133-B-20
W1DGI 11,340- 54- 70-D- 6
WA1NRG 8160- 40- 68-C- 7
W1QV 5724- 36- 53-C- 4
W1SK 4080- 34- 40-A-36
WA1KOC 4032- 32- 42-F- 6
W1ECH 2262- 26- 29-A- 2
WA1HYN 1425- 19- 25-B- 2
W4WFL/1* 816- 16- 17-A- 2
WA1HOL 189- 7- 9-A- 1
WA1LPP 3- 1- 1-A- 8

Multi-Single

K1ZND (+W1ARR) 2,152,728-348-2062-E-96
W1FLM (+WA1NES) 1,393,200-300-1548-C-89
W3DA/1 (+WA1s MOW OLC) 502,128-176- 951-C-90
W1FEG (+WA1LVW) 115,101- 87- 441-C-25
WA1RSG (WA2WOR WBØJKZ)* 11,448- 53- 72-C- 6

Eastern Massachusetts

K1NOL 2,020,977-333-2023-C-71
K1DIR 1,802,808,343.1752-E-82
WA1RCP 1,637,808-298-1832-C-84
W1DAL 304,836-191- 532-C-
W1ENW 237,888-177- 448-A-51
W1PL 165,645-135- 409-C-46
WA1ION 144,150-155- 310-C-20
WA1MYK 99,189-107- 309-D-39
WA1NRT 56,160- 80- 234-B-25
W1VJ 21,888- 57- 128-C-12
W1EJJ 20,400- 68- 100-C- 6
W1PLJ 13,536- 48- 94-B-24
WA1KSF 10,152- 47- 72-B-12
W1OPJ 7140- 34- 70-B-17
W1BB/1 792- 11- 24-A-10
WA1LAI 396- 11- 12-B- 7
WN1RFD 3- 1- 1-A- 1

Multi-Single

WA1NRV (+K1OME WA1KZE) 1,404,153-267-1753-C
WA1RBR (WA1s ABV WA2UQZ) 1,200,642-298-1343-C
WA1LKU (+WA1LAK) 252,927-157- 537-C

Multi-Multi

W1MX (WA1s ABV CQW JZC K. WB2UYM K3ODD WB4SI WA8WNU) 3,316,896-396-2792-F

Maine

W1VF 141,897-203- 233-B
W1BQL 19,665- 57- 115-A

New Hampshire

W1BPW 1,985,568-344-1924-C
W7TML/1 862,638-266-1081-C
W1EHT 196,560-130- 504-B
W1CHA 23,328- 48- 162-C
WA1JSD/1 14,406- 49- 98-B

Rhode Island

K1JYN 655,155-207-1055-F
K2LQQ/1 109,863-117- 313-C
W1RFQ 10,584- 49- 72-A
W1AWE 7371- 39- 63-

Vermont

WB2CKS/1 343,824-208- 551-C
W1PEG 39,360- 80- 164-B

Western Massachusetts

W1YK (WA1JLD, opr.) 1,927,002-301-2134-C
W1EZD 375,390-194- 645-C
W1UUK 232,389-171- 433-B

2

Eastern New York

W2DXL 1,528,866-314-1623-C
K2BK 511,290-230- 741-C
W1BGD/2 481,140-220- 729-F
W2AZO 454,968-213- 712-C
W2HO 438,480-210- 696-C
K2AHQ 346,680-180- 642-C
WA2BWF 136,875-125- 365-B
WA2HAI 123,750-125- 330-A
WB2BXL 80,010-105- 254-C
W2AWF 53,820- 92- 195-E
W2LWI 51,339-109- 157-G
WA2TUJ 43,884- 92- 159-A
WA2RQH 35,838- 66- 181-C
W2AO 19,992- 56- 119-C
WA2EAH 15,345- 55- 93-C
WA2AUB 2016- 24- 28-B
WB2EWY 330- 10- 11-B
WN2EOO 75- 5- 5-A
WB2ESR 3- 1- 1-B

Multi-Single

WB2OEU (+WA2SPL WB2SQN) 895,620-236-1265-E
WA2CLQ (+WB2JAM) 891,636-268-1109-C
K2MME (+WA2DNY) 739,068-242-1018-C
W2SZ (WA2s EAH RAL) 286,824-152- 629-C

New York City-Long Island

W2GGE 921,978-262-1173-C
K2MFY 398,076-196- 677-A
W2FVS 379,080-195- 648-B
WA2RJZ 175,980-140- 419-A
K2HK 158,928-176- 301-C
W2HLI 127,254-127- 334-E
WA2YHK 115,500-140- 275-B
W2GKZ 114,924-157- 244-F
WA2NYV 90,576-102- 296-B
W2YY 72,504-114- 212-C
W2AFM 70,851-113- 209-D
W2EUO 69,888-104- 224-D
WA2FNY 62,559- 63- 331-C
WA2YJN 54,531- 83- 219-G
WB2BXO 24,120- 67- 120-A
WA2CXQ 21,816- 72- 101-D
W2CKR 19,116- 59- 108-D
W2NUF 1932- 23- 28-A
WB2BYY 360- 10- 12-A
W2NHH 147- 7- 7-A

Northern New Jersey

W2GXD 1,716,639-353-1621-C
W2YT 884,736-256-1152-C
W8CQN/2 685,500-250- 914-E

W2IPH 599,967-243- 823-C-53
W2IVU 294,240-160- 613-C-50
W2HUG 267,900-190- 470-A-56
W2CVW 168,270-158- 355-F-
WA2WBE 137,376-108- 424-B-53
W2BHM 118,260-135- 292-C-25
WA2DIG 105,000-125- 280-C-46
WA2ZWH 84,105-105- 267-A-70
W2GZZ 77,826-119- 218-C-20
W2FZY 66,528- 77- 288-A-23
WA2SHR 52,866- 89- 198-B-27
W2HN 40,131- 91- 147-C-
W2MB 32,256- 84- 128-C-15
K2HFJ 27,633- 61- 151-A-19
W2EHN 11,562- 47- 82-A-18
W2BBK 3240- 30- 36-B- 8
WA2IFS 2142- 21- 34-A-
K2EAC 765- 15- 17-B- 2
W2OL 540- 12- 15-A- 8

Multi-Single

W2YD (+W2BHM W2HZY)
1,247,562-302-1377-F-85
WB2FUE (+WA2AYU)
93,564-113- 276-B-45

Southern New Jersey

W2RQF 733,338-262- 933-C-66
W2HYS 352,728-184- 639-C-58
K2QHL 351,000-200- 585-C-50
W2FBF 345,870-189- 610-G-
W2PAU 339,873-193- 587-C-50
W2HBT 280,878-169- 554-C-50
W2DT 230,724-174- 442-C-
W2GOF 216,384-184- 392-C-36
W2SDB 105,561-111- 317-C-20
K2AA/2 (W2EPA, opr.)
61,812-102- 202-C-18
WA2VYA 38,700- 86- 150-F-15
W2FHY 31,758- 79- 134-F-28
W2BZL 5130- 38- 45-B- 4
W2EA 5040- 28- 60-B- 8
K2PZF 1440- 20- 24-C- 7
WA2TRK 429- 11- 13-B-
W2BP 60- 4- 5-A- 3

Multi-Single

WA2BLV (+WA2WLN)
1,224,780-298-1370-E-68
K2IT (+W2s GEY ORA PSY)
654,255-217-1005-C-84
K2FL (+W2UI)
641,802-259- 826-C-96

Western New York

W2QIP 300,762-186- 539-C-36
K2GK 101,745-133- 255-F-41
WA2CDV 88,920-136- 228-B-48
W2FUJ 63,054- 93- 226-C-61
WA2MBP 41,385- 89- 155-F- 9
WB2OIL 31,920- 80- 133-B-24
W2VXA 28,416- 74- 128-A-35
WA2DHS 17,490- 53- 110-C-15
WA2BCK 13,986- 63- 74-C-
W2CXM (WA2DHS, opr.)
11,340- 42- 90-C-10
W2EXA 10,140- 52- 65-C- 3
WA2MPC 7425- 45- 55-B- 7
W2NCI 2871- 29- 33-A-11
WA2AOG 1122- 17- 22-B- 2

3

Delaware

W3GL 21,735- 69- 105-D-11
WA3TVS 546- 13- 14-C- 5

Multi-Single

W3NX (+W3DRD)
555,024-248- 746-C-72
WA3OVC (+WA3KZQ)
231,246-174- 443-C-26

Eastern Pennsylvania

K3YUA 1,438,434-314-1527-C-83
W3YIK 830,532-268-1033-C-75
W3DOG 801,624-263-1016-C-80
K3JII 641,556-213-1004-F-61
WA3NQX 433,260-174- 830-B-63
W3GRS 402,711-241- 557-C-
W3QOR 389,850-230- 565-F-41
W3ALB 368,280-198- 620-C-52
W3BGN 336,753-213- 527-C-48
W3KFQ 310,878-171- 606-C-
W3KV 240,816-173- 464-C-30
WA3HMM 174,582-159- 366-C-31
W3HER 159,606-140- 380-C-48
W3CGS 150,945-145- 347-C-40
K3ZOL 120,120-140- 286-F-
W3ARK 119,016-114- 348-A-29
K3DPQ 87,552-128- 228-C-30
W3MFW 86,505- 79- 365-C-46
W3NOH 73,710-117- 210-C-
K3JGJ 72,225-107- 225-E-24
W3FTG 69,972-119- 196-E-30
W3GHD 66,528-112- 198-B-
W3HMR 60,720- 88- 230-C-29
W3EVW 45,570- 98- 155-C-22
W3CAA 28,638- 74- 129-B- 6
W3GJD 27,432- 72- 127-C-14
W3GHM 16,968- 56- 101-C-10
W3OLW 11,457- 57- 67-C-10
W3EAN 8748- 36- 81-C- 4
WA3QLG 8400- 40- 70-D-10
K3JLI 7869- 43- 61-C- 6
WA3RCD 3741- 29- 43-A-
WA3MHF 2550- 25- 34-A-10
WA3OSJ 2262- 26- 29-B- 9
W3CBF 2025- 25- 27-B- 6

Multi-Single

W3NZ (+W3WJD)
977,109-289-1127-C-64
WA3NNA (+WA3LRN)
505,035-215- 783-C-80
W3KT (multiop)
437,805-235- 621-C-
K3MBF (+K3LJZ)
297,360-168- 590-C-50
WA3RBN (+WA3s PIA RMN)
160,200-320- 445-C-42

Multi-Multi

W3FRY (+K1JGB K3DZB K3HTZ W3WPG WA3LNM G3HLW)
2,954,205-395-2493-C-96
W3GPE (+K3OIO K3WJV W3IBJ WA3FER G3HLW)
2,628,000-375-2336-C-96
W3GM (+K3LWR W3JSX)
2,142,063-363-1967-C-80
W3SS (+K3SME W3YC1 WA3s ERQ OAY SYO)
1,928,604-346-1858-C-96
K3BW (+K3JLK K3TGM W3DOB)
1,389,453-299-1549-C-80
WA3ATX (+WA3s COJ KQC MME)
1,239,540-292-1415-C-96
W3BYX (+WA3KRD)
419,040-194- 720-C-70

Maryland-D.C.

K1LPL/3 2,004,966-321-2082-C-86
W3EZT 1,104,876-282-1306-C-67
W3GKB 1,101,492-282-1302-C-55
W3GN 810,612-253-1068-C-66
W3EYF 621,030-254- 815-C-
W3MFJ 488,448-192- 848-C-70
WA3LHG 476,478-206- 771-C-69
W3AXW 399,960-202- 660-C-53
K3NPV 383,778-206- 621-C-33
W3ZSR 296,562-161- 614-F-46
W3GRM 226,629-149- 507-C-35
WA3NQJ 179,346-142- 421-D-59
WA3AFQ 122,544-148- 276-C-30
WA3NUH 116,907-133- 293-C-19
W3FA 114,678-138- 277- -24
W3AFM 93,849-109- 287-C-56
W3KE 85,050- 81- 350-C-24
W3ZNH 79,002- 99- 266-C-19
WA3QDH 71,448-104- 229-F-35
K3ANA 57,528- 94- 204-F-17
K3RFB 24,570- 63- 130-B-27
K3CKT 13,680- 57- 80-C- 8
W3EPR 13,392- 62- 72-B-19
W3HVM 9450- 45- 70-C- 6
W3BVQ 8979- 41- 73-B-26
WA3RJS 8976- 44- 68-B-11
W3MI. 8256- 43- 64-C-
W3CSZ 6954- 38- 61-C- 5
WA3ENM 6765- 41- 55-C- 8
W3HH 4350- 29- 50-B- 6
W3AWN 2523- 19- 29-F- 9
WA3NYU 1404- 18- 26-C- 2

Multi-Single

W3YXM (WA2s BNB ZRG W3s EPP GMJ WA3s JVG MNN QIA WB4ZQG)
731,187-243-1003-C-96
W3RWZ (+WA3NGS K4BEO W4IDG)
719,280-240- 999-C-88
K3WUW (multiop)
158,043-139- 379-C-30
W3TOS (+WA3MLH)
149,340-131- 380-B-50

Multi-Multi

W3AU (WA1LKX K3EST W3s IN ZKH WA3s AMH HRV IAQ W8CQN Madeleine, Christine)
5,515,164-478-3846-C-88

Western Pennsylvania

W3VT 949,872-308-1028-C-74
W3PZC 220,248-152- 483-C-40
WA3KOS 110,670-119- 310-A-25
WA3RWO 76,956-106- 242-C-35
WA3SWF 64,311- 97- 221-A-44
WA3EPH 41,952- 76- 184-E-75
WA3OER 20,400- 68- 100-B-18
W3KPI 9588- 47- 68-C-
K3CR (WA3IBN, opr.)
3772- 37- 52-C- 7
WA3PWY 2304- 24- 32-A-14
WN3QQH 540- 12- 15-A-16

Multi-Single

K3HZL (+K3BSY W3GXF WA3s BGE GJU)
1,177,632-288-1363-F-80

Multi-Multi

W3TV (+K2ZMA W3s AOH VW)
1,108,878-274-1349-C-60

4

Alabama

W8FAW/4 694,320-263- 880-C-45
K4MG 16,104- 61- 88-C- 7
W4RAL 14,805- 47- 105-A-29
K4AEB 855- 15- 19-C- 3

Georgia

W4DXI 250,101-177- 471-C-63
W4MCM 78,648-116- 226-C-15
W4BFR 62,271-111- 187-C-17
K4JLD 49,572-102- 162-A-40
W4DMB 35,516- 84- 133-A-38
WB4RUA 33,060- 95- 116-G- 8
W4GTS 8775- 45- 65-C-11
W4WRY 8118- 41- 66-B-
K4FZ 3690- 30- 41-C-
WB4WXX 1740- 20- 29-C- 3

Kentucky

K4AVX 1944- 24- 27-A- 3

North Carolina

WB4YOJ 1,605,240-312-1715-C-75
W4TMR 254,310-173- 490-B-57
K4TP 28,305- 85- 111-C-12

Northern Florida

W4WHK 291,468-227- 428-B-68
K4TIG 25,560- 60- 142-C-
W4EEO 9075- 55- 55-A-30

South Carolina

K4II 416,604-233- 596-C-54
WA4EWX 227,970-170- 447-F-56
WB4NRJ 153,216-168- 304-E-72

Southern Florida

K4THA 919,050-275-1114-C-51
K4CFF 801,624-263-1016-C-79
K4CL 575,484-221- 868-C-65
WB4ZHE 285,768-189- 504-C-47
W4OZF 280,704-172- 544-C-28
K4HWW 251,490-166- 505-B-70
W4HOS 182,070-170- 357-B-37
W9WKU/4 161,802-178- 303-C-42
W4WS 57,408-104- 184-C-17
WA4SDK 49,305- 95- 173-B-38
K4QG 34,170- 85- 134-C-20
K4AUA 18,285- 53- 115-C- 9
W4DXL 14,091- 61- 77-B-27

Multi-Single

K4PY (+WB4MKB)
443,982-217- 682-E-72

Tennessee

K4SXD 723,120-230-1048-C-63
WB4WHF/4 10,011- 47- 71-B-24
WB4WHF 6549- 37- 59-A-34

Multi-Single

WB4LDT (+WB4SEZ)
19,980- 60- 111-C-26

Virginia

W4KFC 841,803-277-1013-C-38
W4WSF 552,684-212- 869-C-54
K4OD 532,644-238- 746-E-43
WB4BGY 492,090-235- 698-C-45
W4ZSH 435,600-220- 660-E-48
W4ZCY 380,328-184- 689-C-29
W4UQ 371,169-233- 531-C-44
WB4SGV 344,655-207- 555-A-66
W4JHK 277,590-190- 487-C-31
W4NH 268,770-155- 578-C-37
K4JM 264,708-172- 513-B-33
W4WBC 251,904-164- 512-C-40
WB4HQE 235,334-149- 522-C-63
K4AUL 206,115-151- 455-C-36
K4JYM 204,750-150- 455-C-35
W4NQA 177,600-148- 400-C-18
W4YZC 172,326-154- 373-E-28
K0CMF/4 157,014-143- 366-C-60
W4ZM 136,500-140- 325-C-16
W4DM 133,515-129- 345-C-15
W4EZ 107,730-133- 270-C-16
K4BEO 100,977- 97- 347-C-15
W4GF 98,688-128- 257-C-17
W4QCW 79,980-124- 215-E-
K4KA 76,239-129- 197-B-23
K4IAF 61,359-113- 181-B-19
K4EKJ 46,200- 77- 200-C-14
W4KMS 41,160- 98- 140-E-26
K4ZA 36,984- 92- 134-C-16
W4JUK 27,300- 70- 130-C-
WB4TBO 26,061- 73- 119-C-22
W4PHL 23,598- 69- 114-D-12
WB4RDV 16,665- 55- 101-C-12
K4QD 15,000- 50- 100-B-26
K4EJG 12,789- 49- 87-B-26
K0ETM/4 12,324- 52- 79-E-20
K4IX 9372- 44- 71-B-21
W2GHK/4 4092- 31- 44-C- 7
WA4BAU 1794- 23- 26-C- 2
K4AUN 1710- 19- 30-C- 4
W4BVV 1512- 14- 36-C- 1

Multi-Single

K4CFB (multiop)
640,845-235- 909-C-65

5

Arkansas

W5RUH 51,813-101- 171-B-32

Louisiana

W5OB 190,230-170- 373-C-60
W5WG 39,732- 86- 154-G-35
W4SYL/5 4797- 39- 41-C-
W5PM 3264- 32- 34-C- 6
W5JFB 462- 11- 14-A- 4

Mississippi

K5RFJ 699,504-247- 944-C-65
W5MUG 31,488- 82- 128-B-15
W5AO 16,875- 75- 75-C-30

New Mexico

K5MAT 57,792-112- 172-E-21
WB5BHN 17,331- 53- 109-B- 5

Northern Texas

W5WZQ 1,394,316-308-1509-C-94
W5EQT 936,117-273-1143-C-72
K5ABV 214,809-193- 371-A-75
W5QBM 89,100-108- 275-C-
WA5STI 79,722-103- 258-C-28
WB5FBC 29,376- 64- 153-B-25
W5KYD 3672- 18- 68-C- 3
W5SOD 3078- 27- 38-A-22

Multi-Single

WA5JMK (+WA3GBU WA5UCT WB5EBE)
1,088,061-299-1213-C-96
W5LUJ (+K5BGB)
1,037,232-294-1176-E-90
W5MYA (+W5BJA)
173,352-124- 466-C-32
K5AKW (+W5VKB)
75,810- 95- 266-E-65

Multi-Multi

WB5DTX (W5s BJA MYA WA5UCT WB5s AAR AOF BFZ)
135,786-122- 371-E-27

Oklahoma

W5LW 37,011- 73- 169-B-33
W5TID 60- 4- 5-B- 1

Southern Texas

W5SBX 1,067,352-286-1244-E-79
WA5ZNY 397,800-221- 600-G-74
W5LJT 136,890-135- 338-C-21
WB5DIZ 90,630-106- 285-A-53
W5GO 80,352-124- 216-C-18
W7WAH/5 31,110- 85- 122-D-39
WB5EMA 19,392- 64- 101-B-35
W5RBB 15,687- 63- 83-B- 9
W5BWM 3900- 26- 50-B- 8
K5PFL 3150- 30- 35-C- 4

Multi-Single

WA5LES (+K5s LZO PFL W5s ARJ JAW VQ)
1,683,666-342-1641-C-96

Multi-Multi

W5KFL (+W5s IVN TFL WA5s OCN WPB ZVE ZWC WB5AAU) 2,142,885-373-1915-C-90

6

East Bay

WA6CXK 519,279-179- 967-E-59
W6PM 407,592-216- 629-C-43
K6HIH 404,976-143- 944-C-60
W6AFI 380,721-139- 913-C-87
W6UZX 143,022-121- 394-C-35
W6BH 105,630- 70- 503-C-
WA6IQM 100,845- 81- 415-B-
K6UJS 30,369- 53- 191-E-17
K6AN 7980- 35- 76-C- 6
W6EJA 4032- 21- 64-B- 7

Multi-Single

W6KG (+W6DOD) 1,001,385-231-1445-C-44
WA6NGG (+K6PJY) 333,720-135- 824-C-65
WB6CQY (+K6AUC) 297,780-140- 709-C-48

Los Angeles

W6RR 1,421,550-270-1755-C-83
W6DQX 545,052-212- 857-E-64
K6NA 239,460-260- 307-C-65
W6AM 206,625-145- 475-C-42
K6MP 168,210-126- 445-C-25
W6YRA (WA7DAC, opr.) 156,195-117- 445-C-20
WA6DGQ 147,840-110- 448-B-47
W6NJU 125,208-111- 376-C-20
K6OC 25,893- 63- 137-C-
W6JKR 9600- 40- 80-B-10
W6JPH 4575- 25- 61-A-
W6APW 1944- 24- 27-C- 3
K6MV 120- 5- 8-A- 3

Multi-Single

K6ELX (+K6CEO K6VA W6ABP WA6BNZ) 247,650-127- 650-C-86

Multi-Multi

W6DGH (+W6LYY WB6s OLD ZVC) 775,536-214-1208-C-52

Orange

K6RU 414,120-140- 986-C-41
G3DPX/W6 52,056- 72- 241-B-27
W6HPB 10,500- 50- 70-B-33
WA6LBP/6 10,368- 32- 108-C-24
W6EIE 7308- 29- 84-C-
WØHAW/6 1008- 12- 28-A- 8
WB6FNI 363- 11- 11-A- 8

Multi-Multi

W6ANN (+WA6s EPQ GLD IPY WB6PKA GM3MBS) 2,225,727-309-2401-C-

Santa Barbara

K6OW 247,308-148- 557-C-50
K6QPH 157,509-111- 473-C-30
W6GEB 24,840- 72- 115-C-12

Multi-Multi

W6UA (+W6HOH) 312,957-173- 603-C-

Santa Clara Valley

K6DC 301,950-150- 671-C-34
W6OKK 223,020-140- 531-E-40
WA1ABW/6 127,920-104- 410-C-26
K6QX 107,364- 92- 389-C-
W6CLM 83,640- 85- 328-E-45
W6ISQ 77,418-102- 253-C-14
W6EYY 59,202- 78- 253-C-15
K6WD 58,212- 77- 252-C-
W6ATG 57,120- 70- 272-C-45
W6HOC 55,449-101- 183-C-21
K6YGS 54,480- 80- 227-C-29
W6EJ 38,307-113- 113-C-17
W6MUR 27,090- 43- 210-C-40
W6JKJ 9990- 37- 90-B-
W6GBY 8463- 31- 91-B-20
G3PPE/W6 1200- 10- 40-A- 9
W6KHS 561- 11- 17-C- 2

Multi-Single

K6EBB (+W6RGG WA6s PMK OGW) 1,277,100-258-1650-C-72
WB6KBK (+WA6PGB WB6IWS) 972,792-236-1374-C-94

San Diego

K6SDR 1,392,528-268-1732-C-91
K2DGT/6 270,702-162- 557-C-80
W6MAR 227,682-139- 546-E-17
K2FOK/6 40,800- 68- 200-A-31
W6OVO 35,868- 61- 196-C-

San Francisco

W6NUT (W6PAA, opr.) 1,152,480-245-1568-E-91
W6WB 228,459-161- 473-C-72
WA6IVM 157,113- 99- 529-C-23
W6ZT 44,460- 76- 195-B-28

Multi-Single

W6BIP (+WA6DJH) 587,685-193-1015-C-80

San Joaquin Valley

W6KEV 116,739-119- 327-C-26
W6MYP 72,828- 84- 289-E-32
W6YKS 35,136- 61- 192-A-24
K6CQE/6 22,059- 57- 129-C-15
W6CLP 21,009- 47- 149-B-23

Sacramento Valley

WA6NYV 418,863-191- 731-C-65
WA6JVD 324,075-145- 745-E-90
K6DR 218,115-131- 555-C-65
W6NKR 181,830-145- 418-C-36
W6KYA 38,376- 78- 164-B-16
W6BIL 900- 15- 20-C- 9

7

Arizona

W7AVY 335,118-158- 707-C-46
W7AWH 25,200- 56- 150-A-19
WB4OGW/7 18,468- 38- 162-B-30
W7WV 3510- 18- 65-D-18

Idaho

W7IDV 102,432- 97- 352-C-29
K7NHV/7 73,080- 87- 280-C-22
W7VSS 31,290- 70- 149-A-41
W7IUO 3720- 31- 40-B-19

Montana

W7GKF 514,080-170-1008-E-63

Nevada

WA7CWM 67,068- 92- 243-C-28

Oregon

W7GUR 29,484- 63- 156-E-30
WN7TDZ 1287- 13- 33-A- 7
W7LT 1221- 11- 37-B-12
WAØKXJ/7 270- 9- 10-B- 1

Utah

W7HS 302,940-165- 612-E-58

Washington

W7SFA (K7JCA, opr.) 1,483,560-261-1902-E-88
W7RM (W7EXM, opr.) 846,288-216-1306-E-67
VE7ZZ/W7 598,416-182-1096-E-74
W7YTN 465,687-177- 877-E-77
WA7JCB 160,557-109- 491-C-32
W7UBA 103,494- 94- 367-C-46
W7LZF 74,670- 95- 262-C-32
WA7OBL 63,900- 75- 284-D-26
W7OE 57,024- 88- 216-C-19
W7GYP 37,347- 59- 211-C-32
WA7QCN 28,800- 50- 192-B-34
W7ESE 27,900- 62- 150-E-15
W7APN 14,541- 37- 131-C- 5
K7CXZ 8832- 32- 92-C-16
W7YBX 5325- 25- 71-C- 6
WA7GYR 3192- 19- 56-B- 4
K7EFH 2064- 16- 43-A-14
W7ED 1944- 18- 36-B-11
WA7NOH 1053- 9- 39-A- 5
WA7IOF 198- 6- 11-B- 5
K7UWT 27- 3- 3-C- 1

Multi-Single

W7FR (W7PHO WA7UQG) 278,642-106- 719-C-50
K7GGN (+Tracy Floren) 152,256-122- 416-B-80
K7VPF/7 (+W5QQO) 46,842- 74- 211-C-22
WA7RUY (+WA7RVA) 1161- 9- 43-A-15
WA7TBF (+WN7TTC) 462- 11- 14-D- 7

Wyoming

K7ORN 34,021- 51- 157-C-44
W7LCF 216- 8- 9-B- 2

8

Michigan

W8ROF 1,053,708-277-1268-C-88
W8VSK 534,834-258- 691-B-53
W8DA 144,699-139- 347-C-33
W8DSO 114,585-119- 405-B-53
W8JWN 99,846-129- 258-D-50
W8DQL 93,936-103- 304-C-16
WA8VMQ 52,539- 83- 211-C- 5
WB8GUD 19,581- 61- 107-F-20
WB8DSG 8214- 37- 74-B-13
K8QWG 3108- 28- 37-B-12
W8IUP 297- 9- 11-B- 4
WN8LVT 243- 9- 9-A- 5
WB8HIR 189- 7- 9-A- 6

Multi-Single

WA8RXI (+K8HUT) 25,200- 75- 112-B-31

Multi-Multi

W8SH (WB4JEZ WA8s TBQ VBY YVR ZAV WB8MKR) 1,726,536-344-1673-C-96

Ohio

W8EDU (WA8RXM, opr.) 520,149-217- 799-C-47
W8DB 511,830-242- 705-E-48
W8ZCK 374,508-202- 618-C-70
W8ZCQ 230,748-164- 469-C-47
WB8FOS 177,216-208- 284-A-
W8AB 118,296-106- 372-C-12
W8NPF 105,480-120- 293-C-49
K8YOW 96,921-121- 267-B-24
WA1LKU/8 67,968-118- 192-C-20
W8GOC 45,144- 88- 171-A-
W8WZ 35,700- 68- 175-C-
W8EE 33,600- 80- 140-C-22
W8YGR 25,740- 78- 110-B-12
WB8ACK 24,522- 61- 134-B-27
K8MLO 15,975- 71- 75-A-12
WB8DWP 15,300- 51- 100-B-19
W8PCS 8400- 35- 80-B- 8
W8VZE 7686- 42- 61-E- 6
WB8BOR 7128- 44- 54-B-16
K8CVJ 3654- 29- 42-A- 6
WB8EWQ 2935- 27- 35-B-
W8ICF 1260- 20- 21-B- 5
WA8MEM 1248- 13- 32-B- 3
K8NXV 972- 12- 27-B-14
WA8OYR 330- 10- 11-A- 2
K8KSN 90- 5- 6-A- 5

West Virginia

W8CDV 43,734- 74- 197-E-31
W8BJ 9381- 53- 59-B-40
W8PV 1311- 19- 23-B- 4
WB8APH 231- 7- 11-B-12

9

Illinois

W9BZW 606,960-240- 843-C-63
W9IRH 570,198-226- 841-C-67
W9OHH 535,434-233- 766-C-
W9DOB 533,439-207- 859-C-
W9WYB 342,081-199- 573-C-
W9DWO 221,697-161- 459-C-
W9RER 181,764-153- 396-C-26
W9LF 170,742-143- 398-C-42
K9DWK 168,300-165- 340-C-42
W9AG 127,296-156- 272-C-
W9LKJ 124,032-128- 323-C-11
W9YYG 97,911-129- 253-C-17
W9GR 70,455- 77- 305-C-30
K9UCR 65,550- 95- 230-C-31
W9LVH 57,600- 96- 200-C-25
W9UDK 54,584- 96- 193-C-15
W9VBV 44,625- 85- 175-C-11
W9KBZ 37,146- 82- 151-A-36
W9DGK 15,912- 51- 104-A-32
W9AZP 14,094- 58- 81-B-10
W9REC 11,172- 49- 76-B-30
W9PNF 10,500- 50- 70-D-33
K9OEE 9180- 45- 68-B-26
W9WR 6669- 39- 57-D-25
W9MKL 4914- 39- 42-C-15
W9HPG 3813- 31- 41-B-22
W9TCU 3000- 25- 40-A-13
W9QLD 2958- 29- 34-C-10
W9TNZ 243- 9- 9-A- 4

Multi-Single

W9FXE (+W9ICF,2 meter net) 738,396-258- 954-
W9AXD (K9UIY K9WTS WB9 285,600-175- 544-
W9DY (+VU2JV) 235,209-163- 481-

Indiana

WB9BPG 858,429-319- 897-
K9CUV 841,728-256-1096-E
W9SER 469,062-206- 759-
WA9AHM 334,989-171- 653-
WB9LIO 155,493-117- 443-
K9CLO 97,128-114- 284-
WB9EEF 43,077- 83- 173-
W9LKI 42,960- 80- 179-
K9VOK 20,907- 69- 101-
WA9BWY/9 15,120- 60- 8
W9ZTD 1650- 22- 25-
WB9BUV 396- 11- 12-
K5LZT/9 3- 1- 1-

Wisconsin

W9RQM 429,660-210- 682-
W9GIL 348,840-190- 612-
W9PIT 220,320-144- 510-
K9DAF 56,225- 69- 175-
WB9DRF 34,719- 71- 163-
WA9VCK 26,136- 66- 132-
W9TXF 1242- 18- 23-
W9GF 504- 12- 14-

Ø

Colorado

WAØCVS 725,040-228-1060-
WØLBP 101,310-110- 307-
KØVEN 49,440- 80- 206-
WØNER 5376- 28- 64-A
KØZFI 3198- 26- 41-A

Iowa

KØDDA 393,093-207- 633-C
KØGXR 263,451-137- 641-C
WØBSY 118,422-129- 306-C
WAØATY 23,232- 64- 121-C

Kansas

WØIUB 304,500-175- 580-C
WAØTKJ 129,870-130- 333-C
WØYZB 77,910-106- 245-C

Multi-Single

WBØFGV (+WØIYR WAØTKJ) 348,066-183- 634-C

Minnesota

WØHP 979,623-267-1223-C
WØIYP 366,510-190- 643-C
WØYUR 254,250-150- 565-C
WØNAR 219,030-149- 490-C
WAØPRS 188,160-140- 448-C
WBØANT 122,850-117- 350-C
WØGYH 84,132-123- 228-C
WØKMH 38,376- 78- 164-B
WØLP 20,832- 62- 112-A
WØFDK 10,575- 47- 75-C
WØRXL 1980- 22- 30-C

Multi-Single

WAØFNP (+WAØs BWM WEZ YA 884,472-269-1096-E

Missouri

WØHBH 74,568-104- 239-C
WIØRF/Ø 10,626- 46- 77-B
WAØFBQ 6144- 32- 64-B
WRØFLM 1296- 16- 27-A
KØSGJ 144- 6- 8-C
WBØGRJ 108- 6- 6-A-

Multi-Single

WAØFMS (+KØUTX WBØs LE ELT WNØs RRF GCP HQH CP3B (T.Campbell) 441,210-191- 770-E

North Dakota

KØALL 82,080-120- 228-C
WAØMLE 3268- 27- 28-C

Multi-Single

WAØOVW/Ø (+WAØGOI) 191,520-160- 399-C

South Dakota

WAØONL 21,978- 74- 99-D
WAØVFX/Ø 7254- 39- 62-A

DISQUALIFICATIONS

CW W3CRE, K4POL. PHONE: W3CRE, WA4KJR (opr. of W3GR WA6LHN (opr. of K6EBB), K6SEN (operated by K6s EVR,RF, RU, SI WA6OHI, WB6V7I).

(Continued on page 75)

Strays

RULES FOR LIFE MEMBERSHIP

1. A paid-up Life Membership in the League shall be available to any Full or Associate Member, other than a Family Member, upon payment of a fee twenty times the annual dues rate, and upon approval of the application by the League's Executive Committee.
2. The Life Membership fee for U.S. applicants is currently $150, for Canadian applicants $170, and for other applicants $180, all in U.S. funds.
3. An applicant may choose an alternative time-payment plan of eight quarterly installments ($18.75 for U.S. applicants, $21.25 for Canadians, and $22.50 for others), to be completed within a two-year span. In such instance, he will be provided an interim two-year Full Membership certificate. Upon completion of the payments, Life Membership will be granted.
4. Life Memberships are non-transferable, and dues payments are non-refundable. In the event an applicant is unable to complete payments on the installment plan within the two-year span, he will be given a term of membership, at the annual dues rate, commensurate with payments received.
5. Other licensed amateurs in the same family, and at the same address, of a Life Member may retain or obtain Family Membership upon payment of the annual dues of $2, but without receipt of *QST*. The dues of the Family Member may be prepaid for any number of years in advance, but there is no special rate.
6. Life Membership is also available to blind amateurs upon payment of a fee of $40, without the receipt of *QST*.

After using up the possibilities for call letter license plates on their family car and four wheel drive Scout, W6TEE and WB6PHQ obtained this personalized plate for their new camping trailer!

Edsel Murphy has struck again . . . and again . . . and again at WA3RCA, the Pennsylvania ARC (PENNARC) Explorer Post 681, but he had the time of his life on April 27-29.

First, heavy rain delayed packing of the PENNARC trailer. When they were finally ready to leave, the car's solenoid went kaput and had to be fixed up. Finally, thinking that old Murph had had his fun and left, they headed for Valley Forge Mountain only to discover that Murphy had left a trail of tacks behind. No sooner had they gone a few hundred feet, when Pssst!!! flop . . . flop . . . flop . . . the trailer had a flat! Better luck next time! *WA3FKH*

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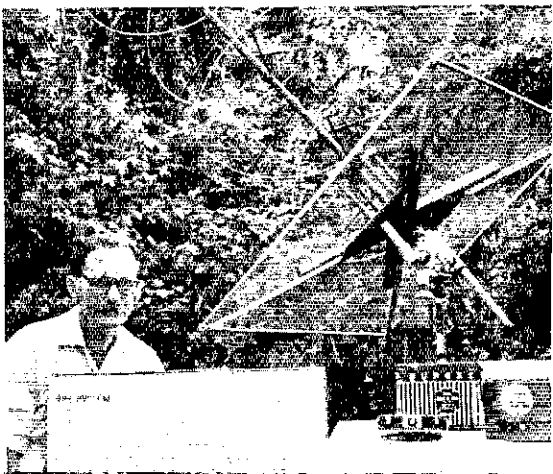
Remember the "Let's Talk Transistors" series by Robert E. Stoffels, WB9ESH? We've put together a reprint booklet of this 9-part transistor primer and it is available from ARRL for $1 including postage.



Here is W4NK's "bare bones" set up for receiving APT (automatic picture transmissions) from the ESSA 8 weather satellite on 137.62 MHz. From left to right on the table is a Vanguard FMR-150A crystal-controlled fm receiver powered by the large dry cell battery, and a converted Western Union desk facsimile unit. The antenna is a homebrew 4-wavelength helix antenna. Received information is plotted on the large board, obtained from the National Weather Service. W1AW regularly transmits APT info relating to times and positions of ESSA 8.

Oscar News

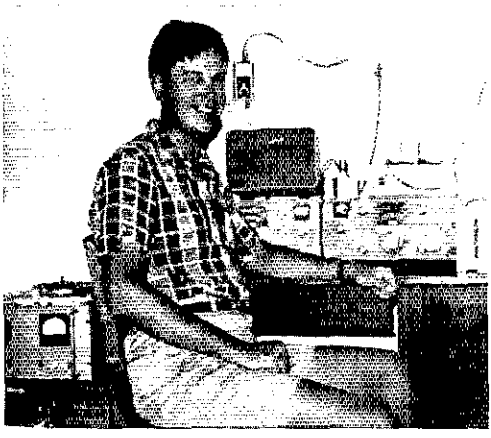
(Continued from page 49)

myself back though Oscar; so I hereby apologize to those I worked." Dave ended up with seven stations worked on two passes.

SWL Activity

Oscar users should remember that many hams and SWLs are listening to the satellite, though they may have not transmitting capability. Listeners' reports played a major role in the evaluation of earlier satellites; these reports have been overshadowed by two-way work on Oscar 6, but they can still be significant.

As an example, Czech SWL OK1-15835 has accumulated QSLs confirming reception of stations on three continents. If the "1000" award were available to SWLs, he would have been the first to qualify. – *K1ZND*



VP5DD (K8PKN) spent the month of June providing Oscar contacts from this setup on Grand Turk Island. Dave should be on now from his Ohio QTH.

Recent Satellite DX Achievement Award Winners

K4MSG YU2RIO DL1SN LZ1AG SP9DH WA6RQP JAØAIF GI2BZV WA6GUY WA6EIR WB2ZOW KX6HK KH6HLK K4GSX.

Certificates have been issued to 131 stations in 23 countries and 5 continents.

Oscar 6 Equator Crossings

Orbit	*Date*	*Time (GMT)*	*Longitude (degrees W)*
4387	Oct 1	0031	55.3
4425	Oct 4	0121	67.8
4450	Oct 6	0115	66.5
4475	Oct 8	0110	65.2
4512	Oct 11	0005	48.9
4538	Oct 13	0155	76.4
4563	Oct 15	0150	75.1
4600	Oct 18	0045	58.8
4625	Oct 20	0039	57.5
4650	Oct 22	0034	56.2
4688	Oct 25	0124	68.7
4713	Oct 27	0119	67.4
4738	Oct 29	0114	66.1
4775	Nov 1	0009	49.8
4800	Nov 3	0004	48.5
4826	Nov 5	0153	76.0
4863	Nov 8	0048	59.7
4888	Nov 10	0043	58.4
4913	Nov 12	0038	57.1

ARRL QSL Bureau

The function of the ARRL QSL Bureau is to facilitate delivery to amateurs in the United States, its possessions and Canada, of those QSL cards which arrive from amateur stations in other parts of the world. All you have to do is send your QSL manager (see list below) a stamped, self-addressed envelope, about 5 by 8 inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner.

Cards for stations in the United States and Canada should be sent to the proper call area bureau listed below. Recent changes are in **bold face**.

W1,K1,WA1,WN1 – Hampden County Radio Association, Box 216, Forest Park Station, Springfield, MA 01108.

W2,K2,WA2,WB2,WN2[1] – North Jersey DX Assn. P.O. Box 505, Ridgewood, NJ 07451.

W3,K3,WA3,WN3[1] – Jesse Bieberman, W3KT, RD 1, Box 66, Valley Hill Rd., Malvern, PA 19355.

W4,K4 – North Alabama DX Club, P.O. Box 2035, Huntsville, AL 35804.

WA4,WB4,WN4 – J. R. Baker, W4LR, P.O. Box 1989, Melbourne, FL 32901.

W5,K5,WA5,WB5,WN5[1] – ARRL W5 QSL Bureau, Box 1690, Sherman TX 75090.

W6,K6,WA6,WB6,WN6 – No. California DX Club, Box 11, Los Altos, CA 94022.

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.

W**Ø** – Reggie Hoare, W**Ø**OYP, P.O. Box 115, Mitchellville, IA 50169.

K**Ø**,WA**Ø**,WB**Ø**,WN**Ø** – Dr. Phillip D. Rowley, K**Ø**ZFL, Route 1, Box 455, Alamosa, CO 81101.

KP4,WP4[1] – Alicia Rodriguez, KP4CL, P.O. Box 1061, San Juan, PR 00902.

KV4 – Graciano Belardo, KV4CF, P.O. Box 574, Christiansted, St. Croix, VI 00820.

KZ5 – Lee DuPre, KZ5OD, Box 407, Balboa, CZ. Box 407, Balboa, CZ.

KH6,WH6[1] – John H. Oka, KH6DQ, P.O. Box 101, Aiea, Oahu, HI 96701.

KL7,WL7 – Alaska QSL Bureau, Star Route Box 65, Wasilla, AK 99687.

VE1 – L. J. Fader, VE1EQ, P.O. Box 663, Halifax, NS.

VE2 – A. G. Daemen, VE2IJ, 2960 Douglas Avenue, Montreal 301, PQ.

VE3 – R. H. Buckley, VE3UW, 20 Almont Road,Downsview, ON.

VE4 – D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg R3N OE8, MB.

VE5 – A. Lloyd Jones, VE5JI, 2328 Grant Road, Regina, SK, S4S 5E5.

VE6 – D. C. Davidson, VE6TK, 1108 Trafford Dr. NW, Calgary 47, AB.

VE7 – H. R. Hough, VE7HR, 1291 McKenzie Rd., Victoria, BC.

VE8 – Yellowknife Centennial Radio Club, P.O. Box 1944, Yellowknife, NWT, Canada.

VO1 – Ernest Ash, VO1AA, P.O. Box 6, St. John's, NF.

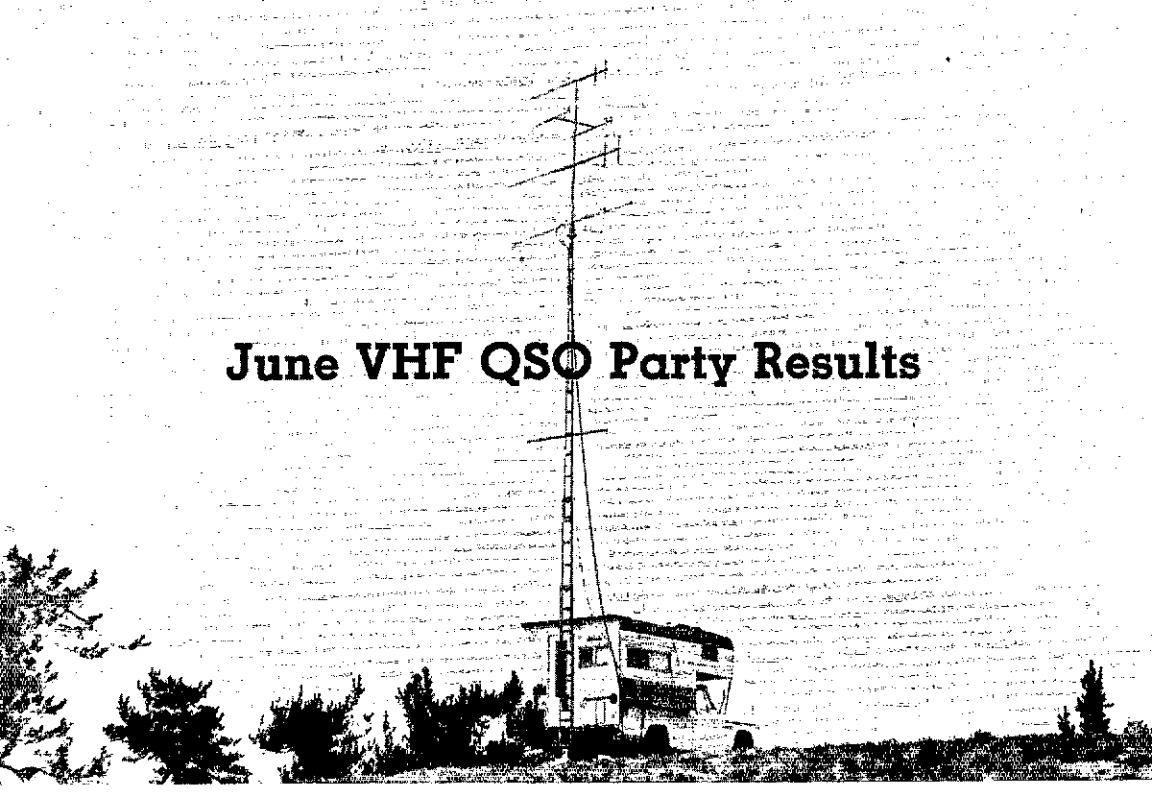
VO2[1] – Goose Bay Amateur Radio Club, P.O. Box 232, Goose Bay, LB.

SWL – Leroy Waite, 39 Hannum St., Ballston Spa, NY 12020.

[1]These bureaus prefer 4 1/4 by 9 1/2 inch or No. 10 business envelopes.

QSL Bureaus for other U.S. Possessions and for other countries appear in the "IARU NEWS" section of the June and December issues of *QST*.

June VHF QSO Party Results



K6YNB/6 – 8831 feet above sea level.

REPORTED BY RICK NISWANDER,* WA1PID

IF YOU MISSED the Sunday evening coast-to-coast E_s opening or the Sunday afternoon aurora, the June VHF QSO Party (held June 9-11) was probably a big washout. If you caught those two openings you had a grand weekend indeed. The aurora seemed to cover the Northeast and the northern Midwest for quite a few hours, allowing some entrants to attain high section totals. The E_s opening occurred after many East Coasters had used up their second 14-hour period, but before most of those in the Midwest and West had to shut down. In many cases, scores doubled in just a few hours.

Scorewise, there were two occurrences of major import. For the first time a West Coast station topped the country – K6YNB/6. Wayne again used his camper station as described in August 1971 *QST*. His score of 29,520 is the highest score ever recorded by a West Coast station. Needless to say, Wayne handily broke the old 13K Southwestern Division record set back in 1961.

The other superlative performance recorded this year was by the multiop crew at WA1MUG. Contrary to the belief of some, this is not a permanent station setup although the call is licensed for their Mount Greylock operating location, the highest spot in southern New England. Before the June and September brawls, a group of guys from up to 100 miles away carts antennas, equipment, etc., to the Mount, assembles a station and, on the Monday after the contest, takes it all down again. Their score of 125,716 tops their own June multiop record of 101,088 set in 1971. It also breaks the highest multiop score recorded in a VHF QSO Party of 109,662 set by them last September. They also set multiplier records in all band (106), 220 (20) and 1296 (11). Their second 14-hour period ended shortly before the tremendous West Coast opening on 6 (sob). The aurora was so intense that they worked two Michigan and Ohio stations on 432, one of which was a dupe (!).

Elsewhere other single op entries did equally well.

K8BBN set a new Great Lakes Division record of 27,132 and took second spot nationwide. Jim also set a new national single op record for section multipliers with 84, smashing the old mark of 71 set by K1AGB in 1969.

The Northwestern Division record set by W7RT in 1961 was broken this year by WA7KYZ with a fine 16K performance – good enough for 5th place nationally.

W7VDZ chalked up the second over-10K score from the Rocky Mountain Division, grabbed 9th spot overall and set a new Division mark. All from Wyoming. FB!

Multiop groups didn't slouch this year either.

W7VE/7 set a new Northwestern Division high with a 20K score breaking their own 15K mark set last year.

*Assistant Communications Manager.

Some can say that their antennas are 135 feet high but not many can also claim their shack is that high also. This shack-in-the-sky was used by the Potomac Area VHF Society during their DX-pedition to Delaware. Nice QTH, but those stairs are tiring.

WØOHU/Ø turned in a fine 21K performance marking the first time a Dakota Division multiop group has ever topped 10K. (That's right, 10K.)

The Mt. Airy gang added a bit to their Atlantic Division record set last year with a 80K showing, good enough for 3rd spot nationwide.

Returns were down slightly with 254 single op and 86 multi op entries plus 5 check logs.

Certificates are scheduled for an October 15 mailing.

Soapbox

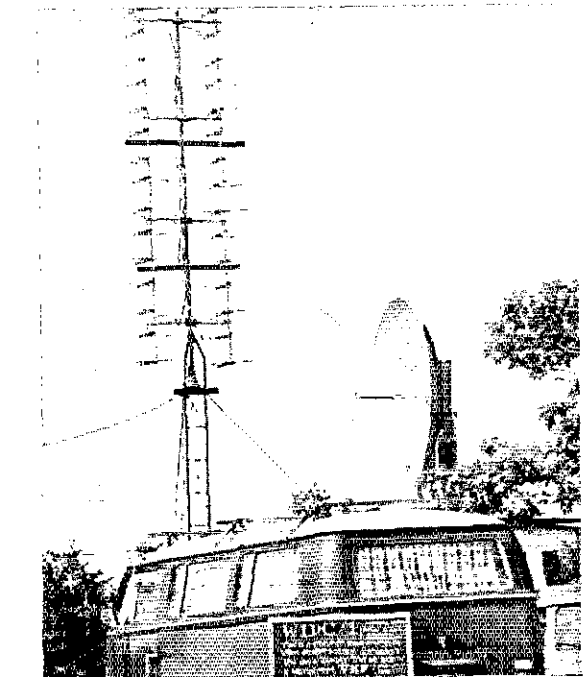
The six Meter opening Sunday evening was the greatest but timing with prime local TV viewing had after effects – (K6SSN). Clear skies, no wind, lousy band conditions. Hearing that fish were biting that weekend made me ill – (WB5CAG). Talked W6BXO into getting on for the contest.

A fine 4th place national showing of 63K by the crew at VE3ONT obliterated the 1971 record of 25K in the Canadian Division. FB job, indeed.

The Mt. Diablo group, usually signing K6KLY/6, changed calls this year and increased their own Pacific Division record by over 12K to 36K. Oh yes, the call this time around was WA6JUD/6. If the call makes *that* much difference the FCC will be flooded with requests for 2X3 callsigns.

DIVISION LEADERS

Single Op.	*Division*	*Multiop.*
K2YCO	Atlantic	W3CCX/3
W9JDJ	Central	WB8HUC/9
WBØELN	Dakota	WØOHU/Ø
K4TVI	Delta	WA5UMP/5
K8BBN	Gr. Lakes	W8CCI
W2CRS	Hudson	WB2GKE/2
KØTLM	Midwest	. . . . .
K1AGB	New Eng.	WA1MUG
WA7KYZ	Northwestern	W7VE/7
K7ICW	Pacific	WA6JUD/6
KH6FLD/4	Roanoke	W4BFB/4
W7VDZ	Rocky Mt.	WA7BBM/5
WA4NJP	Southeastern	WA4NJP/4
K6YNB/6	Southwestern	WA6UMI
K5UGM	West Gulf	W5WAX
VE2DFO	Canadian	VE3ONT



Just a few of the antennas at W1DC/1, N.H. The dish is mounted on a VW Bus and was used for 1296 and 2300 MHz. The other monster is a 96 element collinear array for 432. The multiop gang had a fine 97K second place nationwide showing.

Even gave him an ARRL log. He beat me – (W6OMF). Boy oh boy! Those last several hours made all the difference. I had three receivers going here on 6 meters and two transmitters. While one W8 was in QSO with me he decided to be long winded so I made 3 QSOs in two new sections on the other equipment while he was talking – (K7ICW). Sure enjoyed the contest. Worked W7MD in Montana for my 48th state so I'm in hawg Heaven – (K5WIB). All in all it was a very enjoyable weekend. Tiring, but fun. I learned alot, logged lots of stations I'd never even heard before, and know what to expect in the contests ahead. . .and what to do to get a better score – (WB9LOZ). Boy! That was a real bang-up finish to a slow contest – (WA8HSY). This go-round marked the first time I had four bands to be watching and, as a single-op entry, I must say it presented a quandary in deciding which one to be on and when. While the six meter opening was exciting I think the biggest thrill I got from the whole affair was working WA1MUG on 432 late Saturday night. Heard them on all four bands at one time or another (including aurora on both 220 and 432) and worked them on three. Guess the 8 watts out on 220 just wasn't enough to get back to them – (K8BBN). Watched thunderstorm approach hill for 10 minutes. Were all ready to go charging down hill but storm broke one mile to the west and, after splitting and going each side of us, it reformed just to the east with full fury again. Only got a few sprinkles. Auntie Murphy, thank you – (K1ZKR/1). Heard real good aurora and double hop after I stopped operating – (K2CBA). The aurora on the afternoon of the 10th really helped local stations to increase their scores. I more than doubled my score in the last two hours of operation – (WA3DMF).

SCORES

Scores are listed by W/VE call areas and sections within call areas. The top single-operator scorer in each section receives a certificate award. Multiple-operator scores are shown at the end of each section tabulation; in sections where at least three such entries were received, the top multioperator scorer receives a certificate award. Asterisk following call indicates Headquarters staff member, ineligible for award.

Columns show final score, total number of contacts, section multiplier, and bands used. A represents 50 MHz.; B, 144 MHz.; C, 220 MHz.; D, 432 MHz.; E, 1215 MHz. and above.

VE

Quebec

VE2DFO 8910-161-55-ABC
VE2YU 2688- 69-32-BC
VE2AE 1122- 51-22-AB

Ontario

VE3ADJ 2072- 74-28-AB
VE3EVW 120- 12- 5-D
VE3DJ 110- 11-10-A
VE3DNR 105- 15- 7-B
VE3FHM 39- 13- 3-B
VE3ONT (VE3s BBH DOI DSS DXJ EMS FIB GFY K8MMM WB8IWI) 63,650-613-95-ABCD
VE3FHK (+VE3FHU) 5304-136-39-AB

Manitoba

VE4AS 3000- 99-30-ABD

Alberta

VE6MC 96- 12- 8-A

British Columbia

VE7XF 3040- 95-32-AB
VE7ASV 1975- 79-25-AB
VE7ARM/7 (VE7s ADE AZG BKX) 530-105- 5-ABD
VE7ASM/7 (VE7s AFB ALJ ASI BID BLG BN) 414- 69- 6-AB

U.S.A.

1

Connecticut

WA1NGR 13,244-301-44-AB
K1PXF 12,087-171-51-BCDF
WA1FFO 3220-140-23-B
W1FFF 280- 35- 8-B
W1FEZ 280- 40- 7-B
K1ZND* 165- 15-11-AB
W1WEE 135- 27- 5-B
W1KBM 126- 18- 7-AB
W1WHL 114- 19- 6-AB
WA1RZC* (WA3JSU, opr.) 3- 3- 1-B
WA1GTP (+K1VYU) 6721-134-47-ABCD
K1ZKR/1 (+K1IFP WA1s HYN MDQ QLH) 5304-204-26-AB
W1AW* (WA1MBK WA3JSU) 1200- 60-20-AB
W1MY/1 (WA1s MPY MTZ) 848- 53-16-AB

Eastern Massachusetts

K1AGB 20,874-251-71-ABCD
WA1FCD 1995- 95-21-AB
K1VTF 1737-193- 9-B
W1AAI 912- 48-19-B
WA1MKE 845- 65-13-A
WA1NOV 210- 35- 6-A
WA1LXP 195- 39- 5-A
WA1OFR 160- 32- 5-A
WA1OEZ/1 135- 27- 5-A
WA1MYK/1 69- 23- 3-B
W1JOT 30- 5- 3-D
W1OFO/1 3- 3- 1-B
W1GGM/1 (+W1BFF WA1MJD WB2GLQ K9AQP) 27,930-359-70-ABCDE
WA2JVO/1 (+WA2JHR) 18,768-242-69-ABCD
WA1KGS/1 (K1s ETT MON WA1s GQY KFJ MXF) 4025-175-23-A

Maine

W1YTW 6525-118-45-ABCDE
WA1KGP (+K1s MTJ OYB VBL W1s HHO UOT WA1FTT) 12,336-257-48-AB

New Hampshire

WA1QUB 6656-208-32-AB
WA1FSZ/1 3625-120-29-ABD
W1JSM 1190- 70-17-B
K1PMM 560- 40-14-A
WA1RZP 480- 30-16-AB
WA1GDR 40- 8- 5-B
W1DC/1 (K1s CRI CQX KEC KMV MHO MUC NZQ OIQ SVF TWE W1s BXJ EZA GUU PVF QXX WA1s DRO GVH HHF HON IZO KPS LXU MSK NPN OAM OZI PHR K4GGI) 97,388 883-97-ABCDE

Rhode Island

K1IKN 6474-166-39-AB
W1AJR 1334- 30-23-BCDE
WA1OPS 250- 25-10-A
WA1NTF 136- 17- 8-AB
WA1ODD 90- 10- 6-AD

Vermont

K1GYT 9455-155-61-AB
WA1GYL/1 816- 51-16-AB
W1AIM 608- 38-16-AB
WA1JEX (+WA1s MAO NBU) 6596-194-34-AB
WA2CAC/1 (+WA1LCD) 5110-141-35-ABC
K1NZQ/1 (+K1KEC K1SVF W1BXI WA1HON) 220- 12-11-ABCDE

Western Massachusetts

K1BX (W2BVU, opr.) 2573- 43-31-BCDE
W1FMF 1547- 85-17-ABD
WA1POD 300- 50- 6-A
WB5IZN/1 1- 1- 1-A
WA1MUG (K1s DFU DQV EXY ZND W1KZS WA1s ABV HCO IQI JID QXG RKS RZO WA2s FBI FIQ PVV SCA SPL WB2s BXP BYP DRW DUS OLU WOI WA3GBU WA7ISP) 125,716-1067-106-ABCDE
WA1IAM/1 (+WA1IAN) 44- 11- 4-A

2

Eastern New York

W2CRS 21,648-309-66-ABC
K2CBA (WB2DNE, opr.) 9196-187-44-ABCDE
K2DNR 5069-137-37-AB
WA2BLM 2300- 92-25-AB
W2GKR 1430- 65-22-AB
W2AWX 286- 21-13-BD
WA2QQN 72- 12- 6-AB
WB2FKJ/2 (K2s FWY UKE W2s HCQ LWI WA2s HAQ TQK WB2s DVV GXF HDS IQL YQU) 12,000-250-48-AB
K2ARO/2 (+K2BGU WA2s CGF HRE WB2s LOV NPR) 5270-135-34-ABD
WB2BXL/2 (+K2BK WA2s RUW SVC SVH THZ WB2CCY WN2s EQD MBB) 4060-145-28-AB
WA2RAT/2 (+WA2SLY) 3420-180-19-B
WA2YJF/2 (+K2YGM WA2FUZ) 2464- 83-28-ABCD

N.Y.C.–L.I.

WA2MZH 1037- 61-17-AB
WB2TUT 902- 82-11-B
K2DUX 476- 28-17-A
WB2KYJ 320- 40- 8-AB
K2PAY/2 310- 31-10-A
WA2KXE 231- 33- 7-B
WA2KUX (WA2s OAL SRI R.Attolino) 1649- 97-17-AB
WA2BPO (K2OVS W2GFF WN2GTH) 1254- 50-19-BB
WB2NRP/2 (WA2s MZE RRG WB2s FIG FLE JSJ) 684- 57-12-AB
WB2ZKT (+WA2NUG WN2HDS) 380- 38-10-A

Northern New Jersey

W2OMS 2280- 43-24-DE
WB2CUT 1111-101-11-B
K2OJD 816- 51-16-B
WB2HHH 504- 56- 9-B
K4BNC/2 340- 34-10-AB
WA2ICW 182- 26- 7-AB
WA2BAX 32- 8- 4-AB
WB2GKE/2 (K2OWR WA2s BAT DBD FKX FZW NXD ZOW WB2s WHC WIK) 46,646-506-83-ABCD
K2DEL (K2KDQ WA2s CRF CXS DNU JIM NKL NLP PCS WB2s AYZ BVF NTP NWV QQU VLC WN2s DEP KOC) 17,850-318-51-ABD
WB2KKO/2 (+WA2s RIU UPK WB2s BCA DHN LPX QOQ) 17,799-341-51-ABD
WA2KHL/2 (+WA2UDT WB2s LDE LYP) 14,335-296-47-ABC
WB2ZVS (+WA2KWP) 12,972-282-46-AB

Southern New Jersey

W2HBT 3596-116-31-AB
W2CXC 1540- 70-22-AB
K2BWR (+K2ZRJ) 9676-148-59-ABC

Western New York

K2YCO 7595-134-49-ABCDE
WA2GSX 1188- 54-22-B
W2WGL 722- 38-19-B
K2LGJ 672- 24-14-D
WA2JOQ (W2EUQ WA2s ADZ BPE GCU KTJ OGM WB2s BMM PMI RKD TCZ) 6460-190-34-AB
W2OW (WA2s RBJ RBP WB2EQK) 6384-143-42-ABC
WA2EXP/2 (+K2LCK) 4096-128-32-AB
WB2MXS/2 (+WB2IKO) 868- 53-16-AB
K2ZER/2 (+K2LFB WA2GIA) 435- 29-15-AB

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Delaware

WA3QPX 7448-148-49-ABCD
W3CGV 378- 18-14-ABCDE
K3LNZ/3 (K3s DUA GUW WA3NZL K4LHB W4s PSJ YEB) 20,069-295-61-ABCD

Eastern Pennsylvania

W3JMY 6536-152-43-A
WA3IEM/3 3332- 98-34-AB
W3JLU 2646-126-21-B
WA3LNH 1625- 65-25-A
WA3RJM 1071- 63-17-AB
WA3UGP 1037- 61-17-AB
WA3HIT 656- 77- 8-ABC
W3ETB 460- 43-10-ABC
WA3TUW (WA3BRW, opr.) 225- 25- 9-A
WA3MHF 108- 27- 4-A
WA3KFT 30- 10- 3-AB
W3CCX/3 (K1SPF W2EIF WA2s KOI MWB K3s BPP DLS GAS JFY JJZ IPM IUV IUD ZKO ZGG W1s CJU CL CXU FLX FQD HKZ KKN SAO TMY ZD WA3s AXV JUF

Min. Sections	30	15	4	3	1
MHz.	*50*	*144*	*220*	*4321215*	
VE2AEB	4	18			
VE2DFO	30	24	1		
VE2YU		21	11		
VE3ADJ	6	22			
VE3EVW			5		
VE3FHK*	31	8			
VE3ONT*	42	25	16	12	
VE7XF	31	1			
K1AGB	26	22	12	11	
K1GYT	42	19			
K1IKN	32	7			
K1JIX		4	12	11	4
K1NZQ/1*	3	2	2	2	1
K1PXE		22	11	14	4
W1AAI		19			
W1AJR		7	4	7	5
W1DC/1*	31	23	17	14	12
W1FMF	6	7		4	
W1GGM/1*	22	22	13	12	1
W1JOT				3	
W1JSM		17			
W1YTW	12	18	8	5	2
WA1FFO		23			
WA1FSZ/1	18	8		3	
WA1GTP*	21	18	2	6	
WA1JEX*	30	4			
WA1KGP*	27	21			
WA1MUG*	33	23	20	19	11
WA1NGR	31	13			
WA1ODD	2			4	
WA2CAC/1*	15	17	3		
WA2JVO/1*	34	18	8	9	
K2ARO/2*	15	10		9	
K2BWR*.	27	21	11		
K2CBA	20	7	11	5	1
K2DEL*	23	16		12	
K2LGJ				14	
K2OJD		16			
K2YCO	21	13	6	7	2
W2CRS	28	24	14		
W2GKR	6	16			
W2HBT	30	1			
W2OMS				17	7
W2OW*	19	16	7		
W2WGL		19			
WA2BPO*		15			4
WA2EXP/2*	13	19			
WA2KHL/2*	21	20	6		
WA2RAT/2*		19			
WB2FKJ/2*	27	21			
WB2GKE/2*	30	24	17	12	
WB2KKO/2*	30	15		6	

Min. Sections	30	15	4	3	1
MHz.	*50*	*144*	*220*	*4321215*	
WB2ZVS*	33	13			
K3LNZ/3*	27	16	6	12	
K1JDY/3*	21	20	5	4	
K2YSX/3*	32	21	15	11	
W3AD/3*	29	26		6	
W3BWU	34	1			
W3CCX/3*	27	22	18	13	8
W3CGV	5	2	3	3	1
W3GF/3*	18	21	10	8	
W3IOH	41	5			
W3JLU		21			
W3JMY	43				
W3KMV	24	19			
W3PGA/3*	13	15	7	7	
WA3QPX	31	14	3	1	
K4FRH	38	3			
K4FTO		18			
K4QIF		22		7	2
K4TVI	39				
W4BFB/4*	36	6			
W4UCH	18	5	4	2	
W4VHH		21		2	
WA4CQG*	47	7			
WA4NJP	38	2			
WB4WMT	35	3			
WB4YAB	37				
K5UGM	30	4		2	
W5RSZ	46				
W5WAX*	35	9		1	
WA5QCP	32				
WA5UMP/5*	47	3			
WA7BBM/5*	31	1			
K6BPC/6*	23	8	3	5	
K6DTR	17	6	5		
K6GSS/6*	35	8	5	6	
K6QAX	33	6	5		
K6YA/6*	17	6	5	2	
K6YNB/6	47	11	7	7	
W6FZJ	8			8	
W6GGV*	12	5	4		
W6PZA/6*	14	8		2	1
WA6EIR/6*	36	10	6	5	
WA6GYD	16	3	6		
WA6HXM*	28	7	4	3	
WA6JUD/6*	45	8	8	6	1
WA6NRV	35	5		3	
WA6OHT			4		
WA6PYN	26	5	3	3	
WA6UAP	7	6	5		
WA6UMI*	31	7	5	4	
WB6JCD/6	10	5	4		
WB6NKO	42	1	1	4	

Min. Sections	30	15	4	3	1
MHz.	*50*	*144*	*220*	*4321215*	
K7DVK	36	2		2	
K7ICW	46	4			
K7IDX/7*	15	3	2	1	2
K7TLX	34				
K7ZCB/7*	31	2	1	1	
K7ZOK	38	1			
W7FN	40	2			
W7JRG	35				
W7TYR	34	2	2	1	
W7VDZ	45				
W7VE/7*	38	3		1	
WA7FPO	44	1			
WA7KYZ	47	3	2	1	1
K8BBN	56	18	4	6	
K8HWW	32	11	9	1	
K8III		30			
K8LEE*	48	13			
K8SUB	37				
K8UQA				10	
W8CCI*	41	27	6	2	
W8KPY*	37	28			
W8KUS		13		7	
WA8HPY	38	1			
WA8MEC		15			
WA8PIE		31			
WA8WJO	42	4			
WB8AMI	40	4			
WB8BGY	34	15			
WB8IGY*	41	3			
WB8NJI*	30	3			
WB8NWY*	34	5			
K9AJP		15			
K9HMB	36	30		1	
K9OXY	37	7			
K9QCB	41	5	1	1	
K9UNM		16			
K9UVJ	30	8	6		
W9JDJ	49	8		1	
W9YYF		29			
WA9LEF	37	6			
WB9EDP	32				
KØALL	42				
KØTLM	42	9			
WØKJY/Ø	32	1			
WØOHU/Ø*	52	14		4	
WAØSBZ	38				
WAØVJF	40				
WBØELN	36	1			
WBØFVL	33				
WBØIWG	39				

* Multioperator Station

NFV NGK OVH)
80,608-770-88-ABCDE
K2YSX/3 (+W2s DMK FHU JHG WA2s CPQ GBG UKK WB2LZD)
39,895-463-79-ABCD
W3AD/3 (K3s HEC UGH W3OLV WA3s GPL HMK HRM RKM)
18,239-285-61-ABD
KIJDY/3 (+K3ATL)
10,050-187-50-ABCD
W3GF/3 (+K3SQO)
9690-143-57-ABCD
K3YFD (WA3s MPO OTI RUQ RVO RZX)
1530-102-15-AB

Maryland-D.C.

W3KMV	6708-156-43-AB
WA3MDR	4445-127-35-AB
WA3DMF	2450- 98-25-AB
WA3PNQ	1560- 60-26-A
K3MWQ	1400- 70-20-AB
W3OU	1288- 54-23-ABD
W3HB	492- 41-12-B
WA3OIB	168- 21- 8-B
K2QBW/3	16- 8- 2-B

W3PGA/3 (K3s PHH RQJ YGC YZY W3s JLH VRD WA3s FHV LAW)
12,516-280-42-ABCD
WA3NUL (W3GJB WA3s EOP EOQ FYZ)
4408-152-29-AB

Western Pennsylvania

W3IOH	6026-131-46-AB
W3BWU	4095-117-35-AB
WA3PBD	2375- 95-25-AB
WA3MYI	1210- 55-22-A
WA3RST	525- 35-15-A
W3DJM	133- 19- 7-A
K3YVN	60- 10- 6-A

4

Alabama

WB4RUK	420- 28-15-A

WB4EOW/4 (+WB4s NCN PAB)
2884-103-28-A

Georgia

WA4NJP	5520-138-40-AB
WB4WMT	5054-133-38-AB
K4FRH	4551-111-41-AB
W4ISS	216- 18-12-AB
W4LNG	50- 25- 2-AB

WA4NJP/4 (+WB4s NMA TVU)
2990-130-23-AB

Kentucky

WB4YAB	3219- 87-37-A

WA4CQG (+WA8TYF)
11,826-219-54-AB
WA4JQS/4 (+WB4UQC)
4182-123-34-AB
WB4VLH (+WB9JFT)
2133- 79-27-AB

North Carolina

WB4LDO	2050- 82-25-AB
W4VHH	805- 32-23-BD
K4VAA	161- 23- 7-A
K4MSG	4- 2- 2-B

Northern Florida

WA8YYW/4	36- 8- 4-ABD
W4CSS	16- 4- 4-A

South Carolina

K4PXE	855- 45-19-AB
WA3BSZ/4	629- 37-17-AB

W4BFB/4 (WA3MID K4s BWS LVV WA4s APU IPQ VCC WB4s CES JBW NDB SPV WAW YFC)
9618-229-42-AB

Southern Florida

WB4OSN	1995- 95-21-A
W4OJU	1800- 90-20-AB
WB4BND	1344- 84-16-A
WA4HNQ	690- 46-15-A

Tennessee

K4TVI	6045-155-39-A

W4SGI (+K4QHB W4LQE W4PPR)
6112-191-32-AB

Virginia

KH6FLD/4	2626- 95-26-ABC
K4QIF	2356- 64-31-BDE
W4UCH	2233- 70-29-ABCD
K4FTO	756- 42-18-B
WB2LAI/4	108- 12- 9-A
W4WSF	96- 32- 3-B

West Indies

WA5MZW/KP4	1- 1- 1-A

5

Arkansas

W5TDP	115- 23- 5-B

WA5UMP/5 (+WB4s LHD ZDA)
9400-188-50-AB

Louisiana

WB5CZV	990- 55-18-A

New Mexico

W5RSZ	8050-175-46-A
WØOPN/5	1071- 51-21-AB
WB5CAG	950- 50-19-A

WA7BBM/5 (+K7KHN)
3168- 99-32-AB
W5IXS (+W5IXR)
198- 22- 9-A

Northern Texas

K5UGM	5184-132-36-ABD

Oklahoma

WA5VHN	2280- 95-24-AB
WB5DSH	1960- 70-28-A
WA5DWR	1647- 61-27-A
K9DKW/5	492- 41-12-A

W5WAX (+K5s BOC BXG WVX)
7515-165-45-ABD

Southern Texas

WA5QCP	2208- 69-32-A
K5WIB	1606- 73-22-A
WB5CMB	1425- 57-25-AB
WA5ZLJ	1326- 51-26-A
WA5IYX	660- 33-20-A

6

East Bay

W6BXO	3335-110-29-ABD
W6OMF	1856- 64-29-AB

WA6JUD/6 (+WA2CJK K6KLY

W6YKM WB6NMH
36,380-472-68-ABCDE

Los Angeles

K6SSN 5434-133-38-ABCD
WB6JCD/6 2052- 94-19-ABC
WB6HDB 1937-149-13-AB
WA6HXM (K1TOL K6s KSV SVL WA6s HXM IBZ OLE OZC WB6s OKK WAX)
11,970-264-42-ABCD
W6GGV (+WB6PKA)
1974- 79-21-ABC
WA6MBP/6 (+WA6ERP)
672- 84- 8-AB

Orange

WA6UMI (WB6s ASR RAL RIV)
15,134-297-47-ABCD

Santa Barbara

K6YNB/6 29,520-374-72-ABCD
W6OAL 45- 9- 5-AB
WA6EIR/6 (+WA4APG WA6ICZ)
12,369-192-57-ABCD
K6BPC/6 (WA6s ARC IPN KIK MEM ZNP WB6s IMV MWT RAJ YVP)
9711-229-39-ABCD

Santa Clara Valley

K6QAX 6688-131-44-ABC
WA6GYD 3475-116-25-ABC
K6DTR 3276-100-28-ABC
WA6BYA 1586- 61-26-A
WA6UAP 1548- 56-18-BCD
W6FZI 1280- 51-16-AD
WB6JON 1134- 63-18-AB
WA6OHT 216- 27- 4-C
WB6CXO 78- 26- 3-B
K6GSS/6 (+WB6KBZ)
17,604-287-54-ABCD
K6YA/6 (W6OCP WB6s OVW YZD)
4770-143-30-ABCD
W6PZA/6 (+WA6JYU)
2475- 95-25-ABDE

San Diego

WA6MHZ 2834-109-26-AB
K6DYD 2706- 80-33-ABC

San Francisco

WA6PYN 5439-138-37-ABCD
WA6KNF 153- 17- 9-AB

San Joaquin Valley

WA6NRV 6021-134-43-ABD
K6JKQ 2225- 72-25-ABCD
W6YKS/6 1331- 70-19-A
WB6JAX 512- 32-16-A
WA6ZSN/6 (WB6s ASU DTB QQD)
3243-132-23-ABC

Sacramento Valley

WB6NKO 8352-165-48-ABCD
WB6NKM 28- 6- 4-BC
7

Arizona

WA7FPO 7830-174-45-AB
K7NEQ 2482- 73-24-AB
WA7VCA 3- 3- 1-B

Montana

W7JRG 4585-131-35-A

Nevada

K7ICW 9050-181-50-AB
K7ZOK 3198- 82-39-AB

Oregon

K7DVK 10,080-231-40-ABD
W7TYR 6825-163-39-ABCD
K7HSJ 1300- 50-25-ABC
WA7OTZ 276- 23-12-A
WA7CHE/7 6- 2- 2-BD
K7ZCB/7 (+K7TKX WA7s ECY EEP)
7945-222-35-ABCD
K7AUO (W7BKN W7ZOI WA7MHP)
490- 49-10-AB

Utah

K7TLX 4896-144-34-A

Washington

WA7KYZ 16,060-278-55-ABCDE
W7FN 6636-158-42-AB
K7DBR 4740-158-30-AB
W7UGK 1488- 62-24-AB
K7IDX 450- 30-15-A
W7FIM 297- 27-11-A
W7VE/7 (K7s GWE TUO WA7s GWL NUK RTA UWE WA9DGM)
20,076-474-42-ABD
WA7UOR/7 (+K7IEY K7MQF WA7EHF)
7008-211-32-ABCD
K7IDX/7 (+K7BBO WA7BBJ)
4301-168-23-ABCDE
WA7PVE (+P.Keypost)
1216- 76-16-AB

Wyoming

W7VDZ 11,385-253-45-A
8

Michigan

K8BBN 27,132-303-84-ABCD
K8HWW 10,547-180-53-ABCD
WB8BGY 10,486-214-49-AB
WA8WJO 5382-117-46-AB
WA8PIE 4650-150-31-B
WB8EIY 1617- 77-21-AB
WA8MEC 795- 53-15-B
WB8JXF 402- 67- 6-B
WA8JEJ 132- 22- 6-B
WA8ZCO 105- 18- 5-BC
WB8NWY (+K8LIO)
6240-160-39-AB

Ohio

WB8AMI 6512-148-44-AB
K8III 5790-193-30-B
WA8HPY 4875-125-39-AB
K8SUB 3922-106-37-A
WA8KIW 2325- 93-25-A
W8KUS 1300- 51-20-BD
WA8STX 594- 54-11-AB
K8UQA 480- 24-10-D
WA8RLB 252- 28- 9-A
W8EVY 95- 16- 5-ABC
K8CKY 80- 16- 5-A
WB8AYC 6- 6- 1-B
W8RQV 4- 2- 1-C
W8CCI (W8s OGW ULC WA8s WMH WXT ZKE WB8s UTZ GMZ NUW)
40,888-516-76-ABCD
K8LEE (+WA8ONQ)
24,156-396-61-AB
W8KPY (+G3PAC)
18,395-283-65-AB
WB8IGY (+WA8NJR)
11,176-254-44-AB
W8VVL/8 (W4PH K8DGE W8s BZN HQK WA8DED WN8MIV)
5088-159-32-AB
WB8NJI (+WA8IAA WB8s KQB KRY)
4488-136-33-AB
W8OIW (+WB8GSD)
2268- 81-28-AB
WB8ITW/8 (+WA8ZNC WB8ITV)
884- 52-17-AB

West Virginia

WA8HSY 1725- 69-25-A
WA8FSE/8 (W8AEC WB8s EKG IJW NQB)
4200-140-30-AB
9

Illinois

K9HMB 10,988-162-67-ABD
WA9IEF 8213-191-43-AB
WB9FDP 2240- 70-32-A
W9YYF 2117- 73-29-B
K9DTB 1950- 75-26-AB
K9AJP 1275- 85-15-B
W9IFA 819- 39-21-AB
W9IVI 804- 67-12-B
W9ABA 754- 58-13-AB
WB9LOZ 555-111- 5-B
WB9JED 160- 32- 5-AB
K9DNW 128- 32- 4-AB
WB9AXH 26- 13- 2-B
W9BGX (WA9s ULU ZPL)
2884-103-28-AB

Indiana

K9QCB 8784-180-48-ABCD
K9UVJ 8360-179-44-ABC
K9UNM 592- 37-16-B
WB8HUC/9 (WB8s GEU GEX GEY GFA)
4851-147-33-AB

Wisconsin

W9JDJ 11,832-203-58-ABD
K9OXY 2728- 62-44-AB
W9NHE 560- 70- 8-B
K9REE/9 384- 32-12-A
WB9EPZ 210- 30- 7-A
W9DJ 40- 10- 4-B
Ø

Colorado

WØKJY/Ø 3630-110-33-AB

Kansas

WAØVJF 4120-103-40-A
WBØBBC 1080- 60-18-A
WBØITA 792- 44-18-AB
WBØCTQ 187- 17-11-A

Minnesota

WBØIWG 3705- 95-39-A
WAØSBZ 3534- 93-38-A
WBØFVL 2112- 64-33-A
WØOHU/Ø (+K9s AKS CHZ UYK WBØBBM)
21,420-302-70-ABD

Missouri

KØTLM 7140-140-51-AB
KØLCB 21- 7- 3-AB

North Dakota

KØALL 4662-111-42-A
WØGNS 2660- 95-28-A

South Dakota

WBØELN 6401-173-37-AB

Check Logs

W1ENZ, W1EUJ, K2LGJ, WB4WKE, WB8NTY. QST

DX Competition

(Continued from page 68)

CHECK LOGS

(W/VE PHONE) VE1AIH, VE4SD, W2EU/1, W2EGI, WB2MEX, W3DS, W3GRK, WB4JBP, WB4RUA, W5SU, W6HPB, W8EQG, W8MBB, WA9GFR, (W/VE CW) W2EU/1, W2EGI, W2UKH, W3CTE, W3DS, W3FBK, W3GOC, W3LCX, W4ZC, WA4MES, W6EZS, W7IWY, W8CL, WB8NTY, W2UJ/9, WB9DDR. (DX PHONE) CR6OZ, CR7AF, C29ED, F6BJA, F9OW, G5BAU, HI8XVM, HK5AIT, OD5EJ, OH2PB, OH7RF, PAØGN, PAØNMH, PAØTV, SM2COR, SM5CSS, SM5CVC, SM5GA, SP5BSV, SP9-2220, UK3LAC, UK4WAC, YB5AAQ, YV1KZ, ZB2CO. (DX CW) C29ED, DK5OS, DK5RY, DL1YB, DL6WD, DM2CHN, DM2CYO, DM3TF, DM3UEJ, DM3XHF, DM3YTF, DM3ZMJ, F9QL, G5BAU, HA4XT, KL7FA, LA1K, LA2LI, LA4KQ, LA5KO, LA8XM, OH2BQ, OH5YX, OH7RF, OH7SY, OK1AMS, OK1US, OK2BBQ, OK2BGR, OK3KAP, OK3SLH, PAØTO, PAØWAC, SK5AA, SM5BNX, SM5CPC, SM5DEN, SM5TK, SM6BZE, SM6CZU, SM7EHL, SM7FYM, SP2AVE, SP3CDQ, SP7CLB, SP9BDQ, UA1WAR, UA3DAO, UA3LM, UA3MV, UA3TAM, UA4DK, UA6AAM, UA6AJG, UA6NX, UA9VQ, UAØDL, UAØDGM, UAØWAB, UAØYAF, UB5FAB, UB5HN, UB5NA,UC2009290, UC2-009-315, UK3DAA, UK3DAX, UK3LAC, UK4WAC, UK5ICA, UK6LAZ, UKØAAC, UL7JAE, UO5OAL, UP2DZ, UP2OO, UV3DN, UV3GW, UV9DU, UV9IX, UW6CV, UW6MP, UY5JW.

It Seems . . .

(Continued from page 9)

election. Competition provides a *choice*, a chance for expression of each individual members's opinion. And it is even more flattering and reassuring to an incumbent to be reelected in balloting than to be declared elected by the Executive Committee in the absence of competition. A solid base hit is more satisfying to a baseball player, and better for the game, than a walk – though each has the same result of getting the man on base.

Finally – where there is more than one nominee for an office, we'll mail ballots during the second week of October to all Full Members of record on September 20. That is, we'll mail them, the computer willing! Every year we have a few non-deliveries; with the recent conversion to data processing, we must expect a few more failures than in past years. So if there is balloting in your division and you haven't received your envelope by November 1, let us know, including if possible the long number which appears at the top of your *QST* address label. QST

AMATEUR RADIO PUBLIC SERVICE

NTS RACES AREC

In the Public Interest, Convenience, Necessity

CONDUCTED BY BILL MANN,* WA1FCM

PROGRESS REPORT – DNTS

THE DAYTIME NATIONAL TRAFFIC SYSTEM, the new daylight operating supplement to the seasoned evening setup of the National Traffic System, made its debut in the early months of this year. March saw many of the proposed daytime region nets begin operation as well as the national-level net, the Continental Traffic Net (CTN). Leadership had been appointed in the eastern and western parts of the US and the DNTS plan outlined in December 1972 *QST* began to take shape.

So now, after several months, DNTS is a smooth, well-established organization, right? Not yet. At this writing, most of the Central Area (states in the Central Time Zone) is still without appointed leadership, volunteers willing to establish DNTS region nets. Some region nets are shorthanded and have difficulty filling NCS and CTN liaison schedules with different operators. Many section nets are not supplying liaison stations to their region nets. We're off to a rather slow start.

So what has been accomplished? Much of the groundwork for a *system* of nets operating during the daytime hours has been established. CTN is operational every day and has liaisons to most every region (even to some regions which do not have daytime region nets). Region net managers are establishing rapport with many section leaders and overseeing operations of their region nets. Many sections are taking an active role in supporting higher level DNTS nets.

* Assistant Communications Manager, ARRL.

The usual summer doldrums presented hardships for the DNTS nets. Traffic has been light, participants and prospective participants on vacation and band conditions rather poor. But DNTS nets did have an excellent opportunity to test "possibilities" of the daytime system under heavy traffic conditions. The National Scout Jamboree stations, KJ3BSA and KJ7BSA, used the Continental Traffic Net as an outlet for a large percentage of their traffic. The scout traffic followed normal DNTS routing: CTN to region nets and region nets to section nets for delivery. The large volume of traffic illustrated that a few procedures need improvement, but more importantly, that DNTS *does* work and works rather well.

Obviously, traffic is the lifeblood of any traffic net. We need more traffic. Without traffic, participants quickly lose interest, since it seems meaningless to show up on a regular schedule as a liaison station and receive very little traffic. With reasonable amounts of traffic, participant interest is maintained, more people are eager to become involved and more experience gained in handling traffic, experience vital in times of emergency.

The solution to the traffic problem is simple: more originations are needed. But to get more people to originate more traffic is not simple. The Continental Traffic Net is open to anyone who has formal (written) traffic. If you haven't already done so, get on CTN, 14,315 MHz daily at 1830 GMT (1730 GMT during daylight savings time), and send a message or two.

The National Traffic System was organized on a teamwork basis and the principle has been carried

Amateurs assisted in distributing boys to the 24 camps at the National Scout Jamboree - East at Moraine State Park, Pa, as the scouts arrived on Aug. 1-2. Mobile units throughout the park provided emergency communications and highway traffic reports. K3IXB is shown making one such report. *(Photo by WA3MWM)*

over to the Daytime supplement. The philosophy is that instead of the iron-man type of operation where one station or a few stations handle large volumes of traffic day in and day out, the traffic load is spread out among several stations, affording opportunity for more people to become involved in the "higher levels" of traffic handling. Schedules are established so that one station may be net control of CTN on, for example, Mondays and perhaps liaison from CTN to his (or her!) region net on Saturdays. Some may prefer only an NCS spot, others only liaison functions. The point is that each participant has a chance to be a part of an organized system of nets based upon when he can operate.

Such a system requires a greater number of people willing to spend an hour or two (more if desired) each week to assume traffic handling functions. *In the beginnings of DNTS some people* have been "forced" to hold down several functions each week. As more people become involved, the work will become more evenly spread.

It is the intent that DNTS nets will be the tightly-run, orderly nets presently exemplified by most of the evening NTS nets. This will require time and guidance by operators experienced in snappy net procedure. If a DNTS net doesn't sound just as you think it should, why not send a note to the net manager with your suggestions? The conscientious operator should do his share if he feels procedural changes are needed rather than simply complain, then twist the dial to a different frequency.

DNTS operation is off to a slow but good start through the efforts of many dedicated individuals. Activity is on the upswing. Much is being accomplished. As traffic increases and more people become involved working together for an efficient system of handling traffic during daytime hours, DNTS can and will attain a high level of public service performance. Want to join the team? — *WA1FCM*

New Heading

If you will look at the heading of this column, you will note a change in the identity of its "conductor." This is not so much an actual change as a reflection of an existing situation. For quite some time Bill Mann, WA1FCM, has been doing the legwork (including the dirty work) in compiling the column. It is time he receives the credit for it. As assistant communications manager in charge of the Public Service Branch of the CD, Bill is the nearest thing to what we used to call a "National Emergency Coordinator." WINJM will continue to contribute to the column, by writing lead items.

Traffic Talk

■ Several letters have been received recently from people who have been handling many messages which do not have telephone numbers. Do you include telephone numbers on all messages you originate (other than those to active amateurs)?

Some may say: "What difference does it make if there's no telephone number? It's simple to look it up or call directory assistance. Anyone can do that now by simply dialing 1, the area code and 555-1212. What's the problem?"

True, usually numbers are easily obtained. But isn't it even easier (and more thoughtful!) for the originator to obtain the number directly from the person wishing the message to be sent? In metropolitan areas, active traffic handlers may have several messages to deliver each day. Unquestionably, their job is made easier by the inclusion of telephone numbers. Occasionally, a telephone number is not listed in the same name as the addressee. The originator is in the best position to obtain the correct telephone number.

This is not to imply that the delivering station should be lax in delivering a message if no phone number is included. It is his responsibility to expedite the message whether by phone, mail or perhaps personal contact. However, it is the originator's responsibility to include all information which will assist in the delivery of a message.

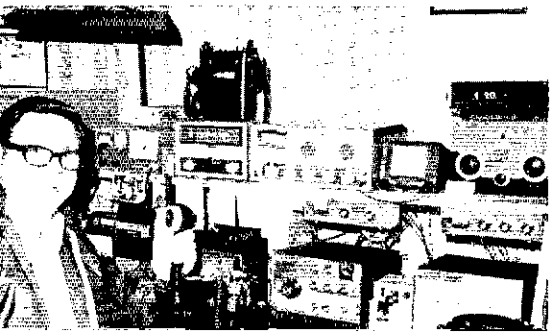
The telephone number is important. If the originator does not make a concerted effort to include a complete address with a telephone number, he may find that a receiving station may not make a concerted effort to deliver his message.

Number please!

■ *Procedural points.* When using ARRL Numbered Radiograms, the numbers should always be spelled out. Aside from causing possible confusion as to which text is being referred to, the non-spelling of numbers may cause discrepancies in the check of the message. The text: "ARL TWENTY FOUR" has a check of ARL 3, whereas the text: "ARL 24" (incorrect) would be check ARL 2.

When passing an ARL (not ARRL!) message to an unfamiliar station who may be new to traffic handling, it is best to check with him to ascertain that he does have a list of ARL texts and understands their use. The list and instructions are contained in the back of each ARRL Log Book and available from ARRL (CD Form 3) free upon request (with stamped, addressed envelope, please).

■ *National Traffic System.* Several NTS topics were covered at a TEN meeting held at a hamfest



Tennessee's SEC is WB4DYJ. Milo was first licensed in 1966 and was EC of Anderson Co. for three years before being appointed SEC last March.

The New York State Phone Traffic and Emergency Net held its annual Policy Committee Meeting in Syracuse on April 14. In attendance were (standing, from left): WA2LUF, WA2IYB, K2YJR, WA2RSP, WA2ABL, WA2NKI, WB2WFJ, WA3QFA and WA2CEA; (seated) WB2QAP, Manager; WB2HLV, Sec./Treas.; WB2LXC, Asst. Sec.; and K2VCZ, Chairman. *(Photo by WB2HLV)*

at the International Peace Gardens (ND) with more than a dozen traffic men in attendance. The PAN report was submitted by WB6AKR filling in for W6BNX. K7NHL has been appointed as new PAN manager. More NCSs are needed on CTN. Newly appointed D1RN manager WA1PHF (WB2CHO/1, opr.) submitted the first D1RN report. WA2s LIK TDW TRK, WB2ADW have earned 2RN certificates, a second annual certificate went to W2CLW and third annuals to W2ZEP and WB2OYV. WA4ABY and WB4GHD earned 4RN certificates. Conditions forced RN5 to return to 80 meters early this year. WA9EED looks forward to winter conditions and end of the vacation season in hopes 9RN will return to normalcy. Summertime conditions forced TWN to 40 rather than 80.

July Reports

Net	*Sessions*	*Traffic*	*Rate*	*Avg.*	*% Rep.*
EAN	31	1342	1.034	43.3	97.3
CAN	31	960	.726	31.0	98.4
PAN	31	763	.678	24.6	98.9
CTN	27	150	.123	5.6	53.0
1RN	62	486	.346	7.8	93.3
D1RN	18	41	.179	2.3	21.1
2RN	62	479	.633	7.7	99.7
3RN	62	524	.563	8.5	91.9
D3RN	30	233	.392	7.7	96.0
4RN	45	366	.274	8.1	67.5
D4RN	4	4	.082	1.0	8.3
RN5	62	730	.326	11.8	93.2
RN6	62	560	.403	9.0	100.0
RN7	61	273	.340	4.5	58.3
8RN	50	256	.294	4.1	71.5
D8RN	20	34	.143	1.7	44.1
9RN	62	363	.383	5.6	89.9
TEN	62	477	.362	7.7	82.4
ECN	62	144	.253	2.3	87.1
TWN	62	268	.181	4.3	52.6
TCC Eastern	111[1]	507			
TCC Pacific	111[1]	536			
Sections[2]	3029	11490			
Summary	*3935*	*20986*	*EAN*	*5.3*	
Record	*5164*	*26748*	*1.267*	*15.2*	

[1] TCC functions not counted as net sessions.

[2] Section and local nets reporting (90): APSN (AB), MIN (MB), APN (Mar), CM GBN ODN OQN (ON), WQ-V/UHF (PQ), AENB AEND AENM (AL), ATEN HARC (AZ), NCN NEN SCN (CA), CN CPN NVHFTN (CT), DFN-2 FAST FMTN FPTN GN NFPN OFN QFTN TPTN VEN (FL), GASSBN GSN (GA), IMN (ID,MT), ILN (IL), QIN (IN), KPN KSBN QKS QKS-SS (KS), KNTN KSN KTN KYN (KY), LTN (LA), SGN (ME), MDCTN MDD (MD-DC), EMN WMN WMPN (MA), MSPN PAW (MN), HBN JC2AN MOAREC MOSSBN WEN (MO), MTN (MT), NJN (NJ), NLI NYCLI-VHF-TEN NYS (NY), CN (NC,SC), BNR COAREC-TEN OSSBN (OH), OLZ OPEN OTWXN SSZ (OK), BSN OSN (OR), EPA GCRN KSSN PTTN (PA), TNN (TN), TEX TEX-SS TTN (TX), BUN UCN (UT), VN VRN VSBN (VA), NSN WSN (WA), BFN BWX WIN WSBN (WI).

Transcontinental Corps

In July, W3EML issued TCC-Eastern certificates to WA2CNE and WB4SGV. K5MAT issued a TCC-Pacific certificate to WB6AKR.

Area	*Functions*	*% Successful*	*Traffic*	*Out-of-Net Traffic*
Eastern	124	89.5	1415	807
Pacific	124	89.5	1073	536
Summary	*248*	*89.5*	*2488*	*1043*

The TCC roster (July): Eastern Area (W3EML, Dir.) - W1s BJG EJI NJM OYY, W2s FR GKZ, WA2s CNE ICU/4 UWA, W3EML, K3s CB MVO, WA3OGM, W4s SOO UQ ZM, K4s FAC KNP, WB4s OMG SGV, WRs PMJ VDA/4, K8KMQ, WA8PIM. Pacific Area (K5MAT, Dir.) - W5RE, K5MAT, W6s BGF FQT IPW ISC MLF RSY VNQ VZT, WA6DEJ, WB6s AKR VKV, W7s BQ DZX EM GHT KZ PI, K7s NHL QFG, WØLQ, KØOTH, WBØAXW.

Independent Net Reports (July)

Net	*Sessions*	*Traffic*	*Check-ins*
Clearing House	26	542	382
20 Meter ISSB	21	1233	303
North American Traffic	25	246	444
Ohio Valley Teenage	31	128	229
Hit & Bounce Slow	18	43	125
IMRA	48	717	1676
Northeast Traffic	29	144	187
40 Meter Sideband	20	1029	199
7290 Traffic	43	478	1564

Public Service Diary

■ Between May 24 and July 13 San Antonio (TX) amateurs reported 6 traffic accidents, 8 traffic hazards, one fire and a request for medical

BRASS POUNDERS LEAGUE

Winners of BPL Certificates for July Traffic

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
W3CUL	284	929	841	67	2121
K∅ONK	151	479	455	13	1098
W∅WYX	56	441	184	313	994
WA8MCR	17	313	263	50	643
WA3IYS	34	303	270	14	621
W3VR	149	237	209	12	607
WA2CNE	48	282	205	56	591
W1BFY	116	206	194	22	538
WA9EED	35	336	150	10	531
W3EMI	46	282	185	5	518
W6RSY	57	270	149	39	515

BPL for 100 or more originations-plus-deliveries

WA1KHP 217	K4WKY 122	WA3SWS 102
WA3NLP/3 155	WB9VHL 117	WB4MWC 102
WB∅GVR 153	WB4ZMK 115	W8QCU 102
WA8WZF 141	WA3QLG 110	WB2NOM 101
K6UYK 139	WN∅HTR 109	WA3PZO 101
WA3EOP 130	W∅OYH 106	W8QCU(June)112
	WA3ATQ 105	

BPL Medallions (see July, 1968 *QST*, p. 991 have been awarded to the following amateurs since last month's listings: WB4ZMK, WA9EED, K9HDP.

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.

assistance through the WA5VKZ autopatch repeater. - (WA5ABA, EC Harris Co.)

■ The Boeing Employees Amateur Radio Society Emergency Group was requested to assist in a search for a young man lost in the Green River watershed area near Enumclaw, WA on June 5. At 1100, WA7JBM activated K7NWS/7 from search headquarters and ran phone patches to Seattle and Tacoma for search units until 2200. The search continued the following day. More than 50 phone patches were handled with the help of W7s CJL QCV. - (W7RJW, EC BEARS)

■ On June 5, WB5GBR and WA5TCM noticed smoke coming from a motel room in Dallas, TX, and alerted police through the WA5VKW repeater, then carried a man from the room. - *(The Mike)*

■ While driving in San Antonio at about 0200 on June 14, WB5HBL heard gunshots and saw an off-duty policeman chasing three subjects. W5PKK used the autopatch and called police. The officer used WB5HBL's rig to request help directly from the police control room. Assistance arrived within two minutes. - (WB5CIT)

■ At 2100 on June 16, W5PKK came upon an automobile accident which had just happened. Two adults and a child had been thrown from the cars. Police were summoned via the WA5VKZ repeater and arrived in about 10 minutes with ambulances. - (WB5CIT)

■ While vacationing in Calvin Coolidge State Park in Vermont on June 30, WA1LAD and 15 other families became stranded during torrential rain. Since the park ranger's telephone was out of service, WA1LAD contacted WA3KZQ on EastCARS who reported to Pennsylvania police and in turn to Vermont police. Traffic was also handled to relatives of marooned families during the three day isolation. - (W5IK)

■ Assistance by the BEARS Emergency Group was requested for a search for evidence of a skier who had disappeared. On June 30, W7QCV activated K7NWS/7 and maintained contact with W7CJL and WA7s HKD FHG. Operation, centered in Snoqualmie Pass, WA, began at 0900 and concluded at 2100. - (W7RJW, EC BEARS)

■ During the month of July, Harris Co. amateurs reported 4 traffic accidents and summoned one ambulance using the facilities of WR5AAA. Participating amateurs were: K5HWR, WA5s AZD WCT, WB5s ETS IZD. - (WA5ABA, EC Harris Co.)

■ At 2210 on July 7, W8YML and W8AUV notified EC WB8IPV of a lost child in Newtown, OH, and that searchers and communications were needed. A call was put out on the WB8NON and WB8CRS repeaters for help. Thirty-five mobiles responded and were directed to the scene by K8DAJ and WB8NCS. A deputy sheriff gave the child's description over the repeaters. Amateurs were assigned to search parties with police and firemen. The child was found at a nearby house at 2315. - (WB8IPV, EC Hamilton Co.)

■ While in contact on 40 meters July 11, a weak station called W6CBX asking for a phone patch to the Coast Guard. W6CBX placed the call and relayed information indicating the boat was experiencing high winds and heavy seas but needed no assistance at the moment. After concluding the call, W6CBX tried unsuccessfully to contact the boat. No further information was received. - (W6CBX)

■ On July 16, all communications at the National Weather Service at Hondo, Texas, failed because of flooding. W5IXQ/mobile checked into the 7290 Traffic Net and WA5FJN, assistant EC Harris Co., established contact with the weather service in Houston for weather observation transmittal back to the San Antonio area. As a result of the link, a flash flood warning was issued for Edwards Co. Later, W5IXQ set up a 75-meter link with WA5UYE until normal means were restored. - (WA5ABA, EC Harris Co., WA5RNV)

■ While operating mobile on July 17, W8HQQ and K8CLA were notified via the WB8NON repeater of a car which had been pushed off the road and abandoned near W8HQQ's Finneytown, OH home. W8HQQ autopatched the police and determined that the car had been stolen. Another amateur spotted two "suspects" in the area and joined W8HQQ and K8CLA in "surveillance" until police arrived. - (WA8COA, SEC OH)

■ On July 18, at 0144Z, WB4VYU was monitoring the WR4AAF repeater in Jacksonville, FL, when he was called by WB4WNO/mobile

The Green & Gray Gorilla Net of San Mateo Co., California conducts an occasional hidden transmitter hunt on two meters. The winners of a recent hunt, complete with the champion antenna, are W6BXQ and XYL WA6GWH.

Public Service Honor Roll July 1973

This listing is available to amateurs whose public service performance during the month indicated qualifies for 30 or more total points in the nine categories below, as reported to their SCM. A delineation of the points awarded for each function is given in the category key at the end of the Honor Roll listing. Please note maximum points for each category. Those making fewer than 45 points are listed with point totals only.

Category	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	
Max. Pts.	*10*	*10*	*12*	*12*	*12*	*20*	*3*	—	*5*	*Totals*
WB4SVH	10	10	12	12	12	7			5	68
WA5NYY	10	10	12	12	12	2			5	63
WA1MSK	10	10	12	12	12				5	61
W2RQE	10	10	12		12	12			5	61
W5GHP	10	10	12	12	12				5	61
W7OCX	10	10	12	12	12				5	61
WA1LIR	10	10	12	12	12	4				60
WA2CNE	10	10	12	12	12		3			59
WA3QLG	10	10	12	12	12		3			59
W4OGG	10	10		12	12	15				59
WB5EIN	10	10	12	9	12				5	58
WA1QZH	10	10	12	12	12					56
WB2AEH	10	10	12	12	12					56
WB2CHY	10	10	12	12	12					56
WB2OYV	10	10	12	12	12					56
WA2TRK	10	10	12	12	12					56
WA3DUM	10	10	12	12	12					56
WB4VYU	10	10	6	12	12	6				56
WB5AMN	3	10		12	6	20			5	56
WB5EEY	10	5	12	12	12				5	56
WB8NRC	10	10	12	12	12					56
WBØHBM	10	10	12	12	12					56
WA9EED	10	10	12		12	1	3		5	53
WA9QVT/4	10	10	12	9	12					53
WA6TVA	10	10	3	12	12				5	52
W8QCU	10	10	12		12		3		5	52
WB4FDT	10	10	12	6	12					50
WB2FWW/8	10	10	12		12				5	49
W2OE	10	10	12	12					5	49
K3KAJ	10	6	12	12	9					49
K3OCB	10	10	12	12		5				49
K7QUF	10	10	12		12				5	49
K8MLO	10	10		12	12				5	49
WB9KVN	10	10	12		12				5	49
VE3FQZ	10	10	12	12					5	49
WB2NOM	10	10	12		12		3			47
WA8UPI	8	10		12	12				5	47
VE3GIG	10	10	12	3	12					47
WA1PIU	10	7	12		12				5	46
WA3ATQ		10			12	20	3			45
WBØCZR	10	10	12		12	1				45

WA2AYC	44	W2RUF	*39	K4KNP	34
K3OIO	44	K5MAT	39	WB4KSL	34
K3TNM	44	W5RB	39	WB5CSO/5	34
W5ABQ	44	WB9FOT	39	WB5FML	34
WB5DLW	44	W9MUC	39	K6GMI	34
K5YTA	44	VE3AWE	39	W6YBV	34
W7IEU	44	VE3DPO	39	WB8ALU	34
WB8MJI	44	VE3GFN	39	WA8BCX	34
KØBIX	44	WA3EOP	38	WB8KKI	34
WBØBIY	44	WB4EKJ	38	WB8KZD	34
WBØGVR	44	WB5FMA	38	W9EI	34
WBØHSZ	44	WA5YEA	38	WB9FHL	34
VE3FRG	44	W8IMI	38	W9FWH	34
VE3SB	44	K1YMH	36	K9HDP	34
WB4NIR	43	WB2FNK	36	W9KRR	34
WA8ETX	43	WA3MQP	36	W9QLW	34
KØMRI	43	WB6AKR	36	WBØCCB	34
WB5DBK	42	W6LYY	36	WAØFMD	34
WA5VBM	42	WB8IFT	36	WBØHCK	34
W6BGF	42	WB8NCD	36	VE3EHF	34
K6NCG	42	W1UBG	35	WA2EXX	33
W8GLC	42	K4BSS/4	35	WA3RKH	33
WB9HEG	42	W6DEF	35	WB8HWE	33
WØOYH	42	W7BQ	35	VE3GT	33
WA2ICU/4	41	WA7MEL	35	WA2UOO	32
WA3QDH	41	WB8KXV	35	WB4PQD	32
W6INH	41	WB9CAC	35	WB4SKJ	32
W6OAW	41	WA1MBK	34	W6RFF	32
W7WAH/5	41	WA1PHF*	34	WA7QAR	32
WØOF	41	W2FIR/5	34	KØBAD/4	32
WB8AYC	40	WB2VEJ	34	W4UQ	31
K1ONW/5	39	WA3QIA	34	W7QGP	31
W2FR	39	WB4DXN	34	WA1NLD	30
WB2LZN	39			W2MTA	30

*Denotes multioperator station.

Category Key. (1) Checking into cw nets, 1 point each; (2) Checking into phone/RTTY nets, 1 point each; (3) NCS cw nets, 3 points each; (4) NCS phone/RTTY nets, 3 points each; (5) Performing assigned liaison, 3 points each; (6) Legal phone patches, 1 point each; (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.

reporting an automobile-motorcycle accident. WB4VYU immediately called police and assistance was provided within three minutes. - (WB4VYU)

■ WA7KQN/mobile near Everett, WA, on July 23, came upon a two-car accident with injuries. WA7KQN called on two meters and was answered by K7NQR who called police. Police were immediately dispatched. - (W7IEU, EC/RO Snohomish Co.)

■ When a young girl was lost in Tolland, CT, on July 26, 24 members of the Pioneer Valley Repeater Assn. set up a link the next day between rescue headquarters and searchers. Using the WA1KGQ repeater as a coordination frequency and simplex as a relay to searchers, the base station was able to follow all activities for the two days of operation. - (WA1IGQ)

■ On July 28, members of the Tompkins Co. Radio Club set up a 2-meter link between first aid tents and the Watkins Glenn Rock Festival (NY) and the Schuyler Co. Hospital. During the all-night operation, information on people being ferried to the hospital and orders for medication and supplies were handled. Participants were: WA2s ECQ WXZ, WB2s TNL TQF, WA3AYX/2. - (WB2TQF, EC Tompkins Co.)

■ At 2330 GMT, on July 25, WA9MZS heard OA4CCF relaying a request for a rare, life-saving drug to WB4ATX. Within two-and-a-half hours, WA9MZS transported it to the airport for flight to Peru. - (WA9MZS)

■ Twelve amateurs participated in a search for a drowning victim on July 30 and 31 near Owensboro, KY. The following day, another search for another drowning victim was conducted involving 7 amateurs. - (W4OYI)

■ Heavy rains in the Birmingham, AL, area on July 31 caused several accidents. WB4JVY/mobile came upon a wrecker pulling a truck from a ditch and blocking traffic. WB4ZAG answered the call on the WB4QEX repeater and alerted police who acted promptly.

WA9RDF/mobile spotted an accident at a dangerous intersection, called W4CJZ via WB4QEX, and the accident was reported to police.

Also on July 31, K4AOZ/mobile reported an accident in Vestavia via WB4BZD through the repeater. - (K4AOZ)

■ On Aug. 5, WB4TUP's grandfather was involved in an auto accident. WA4ZUU called police while K4RMU contacted the victim's son. - (WB4TUP, EC Hillsborough Co., FL)

■ Because of a death in the family, it became necessary to notify a close relative who was visiting in Houston, TX, on Aug. 6. All normal means of

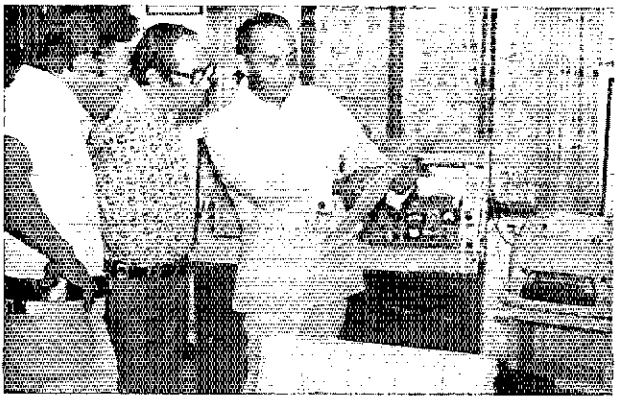
(Continued on page 111)

Some QST Abbreviations used in Text and Drawings

A – ampere
ac – alternating current
A/D – analog-to-digital
af – audio frequency
afc – automatic frequency control
afsk – audio frequency-shift keying
agc – automatic gain control
alc – automatic load (or level) control
a-m – amplitude modulation
anl – automatic noise limiter
ARC – amateur radio club
AREC – Amateur Radio Emergency Corps
ARPSC – Amateur Radio Public Service Corps
ATV – amateur television
avc – automatic volume control
bc – broadcast
BCD – binary-coded decimal
bci – broadcast interference
bcl – broadcast listener
BFO – beat-frequency oscillator
BPL – Brass Pounders League
CB – Citizens band
CCIR – International Radio Consultative Committee
ccw – counterclockwise
c.d. – civil defense
CD – Communications Department (ARRL)
CMOS or COSMOS – complimentary-symmetry metal-oxide semiconductor
coax – coaxial cable, connector
COR – carrier-operated relay
CP – Code Proficiency (award)
CR – cathode ray
CRT – cathode-ray tube
ct – center tap
CTCSS – continuous tone-controlled squelch system
cw – continuous wave (code), clockwise
D/A – digital-to-analog
dB – decibel
dc – direct current
DF – direction finder
DOC – Department of Communications (Canadian)
dpdt – double-pole double-throw
dpst – double-pole single-throw
dsb – double sideband
DTL – diode-transistor logic
DX – long distance
DXCC – DX Century Club
EC – Emergency Coordinator
ECO – electron-coupled oscillator
ECL – emitter-coupled logic
EME – earth-moon-earth
emf – electromotive force (voltage)
FAX – facsimile
FCC – Federal Communications Commission
FD – Field Day
FET – field-effect transistor
FF – flip-flop
fm – frequency modulation
FMT – frequency measuring test
fsk – frequency-shift keying
GDO – grid-dip oscillator
GHz – gigahertz
GMT – Greenwich Mean Time
gnd – ground
H – henry
hf – high frequency
HFO – heterodyne frequency oscillator
Hz – hertz
IARU – International Amateur Radio Union
IC – integrated circuit
ID – inside diameter
i-f – intermediate frequency
in./s – inch per second
IRC – International Reply Coupon
ITU – International Telecommunication Union
IW – Intruder Watch
JFET – junction field-effect transistor
k – kilo
kc – kilocycle
kHz – kilohertz
kW – kilowatt
LED – light-emitting diode
lf – low frequency
LMO – linear master oscillator
LO – local oscillator
lsb – lower sideband
LSB – least-significant bit
LSD – least-significant digit
LSI – large-scale integration
luf – lowest usable frequency
mA – milliampere
MARS – Military Affiliate Radio System
Mc – Megacycle
mf – medium frequency
MG – motor-generator
mH – millihenry
MHz – Megahertz
mic – microphone
mix – mixer
MO – master oscillator
MOSFET – metal-oxide semiconductor field-effect transistor
MOX – manually-operated switching
ms – millisecond
m.s. – meteor scatter
MSB – most-significant bit
MSD – most-significant digit
MSI – medium-scale integration
muf – maximum usable frequency
MUX – multiplex
mV – millivolt
mW – milliwatt
nbfm – narrow-band frequency modulation
n.c. – no connection
NC – normally closed
NCS – net control station
NO – normally open
npn – negative-positive-negative
NTS – National Traffic System (ARRL)
OBS – Official Bulletin Station
OD – outside diameter
OO – Official Observer
op amp – operational amplifier
OPS – Official Phone Station
ORS – Official Relay Station
osc – oscillator
OVS – Official VHF Station
oz – ounce
PA – power amplifier
pc – printed or etched circuit board
PEP – peak-envelope power
PEV – peak-envelope voltage
pf – picofarad
PIV – peak-inverse voltage
pk – peak
pk-pk – peak-to-peak
PL – private line
PLL – phase-locked loop
pm – phase modulation
pnp – positive-negative-positive
pot – potentiometer
PRV – peak-reverse voltage
PSHR – Public Service Honor Roll
PTO – permeability-tuned oscillator
PTT – push-to-talk
RACES – Radio Amateur Civil Emergency Service
RCC – Rag Chewers Club
rcvr – receiver
rf – radio frequency
rfc – radio-frequency choke
RFI – radio-frequency interference
RM – Route Manager
RM-(number) – FCC rulemaking
rms – root-mean-square
RO – Radio Officer (c.d.)
RST – readability-strength-tone
RTL – resistor-transistor logic
RTTY – radio teletype
s.a.e. – self-addressed envelope
s.a.s.e. – stamped s.a.e.
SCM – Section Communications Manager
SCR – silicon-controlled rectifier
SEC – Section Emergency Coordinator
SET – simulated emergency test
S.M. – silver mica (capacitor)
SNR – signal-to-noise ratio
spdt – single-pole double-throw
spst – single-pole single-throw
SS – Sweepstakes (contest)
ssb – single sideband
SSTV – slow-scan TV
SWL – short-wave listener
SWR – standing wave ratio
sync – synchronous, synchronizing
TCC – Transcontinental Corps
TD – transmitting distributor
TE – transequatorial (propagation)
tfc – traffic
tpi – turns per inch
T-R – transmit-receive
TTL or T^2L – transistor-transistor logic
TTY – Teletype
TV – television
TVI – television interference
UJT – unijunction transistor
usb – upper sideband
uhf – ultra-high frequency
V – volt
VCO – voltage-controlled oscillator
VCXO – voltage-controlled crystal oscillator
VFO – variable frequency oscillator
vhf – very high frequency
vlf – very low frequency
VOM – volt-ohm-milliammeter
VOX – voice-operated break-in
VR – voltage regulator
VTVM – vacuum-tube voltmeter
VXO – variable crystal oscillator
W – watt
WAC – Worked All Continents
WAS – Worked All States
wbfm – wide-band fm
wpm – words per minute
ww – wire wound
wv – working voltage
xtal – crystal
μ – micro (10^{-6})

IARU News

INTERNATIONAL AMATEUR RADIO UNION, THE GLOBAL FEDERATION OF NATIONAL NON-COMMERCIAL AMATEUR RADIO SOCIETIES FOR THE PROMOTION AND CO-ORDINATION OF TWO-WAY AMATEUR RADIO COMMUNICATION



Philippine Amateur Radio Association president DU1CP (left) and treasurer DU1CMT were treated recently to a demonstration of radioteletype at the station of DU1PT in Manila.

NEW ZEALAND REVISES LICENSING STRUCTURE

Three grades of amateur operator's license are available in New Zealand. Grade III is issued upon passing a written test on radio theory and operation, and on regulations, but no code test is involved; it carries full vhf telephony privileges. Grade II involves a similar exam, but with the addition of a 12 wpm code requirement; operation on all bands but 7, 14, 21, and 28 MHz is permitted. The Grade I certificate has in the past involved a similar written test, but with a 15 wpm code requirement, and has carried full amateur operating privileges.

At the request of the *New Zealand Association of Radio Transmitters*, the requirements and eligibility for a Grade I certificate were revised on February 23. The code speed for Grade I has been reduced to 12 wpm. However, amateurs desiring to qualify for the Grade I certificate are now required to have operated in the 3.5 MHz band as Grade II for at least a year and to have had at least 50 contacts in this band. The 12 wpm code test is readministered to the amateur when he applies for Grade I.

VHF REPEATERS IN REGION 1

The August 1973 edition of the IARU *Region 1 News* contains a listing of 202 repeaters in operation, or proposed, in Region 1 (Europe, Africa, the Middle East, and the European portion of USSR). The vast majority (171) are on 144 MHz, with the remainder on 430 MHz. (In Region 1, two meters extends from 144 to 146 MHz and the 70 cm. band is only 10 MHz wide – 430 to 440 MHz.) With the exception of one in Haifa, Israel, all of the listed repeaters are located in Europe. All use fm, though OKØA near Prague is a linear repeater which will accept any mode up to 15 kHz wide.

Ten countries are represented in the tabulation: Austria, Belgium, Czechoslovakia, Denmark, Germany, Israel, Norway, Sweden, Switzerland, and the United Kingdom. Germany leads the list with 104 repeaters, including a pair of machines which may be linked together to provide communication across the 180 km separating West Berlin from the Federal Republic.

Repeater standards adopted for Region 1 call for inputs every 25 kHz from 145.025 to 145.225 MHz and outputs 600 kHz higher, for a total of nine channel pairs. Most German repeaters predate this standard, and use input/output separations on the order of 1.6 MHz; however, these machines are in the process of being converted to 600 kHz separation. On 430 MHz there are an additional nine channel pairs, with inputs every 50 kHz from 431.050 to 431.450 MHz and outputs 7.6 MHz higher.

Interest in vhf repeaters and fm continues to increase at a rapid rate in Region 1. For example, a major article on the subject appears in the June issue of *Radio ZS*, official organ of the *South African Radio League*. QST

In conjunction with his attendance at the IARU Region 2 conference in Santiago, Chile, IARU president WØDX visited the *Radio Club Argentino* and its headquarters station, LU4AA, in April. Here, OM Denniston tries his fist on an antique telegraph sounder while (l-r) LU6ACY, LU6EAM, and LU6DMQ look on.

Hamfest Calendar

OCTOBER

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

California – The Foothills Amateur Radio Society's Annual Auction is 7 PM on Friday, October 26 at the cafeteria, Ampex Corporation, 401 Broadway, Redwood City, CA.

Louisiana – The New Orleans Hamfest is October 6 and 7. Contact K5FVA for info.

Maryland – The Foundation for Amateur Radio's Annual Hamfest is at the Gaithersburg Fairgrounds on Sunday, October 21, Gaithersburg, MD. Large flea market, food service, exhibits, ladies events, supervised children's program. Main events indoors, picnic grounds, free parking. Rain or shine. Participation fee $1.50; sales space $5. Talk-in service provided. Nearby motel rooms available. For info write: Bill Miller, K4MM, 10919 Woodfair Rd., Fairfax Station, VA, 22039 or call (703) 893-2450.

Michigan – The 19th Annual VHF Conference is October 13, at Western Michigan University, Kalamazoo. Flea Market, speakers, dinner. Write: W8DF, VHF Conference, PO Box 934, Battle Creek, MI 49016.

Minnesota – The Annual Southern Minnesota Swapfest is October 6, from 9 AM to 5 PM. Trading, meetings. Waseca, MN. Talk-in 146.94 and 3925.

New York – The 3rd Annual Chautauqua County Amateur FM Association Auction, Shores Acres Boat Yard, Bemus Point, NY is Saturday, October 13 at noon. For details write: Robert Greenwald, WB2YQO, Rt. 2 Box 176, Jamestown, NY 14701.

Tennessee – The Music City Hamfest is October 21 at Lock 2 Park near Opryland USA. Bring the family; many activities planned in Nashville.

Texas – The Terry County Amateur Radio Club's 19th Annual Brownfield Free Swapfest is October 14 in the National Guard Armory in Brownfield. No fees. Largest flea market in Texas. Free parking and trailer camping in Coleman Park next to the armory. Entertainment Saturday night. Buffet lunch at noon on Sunday. All amateurs, CBers and families welcome. Doors to Armory *open at 6:30 AM with Swapfest activities to 3 PM.*

Texas – The Tylrun Birthday Party is November 9, 10 in the Fort Brown Motel in tropical Brownsville. All you need is an exchange gift, max. $2. Hospitality room open Friday afternoon and again Saturday morning for coffee. The fiesta begins Saturday morning with games followed by a delicious Mexican luncheon for $3. A shopping, sightseeing, tour of Matamors is also available for a small fee Sat. afternoon. For info write: Sue Rich, WB5CUR, PO Box 392, Los Frenos, TX 78566.

50 Years Ago this month

October 1923

. . . "Brown, Darne & Basim" may sound like a law firm but is really the three principals at 3BWT, who describe a "real" short-wave transmitter for 150 to 100 meters (and maybe as far down as 50). They also urge putting a series condenser in the antenna circuit to make it oscillate at the lower wave.

. . . ARRL's Traffic Manager Schnell announces more Transatlantic tests for late December. Emphasis this year will be on listening; last year, unrestrained transmitting caused so much local QRM there wasn't a chance to hear European stations. Autumn tests also being set up for spanning the Pacific.

. . . Don Mix, 1TS, gets through to 1ANA with word of safety of the MacMillan Arctic Expedition on the *Bowdoin* near the North Pole.

. . . Chief Engineer Tyzzer of Amrad proposes a "new radio system" where a low-frequency (say, 60 kc.) oscillator will modulate a higher frequency (say 1000 kc.) c.w. transmitter; the receiver would detect and rectify, passing the 60 kc. signal to a series of intermediate amplifiers, with a second (and oscillating) detector at 60 kc. Shades of the superhet!

. . . About 100 stations have signed up as "Official ARRL Broadcasting Stations" to spread late news around the country.

. . . A readership questionnaire produces the complaint on about half the responses, "Don't make your articles so technical."

25 years ago

October 1948

. . . Ten and twenty meters in the same rotary beam without switches or relays is described by W3NJE. The driven element is two half waves in phase on ten; a simple dipole on 20. Matching networks at the center of each parasitic element effectively short the two halves at 14 Mc.

. . . Teleprinter pioneer W2BFD summarizes growing interest in this comparatively new phase of ham activity, with details on the real essential – how to get a surplus printer.

. . . A "hot" converter for 220 Mc., described by W1PMS and W1CTW, uses triodes in key r.f. stages for better s/n ratios, grounded-grid circuits to inhibit feedback, and cross-neutralization to allow highest gain. Active stations in the east are all crystal controlled, and thus able to take advantage of such features.

. . . "The Transistor – an Amplifying Crystal" developed by Bell Telephone Laboratories, is briefly announced, with interesting prognostications – "it doesn't appear that there will be much use made of Transistors in amateur work," but also, "these clever little devices are well worth keeping an eye on."

. . . *QST*'s heavy promotion of s.s.s.c. is not universally accepted by members. Complaints to the editor charge "single-sideband gibberish and your present tactics of trying to shove it down the throats of the ham fraternity. . . quit trying to play god to the hams."

. . . A QSO Party will be held for the first time in connection with the Navy Day Receiving Competition, a forerunner of Armed Forces Day programs (but still in the ham bands at both ends). – *W1RW*

this standard, and two input/output connections on

PACIFIC DIVISION CONVENTION

Santa Cruz, California **October 13-14, 1973**

The Santa Cruz County Amateur Radio Club invites you to attend the 1973 ARRL Pacific Division Convention at the Dream Inn on the beach at Santa Cruz, California, on October 13-14. There will be manufacturers' displays, swap tables, technical sessions on such topics as antennas, repeaters, vhf receivers and propagation, an ARRL Forum on Sunday morning, a talk on the legal aspects of amateur radio and other activities of general interest. Special guests will include IARU President/ARRL Vice-President Robert W. Denniston, WØDX; League General Mgr. John Huntoon, W1RW; Lewis G. McCoy, W1ICP, Headquarters Liaison to the Repeater Advisory Group; and FCC representative Ney Landry, K6RI. President Denniston will be the featured speaker at the Sunday afternoon banquet. The entire family will enjoy the Saturday evening travelogue show presented by Larry Reed. A special program for the ladies will include a luncheon and fashion show and tours of local attractions. The youngsters will enjoy the antics of "Tiny the Clown," W6JCR.

Pre-registration, including Sunday banquet, before October 1 is $12, after that date $14. General registration is $3. Those under 16 admitted free. The Dream Inn offers special rates to those mentioning that they are attending the convention. Prices range from $18 single to $25 double. For information and reservations write to the Dream Inn, Santa Cruz, CA 95060. Convention pre-registration and requests for further information to Jim Marshall, WA6HCL, 1027 Pinehurst Drive, Aptos, CA 95003 (408-688-4571) or Paul Tibbs, W6WGO, 3060 Porter Drive, Soquel, CA 95073 (408-475-4280).

SOUTHWESTERN DIVISION CONVENTION

Los Angeles, California **October 19-21, 1973**

The Sheraton-Universal Hotel in North Hollywood, California will be the site of the 1973 ARRL Southwestern Division Convention over the weekend of October 19-21. A full program is planned which will include manufacturers' displays, technical sessions, breakfasts and luncheons for special interest groups, a Wouff Hong ceremony, an ARRL Forum, tours of local studios and other activities of interest to all. President Harry J. Dannals, W2TUK, General Manager John Huntoon, W1RW, and Lewis G. McCoy, W1ICP, Headquarters Liaison to the Repeater Advisory Group, will be in attendance. The convention wrap-up will be the Sunday evening banquet from 7 to 11 PM featuring President Dannals.

The convention hotel is located at 30 Universal City Plaza, North Hollywood, CA 91606. It overlooks the Hollywood Freeway and has shuttle service to both the Los Angeles International and Hollywood-Burbank airports. Free parking is provided for 750 cars. Rooms are available on a first-come, first-served basis at the following discount rates: Minimum rooms $19 single or $24 double, regular rooms $21 single or $26 double, superior rooms $24 single or $29 double. Luxury rooms and suites are also available. Room reservations must be sent directly to the Sheraton-Universal Hotel and convention association must be specified to obtain the reduced rates. Convention ticket prices are: Pre-registration before October 1 - Exhibits and presentations only, $4.50; banquet only, $8.50; exhibits, presentations and banquet, $12.00. Registration after October 1: Exhibits and presentations only, $5; banquet only, $9; exhibits, presentations and banquet, $13. Registration reservations should be addressed to Hamcon, Inc., 2814 Empire Avenue, Burbank, CA 91504. QST

COMING ARRL CONVENTIONS

October 5-6-7 – Midwest Division, Lincoln, Nebraska.
October 6-7 – Tennessee State, Memphis.
October 13-14 – Pacific Division, Santa Cruz, California.
October 20-21 – Southwestern Division, Los Angeles, California.
January 19-20 – Southeastern Division, Miami, Florida.
March 1-3 – Delta Division, Lafayette, Louisiana.
March 23-24 – Great Lakes Division, Muskegon, Michigan.
July 18-21 – NATIONAL, New York, N.Y.

NOTE: Sponsors of large ham gatherings should check with League Headquarters for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL Hq. for up to two years in advance.

Strays

During recent negotiations of a contract, William B. Soble, W3QXT, representing the Government, discovered that his old WWII Navy buddy Stanley Rosenberg, W1GKF, ex-W2GSC, represented the contractor. Negotiations had been conducted by letter and the telephone. They, and many other hams, served together at the Naval Training Station, Newport, R.I. and Naval Radio School, Noroton Heights, Connecticut in 1941. Their subsequent personal meeting in the Philadelphia area after 32 years in January 1973 resulted in plans being made for a reunion. Many former shipmates have been located and fully support these plans. Included in this group are W1ISV, TI2REL/3, W3ZBZ, W4IQW/ZF1QW, and W8BIF. Other former Navy associates attached to the Newport and Noroton stations during the spring and summer of 1941 are urged to contact W3QXT or any other amateur mentioned above. – *W3QXT*

Correspondence From Members-

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

50-YEAR PLAQUE

● I have enjoyed reading *QST* over the years, but did not realize that I have been a member of ARRL for 50 years, so I was pleasantly surprised to receive the beautiful plaque attesting to that fact. Thank you for a very honored remembrance!

It does remind me that I am getting older, in fact I will be 80 years old in October. I retired from RCA Laboratories 15 years ago, but continued as a consultant on radio communication. – *H.H. Beverage, Stony Brook, NY*

● I have always been proud to be a member of ARRL and wear the diamond pin in my lapel. I was even more proud to wear the 25-year pin as time passed. Now, believe it or not, more time has passed and I have reached the 50-year mark (over a half century!!). You can be sure I will wear the 50-year pin and display the 50-year plaque with honor. – *James Perkins Saunders, W1BDV, Whitinsville, MA*

● My sincere thanks and appreciation for the beautiful 50-year membership plaque, which I just received.

Beginning with my first Ford spark coil transmitter back in 1920, radio has been like a dream with all of its changes and ever-increasing possibilities. I feel very fortunate to have lived in this particular period of this wonderful hobby. – *Alva A. Smith, W@DMA, Caledonia, MN*

● I received my beautiful 50-year plaque in perfect condition, and immediately hung it on the wall above my Charter Life Member plaque. The two of them make a most impressive display and may even convince visitors that I like ARRL!

That I do is evidenced by my membership since I found out about the League after my return from the Philippines (where I'd been a pioneer ham) and sent in my application (according to my diary) on 21 September '21. – *Col. Fred J. Elser, USA Ret., W6FB, Palm Springs, CA*

● This is a lovely thing – my friends will be jealous – and I'm mighty proud of it. It will have a treasured place among my possessions. – *Clifford H. Daykin, W2AFE, Geneva, NY*

● It is a splendid gesture of appreciation for my more than fifty years of loyalty to the League, and it adds to my gratitude for all you have done for amateur radio (from the "Lid's Off!" in 1919 to now), and for all that the League and *QST* have done for me. – *Col. Charles F. Felstead, USA Ret., KH6CU, Honolulu, HI*

● I do not know how many have received this initial 50-year membership plaque. May I suggest that the names and call letters of those receiving this plaque be inserted in an early issue of *QST* as an historical record. – *David Talley, W2PF, New York, NY*

● Many thanks. Looking forward now to receiving the one hundred years membership plaque. – *J.B. Wathen, W4BAZ, Louisville, KY*

UNDER ACHIEVER?

● I am greatly disappointed about the article "How to Achieve an Impressive DX Score" in August *QST*. It recommends that you keep your fellow ham from working DX, just so you can have a higher DX score! The various ways the author, William R. Lowry, W1RML, suggests include calling CQ the moment the DX station starts to give out QSL information. This is absurd! One thing hams could do without is malicious interference from some jealous ham while working a rare DX station. I feel that every one should have a fair chance to work DX. – *Jeff Lepape, WA6SEP, Palos Verdes Penin., CA*

● I am shocked that such an article would be printed in such a fine publication. If Mr. Lowry has to resort to such low tactics to achieve a good DX score I think it's about time he turned in his ticket and retired. I have been a ham since 1948 when I was W2EJJ. In all my years in radio I have never heard of anyone condoning jamming another station just to prevent him from making a contact. Personally I think Mr. Lowry is sick. . . . – *Fred Hendrickson, WA2NMU, Hicksville, NY*

● I really feel sorry for W1RML and his opinion on working DX. I bet he really feels proud after knocking some Novice out of his first DX! I remember my first DX. It was only a VE but it was still one of the biggest thrills I ever got out of ham radio. I think he ought to read page 11 in his '73 *Callbook* about the DX code! I think WN7TFE/8 in August *QST* was more than right when he said, "Not all inconsiderate slobs are CBers!", – *Dave Wyatt, WN@ICI, St. Louis, MO*

● You left out two of the popular methods of "Achieving an Impressive DX Score."

1) Continue calling the DX station even after he has answered you or someone else!

2) Hollering "break" on top of his established QSO!

Enjoyed the article a lot. Hope some of our fellow hams realize W1RML wasn't serious! – *William E. Meacham III, WB4SXX, Charlotte, NC*

● W1RML must be proud of all the gentlemen on 20 meters who read his article and are following his directions to the letter. – *John D. Young, WA8KNE/6, San Diego, CA*

MARS REPEATERS

● My concern is an unusual one: Air Force MARS. In this part of New York State, Air Force MARS has installed a number of vhf repeaters and linked them together. Since they are on military assigned frequencies, they do not have to comply with normal amateur repeater rules. These repeaters are on 24 hours a day with free access to MARS members. I had always understood that the main purpose of MARS was to provide military morale traffic and not to enter into competition with regular amateur emergency systems. This is

what they have done and are expanding on this system. Members are being required to sign statements that during an emergency they must operate under MARS and abandon normal amateur frequencies if called upon. It may be that this is proper, but to me it doesn't quite ring true. Everyone has his own special interest and to belong to MARS is an accepted means of service. However, many people look upon this means as a free repeater system completely free of the stringent FCC rules. In our local area we have formed a repeater organization (Southern Tier Amateur Radio Repeater Society) to serve Elmira and Corning, N.Y. This group was formed primarily for emergency communications because of our experience last year during the flood. We are now licensed as WR2ABL.

During the flood we did liaison with Air Force MARS to provide outside channels for emergency traffic. It proved very beneficial and we have since cultivated the liaison.

The point is that during normal periods very little traffic is on this system and it serves mainly as a chatting channel covering quite a bit of New York State. It just doesn't seem fair to hams who, on their own, work hard trying to conform with the new FCC repeater rules. This monitoring requirement really limits our effectiveness. I think you can see why this would be upsetting.

It could be that the MARS requirements are proper, I don't know. But, if it is, I do not like it. You must be an amateur to belong to MARS and I say; first an amateur, second a MARS member. — *James W. Beckett, WA2KTJ, Millport, NY*

PACEMAKER INTERFERENCE

● Paraphrasing K2QBV, Cardiotronics President Joel H. Kornreich's statement in your May issue, I was taken aback and surprised at Kornreich's assertion that Dr. S.A. Sanchez's article in the March issue "is an invalid, over-exaggerated warning" to Pacemaker wearers.

Now on my third demand Pacemaker, I have experienced three isolated episodes of near fainting due to my Pacemaker being inhibited by my ham rig. Sparing the details, the source was located in the radiating system and corrected.

I believe Mr. Kornreich when he says that it takes two years to convey knowledge from manufacturer to doctor. After more than a year's investigation on my part with manufacturers, thoracic surgeons, and cardiologists, it is very clear that important interference information is almost non-existent. Letters from manufacturers are vague and incomplete, conveying that they really don't know. Surgeons have developed simple procedures for implanting the device but have little information to give their patients on the care and feeding of the unit. The manufacturer's slip is showing for lack of manufacturer/doctor communication.

Some Pacemaker manufacturers have incorporated important design improvements in newer units, some have made lesser contributions. Incorporated in more improved units are: titanium shielding, better pulse generators, and bypass of myocardial and catheter leads from the heart to Pacemaker to reduce RF pickup. Despite these improvements a distinct possibility still exists in that the myocardial or catheter leads can act as an antenna to conduct RF to the Pacemaker and inhibit the unit if the field is sufficiently strong. Until such time as Pacemaker manufacturers can produce sufficient test data to doctors and interested Pacemaker users, I strongly advise Pacemaker users to exercise care at all times when near electrical and electronic radiating devices as Dr. S.A. Sanchez suggests. — *Theil W. Sharpe, W5YMU, Rockport, TX*

WELL PRIMED

● I read "A Primer for Novices" in the April 1973 issue of *QST* magazine, and I congratulated Margaret Koerner on being at least one amateur who can get down to basic facts without becoming involved in technical words and phrases that are over and beyond the comprehension of a genius.

I have now just read, with considerable pleasure, her most recent article, "Let's Start with the Rig," in the August 1973 issue.

The world is full of knowledgeable people who have a miserably poor knack of imparting their knowledge to others. Seems their primary goal is to outdo the late Albert Einstein in the promulgation of scientific jargon. Thank heavens WBØBEM doesn't fall in that category. — *Warren A. Freeman, WN4DAM, Newnan, GA*

● For *QST* to occasionally compromise its editorial excellence is deplorable but understandably forgivable. I hope that the remainder of the series beginning with "Let's Start with the Rig" will be mercifully postponed indefinitely. — *Donald C. Mead, W2LT, Ridgewood, NJ*

● Let me congratulate you on the piece, "Let's Start with the Rig," in August *QST*. Such a primer has long been needed and it looks like WBØBEM is on the road and has made big strides. It must be printed in booklet form — either by ARRL or someone else. The ham world has many embryo hams just waiting to read something like this series. — *A. David Middleton, W7ZC, Springdale, UT*

● I saw Margaret Koerner's articles in April and August *QST* and think they will help the beginner a lot. I am happy to see she is going to write a series. Keep up the good work. — *Gary Businsky, WA3RIF, Baltimore, MD*

● A few lines to compliment you on WBØBEM's article in August '73 *QST*. Keep up the splendid work. Will be looking for future ones. — *Ernie Mintel, WA2PLK, Canandaigua, NY*

QST'S NEW LOOK

● August *QST* arrived properly today (address computer works) but looked strange. Very strange. I know new things must come to pass, etc., but could you not at least keep the open letters and only make them smaller?

Even the 1941 *QST* that I received through the WWII blockade (as SM5XH) had that glorious big AMATEUR RADIO overlaid on 811s or something. R.I.P. — *Jan K. Moller, K2DT, North Caldwell, NJ*

● Noticed change in August *QST* logo. Sure makes cover seem bigger, but prefer the older one, I think! — *Kevin J. Martin, WB8MJI, Kalamazoo, MI*

● Just to let you know I do *not* like the new *QST* cover. The old one has been a "trade mark" for years and set *QST* apart from all others.

Let's revert back, huh? — *Walt Carr, W3LDD, Havre de Grace, MD*

● I do believe that the new cover design for the August 1973 issue of *QST* is much better than the

previous one. — *Richard W. Randall, K6ARE, Livermore, CA*

● UGH . . . — *George W. Hippisley Jr., K2KIR, North Syracuse, NY*

● The initial change in the *QST* cover looks good. I assume, that as in past years, changes happen very slowly, and that each month's cover will have its little change to the final form of a modern "state of the art" cover for January 1974. At least this is a step in the right direction. — *Jordan Kaplan, W9QKE, Chicago, IL*

NO FOOLING

● I was pleasantly surprised to see such a good article on the general subject of antennas and transmission lines. As an electronic engineer working in an antenna R&D lab I fully agree with the content of "Another Look at Reflections," by M.W. Maxwell (April and June *QST*). Such a fine article has been long overdue.

It is discouraging, however, to discover that many hams have gross misconceptions so firmly imbedded in their minds that they cannot recognize the truth when they see it. I overheard a 75-meter roundtable (prior to the publication of part 2 in April *QST*) and about 50% of those participating in the discussion were either partially or fully convinced that Mr. Maxwell's article was the "April Fool article" of the year. Thanks for publishing part 2 before April, 1974! — *Lynn A. Gerig, WA9GFR, Monroeville, IN*

MAXIM'S FLYING MACHINE

● Since this December will mark the seventieth anniversary of what is generally recognized as the first successful flight of a heavier than air flying machine I thought it might interest amateur radio operators to know that Sir Hiram S. Maxim, the father of the co-founder of ARRL, was one of the early experimenters in flight.

I had hoped to find time and ambition to get up a little article on the subject. All the information I have is that contained in the article on flight in the *Encyclopedia Brittanica, eleventh edition*, published around 1911. The article describes the test flight of quite a machine – fifty feet tip to tip, 4000 square feet of wing surface, 8000 lb. weight, steam powered with 363 hp. This apparatus was tested in 1894, mounted on a nine foot gauge track, but also an upper track to prevent its lifting on test. This was wood, and the wheels to engage this were painted, so as to indicate at which point lift occurred. It lifted so much that it broke the axles of the upper track wheels. But the article says no more about further experiments, and I haven't found time to research the matter further.

Many amateurs know that Hiram senior was quite an inventor – it was he who made the Maxim machine gun. But I doubt that his aeronautical experiments are so well known. — *Woodrow W. Williams, W8WEG, Columbus Grove, OH*

The Post Office Department promises faster mail service with Zip codes. Use Zip codes.

TO ALL CANADIAN AMATEURS:

This joint letter is addressed to all licensed amateurs in Canada, in order to set at rest once and for all misconceptions regarding the relations existing between the Canadian Division of the American Radio Relay League and the Canadian Amateur Radio Federation. Much has been printed in amateur publications and said over the air on this subject, a good deal of it based on misunderstanding and lack of communication.

During a recent meeting between the president of ARRL, the president of CARF, and officials of both, it was quickly agreed that the aims of both organizations are basically the same, namely the furtherance and protection of the amateur service, and representation of the individual radio amateur as and where necessary.

In many fields we can do a much better job together than can be done separately; in some, one of us may presently excel. One of the latter is dissemination of news through *The Canadian Radio Amateur* by the Federation. It was agreed that the two bodies would join in this function; the present Canadian Division newsletter addressees will receive *The Canadian Radio Amateur* instead.

There are several additional areas in which cooperation is possible and desirable. These include joint submissions to DOC, emergency communications, fm repeaters, and so on. Further discussions will take place on such subjects in the future, in the hope of better serving our fellow Canadian amateurs.

73,

Noel B. Eaton, VE3CJ
Director, Canadian Division, ARRL
A.E. Blick, VE3AHU, President
Canadian Amateur Radio Federation

Happenings of the Month

REPEATERS AND REMOTES EXTENDED

- Timely Filed Applications are the Key
- ARRL Asks More Time on 220 MHz
- ARRL Emergency Committee Appointments
- Amsat-Oscar B Approved

REPEATERS, REMOTE STATION LICENSES EXTENDED

The Federal Communications Commission on August 30th released a public notice and Order extending the license term of all repeaters and remotely-controlled stations which were licensed on or before October 17, 1972 and for which applications for renewal or modification were timely filed. Further, "timely-filed" in this case has been specified as those applications received by the Commission on or before August 30, 1973. The action was taken by the Acting Chief, Safety and Special Radio Services Bureau (parent of the Amateur and Citizens Radio Division). We are reproducing both documents, since the Public Notice in this case is more "editorial" than usual, conveying some advice to license applicants not contained in the Order.

FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20554

In the Matter of
Amendment of Part 97 of the Commission's Rules concerning the licensing and operation of Repeater stations in the Amateur Radio Service — Docket 18803

ORDER

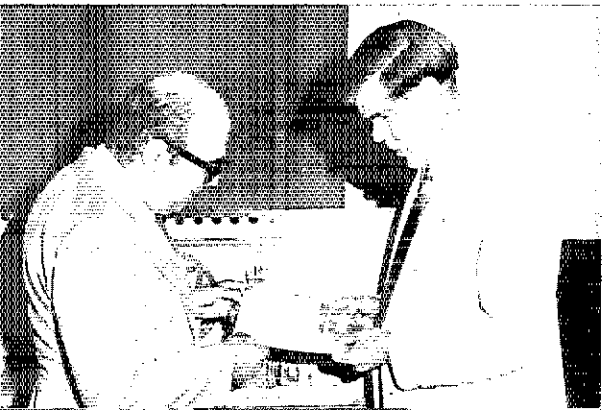
Adopted: August 29, 1973
Released: August 30, 1973

by Acting Chief, Safety and Special Radio Services Bureau:

1. The Commission has under consideration on its own motion the extension of the license term of all amateur stations licensed prior to October 17, 1972, and operating to automatically retransmit the radio signals of other amateur radio stations or as remotely controlled stations prior to that date. The purpose of our action herein is to preclude any unnecessary interruption of any on-going service due to delays in processing applications.

2. In Docket 18803 the Commission adopted rules pertaining to the licensing and operation of amateur repeater stations. Those rules became effective on October 17, 1972. All stations licensed after October 17 had to comply with those rules. However, to provide continuity of operation and to assure continued public service activities, existing repeater stations were granted a grace period to June 30, 1973 to bring their operations into full compliance with the rules and to obtain a new license. At the request of the American Radio Relay League, this period was extended to August 30, 1973.

3. We find that more than adequate time has been given to those previously existing stations to allow their operations to be brought into compliance with the rules. However, because of the initially heavy administrative workload imposed upon the Commission, the fact that initially filed applications were generally inadequate and because of the lack of processing personnel during the summer months, we find that there has been inadequate time for all existing licensees to actually receive their license documents evidencing their full compliance with the rules. Therefore we will allow all amateur stations licensed prior to October 17, 1972, which were operating to automatically retransmit radio signals of other amateur stations or as a remotely controlled station and for which a timely and sufficient application for renewal or modification was filed, to continue operation until final action is taken on the application. An application will be considered as being timely filed if it was received by the Commission on or before August 30, 1973. The application will be considered as one for renewal or modification if it proposes to license transmitting apparatus which was previously operated as a repeater or remotely controlled station.



The Post Office recently issued four stamps commemorating "Progress in Electronics." The amateur fraternity has been deeply honored since one of our number, W2ICE, was asked to give a Dedicatory Lecture (itself a rarity: only three previous Dedicatory lectures are recorded). In the photo Elliot Sivowitch, K3HJA, of the Smithsonian and Bruce Kelley, W2ICE (right) examine a cover. Bruce is well-known as secretary of the Antique Wireless Association, as curator of its Museum, and as a speaker at ham radio meetings on the early days. The Dedicatory Lecture was delivered at the National Museum of History and Technology on July 10.

QST for

The Army's "Community Action Support Element" (CASE) gave courses in basic aerodynamics; basic communications; introduction to surveying and navigation and weather techniques this summer at Camp Pickett, Virginia; Camp Roberts, California; Camp McCoy, Wisconsin; Fort Chaffee, Arkansas and at New Mexico National Guard Headquarters, Santa Fe. Shown here at the key is Chip Connor of Fort Totten, NY at Camp Pickett while other students and instructor, Staff Sergeant Tom Bowman, look on.

4. Accordingly, the Commission by the Chief, Safety and Special Radio Services Bureau pursuant to the delegated authority in Section 0.331(b) (1) of the Commission's rules, ORDERS that all amateur stations licensed prior to October 17, 1972, which were automatically retransmitting radio signals from other amateur stations or licensed as remotely controlled stations and for which a timely and sufficient application has been filed, may continue to operate until such time as the Commission takes final action on the application.

FEDERAL COMMUNICATIONS COMMISSION
Charles A. Higginbotham, Acting Chief
Safety and Special Radio Services Bureau

FCC Public Notice

August 30, 1973
All Amateur Repeater Stations Must Observe Rules Adopted in Docket 18803

There apparently has been some confusion among amateur licensees as to the actual effective date of the rules adopted in Docket 18803. The Commission reiterates what should be clear to all amateur licensees, that the rules became effective October 17, 1972. Licensees have been informed in the Report and Order, the Memorandum Opinion and Order, and by several Public Notices and Orders, that full compliance was expected as soon as possible but not later than June 30, subsequently extended to August 30. The Commission adheres to the view that all licensees have had adequate time in which to modify their operations and fully comply with our rules, although there may not have been sufficient time to obtain the licensing authorizations for repeater station, control station, and/or auxiliary link station. Licensees operating such stations under a previous authorization are cautioned their operations must otherwise fully comply with the rules. Licensees and control operators of stations not operated in compliance are subject to appropriate enforcement action.

An excessive number of problems are being encountered with defective amateur repeater station applications, contributing to wasted effort and lengthy processing delays. The principal problems are a lack of standardization, failure to supply the required information and/or failure to present the information in a manner permitting expeditious processing. Using the experience in processing thousands of these applications, suggested application forms designed to eliminate the most frequently encountered errors are being developed. Whether these forms will be adopted as official FCC forms is undetermined. However, properly prepared applications based upon these suggested forms will be acceptable for processing. Amateurs are encouraged to develop more universally accepted terms and symbols for use in their applications.

ARRL REQUESTS 220 DELAY

The League has petitioned FCC for an extension of time for filing comments in Docket 19759, the proposal for a new Class E Citizens Radio Service which would occupy the top megahertz of our 220 MHz band.

A major reason for requesting the delay is the need to accumulate statistical information. For example, members of our Official Observer corps are collecting data on illegal use of frequencies adjacent to the Class D band at 27 MHz (including the amateur 10-meter band and the business radio service) by stations originally attracted to the spectrum by Class D operation. The aim is to draw a parallel with what might happen on channels adjacent to 224-225 MHz, including the amateur band and frequencies used by the government above 225. Such studies are not expected to be complete by the original deadline of September 20.

The text follows:

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of

The creation of a new class of Citizens Radio Service and the reallocation of frequencies between 224 MHz and 225 MHz in the band 220-225 MHz now allocated for shared use by stations in the Amateur Radio Service and Government Radiolocation Stations for that purpose.

Docket 19759. RMs 1633, 1656, 1747, 1761, 1793, 1841.

To: The Commission.

PETITION FOR EXTENSION OF TIME

The American Radio Relay League, Incorporated, respectfully requests that the time for submitting comments in response to the Notice of Inquiry and Notice of Proposed Rule Making, released June 12, 1973 (FCC 73-600), be extended from September 20, 1973 to February 20, 1974, and the time for submitting reply comments be extended from October 22, 1973 to March 22, 1974.

In support whereof, the following is respectfully submitted.

1. The Notices evidence the Commission's very deep concern over the problems created by the unlicensed and otherwise unlawful operations in the 27 MegaHertz (MHz) band allocated to the

Hank Koch, W2EW, (second from right) gets his plaque marking 50 years of membership in ARRL from President W2TUK. Others looking on, from left, are SCM K2DGI, Asst. SCM WB2CHY and Director K2SJO.

Class D Citizens Radio Service that continued to grow like a cancer and threaten not only to destroy the Class D Service but also to seriously disrupt licensed operations of other services in the upper end of the high frequency (HF) portion of the spectrum.[1] The solution under consideration by the Commission in this proceeding is to reallocate one MHz of the 220-225 MHz amateur band for creation of a new Class E Citizens Radio Service.

2. The League is unalterably opposed to the proposal to reallocate a portion of its 220 MHz band for a Class E Citizens Radio Service or for any other service.[2] It also is greatly concerned over the ever-increasing invasion of the 28 MHz amateur band by some of the tens and perhaps hundreds of thousands of persons now engaging in unlicensed and otherwise unlawful operations in and adjacent to the Class D band. The League is firmly convinced that many within the Commission, the Congress, the Electronic Industries Association, and other responsible groups are unaware that the cancer existing in the Class D band will continue to grow unless some new treatment is devised and most vigorously applied.

3. The League desires to assist the Commission in finding a solution to the present Class D dilemma and is firmly convinced that, if given reasonable time, it can come forward with some most practical suggestions and proposals. As the Commission knows, the League is a non-profit membership organization supported by many thousands of dedicated amateur radio operators who voluntarily and without material compensation devote much of their spare time to advancing amateur radio. Various volunteer groups within the League, including the Board of Directors, the VHF Repeater Advisory Committee, the Official Observer Corps, and the Intruder Watch, have established programs to support the constructive proposals the League shall submit in response to the Notices. Unfortunately, these and other groups cannot complete their assigned tasks in time to meet the present September 20, 1973 deadline.

4. The requested extension of time will not unduly delay final deposition of this proceeding. The problems are far too complex and deep-rooted, and the solutions are not readily available. To merely adopt the proposal for Class E Citizens Radio Service would simply compound the existing chaotic conditions. Each has been pending for more than two years and some for more than three years. Surely, the Commission is interested in finding the *right* solution, if one exists, rather than a solution which may multiply the present problems. The six-month extension requested by the League is entirely reasonable and in the public interest.

Wherefore, the premises considered, the Commission is respectfully requested to extend the time to February 20, 1974, to submit comments to the Notice of Inquiry and Notice of Proposed Rule Making, and to extend the time to March 22, 1974 to submit reply comments.

Respectfully submitted,
THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED

By Robert M. Booth, Jr.
Its General Counsel
August 21, 1973

[1] Unauthorized operations on Industrial Radio Services frequencies close to the Class D band and in the 28 MHz amateur band are increasing. Some publications catering to those operating in the Class D band carry advertisements for crystals for operation on industrial radio frequencies, variable frequency oscillators (VFO's) as a substitute for crystals covering frequencies outside the Class D band including the 28 MHz amateur band, and linear amplifiers for powers far in excess — sometimes up to one kilowatt — of the 5 watts input permitted by the Commission's Rules for the Class D Service.

[2] See the League's opposition to the Electronic Industries Association petition, RM-1747, filed February 16, 1972.

ECAC APPOINTMENTS

As we reported briefly in last month's "League Lines," ARRL President Harry J. Dannals, W2TUK, has appointed eleven members to the Emergency Communications Advisory Committee.

Named as acting chairman and appointed for a three-year term is Montie F. Cone, WA4PBG, of Falls Church, Virginia. "Bud" Cone has served as section emergency coordinator of Virginia for the past three years and as an assistant director from the Roanoke Division for six. He's an active member of the Virginia ssb, cw and slow nets, and was earlier emergency coordinator for Fairfax County. Bud is trustee and past president of the Northern Virginia Radio Club and past president of the Foundation for Amateur Radio, the council of radio clubs in the greater Washington area. First licensed in 1963, he holds the Extra Class license and is a life member of ARRL. WA4PBG has also been chairman of an ad hoc committee helping to formulate ARRL's position on the RACES docket 19723.

Charles A. Starks, Sr., W2URP, of Schenectady, New York, is presently serving as section emergency coordinator for the Eastern New York section and was earlier an emergency coordinator. He was a member of the League in 1946 under the call W8URP and presently holds the General Class license. He has been an official observer for a long while and also serves as an official phone station. His appointment is for three years.

From Philadelphia comes Ellwood W. Haldeman, W3PST, who has been appointed for a two-year term. He's been licensed and a League member for nearly twenty years and has been active during that time in civil defense, RACES and AREC. W3PST is heard on both the hf and vhf bands, the latter through fm repeaters primarily, and holds the Advanced Class license.

Andrew C. Clark, W4IYT, of Miami Springs, Florida (well-known throughout the state as editor/publisher of *Florida Skip*) has received a two-year appointment to the ECAC. Andy has been section emergency coordinator of East (now South) Florida section since 1955; assistant director, Southeastern Division, 1954-1965 and 1970 to the present; emergency coordinator Dade County, 1952-1955; and currently holds ORS, OPS and OBS appointments. He is founder and past president of Dade County Amateur Radio Public Service Corps; amateur radio communications chairman, Dade County American Red Cross, and amateur radio consultant to the Red Cross' South Florida Division. Andy is an Advanced Class licensee, first on the air as W9KCS in 1939; a member of ARRL since 1943, and now a Life Member of ARRL, QCWA, and the Miami and Gainesville, Florida, Radio Clubs.

A three-year appointment has gone to William E. Mixon, K5SVD, of Baton Rouge. Bill is section emergency coordinator for Louisiana; area radio officer, Louisiana State Civil Defense, assistant communication officer, East Baton Rouge Parish (county); and director of the Baton Rouge Amateur Radio Club, Inc. K5SVD was first licensed in October 1957 and is Advanced Class. He's a member of the ad hoc committee on Docket 19723 of which WA4PBG is chairman.

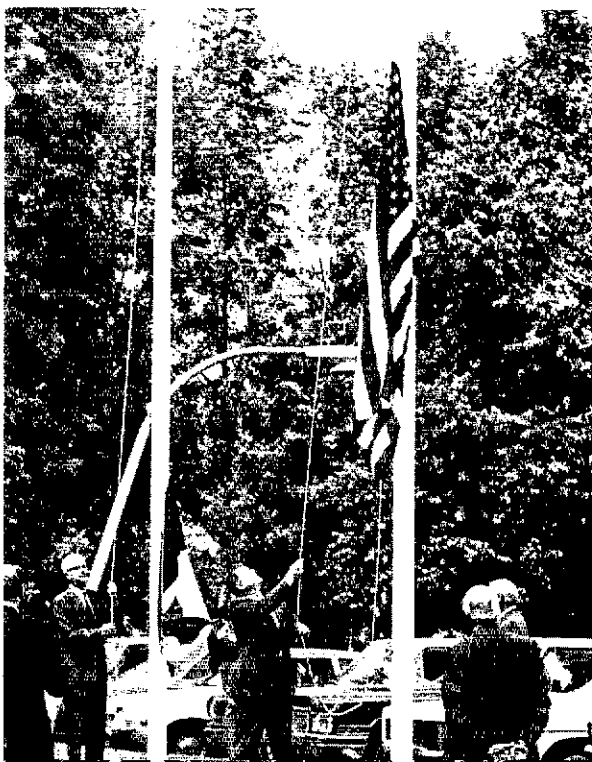
Another member of the ad hoc group who has been appointed to the regular ECAC for a three-year term is Arthur R. Smith, W6INI, of San Diego. He's been assistant SCM of the San Diego section since 1969 with a special assignment in emergency communications and was emergency coordinator for the City in 1971. He also serves as assistant director in the Southwestern Division and has been active in liaison between amateurs and such other groups as police and fire departments, sheriff's office, highway patrol and Pacific Telephone. First licensed in 1936 as W1INI, Arthur holds the Extra Class license.

Robert L. Klepper, W7IEU, of Marysville, Washington, will serve on the ECAC for two years. A General Class amateur who has been licensed since 1957, Bob is emergency coordinator for Area 2 of the statewide AREC and also is radio officer for Snohomish County Department of Emergency Services. He holds appointment as ORS, OVS, OPS, and OBS, and takes part in both phone and cw nets.

Another two-year appointment goes to Robert S. Dixon, W8ERD/W9OKN, an Extra Class licensee from Powell, Ohio, who has been in amateur radio since 1955. Bob is emergency coordinator for Central Ohio (since 1968); amateur radio chairman, Franklin County Red Cross; assistant radio officer, Ohio State Civil Defense, and past radio officer for Franklin County CD. He's a past president of the Badger Amateur Radio Society, delegate to the Ohio Council of Amateur Radio Clubs and delegate to the Ohio Area Repeater Council. He also holds appointment as ORS.

ARRL Life Member Robert J. Hajek, W9QBH, of Riverside, Illinois, has a two year appointment on the committee. He is radio engineer for the villages of Woodridge and Oak Brook, Illinois and radio officer, Cook County CD. Bob has been very active in Associated Public-Safety Communication Officers, Inc. (APCO) including eight years as state secretary/treasurer and two as state president; currently he is chairman of APCO's national committee on Public Safety Planning. His ham radio experience goes back to 1946, with Advanced Class since 1948.

Another three-year appointee is Harry F. Legler, WØPB, of Hiawatha, Kansas. Harry has been serving on the special ad hoc committee for Docket 19723. Earlier he had written the county emergency communication plan and organized RACES within the county. He is author of the January 1973 *QST* article, "The F2TU for VHF FM RTTY," and holds an ORS appointment. He currently holds an Extra Class license and has been both a League member and an amateur since 1928.



The flags go up — ARRL Canadian Division Director Noel B. Eaton, VE3CJ, (left) raises the Canadian Flag while ARRL President Harry J. Dannals, W2TUK, raises the United States Flag at Hq., just before the July Board meeting. The flag-raising marked the dedication of twin flagpoles (floodlit at night), symbolizing the binational character of ARRL.

Holland H. Shepherd, VE3DV, of Ottawa, is the remaining member of the committee with a two-year term. Currently section communications manager for Ontario, Shep had earlier been section emergency coordinator and in the fifties, emergency coordinator for the Maritimes. Licensed since 1946 and an Advanced Amateur since 1947, Shep is a member of the Intruder Watch, holds ORS, and is active on hf and vhf.

All of the above appointments begin formally on January 1, 1974, but are effective immediately on an interim basis.

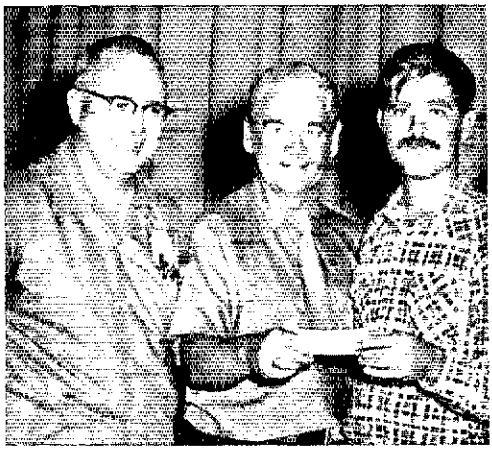
The liaison director is Max Arnold, W4WHN, of the Delta Division; Hq. liaison is William C. Mann, WA1FCM, assistant communications manager for public service.

VE3WT ON REPEATER ADVISORY COMMITTEE

Howard R. Cowling, VE3WT of St. Catherines, Ontario, has been appointed to the VHF Repeater Advisory Committee, replacing Leon Giannakeff, VE3BUI. Howard has been involved in fm professionally as a technician since 1943 and operated his own communications business from 1950 to 1972. Licensee of VE3NRS, he was a founder and director of the Western New York and Ontario Repeater Council, but he's also active on the hf bands and is on the DXCC honor roll. A member of the League since 1946, Howard was licensed two years later and currently holds an Advanced Amateur certificate of proficiency.

STILWELL RESIGNS: DAHLMAN VICE DIRECTOR

Gary Stilwell, W6NJU, vice director from the Southwestern Division since January, 1973, has been transferred by the California Highway Division to a better job in Sacramento, which of course is in the Pacific Division. Accordingly, he resigned effective August 4; Arnold Dahlman, W6UEI, of Santa Barbara, has been named by ARRL President Harry J. Dannals, W2TUK, to fill the vacancy. Arnie is no stranger to SW Division members, having filled the post from 1969 through 1972.



Roger Ryan, WB6JXX, right, has been presented with an Honorary Life Membership in the San Fernando Valley Radio Club in recognition of a lifesaving episode on Field Day. Archie Willis, W6LPJ, left, was felled by electric shock while working on the club's generator and was given immediate artificial resuscitation by Roger. Forrest Smith, WA6ZNQ, made the presentation.

NEXT OSCAR APPROVED BY NASA

The administrator of the National Aeronautics and Space Administration (NASA) has approved an Amsat proposal for the launch of another Oscar. In a recent letter the space agency reported, "NASA has agreed to undertake the launch of the Amsat-Oscar B satellite as a secondary payload subject to the identification of a suitable mission with adequate payload capacity." After a successful launch, the satellite would be redesignated as Oscar 7, following usual practice.

Amsat-Oscar B is now under accelerated construction with a grant from ARRL (expenditure of up to $38,000 was authorized at the Board Meeting in July; see minute 30 in this column, September issue). It will contain a repeater similar to the one aboard Oscar 6 (144 MHz input, 28 MHz output) plus a 432 to 144 MHz transponder with 50 kHz bandwidth. A launch opportunity during the first quarter of 1974 is hoped for. An orbit similar to that of Oscar 6 is planned, and the expected lifetime of the Amsat-Oscar B is three years.

LOUISIANA LICENSE PLATES

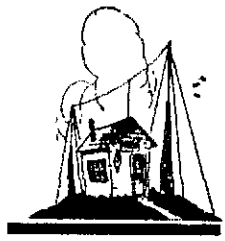
Since 1950, hams in Louisiana have enjoyed the privilege of having their call signs on automobile license plates. This year, a bill was passed allowing "prestige" license plates – names, nicknames, etc. – with a fee of $25 per year. While it was not the intent of the legislature to apply this new law to ham plates, an attempt was made at this interpretation by a public official connected with the license plate division.

Fortunately, State Senator M. Joseph Tiemann of Metairie, Louisiana, is W5DNU. He contacted Governor Edwin Edwards and explained the situation to him. The governor has issued an executive order that hams are to be allowed to have their special license plates in accord with the original legislation and because of their record of continued service to the community. Thanks to Senator Tiemann for his prompt and effective action, to Victor J. Bradbury, K5GGR who sent this report and to the many other Louisiana amateurs who have kept us posted.

CB ANTENNAS

FCC has proposed an amended section 95.37 (c) of its rules to allow antennas in the Class D Citizens Radio Service up to 60 feet in height (assuming no conflict with the FAA rules governing structures near airports). Comment deadline is October 15 with reply comments due by October 26. QST

How Hams Discovered Short Waves



A Momentous Turning Point in the History of Radio

BY ROYAL MUMFORD,* W3CU

BY SHEER CHANCE, radio amateurs made a most remarkable discovery about 50 years ago. They discovered their true birthright – wavelengths under 200 meters!

Originally they had started out by pushing their legal 200 meters to 220, 240 or 275 meters, as high as they could "get away with it." Like most professionals, hams thought that 200 meters was virtually useless, and that adding an extra forty or fifty "useful" meters to the legally allotted 200 was the only way to get out. There was plenty of justification for this point of view at that time. It was supported by many early experiments, much textbook theory and radio-engineer's experience. All commercial applications were on much, much longer wavelengths. The surprising thing is that at least a few of the hams were beginning to look in the other direction.

"We began to feel our way downward," wrote S. Kruse,[1] Technical Editor of *QST*, "in the winter of 1920-21, mainly to get away from NSF's chopper and NAA's arc mush, in Washington, D.C. To our pleased surprise, we found that our regular sets would work easily below 170 meters if anyone could be induced to get down and listen for them. A low powered tube set in Washington and a small spark-tube set in Hyattsville, Md. were able to work beautifully without any interference at all from NSF, NAA or *anything else* on *any* wavelength, although 3RP at Hyattsville was using only a Western Electric 'E' tube driven by a Ford spark coil. His signals at Washington (8 miles) were so intense that the phones were normally left on the table. The other station 3ABI, was able to work 1TS and 1QP whenever they could be induced to tune down – again there was *no interference*."

1QP, 3ALN and 9ZN also experimented with short waves, according to Kruse, and, in February 1923, went down as far as 110 meters and "everything was copied solid" all the way. Our Technical Editor further commented, ". . . *in every single test*, with one exception, *the best signals were heard at some wave length below 170 meters*."

So – the following notice appeared in the March 1923 issue of *QST*.[2]

A 100-Meter CQ Party

BY F. H. SCHNELL, TRAFFIC MANAGER

For the benefit of those stations which think they can get down to 100 meters or thereabouts with both transmitter and receiver; a 100 meter CQ Party is arranged for the nights of March 24th and 25th, beginning promptly at 10:30 P.M., Eastern Standard Time . . . . Don't call CQ 135 times and sign once; no one is going to camp on your wave forever – keep signing at intervals. Everybody is invited to try both sending and listening and to send logs to *QST* Shop. They must be clean logs – not logs written on scrap paper or in the middle of a letter.

The prospect of a CQ Party was like a red flag waved in front of a bull. Boyd Phelps wrote on "Receiving Tuners to Work Below 200 Meters,"[3] embellished with such words of wisdom as, "No condenser is needed across the tickler but a good fixed mica condenser (probably between .0005 and .001 microfarads) should be connected around the phones and B battery. Any inductive-wound rheostats should also be shunted by condensers. Several different tickler coils should be kept handy."

These early experimenters were not guided by any textbook theory or scientific papers on short waves. They were exploring new territory entirely on their own. The true exploratory nature of these tests is clearly revealed by S. Kruse in "Getting the Transmitter Down to 100 Meters," in April *QST*,[4] in which he wrote, "Altho the fundamental wave length of the antenna at 9ZN is about 225 meters, this circuit [Hartley] works down to 70 meters quite readily. The reason for this is not at all clear. However the fact has been checked up with several good wave meters, including that of the 9th district radio inspection office, and cannot be denied."

Whether they understood it or not, hams did get down on the appointed days and the entire radio world was astonished at what happened. The May, 1923, *QST* published a full page of "Calls Heard," all "copied between 80 and 190 meters."[5] Every district but the 7th was heard from. Canadian stations participated. 3APV, 8LW, 8VN, 9EBV, 9DWK and possibly others copied every district except the 7th. They probably copied some Canadian amateurs as well, since there were no country prefixes to distinguish them at that time. Even a few two-way contacts resulted, which is all the more astonishing, since sending and listening frequencies were chosen entirely at random, usually without benefit of wave meters. 6AJF worked 9ABU; 8LW worked 9OF; and 8AJX

(Continued on page 111)

* CDR USNR (RET) Rt. 1, Box 397, Annapolis, MD 21401.

[1] Kruse, "Exploring 100 Meters." *QST*, March 1923, page 12.

[2] Ibid.

[3] *QST*, March 1923, page 13.

[4] *QST*, April 1923, page 24.

[5] *QST*, May 1923, page 75.

CONDUCTED BY BILL SMITH,* W5TVB

Who Wants 220, Anyway?

HAVING HAD opportunities to talk over the 220 MHz situation with many amateurs in widely distributed areas of the country, I'm concerned over what appears to be a general apathy toward FCC Docket 19759. All-too-common a reaction seems to be "We can't justify retention of the top Megahertz of the 220-MHz band on the basis of current or past use, so why fight its possible loss to CB?" One wonders if the attitudes would be similar if the 50- or 144-MHz bands were involved.

A careful reading of the Docket (August *QST*, p. 88) makes it apparent that FCC is not wholly sold on assigning 224 to 225 MHz to a Class-E Citizens Radio Service. If they were, FCC would not have taken more than three years to consider Wayne Green's initial 220 "hobby class" proposal, RM-1633, and nearly three years to consider the EIA request for a 220 to 222-MHz CB allocation, RM-1747. Further, the FCC proposal cuts in half the EIA's two-Megahertz request, and assigns it to a different part of the band. Coupling these facts to the questions posed by FCC in the Docket, it becomes quite clear that FCC is not convinced about the validity of the proposed Class-E assignment. FCC all but pleads for amateur help to deny Docket 19759, but if appreciable segments of the amateur body say, in effect, "Go ahead and take it," we should realize that we could be laying ourselves open to further intrusions, especially in our higher bands, which are assuming ever higher priority in the world's eyes.

Probably most vhf groups will go as far as did the Central States VHF Society recently, in voting to "support ARRL" in defense of the top Megahertz of the 220-MHz band, but more action than this is needed. Everyone concerned with the future of our "world above 50 Mc" should write FCC in opposition to Docket 19759. Logical argument, not emotional ranting, is needed – and we have plenty of logic available.

Past or even current occupancy of the 220-MHz band is not impressive in terms of numbers, but uses to which the band has been put, since the earliest days, *are*. Hams were using the 220-MHz region effectively when the first edition of this column appeared in *QST*, two years before the entry of the United States into World War II.

Outstanding experimenters and communicators proved the worth of the band as far back as the early '30s, and almost continuously since. They showed that it responded to long-distance tropospheric effects before 1950. Communication on 220 via the auroral curtain was achieved over 20 years ago, at a time when our band was the highest frequency ever used for auroral observations. Meteor scatter techniques were first employed in 220-MHz work in the 1960s. The first amateur 220-MHz communication via the moon was accomplished in 1970.

Who can ever forget the superb job done by W6NLZ and KH6UK in linking California and Hawaii on 220 MHz nearly 15 years ago? And how about schedules currently being kept between these two areas on 220, which will surely contribute in a significant way to our knowledge of transpacific duct propagation in this frequency range? Would any other user, especially a CB-type service, do as well?

At this writing we have no clear indication of the overall response of amateurs to the Docket, but copies of letters we've seen to date seem to have come mainly from outside the vhf community. We've read letters from 20-meter DXers, a 75-meter ragchewer, a MARS operator, a former Novice whose license has expired, and so on. Do these non-vhfers see Docket 19759 as a threat to their favorite frequencies? Have our low-band colleagues read the record of amateur endeavor in the higher bands with better historical perspective than we who have done and are doing the work? Or do they see, now, in the 220-MHz band a potential solution for the problems currently plaguing the fm-and-repeater people, many of whom are converts from less-effective mobile frequencies in the hf range?

In any event, we need all the logical argument we can muster, not only for Docket 19759, but for coming international problems.

A world radio conference is in prospect, soon. Basically participating governments have planned to discuss mostly the frequencies below 30 MHz, but the whole radio spectrum will be included – yes, vhf and uhf, too! What position can ARRL and our governmental representatives take as they set forth to defend our frequencies, if vhf users sit by and let a valuable portion of our spectrum be reassigned without so much as raising their voices in logical argument? What effect would such indifference have on nations whose representatives have little knowledge of, or appreciation for, the worth of amateur radio?

These are questions we must face *now*. "George" is not going to do it, and neither, apparently, are some of the vhf fraternity. So,

* Send reports and correspondence to Bill Smith, W5TVB, ARRL, 225 Main St., Newington, CT 06111.

please read (or reread) the Docket in August *QST*, and file your 14-copy comment, now. – *W5TVB and W1HDQ*

California to Hawaii on 2-Meter Tropo

Last month this column made a preliminary report on the late July tropo ducting opening between Southern California and the Hawaiian Islands. It was intended that this month's column would detail the record-making session, but due to the volume of mail received and the importance of the event, we are still in the process of developing a detailed report. This will include photographs, information from California, Hawaii, and weather data from several sources, including airlines people who experienced difficulty on vhf aircraft circuits across the Pacific during the period.

The opening appears to have lasted from July 28 through August 3, and on the California end, extended from San Diego to the San Francisco area as the duct shifted position. The frequency cut-off of the duct was, for the most part, somewhere between 148 and 220 MHz on the high end, and as low as the 50-MHz band. It appears that had there been 2-meter activity in the Pacific beyond Hawaii, they, too, might have been able to work to the Mainland, as the entrance height into the duct at the Hawaiian end was between 5000 and 8000 feet, and only several hundred feet on the California end.

The month delay in publishing the report will assure its being more detailed and accurate.

OVS and Operating News

50-MHz DXers have mixed comments regarding this past summer's *E* season. In general, the season was two weeks late starting, but extended well into August, which is somewhat unusual. The number of openings appeared fewer than normal, but based upon the number of openings, there were more multihop openings observed. Around the country, we have these reports.

WA1DFL, Mass., says "all things considered July was one of the worst in several years." Steven worked 8P6EN July 1 and XE1GE July 9. Between July 12 and 22 WA1DFL observed no *E*, but the band was open July 22 through 25, mostly to 4s, 5s, 8s, 9s and ϕs. Steven says, "hard to believe, but I think the band was better last December than this July." K2MZE was one of several New York City stations to work 8P6EN August 5. Joe says the Barbados station also worked several 1s. Those who missed Allen this summer may have a long wait for another 8P6 on 50 MHz, as he is scheduled to return to Australia this winter.

Several New Jersey stations are drumming up RTTY activity. Stations involved include WA2AAR, WA2MPQ, WB2FJW and WB2OVA. Other interested operators should contact WA2AAR for details.

In Atlanta, WB4WMT says he observed *E* on 12 days in July but the opening of the 10th was best. Other openings were described as poor and Bryan calls the season in general "very poor." Scatter conditions were good however, as he kept two months of schedules with K8BBN, Saginaw, a 650-mile path, with excellent results. WB4NBK, S. C., worked 8P6EN July 16, and heard KP4s August 5, working into the Midwest. Bob, and others, mention the desire for fellows who need their cards to include return postage. We hate to see this, but certainly can understand the reason due to postal rates and the present state of the economy. Fellows operating from the more rare states could develop some large postage bills for cards they don't want or need.

WB2LAI/4, Va., calls July "basically disappointing." He says the season's last significant opening was July 25 with cochannel television interference noticed as high as channel 7, 174 MHz. He also heard a QSO on 144.18, but no one was giving call letters. Several CQs produced nothing on 144, but on 50 MHz Bill observed backscatter signals over 200-mile paths. Other July openings were observed on the 4th, 10th, 11th, 15th and 22nd, mostly 4s, 5s, 9s and ϕs.

And then there is Pat Dyer, WA5IYX, San Antonio, who, when compared to others, generates his own *E* openings, or so it seems. Pat shoots the "poor season" theory to bits with his loggings. In June he logged 54 openings on 24 days, almost 140 hours worth! All states except Delaware were heard, plus VEs 3, 5, and 7 and KP4. And Pat concludes that July had the most *E* of any June since 1965.

Moving to the West Coast, K6QHC says "6 meters was very poor this July." He observed multihop to the East Coast on the 12th and 13th, and worked XE1GE on the 17th. But WB6NKO says he worked *E* on 14 days, with multi-hop openings coming on July 7, 11, 12 and 22.

Moving up the coast to Oregon, WA7GCS can't be convinced that July wasn't good to him. Lou worked KH6EQI at 2055 GMT on the 18th to earn 50-MHz WAS certificate number 119. Certificate number 118 was issued July 31 to WB6NKO. K7ZCB, near Portland, worked and confirmed 42 states this summer, but missed openings to KL7, KH6 and W1. He mentions July 10 and 12 as the better openings he caught in that month. K7ICW, Las Vegas, says the band was quite active in July. Al caught openings on 15 days, including multihop on the 6th, 12th and 13th.

K8TUT, Ohio, caught five July openings, including one to VE1KO, New Brunswick, on the 7th. WBϕDAS, Moberly, Mo., joined the six meter fun this summer and came away with 18 states worked on a-m phone. He says July 11 and 25 were interesting, working 1s on both dates. Welcome to vhf, Danny, and we look forward to your

Active vhfers K1HTV (left) and DC7CA meet at Rich's QTH during Peter's recent visit to the U.S. The two had QSOd via Oscar 6.

future reports. WBØIWG, Northfield, Minnesota, reports multihop to New England July 24, but August 5 was better, as he worked all call areas except W6, but including WA7FSI/7, Idaho. On the 10th he worked Florida and W1HDQ, Conn., and then enjoyed meteor scatter contact during the Perseid shower August 11 and 12.

W1HDQ feels that the season made up in August for what it may have lacked in earlier weeks. Two of the season's best days were Aug. 5 and 10. Ed worked W6ABN, WA6JRA and W7FN on the latter date and heard many other areas at multihop distances.

Other 50 MHz *E* reports were received from WA1HYN, WA2PMW, K2PQY, W3ZRR, WA3KFT, WB5IUY, K5ZMS, K7HSJ, WB8MXU, WB8GZL, WB9ETQ, K9OXY, and WAØTRB. Thanks to you all.

144-MHz DXers got their usual taste of late July and August meteors. Not many contacts were reported, as has become the case in the past two or three years. Meteor scatter is becoming more common and apparently the fellows doing the work aren't nearly as impressed with their results nowadays. We'll look later at individual reports available, but one fact is obvious: the shower was late peaking this year. So late, in fact, that it appears many operators had concluded their schedules and gone to bed.

W5KHT, Oklahoma City, doing his meteor scatter work on the television channels, says the shower definitely peaked between 1500 and 2100 GMT, August 12, with the best being between 1730 and 2030. Observing on channel 11, among others, Bob noted many over-dense bursts and brought his television station loggings to nearly *500* stations identified. W5TVB spent some hours watching TV meteors and noted these exceptional over-dense bursts: August 10 at 2215 GMT, 2 minutes 15 seconds on channel 8 (180 MHz); several 30- to 45-second bursts August 11 and 12, between 1000 and 1300 GMT on channel 8; August 12 for nearly 4 minutes at 1700 GMT on channel 6, 60 MHz; and August 13, 0213 GMT, 2:12 on channel 8. Considering the sensitivity of television receivers, these are exceptional bursts. W2AZL, N.J., worked Iowa and Illinois on a single 2-minute burst August 12 at 0530 GMT.

WA1OAM, Mass., found tropo conditions excellent July 2, working south to Virginia. He says the old W1BU moonbounce site is being used by him and WA1OZI for EME tests, with a 28-foot dish.

K3CFY, Pa., worked his state number 36 July 28; WA5UNL in Arkansas, on meteors; followed about one hour later with another Arkansas meteor contact, WA5RBH. K3CFY would like to schedule a Kansas station via the same mode. July 7 produced good tropo from the east coast as far west as Iowa. W3ZD, Pa., upped his total to 22 states, working Wisconsin and Iowa. I have second-hand reports of the Connecticut-to-Iowa path also being worked the same day, but again few details.

After a year-long bout with illness, K4GL is again active. Jack became the first 4 to work 10 call areas on 144 MHz, during a July 22 moonbounce contact with W6PO. Jack now has 40 states, a fine achievement from the Carolinas! He offers a possible clue to when an aurora may support 432 MHz buzz. He says to observe the bandwidth of the signal at 144. If it is wide and mushy, chances are the aurora is too weak to reflect 432 signals. Jack says if two-meter signals are narrow and clear, possibly good enough for phone work, then expect 432 aurora to be present.

In Virginia, WB2LAI/4 caught good tropo the evening of July 2, working north to W1JSM, N.H., and all states between. At Tulsa, WB5BKY, caught two 45-second plus bursts August 4 and worked New York and Virginia on meteors. KØWLU, near Sioux Falls, S.D., now has 24 states worked, completing 12 meteor contacts during the August Perseids. Seven of those contacts were made without the benefit of schedules and included stations from Maine to Arizona. In neighboring Minnesota, WØMJS, Minneapolis, caught a duct into the Tulsa area the evening of August 14, working W5UGO, W5HFV and K5BXG, and then for good measure, WØZJY, Kansas, for state number 26. The next day Ron began preparations for his move to Illinois where he'll face even more competition than WØLER and WØRLI offered. Ron's new address is 10-S-486 Curtis Lane, Naperville, Ill., 60540 from which he'll be looking for schedules and to rebuild his states totals. During the Perseids, WA7RTA and WA7BJU, both from the Portland area, operated from a mountaintop location in extreme southeastern Alaska, but reportedly made no contacts, although they gave their equipment the acid test of British Columbia and Alaska highways.

In New Brunswick, VE1ZN says not much doing, but from the number of times he sees tropo television signals from New England, many good contacts are being missed. He says VE1AFB is now VE1RG, and that VE1AHJ is now VE1DO.

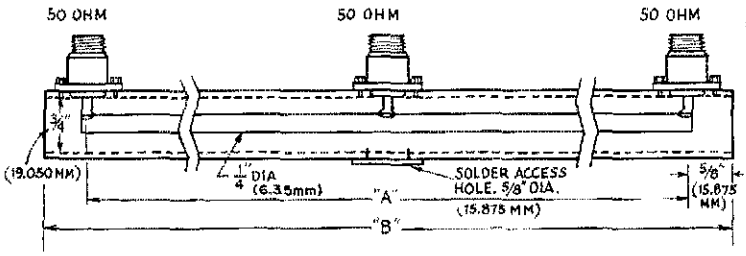
Effective June 24, Italy began issuing 144-MHz licenses with the prefix IW. It is a restricted, non-code license. One of the first tickets issued was to IW3EAD, who says he is now active on 2-meter a-m phone.

220-MHz isn't nearly as void of amateur signals as the EIA would lead FCC to believe. W1YTW, Maine, reports a July 3 tropo contact with WA4TTG, Virginia, and another July 9 with WA8PKB in Ohio. In Connecticut, K1PXE, W1QAK, WA1NQG and WA1GTP are all active. Several are running 100 watts of ssb. And in Southern New Jersey, W2EIF worked Michigan stations K8HWW, WA8PKB and WB8JSD, July 9. Since then W2EIF and WA8PKB have been running nightly schedules as time permits, finding conditions normally like those encountered at 144 MHz. K9HMB, near Chicago, continues to search for new stations on 220, looking especially for Kansas. Frank now has 20 states on 220.

432 MHz nearly gave up two more meteor scatter contacts during the August Perseids shower. August 11, W2AZL and W5ORH were scheduling over a 1385-mile New Jersey-to-Oklahoma path when a 22-second burst came through. W5ORH was doing some library research and was unable to reach the automatic sequencer in time to take full advantage of the burst, hence the schedule ended with only Rs needing to be exchanged. On the 12th, a 3-hour schedule, plagued by radar interference at both stations, ended in what some operators would have called a contact, but W2AZL and W5ORH decided to "wait until next year." Another 432 meteor schedule between W5SXD, Dallas, and WØLER, Minneapolis, went without contact when an exhausted W5SXD fell asleep needing only the Rs to finish. W5SXD also suffered transmitter problems which cut his output to about 150 watts (to a 20-element collinear) but still WØLER was copying.

In other 432 and higher frequency news, WA2LTM reached 15 states worked on 1296 recently, adding W1YTW, Maine, K8UQA, Ohio, and W3CCX/3, Delaware. WA2LTM had worked

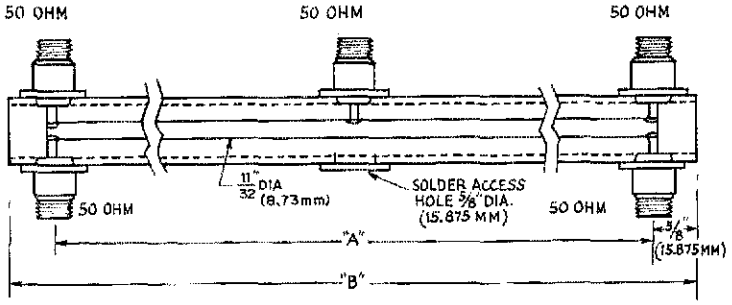
50-OHM TWO-PORT POWER DIVIDER



Physical dimensions of WØEYE's two- and four-port 50 ohm power dividers:

MHz	*Dimension A*	*Dimension B*
144	41"	42.25"
220	26.84"	28.09"
432	13.67"	14.92"

50-OHM FOUR-PORT POWER DIVIDER



W8YIO, near Detroit, five times this year at this writing. That's over a 520-mile path. WA2LTM is keeping 300-mile schedules with K2YCO, Rochester, enjoying 60 percent success. K4QIF, at 260 miles, is considered a "local" by WA2LTM. *Thanks Doug for the information; keep us posted.*

K2YCO, taking advantage of the July 7 tropo, reported earlier in this column, exchanged 1296 signals with Illinois stations W9WCD and WA9HUV. The path to W9WCD is 560 miles. K2LGJ, Buffalo, reached 11 states worked on 432 during the June contest, adding New Hampshire and West Virginian, W8QOB. Please send me your 432 score, Bob, as you're eligible for a box listing. K2LGJ is using the K2RIW 13-element Yagi design now becoming popular on the East Coast. This writer heard an interesting talk by K2RIW at the Central States VHF Conference in Minneapolis, in August. We will give details of his Yagi design in this column at a later date.

K2UYH, Trenton, likely has completed his summer-long antenna project by now, a 28-foot dish for use on 432, 1296 and 2304 moonbounce. Al donated his "little" 20-footer to the Mt. Airy VHF Club, W3CCX, for a 432 EME project. Anyone interested in schedules with the K2UYH effort should address requests to Al. WA2LTM is handling the 1296 and 2304 project.

On 432, K2UYH has reached 20 states from his new location, his latest being W8QOB, West Virginia. Al worked WA9HUV, near Chicago, during the July 8 tropo. On 1296, Al boasts 10 states, working WA1MUG, Mass., during the June contest, but Al agrees that WA2LTM is *the* competition on 1296. W3CCX/3 in Delaware was state number 9 *for K4QIF on 1296. That was back in May, and* since then Rusty has added three more to total 12, that being K8RYU, Ohio, on July 31.

In Ontario, VE3EVW (VP2MJ to 50-MHz DXers) now has nine states on 432. Recent contacts include those on July 4 with W9ZIH, W9IDCN and WA9HUV, and on July 8 K9HMB and W9ZIH, all in Illinois, and K2UYH, for topping. Monty heads south again in November, for a *Caribbean winter on Montserrat. He may not set* up this year for 50 MHz, because he doubts the band would be profitable at this state of the sunspot cycle. You never know, Monty, but 6 has a bagfull of tricks at times – and Mel Wilson loves Caribbean *E* data.

50-Ohm Power Dividers

Described here and in the accompanying drawings are two- and four-port power dividers for the 144-, 220- and 432-MHz bands designed by Don Hilliard, WØEYE. Don stresses that the design information should be exactly followed to prevent performance degrading. The two-port model uses a 1-inch square, 1/8-inch-thick aluminum outer conductor and a 1/4-inch dia. round brass or copper tube for the inner conductor. The four-port model uses the same outer conductor as he two-port model, but the inner conductor is a brass or copper round tube, 11/32-inch OD. All connectors are UG56A/U mounted in 5/8-inch holes with No. 4-40 screws, 1/4-inch long. Mounting screw holes are drilled No. 43, tapped for 4-40 thread. The ends and solder access holes should be covered with 1 × 1 × 1/32-inch aluminum plates held in place with *RTV* sealant after the assembly is completed.

The rf handling capacity of the power divider is limited by the type-N connectors, but nevertheless is in excess of legal amateur limits, being two *kilowatts or better at* 432 MHz.

Bandwidth of the devices is more than sufficient to cover the entire band of design with less than 1.24:1 VSWR. QST

YL news and views

CONDUCTED BY LOUISE RAMSEY MOREAU,* W3WRE

The "In Sound"

IF WE CHECK the dictionary we find that there are about a dozen different definitions of the word "in," and that it can be used as an adverb, preposition, adjective, noun, or a verb. In the modern vocabularies we find ourselves describing a style or design as "very in," or calling an activity the "in thing," while the very desirable groups are known as the "in crowd," for this latest definition makes use of "in" as a sort of popularity index to indicate the top of the list.

When it comes to music the correct term in the mod use is the "in sound" that varies as the styles and rhythm become popular. For those of us in amateur radio there are variations of this in sound depending on our preference in emission forms. Many of the women in the MARS groups, as well as those who love to operate a keyboard find the chatter of the printers is the only way to listen. We can argue our favorite form 'til we're blue in the face with a phone operator but to them the finest sound is the friendly sound of the voice coming through the speaker, be it ssb, a-m or fm, it's still fone and it's "in." The cw addicts will listen to all efforts to convince them with a "who needs it?" shrug and then turn back to those code characters. To others, the unmistakable tone of Oscar, as they track and log that satellite, makes all the rest seem tasteless.

Within the individual choices of form of emission there are other sounds that are, as a designer might say "very in," or as one gal put it after a good contact, "that kind really turns me on." There are the YLs who find contests, AP, YL-OM, Howdy Days, a siren song, and "CQ contest" makes them go right into orbit and never quite come down until the final second that it ends, for be it cw or voice, that is all they want to hear.

Many of us find net operation our particular delight. The warmth of the voices checking in, the anticipation of who will be on this session, or the net control procedures. And when there are new calls that mean more contacts towards a certain certificate the effect is sound lit up by strobe lights to the gal who hears it. We go right up and pass the stars when DX is rolling for to the DXer the most beautiful music is the answer to our calls, and we purr like a cat in a creamery over the reports.

To all of us the true definition of the "in sound," that appeals to us, no matter what form our operating takes, is the sound of good operating techniques. The popularity rating of an operator depends on the skill and know how, whether Novice, or long time veteran on the air. We check into those weekly nets because we enjoy the expertise of the net operation, the methods used in keeping us all in contact with each other no matter how far flung the scope of the net. We answer the person who keeps the calls short, and with whom we have a satisfying contact. We sit and admire the gal who takes the time and patience to work with the beginners and who, by using the correct operating methods shows these newcomers the way to form those on-the-air habits that will add to the enjoyment of everyone that they work, for in amateur radio the only identity we have is the sound of our operating habits.

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

New YLRL Sponsored Contest

YLRL will sponsor a new contest to be introduced in January 1974. Called the "DX YL to Stateside YL Contest," it will be for women amateur radio operator participation only. The operating rules are illustrated by the name of the contest, for DX women may contact YLs in the 50 United States only, while women in the 48

Chix-on-Six 1973 officers left to right, front row: Elaine, WA8QFL, president; Marge K8ZEV, certificate custodian; Carol, W8WRJ, vice president. Back row: Eila, WA8EBS, YLRL vice president: Sue, WA8OZB, Chix-on-Six reporter to the *Buckeye Belle Burr*; Carolyn, K8TFR, Treasurer; Dot, WA8IJW, secretary; Helen, W8EFB, club historian. *(Photo courtesy WA8EBS)*

mainland states may count DX YLs and those in Alaska and Hawaii as scoring contacts. What happens, then, with the gals in Hawaii and Alaska? For their individual call area they may score contacts with the other 49 states, and all DX countries.

The cw contest will be January 9-10, 1974 GMT, and the phone contest January 23-24, 1974 GMT. The rules may be found in the Operating Events section of *QST*.

Floridora Month

October might be listed on the YL calendar of activities as Floridora Month for each year the *Floridoras, the statewide YL club in Florida*, schedule that month as the time when members of the club are on the air to give contacts to any and all persons who are anxious to work women in that state leading to, of course, the acquisition of the *Floridora certificate.*

Trillium Weekend

The Ontario Trilliums sponsors a "weekend" early each November to make possible contacts with the club members for all other amateurs. This activity is open to all other amateur radio operators who wish VE YL contacts. TOT members are not eligible for the award and will be on the air for the purpose of giving points to non-members of the club.

An engraved plaque is awarded to the person who submits the highest score. For those who do not win, this weekend is an excellent time to acquire the necessary contacts needed for the Trillium Certificate that is awarded for proof of contact with at least six TOT members.

AWTAR 1973

Carolyn Currens, W3GTC, chairman of the communications link for the annual Powder Puff Derby, has announced that the 1973 event was a completely successful activity from the com*munications angle, and one of the best, and most* smoothly handled so far. No problems were encountered this year and the OMs who assisted were a great help in making it a success.

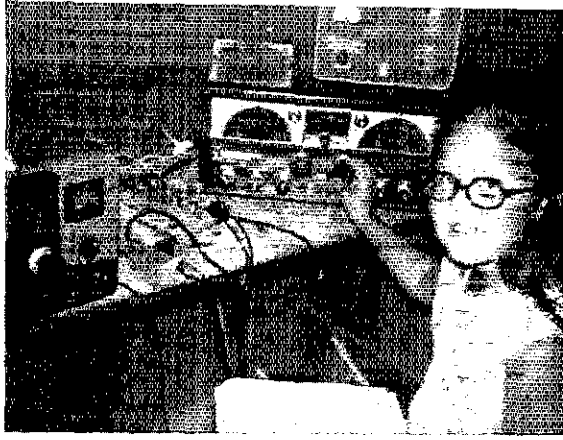
This year, for the first time, there was a representation from the Novice ranks with the operation of WN5HYN who organized an outstanding group at the Albuquerque, New Mexico stop.

Carolyn stated that the 1974 Powder Puff Derby will have Lancaster, California, as the take off point. The intermediate stops along the route, and the terminal stop have not yet been selected.

Three New French YLs Licensed

F6COS, Marie Bruant, F5CMK; Brigitte Denis; and F6CMQ, Jaqueline Risacher, have been listed in the "new calls' column of the May 1973, issue of the French publication *Ondes Courtes Informations*, as the latest additions to the growing YL picture in France. There are now over 50 women who hold amateur radio calls in that country.

XE1CI, Nellie representing Mexico at the YLISSB convention.



Radio's youngest YL, WN0KXO, Tamra Williams.

1973 YLRL *Directory* Published

The 1973 Directory issue of *YL Harmonics*, the official publication of YLRL, was published in August 1973. The Directory Issue lists names and addresses of the current membership, as well as rules on the five YLRL sponsored certificates, YL Net Directory, and the YLRL Contest Calendar.

YL Harmonics is published by and for members of the Young Ladies' Radio League bi-monthly. Harmonics is also available on tape for blind YLs under the "Tape Topics" program of YLRL.

YLRL Novice Award

For the first time YLRL is offering certificates for the highest score earned by a Novice participant in all four of the club's major contests. Second and third place certificates will be awarded *if the Novice participation in the contests should* warrant their being issued.

It should be noted that this Highest Score Novice Award will be available to any Novice who submits an official contest log in the YL-OM only. The Howdy Days, YL Anniversary Party, and the DX YL to Stateside YL contests are limited to YL participants only.

Amateur Radio's Youngest YL

When Tamra Diane Williams, WN0KXO, received her license she joined a very exclusive group

The group at the YLISSB convention in Minneapolis with ARRL officials, members from all ten of the call areas in this country, and many members from DX countries. *(W7UXN photo)*

of women amateur radio operators for she is the fourth YL to have been licensed at the age of 8. Her interest in radio was inspired by her father Marvin Williams, WAØYKJ. For several years he had been participating in the Tri-State Amateur Radio Society Field Day at Pittsburg, Kansas. Tamra had been wanting to go with him but he told her that the only way she could go would be as a licensed operator.

Tamra found that the code came fairly easily, but failed the written examination the first time she took the test. She reapplied and took the test again and both the FCC, and the mails were kind and she received her Novice license the day before Field Day this year.

Tamra is a member of ARRL, and, after an hour long QSO, qualified for Rag Chewer's Club. She is active on 40 meters.

Only three other YLs have become amateur operators at that age: Jean Hudson, W2TFF of code championship fame in the 1930s. KN6TMQ, Ann Deck; and KN4LXL, Dollie Reynolds. QST

Silent Keys

IT IS with deep regret that we record the passing of these amateurs:

WA1BVN, Samuel N. Nash, Beverly, MA
W1CIT, James L. Hannon, Hartford, CT
W1DMZ, Thornton M. Skidgell, Wethersfield, CT
W1LHZ, Charles L. Burgoyne, Hanover, MA
Ex-W1LJT, Charles O. Nowell, Brockton, MA
WN1MTG, Joseph L. Bottari, Everett, MA
W1NZO, Samuel S. Pierce, Milton, MA
W2AV, John L. Heins, Staten Island, NY
W2CG, Ellsworth A. Pierson, Wilson, NY
K2GCB, Carl N. Zimmerman, Bronx, NY
W2GWV, William W. Crosby, Yonkers, NY
WA2HIQ, George F. Duvall, Shelter Island, NY
W2MDV, Louis Mackay, Edison, NJ
WA2MJM, Jean M. Fox, Kingston, NY
WB2NFF, Michael A. Kennedy, Poughkeepsie, NY
W2NL, Herman A. Wilm, Jersey City, NJ
Ex-WB2PES, Peter J. Dittmar, Cottekill, NY
K2PLB, Louis O. Acevedo, Mahopac, NY
W2SVR, Hugo L. Estberg, Hastings-on-Hudson, NY
WA3BNG, Merritt P. Raymond, Beltsville, MD
K3CIV, Ralph J. Hersh, Philadelphia, PA
W3CZS, Carson B. Call, Smyrna, DE
W3ECP, Edwin S. Van Deusen, Washington, DC
W3GRJ, Frederick V. Sloop, Kittanning, PA
W3HBT, Ezra A. McIntosh, Olyphant, PA
WA3OCT, Leonard Barber, Newark, DE
W3PK, Seton M. Maynadier, Rehoboth Beach, DE
W3TYJ, Charles C. Worsley, Silver Spring, MD
K4BVE, Judson U. McGuire, Chesapeake, VA
W4EFG, Joseph D. Andrew, Skyland, NC
W4HHJ/W5ECY, Howard P. Black, Mobile, AL
K4HQC, Alex C. Phillips, Tallahassee, FL
K4HWL, Raymond A. Limberg, Bradenton, FL
W4KWO, Asa W. Adkins, Sr., Lexington, KY
WA4MXV, Albert V. Cito, Tampa, FL
K4RIS, Samuel T. Webster, Jr., Elon College, NC
W4UUZ, Emmett M. "Pete" Taylor, Miami, FL
W4VN/Ex-4OK, Elbert M. Fox, Annandale, VA
W5CYO, George A. Rauch, Little Rock, AR
W5FHG, Louis E. DuTreil, New Orleans, LA
WB5FIW, John W. Livingston, Karnack, TX
W5NVD, Andy W. Scott, Holdenville, OK
W5RRR, Harmon L. "Red" Brendle, Houston, TX
K5VLV, Carl E. Merriman, Ocean Springs, MS
W5YDI, Anselmo G. Altobelli, San Antonio, TX
W6AFP, Russell F. Davis, No. Hollywood, CA
W6DPE, Eugene P. Jennings, S. San Francisco, CA
K6KS, Roy E. Butler, Desert Hot Springs, CA
W6HJN, Charles L. Moody, Oakland, CA
W6PDL, Eugene J. Savage, Lynwood, CA
W6RPX, Joseph C. Wimmer, Monrovia, CA
W6UCV, Maurice E. Borden, Stanton, CA
W6UNP, Daniel F. Earhart, S. Lake Tahoe, CA
Ex-W7CEO, George W. Daiber, Cheyenne, WY
W7DOG, Emory J. Foren, Yakima, WA
W7HCN, Paul S. Thun, Eugene, OR
W7HLB, Dale P. Smith, Eugene, OR
W7HPS, Frederick A. Riebe, Eugene, OR
WA7QQJ, Hudson H. Darrah, Renton, WA
W7RGV, Jack L. Ellison, Orting, WA
W7SEI, Charles H. Thomas, Huachua, AZ
W7UI, Patrick F. Kearins, Carson City, NV
W7ZDF, William W. Willard, Sierra Vista, AZ
W7ZJS, Raymond B. Donnell, The Dalles, OR
W8GBG, Robert A. Cartwright, Sr., Toledo, OH
WB8IEP, Robert D. Wallen, St. Joseph, MI
K8IGT, Harold E. Dennis, Sr., N. Ridgeville, OH
Ex-W8LJZ, Donald E. Moe, Kalamazoo, MI
W8QXV, Harry S. Bertesky, Barberton, OH
K8RKF, Martin M. Meade, Cleveland, OH
W8ZCL, Robert F. Rychlik, Dayton, OH
W9DYW, Arthur Berry, Hamilton, IL
K9HWI, Vecal P. Lager, Barrington, IL
W9KCR, Laverne A. Bamberg, Hixton, WI
WA9YIY, Donald R. Bilbruck, Carlinville, IL
W9ZN, Norman E. Wunderlich, Los Angeles, CA
WAØAEA, Barbara L. Robertson, St. Louis, MO
WØNWQ, Victor A. Damora, Boulder, CO
WØPGB, Leo W. Grimm, Bouton, IA
VE3BBQ, R. V. G. Stevens, Trenton, ON
VE3CIH, Philip A. Hutchinson, Toronto, ON
VE3CKK, W. G. D. Hughes, Oshawa, ON
VK3HL, Allan T. Hutchings, Callawadda, Victoria, Australia

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

When:

W2OEU's discussion in August 1948 *QST* of the life and work of Dr. Mahlon Loomis, recalled by W1RW in this August's "25 Years Ago," is as interesting as ever on second reading. America's first DXer was quite a guy, a worthy Leif Ericson to Marconi's Columbus. Poor parallel, that; Leif's exploratory claims are mere folklore compared to the extensive documentation of Dr. Loomis's wireless pioneering.

U.S. Patent No. 129,971 reads in part, "The nature of my discovery consists, in general terms, of using natural electricity and establishing an electrical current or circuit for telegraphic and other purposes without the aid of wires . . . yet communicate from one continent of the globe to another." This was, mind you, a quarter century before Marconi applied for his famous 1896 British patent. A drawing by Loomis illustrating his DX concept, sketched in the year of Lincoln's assassination, singularly includes a global ionosphere-like blanket which he called the "static sea."

But the world wasn't ready for a dentist's newfangled ideas in the 1870s. Financial backing Dr. Loomis failed to find fortunately did appear in time to propagate the undeniable genius of Marconi. And say, what about that Scotchman W2OEU mentions, the James Bowman Lindsay who "between 1844 and 1853 sent wireless messages short distances with aid of batteries."? Was Lindsay's field day aborted by the great-great-*grandfather of Murphy*?

Mary Texanna Loomis, a remarkable YL somewhat overlooked by current Libbers, tells us more about Lindsay in her *Radio Theory and Operating* offered in 1925 by Loomis Publishing Company, a rare 900-page volume we borrowed from the library of WA9ESO. Mary records that Lindsay did his experimenting near Dundee and obtained a wireless patent in 1860. Moreover, she points out that Spanish scientist Salva evidently got an underwater wireless working 'way back in 1795.

WA9ESO's book by Mary Loomis is a veritable encyclopedia of the art compiled while she served as president of Loomis Radio College and Institute of Radio Engineers lecturer. Therein is to be found full lowdown on the "Single Side Band Carrier Eliminated" rig with which Bell Telephone was working England in 1923. Yup, the very same basic balanced-modulator/filter state-of-the-art technique we're so proud of half a century later. Sure isn't easy to visualize ssb and spark side by side in the radio spectrum but that they were.

You didn't realize ssb and cw are just about the same age? That's probably because historical perspective is so easily overexcited into distortion. Mahlon and Mary Loomis would understand.

† † †

What:

10PHONE keeps making curtain calls, sunspots or no. Will 28 MHz bounce in again this season, how well and for how long? Your log will tell the story. Despite customary direful predictions the past season surprised "how's" reporters *Ws 3HNK 8EFW 9LNQ 9TGN*, Ks 6SGD 8PYD, WAs 4EPH 9QJW ØVJF, WB4UKA and the clubs press with ample audio from A2s CAY CEW CCY, A4s XFD XFE, A6XF, CEs 3AN 3OE 3PY 3RC 3UM 3YO 4DM 5GO 6CE, CP1JV, CRs 4BS 6CA 6EO 6EW 6PR 6QR 6RC 7AF 7CH 7IZ 7LE 7TJ 7WL, CXs 2AAJ 2CO 4AR 5BC 6AM 7AP 8BE 8BZ, DU1s FH 1GJM, DXØPAR, EAs 4MN 9EJ, ELs 2AK 2DG 8I, EP2s MO SP, ET3DS, FCØAHY, FG7s XL XT, FK8BQ, FL8OM, FY7AF, GD2HCX, GC3EML, GM3CAN, HBØLL, HCs 1CE 8FN, HH9DL, HI8LC, HKs 3BGB 3CMI 3CPW 3CTJ 4CJB ØBKX, HPs 1AH 1NC 3ZP 6EN, HR1KS, HV3SJ, ISØSOF, IT9DIK, JA3BG, JY6FC, K5QFH/VQ9, KB6CU, KC6HC, KG4s FO FS FV, KG6s 6SH 6SW, KH6s BZF EDY (Kure), GMP HQF IJ RS SP, KJ6BZ, KL7s CK HQG FSJ, KM6DZ, KP4DHD, KS6s DY DT EI, KV4s GV HW, KW6DT, KX6s BR BU, KZ5s JF LK NG, LUs 1EMT 2DEK 3DTV 4DSZ 4MT 5DEL 5HEN 8AJG, LX1s BW HD RF, MP4s BJS TDM TEF, OAs 4AAA 4AHA 4AZ 4CBU 7BI, OD5s CS FU, *OHØMAS, OX3JW, OY9LV, PJs 2CW 2HA 2MI* 7ARI 8GQN 9BB 9TED, PYs 1DBK 2CSS 3BMJ 3BXW 8ZAI, PZ5CW, RAØLEV, ST2SA, SVs 1EN ØWUU, TG7BY, TI2NG, TJ1BB, TT8AC, TU2s DF DN DO, UK5IBG, UR2TAX, VKs 2AXB 2XT 4QM 8CW 9AR 9FH 9KX 9XI, VO1FG, VPs 2AA 2KH 2LAW 2LI 2MAH 2ME 2MY 2SAB 2VAM 2VPI 7NH 8KF, VQ9s D HCS MC R, VR1AA, VS6DM, VU2ABV, WB2KEA/VP7, XE1SSC, XT2AJ, XV5AC, YA1DT, UN1AZ, YS1s MBL WPE, YV4AIG, ZB2CO, ZC4s PE TY, ZDs 7BB

KH6ABH contributes your QTH of the Month, remote Tern island of French Frigate Shoals. The place is about the size of an aircraft carrier and even looks like one. Gary, finising a rather lonely tour on Tern with the Coast Guard and countless goony birds, keeps in touch with home via the trusty 21-MHz indoor dipole of friend WA1NSJ.

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

CR7IK mans a neat DX corner at Beira. Aurelio answers plenty of pursuing W/K/VEs, yet approaches the 300-country mark in quest of his own DX.

7FT 8KO 8RR 9BM, ZEs 1AD 1CU 3JO 4JS 4JW 6JL 7JC 8JJ, ZKs 1CD 2BD, ZLs 1BIN 2AAS 2BAD 2LG 3GG 3QN, ZM2s ACP BFJ, ZPs 5HZ 5TT 7VO, ZSs 3CJ 3HX 3JJ 4MZ 5LB 6AWU, 3A2AH, 3B8CV, 3D6AX, 3E1JC, 4W1AF, 4X4FE, 4Z4s AB MU ND, 5B4AO, 5H3MT, 5N2ABG, 5R8CO, 5T5DY, 5U7s AX AZ BB, 5X5NK, 5Z4s JE JJ KL LW OB, 6W8s AL DY, 6Y5EE, 7Q7s NB RM, 7X0WW, 7Z3AB, 8P6AD, 8R1N, 9G1s AR HE HO HW, 9H4B, 9J2s BL DT HE JN LF RC TC XZ, 9L1JK, 9M2DQ, 9Q5BG, 9X5VA, 9Y4s EH and HR. Elegant sufficiency for Five-Band DX Century Club purposes but one must move fast to catch those mercurial openings. Now you hear 'em, now you don't!

10CW still gets the phone spillover and contest play on weekends. Before the band folded last spring Ws 6AM 9LNQ 9TGN, Ks 3CL 8LJQ, WA0VJF, WB4JYX, VE7BAF, WNs 4BYS 4ZVF 5HII 5HVY 6RXI and G3DME's *QUAX* crew telegraphed with CR6s OZ PC, CR7IZ, CT2BG, CX1NG, DJ6LM, DM2AEB, EAs 6AU 7OS 8URE, EL2Y, ET3USA, Fs 3AT 0AHY/FC, FG7TG, FK8BP, Gs 3EJV 5RI, GD3GMH, GM3BNX, HA5KFH, HBs 9AFI 0NL, HGs 4KYV 8KGX, HH9DL, HI3XAM, I6BQI, JAs 1SJV 5FBZ 7ARW, K6HLK/KH6, KC6SK, KH6s IJ RS, KV4s CK HW, KH6BB, LUs 2DKG 4MT 5DVO 5HFI, OD5EJ, PJs 2JW 2VD 7VL 9BN 9JT, PYs 1MCC 2ZBA, RA0LEV, TG9CD, TI2s DX WX, UK2FAA, UH8HAB, UN1AU, VK2EO, VPs 2LAT 5GR, VQ9s R RK, VR1s AA W, WN8MFO/KP4, WP4DPW, XW8s BP EV, YN1AA, YU4EJC, ZDs 3Z 9BM, ZE3JJ, ZL1s BLD IL, ZM2GH, ZSs 2AG 5LB 6ADE, 5T5CJ, 5Z4KL, 6J9AA, 6W8DV, 8P6DR, 9G1HE, 9J2s LA XZ, 9L1s GC JT and 9Y4VU. The lads are also keeping an ear out for beacon stations DL0s AR on 29,000 kHz, IG1 28,195, GB3SX 28,185, VE3TEN 28,175, ZC4CY 28,280 and 3B8MS on 28,190 kHz but if you want ten to stay alive it's important that you don't sit around just listening. Bang out those CQs long and loud to stir things up. Our Novice cats are in there swingin', too, and their fresh DX enthusiasm will give the ten-meter ball a big shove. DX openings on 28 MHz now display critical latitudinal selectivity, you'll observe, mainly north-south paths with the southland getting most of the east-west breaks. Anyway, for better or for worse, till QSB do us part, another 10-meter season is here. Good huntin' and keep us posted!

† † †

W h e r e :

EUROPE – British callsigns are currently issued in the G4C- series so there can be G2-3-4 three-letter calls in the A-B-C runs which are identical except for the digit. This requires extra care in writing out QSLs where confusion between, for example, G2AAX, G3AAX and G4AAX easily arises. There is also a G8AAX, incidentally, but he would be a vhf/uhf-only man. Cards for the previously mentioned G2-3-4s are handled by different sub-bureau managers so there is no possibility of wrongly addressed QSLs being automatically forwarded to correct recipients. (G3IDG) . . . Just received about a hundred tardy Russian QSLs. Is that problem on the mend? (W1BFK) . . . The UX prefix was used by stations in the Moscow area during July for commemorative purposes. (DXNS) . . . 4U1ITU QSOs dating after this June can be confirmed through W2GHK. (LIDXA) . . . HB9S contacts from July 29 to August 5, 1973, can be confirmed via HB9ALY. The call was used on several bands at the Kandersteg Scout Jubilee. (DXNS) . . . Cards for DT-prefixed Germans can go via the DM QSL Bureau. The calls should be active through '73. If you would go direct, substitute the DM prefix and try the *Callbook*. (WCDXB)

AFRICA – All QSLs for my Mozambique operation may still go via W7VRO or to my new address, Vila Oriental, Rua Sacadure Cabral No. 1, Carcavelos, Portugal. (ex-CR7FR-XX7FR) . . . The total solar eclipse observed at 5T5ES will be pictured on our QSLs. (K5HAY, W3ZUE) . . . No logs from ZS4JB in over a year, and no reply from Dick answering letters of inquiry. Therefore I can no longer act as ZS4JB's QSL manager except for QSOs of April 25, 1972, and earlier. Any QSLs on hand will be mailed to Dick along with blank cards for his own replies. (W9LT) . . . K9KXA assumed QSL duties for my contacts as of June 1, 1973, on the usual basis, self-addressed stamped envelopes (s.a.s.e.) from W/Ks, s.a.e. plus International Reply Coupons (IRCs) from others. (5T5LO) . . . Note again that I handle QSLs for A2CEW but for no other A2 stations. To my knowledge cards for A2s CAB CAE CAH and CJP all go direct to Botswana. (VE4SW) . . . Received ET3GB's QSL direct for a contact back in 1955, better late than never. (W8ZCO) . . . Ex-ET3GB invites QSL inquiries for his Ethiopian QSOs at his present OA6CV address. (DXNS)

ASIA – UA9MP tells me he has dispatched some 10,000 QSLs over the past few years with only forty percent returns to show for it. Vlad pleads for response through the usual Box 88 channel. (W4UMF) . . . QSLs for new AP2s JL MD MQ and TH can be sent via AP QSL Bureau, P.O. Box 65, Lahore, West Pakistan. (ex-AP2U) . . . YA1GJM reports our Camel Drivers Radio Club QSL Bureau running smoothly in both directions and observes an increased flow of SWL cards. (YA1AB) . . . XU1AA QSOs by operator Ted may be QSLd to his HB9OP address. (DXNS)

SOUTH AMERICA – I welcome QSL inquiries at my new Las Vegas address concerning my DX work as PY1ZAO, HO1XGL, HP1XGL, K4UGL/OA4 and KZ5EE. (W7JRW) . . . W3DQD/YV1 promised to catch up on his QSLing after returning to Pennsylvania in August. (WN6SWM) . . . I'm managing cards for QSOs with HC1GK in 1966 only, OA4YM 1966-'67, CP1HW 1968-'70, YB0AAN 1970-'72, and all QSLs for K7DVK/KS6, VP1EG, 3D2s DK and GK. (K7DVK)

NORTH AMERICA – Manager W6KNH and most other QSL aides appreciate it when you submit separate envelopes for each of more than

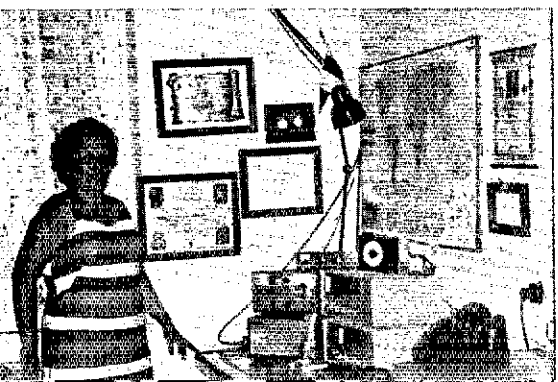
one QSL requested. (DXNS) . . . WA1QOX/VE8 states he will take care of his Baffin Island QSLing on return home this month. (W4WFL/1) . . . "QSLers of the Month" commended for quick confirmational comebacks in correspondence from W1s OPJ RML SK, Ks 6SE ØVFN, WB2AQC, WNs 6SWM ØGTJ and VE7BAF include such reliables as CT3AF, DK5MN, EA8GZ, EL9A, F6s BLV BVY, FO8DO, Gs 3AMR 5NX 6CJ, GD3RFK, HB9AMZ, HV3SJ, JH1WIX, KAs 2AD 6WS, LU3AU, M1C, OZ6PI, SM6s ASK CYA, SU1IM, TI2DX, VKs 2ADE 4MY, VS6FB, W3JAK/mm, WB2PXZ/PY9, YU3WO, ZL1s RO SV, 4W1BC, 6Y5DL and 9K2AM, together with QSL tenders Ws 3HNK 6KNH ØDMA, Ks 4TSJ 7NHV, WA6TWG, WN7TDZ, G3SUW and I1FTU. Any punctuals you'd like to applaud here? . . . Halp! Overdue pasteboards from holdouts mentioned inspire the following italicized colleagues to seek your aid and advice: (W9KB) TN8AU; (K1NJC) KP6AC; (WA2AEY) F6CCU, G3RGD, ls 3GUS ØBVP, PY7BBX, UK2RAN, UT5BV, XE1TI; (WB2AQC) TZ2AC, VP2DAI, VS6BS, VR6TC and 4S7AB. Any 'alp!? . . . K8ZYK, WA3SWF and Dr. S. Zane, 869 Jane St., Toronto, Ontario, M6N, 4C4, Canada, volunteer to serve as QSL managers to overseas ops in need.

OCEANIA – ZM4NH vows 100-percent reply via bureaus to all incoming cards. (DXNS) . . . P.O. Box 184, Suva, is still okay for Fiji QSLing. (NTDXN) . . . Now let's check individual recommendations from the flock on condition that each suggestion is necessarily neither accurate, complete nor "official." As we remind you from time to time we have no space to duplicate listings available in your latest *Callbook* supplement, and we usually make a six-month pause before repeating given data. Let's go:

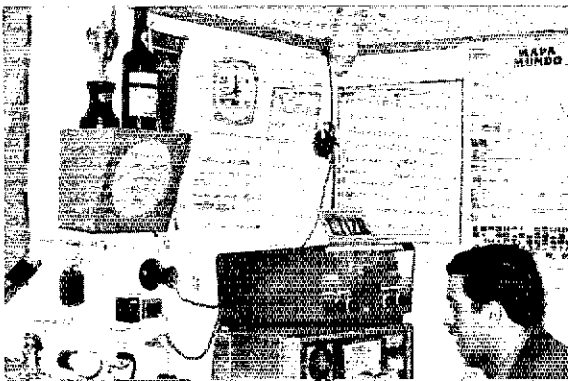
A4XEJ, Box 981, Muscat, Sultanate of Oman
AP2JL, S. Jamil, Scientific Officer, PAEC, Rawalpindi, Pakistan
AP2MQ, Mohammad Qureshi, 7 Union Pk., Samnabad, Lahore, Pakistan
AP2TH, T. Hussain, c/o Pak. Laboratory Supply, McLagan Rd., Lahore, Pakistan
DTØDDR (via DM bureau)
FGØAFA/FS7, J. Irwin, 578 Morris Av. A6, Elizabeth, New Jersey, 07208
FK8BV, B.P. 12, Noumea, New Caledonia
FPØBG, S. Arosankari, VE1AIH, 135 Purcell's Cove Rd., Armdale, Halifax, Nova Scotia, Canada
FP8CZ, P.O. Box 16, Telecom Svc., St. Pierre via Sydney, Nova Scotia, Canada
FY7AN, C. Loit, cite Rebard, P.O. Box 746, Cayenne, 97305, Fr. Guiana
G3YUT/OHØ (to G3YUT)
GC5s BDP BDX BDY BDZ (via F6BSW)
HI8XAW, c/o U.S. Embassy, Santo Domingo, D.R.
HP1PAX, P.O. Box 3462, Tel-Aviv, Israel
ISØXMA, Box 392, Cagliari, Sardinia, Italy
JD1s AHN AHR, JA3s LWA/JD1 3LWA/JD1, via JDXRC c/o JA3GZN, P.O. Box 29, Amagasaki, Hyogo 660, Japan
JWØAU (via Belgium's UBA)
JY3ZH, P.O. Box 11020, Amman, Jordan (or via JR1RDE)
K7DVK/KS6 (to K7DVK)
KH6ASN/KB6 (via K9KXA)
OIØAM, K. Eriksson, SF-22430, Saltvik, Finland
OX5NA, Box 1104, APO, New York, NY 09023
PAØEHF, A. Hugenholtz, Neijenheim 52-01, Zeist, Netherlands
ex-PY1ZAO-HO1XGL-HP1XGL-K4UGL/OA4-KZ5EE, E. Wachter, W7JRW, 1205 E. Cartier Av., North Las Vegas, NV 89030.
PY7ZAH/Ø (via WB8FDF or PY1ZAE)
UX3A-B-C-F-I-R (via CRC of Russia)
WA1QOX/VE8 (to WA1QOX)
WA3SBW/6Y5, J. Fiefarek, Box 837, Kingston, Jamaica, W.I.
WA4KPH/HKØ, E. Duncan, P.O. Box 160, San Andres, Colombia
WB4BUQ/8R1, H. Neufeld, P.O. Box 596, Georgetown, Guyana
WB4HIT/VP7 (via W4LR)
WB4VKH/8R1, J. Davidian, P.O. Box 596, Georgetown, Guyana
WB8MZN/KS6, J. Clausing, Box 611, Pago Pago, U.S. Samoa, 96799
YA1ED, E. Thompson, P.O. Box 5, Kabul, Afghanistan
YA1JS, J. Stroud, P.O. Box 5, Kabul, Afghanistan
3D2AZ, 11 Milne Rd., Suva, Fiji
ex-5H1LV-5H3LV (to VE7AUE)
9L1NB, Fr. N. Bramati, P.O. Box 1, Makeni, Sierra Leone
9M8FDS, D. Smith, 71 Lintang, Pk., Kuching, Sarawak

C21KM (to ZL1AIH)
C31ED (to DL2BK)
C31FO (to F3HW)
C31GM (to DJ9NA)
C31GN (via DK3SF)
CN8BO (via W4GKF)
CR8AM (via WB6BGQ)
EIØDI (via EI7CC)
EIØMIC (via EI7BM)
ex-ET3GB (to OA6CV)
FPØXX (to K1DRN)
GM5BCQ (via WA2KWP)
HK4CYX (via WA2KWP)
HL9KK (via WA8GUB)
HL9WI (via WA5ZWC)
JW1SO (via LA1RO)
KM6DY (to WB4WRN)
OE6HZG (to W2VMH)
OHØSUF (to OH1JP)
PJ8SE (see FGØAFA)
TA1MB (via DK3GL)
TR8SS (via DJ5IO)
VK9MH (via VK3RJ)
VP5BN (via DL8UI)
XU1AA (see text)
YA1CA (via CDRC)
YA1ECN (to VE3ECN)
YA1EEE (to VE3EEE)
YJ8RJ (via F8BG)
YK1QK (via OK2QF)
YS1PRT (via WBØCTS)
ZB2CF (via WA2MVQ)
ZD7FT (via VE1AIH)
ZF1RH (via W4MCM)
ZPØWL (via WA2LEY)
ZS4JB (see text)
3AØFY (to F9UW)
3D2DK (to K7DVK)
3D2KM (to ZL1AIH)
4U1ITU (see text)
4Z4NNF (via WA2KWP)
5R8AC (to W3ABC)
ex-9J2ED (to YA1ED)
9M8SDA (via WB6BGQ)

IT9GCV is prominently active among Sicily's DX gang. Vittoria and OM Giovanni lavished true ham hospitality on W4WFL during Morgan's recent visit to Palermo and other European points of interest.



CT1ZQ likes code or voice DX sport with an effective Queijas ensemble. A simple Windom wire does the job behind a G222TR and KW77.



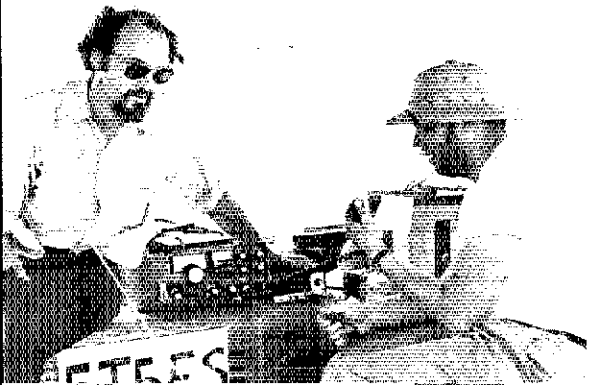
These specifications come via benefactors Ws ICW IOPJ 1RML ISK 4WFL 9DY, Ks 2YFE 3CL 6SE, WA1CQX, WB2AQC, WNs 6SWM ØGTJ, VE7BAF, Camel Drivers Radio Club *Newsletter* (YA1AB), Columbus Amateur Radio Association *CARAscope* (W8ZCQ), *DX News-Sheet* (G. Watts, 62 Bellmore Rd., Norwich, N. 72T, England), International Short-Wave League *Monitor* (E. Chilvers, 1 Grove Rd., Lydney, Glos., GL15 5JE, England), Japan DX Radio Club *Bulletin* (JA3GZN), Long Island DX Association *DX Bulletin* (K2KGB), Newark News Radio Club *Bulletin* (M. Witkowski, Rt. 5, Box 67, Stevens Point, WI 34481), North Texas *DX News* (W5SZ), Northern California DX Club *DXer* (Box 608, Menlo Park, CA 94025), Southern California DX Club *Bulletin* (W6EJJ), VERON's *DXpress* (PAØs INA TO), West Coast *DX Bulletin* (WA6AUD) and Western Washington DX Club *Totem Tabloid* (WA7JCR). Do you have a fresh item or two the gang might need?

† † †

EUROPE — W2LFL, K6WZ, WØMT, K5OBU, WØNP, WA4BZP/7, W7s BCT and CBY led North Americans in that order among entrants in this year's DARC (Germany) RTTY DX Contest. I1BAY turned in the world-wide high while LU2ESB and ZL2ALW paced their continents. DLØTD's gang took global multiop honors. Despite poor conditions about fifty countries contributed printer activity. Next year's affair is set for the third weekend in April. Incidentally, we offer certifications EURD and DRD based on RTTY DX work, information available in response to s.a.e. with IRCs. (DARC) . . . DJ9NA, DKs 5SF 8ST 9SP and I worked 15 through 80 meters, cw and phone, as C31GM last month. (DK8SQ) . . . S.a.e. with IRCs to me will secure details on my club's new AGDX certification, rules similar to ARRL's DXCC but based on 25-country units. (OE3PUW) . . . SP1FTC is a young student who likes hour-long cw ragchews with W/Ks near 7028 kHz around midnight GMT. (K2YFE) . . . Worked Hamburg & Harbors of the World, WHHW, is a fresh diploma offered by HARC. S.a.e. and IRCs to my address will obtain full specifications. (DK4HD) . . . Nice visit with PAØTO of *DXpress* and W4ZXI (KS4CF) on a junket to Holland this summer. (W4HOS-PA9HOS) . . . Enjoyed signing PAØFHF/W1 on DX bands last year. I'm now quite active again back home. (PAØEHF) . . . CT2AK concentrates on QSOs with Sixland, gunning for Northern California DX Club's popular California Award. (W3HNK) . . . SP6DMJ keeps a potent 40-watter warm on 20 cw. Janek's brother also runs the rig as SP6DLZ. (WA3SWF) . . . Since 1960 I've been cw-only. In fact 94.2 percent of all my QSOs have been by key. As a point of interest I wonder who holds the longevity record as a strictly-telegraph amateur. Research has turned up a list of 35 U.K. oldtimers among Silent Keys; our two-letter calls are diminishing at a sad rate. My equipment is fast approaching antique status, a 1957 transmitter, 1951 HRO—MX receiver and 1953 frequency meter. (G3IDG) . . . That's a young set-up compared to my own "comfort station," Allan: an 813 rig born in 1951, NC-100X and SX-24 receivers from the 1930s, a 1943 LM freqmeter and a 1948 Mon-Key, all dusty but durable. (W9BRD) . . . After thirty years on the air I was gratified at last to see a photo of my station in a major ham publication, April *QST*. (HA3MB) . . . Working 10 meters in Monaco usually is impossible because most of the country's TV sets have 28-MHz intermediate strips. (JDXRC) . . . OZ7DX expects to radiate from research vessel *Dana* on 7 through 28 MHz through next month, also gunning for QSOs via Oscar. (DXNS) . . . In view of the band's sharply selective DX openings these days, G3RFG feels that 28-MHz beacons should not be too heavily depended upon to provide accurate indication of general conditions. Call CQ! (WCDXB)

ASIA — SVØs WC and WCC, OM and XYL, hope to be heard from Turkey around this time. (W3HNK) . . . Camel Drivers Radio Club's June meeting in Kabul was attended by YA1s AB AH CA DT GNT JS and OS with VE3s ECN and EEE as featured guests. (YA1AB) . . . Warmed up my new three-watt HW7 and dipole by working JH1PZN on 40. (WB6RZX) . . . Amateur radio in Pakistan officially revived on April 1, 1973, after long QRT. (ex-AP2U) . . . WA2BAV and I plan a DX pedition to Crete, Rhodes and possibly Turkey early next year. Can "How's" readers contribute helpful information on TA licensing possibilities? (WB2AQC) . . . Orientalisms via DXNS, LIDXA and WCDXB sources: F5IQ expects to resume activity from XU1AA this month after French leave. HB9OP also occasionally runs the Phnom Penh FT101, 2-kW linear and five-element spinner. . . . OK3CBY ran a well-subscribed summer session as YK1OK on 20 and 40, then expanded operations from 10 through 160 with mike and key. . . . EP2BQ cracked the summer static barrier on 160 for July QSOs with several W/K/VEs, 4W1AE and Europeans. . . . TA1TS readies a homespun 150-watt cw sender for 10 through 80 meters, meanwhile frequenting the low end of 14 MHz. Neighbor TA1MB lurks higher in the band. . . . KA2DF may be operating CR9AK this month in contest flurries. . . . Ex-VP8MM, recently visited by roving 9M2IR in South Yemen, says hamming authorization there is a rough proposition under current unsettled conditions. Paul figures some sort of club-type effort could turn the trick and put some 70s on the air. . . . Even more Ogasawara JD1 action is in store, according to JARL and JDXRC releases. . . . Singapore's SARTS society will be host for South East Asia Net's gala conclave in 9V1-land on the 8th-10th of next month with YB8AAP as chairman. SEANET has been going strong since 1964 with all sorts of goodies regularly appearing on 14,320 kHz at noon GMT and after.

AFRICA — Anybody needing Mauritania should watch for me on the YL ISSB network, 14,332 kHz. (5T5LO) . . . CR6LF's new linear and Yagi aim large signals Statesward on 14,210



5T5ES was one of several amateur stations activated by scientific personnel visiting Mauritania during this summer's solar eclipse. Operators K5HAY (left) and W3ZUE worked 55 countries in limited operating time with their FPM300 and ground-plane. That's the dread Sahara in the background, source of hot vicious winds that plagued the party continuously.

DU1JMG runs a smooth layout in Manila where he serves on the board of Philippines Amateur Radio Association. Jose, regularly found on 14 MHz at 1300-1800 GMT, is a new SSTV enthusiast. "I would be very happy to entertain amateurs visiting the Philippines," he writes.

kHz commencing at 2000 GMT. ZE4JS is shaking down a new HT44 outfit. (W3HNK) . . . A2CEW still needs a Montana QSL for ARRL's WAS credentials. I understand that VE6AIF plans operation in Tunisia this month. (VE4SW) . . . VQ9HCS reportedly undertakes an assignment on Astove isle after an unoperational Farquhar stopover. . . . HALX is another candidate for potential Bouvet proceedings this month or next. The island has suffered DX dormancy since W4BPD's sortie eleven years ago — how time flies!

HEREABOUTS . . . K2FI expects to kick off another two-week PJ8DX splash about the 23rd of this month. (W1RML) . . . WA1QOX/VE8 will be DXing from Baffin Island till about the middle of this month. (W4WFL/1) . . . HI8XAM is a new voice from Santo Domingo with HW101 and quad. Al likes 14,330 kHz and vicinity, a Navy yeoman attached to our embassy. (WA1CQX/7) . . . PJ8NLO hails from New York and pilots interisland aircraft down that way. I enjoyed meeting JH3JPE and EL2CI at our annual MARCO meeting this summer. (K2YFE) . . . One more confirmed country will qualify me for DXCC after 35 years of leisurely hamming. Worked some good ones long ago from which I regrettably never bothered to extract QSLs. (W1OPI) . . . HR1KS sure has a loud S-line and TA36A going in Tegucigalpa. Ken is one of too few DX stations willing to chew the rag these days. (WA2AEY) . . . ZP5FN still regales Novices near 21,110 kHz (WN6SWM) . . . Just returned Stateside after DX sessions in Brazil, Peru, Panama and the Canal Zone. I'm watching for on-the-air pals now from Nevada. (W7JRW) . . . If you worked five Cali HK5s during a special activity July 24th you may qualify for sheepskins offered by UCRA, Aptdo. Aereo 6149, Cali, Colombia. (NNRC) . . . K5QHS figures he can make it to Juan Fernandez, Cocos and/or Trindade if enough interest arouses him. (DXNS) . . . KZ5PW might try Malpelo under the right circumstances, and WA6AHF is also interested. (UDXA) . . . Southern Californian W6NJU forsakes our area for a switch to Sacramento. DX openings are shrinking as you go north, Gary. (SCDXC) . . . W5s MYA and QBM anticipate a VP2MYA encore this month assisted by W5EQT on 10 through 160 meters. (WCDXB)

Strays

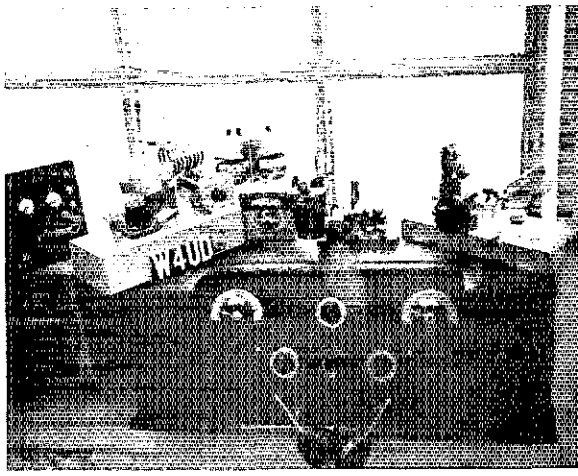
I recently taught a Novice radio class for KCMO employees. One of those successfully completing the course was one of our engineers, Jim Dunn. One of my calls is WAØJPX. Jim received WNØJPX. Ever figure the odds of that happening? — *WØAAD/WAØJPX*

Night classes on various subjects were just starting for the spring semester at the local school campus. Adjoining our assigned room for a Novice Class, a Driver Education class was being held. During our first Novice code session, a middle-aged lady entered and calmly took a seat. She appeared bewildered at first; however, towards the end of an hour, she was actually copying quite a few characters. As we were leaving, she was overheard when remarking to another student, "I didn't know that one had to go through all this just to get a driver's license." — *WA6JNY*

You *can* go back! At least you can go back to the decade 1924-34 and have a bushel of fun. True, you cannot legally operate spark again, but a 201A or a UV199 in a Hartley, TPTG, TNT or Colpitts circuit using battery voltage and light coupling, can be made to sound as good as many present day rigs.

After operating QRP transistor rigs for several years, W4UD built a 201A TNT rig for 160 meters, a UV199 Hartley for 80 meters and a 201A Hartley for 40 meters. He found an old three tube (201A) regenerative reflex receiver in an antique shop, refurbished it, tapped the coils to cover the lower three ham bands, and was ready to operate *a la* 1924.

Russ says he has had as much fun as he would from driving a Model T Ford again.



Operating News

GEORGE HART, W1NJM
Communications Manager
ELLEN WHITE, W1YL
Deputy Communications Mgr.

ASST. COMMS. MGRS.: *DXCC*, R. L. WHITE, W1CW; *Hq. Station*, C. R. BENDER, W1WPR; *Contests*, F. D. NISWANDER, WA1PID; *Public Service*, W. C. MANN, WA1FCM.

CD Bulletin Poll. The CD Bulletin has nothing to do with civil defense; the initials stood for Communications Department long before the term "civil defense" became common, and we have refused to relinquish them. To avoid confusion, we customarily use c.d. or C.D. for civil defense, the initials without the periods for Communications Department. The CD Bulletin therefore, is a printed quarterly bulletin emanating from the ARRL Communications Department, mailed to all SCM/ARRL official appointees, directors and vice directors, officers, assistant directors, affiliated clubs and certain complimentaries, mostly government officials. Every so often a poll sheet is included and responses analyzed. The response is moderate in numbers, but enthusiastic in tone. Many appointees will not comment spontaneously, even though they may have strong opinions; but when asked specific questions, they will usually "come out" strong.

The CD Bulletin Poll questions are always on details, often of an administrative nature, the type of things usually decided by the headquarters; thus, the polls are advisory only, and consist of questions devised specifically to be within administrative feasibility. That is, no questions are asked unless it is administratively possible to comply with the result. If the vote is strongly affirmative, therefore, we usually do comply. If it is close, we keep the matter under consideration. If it is strongly negative, we drop it. In the case of the latter two, the subjects may be brought up again at a later date if a possible change of sentiment is apparent.

Just for info, here are the questions and the results. Please bear in mind that there are reasons why these questions are asked, and why they are asked as they are. The final tally is based on 650 returns. A few have arrived since then, but are not included.

On appointment matters, the vote was AGAINST making conditional or technician class licensees eligible for OO (Official Observer) appointment, AGAINST reducing the 4-year experience requirement for OO appointment, IN FAVOR (but only very slightly) of raising measuring ability requirement for OO Classes I and II, IN FAVOR (again only very slightly) of making novice licensees eligible for a junior ORS (Official Relay Station) appointment, AGAINST combining ORS and OPS (Official Phone Station) into OTS (Official Traffic Station) and creating an appointment for repeater operators, and IN FAVOR of changing appointment terms to two years (now one year).

On CD Party (contest) matters, the vote was AGAINST restricting eligibility to appointees only, IN FAVOR of counting Canadian Maritime provinces as separate multipliers.

On Prosigns and Procedural Signals, the vote was AGAINST adopting a new Q signal to indicate partial break-in, and AGAINST any changes in ARRL-recommended ending signals. The most popular choice for the exclamation point was the present comma, context determining meaning, although many indicated weariness of the subject. The vote showed IN FAVOR of ARL numbered message texts for Mother's Day, Father's Day, General Holiday and general congratulations, AGAINST texts for Valentine's Day, Hanukkah, license upgrading and reduction of the number of texts.

On PSHR and BPL, voting was AGAINST including traffic count in PSHR and eliminating BPL, AGAINST changing the name of BPL to eliminate the cw connotation, IN FAVOR of making PSHR more difficult.

On the ARRL message form, voting was IN FAVOR of putting in text-counting lines, 5 spaces per line, and IN FAVOR of a separate line for the telephone number.

So what happens now? Well, it seems most of the voting was negative, so no action is indicated on those questions. Of the ones that were af-

Meet the Abbotts, recipients of plaques awarded them by the Greater Cincinnati Amateur Radio Association (affiliated in 1937) for their faithful and dedicated service in teaching code and theory classes for the past eight years. On the left is Jim K8CKJ, his live-wire XYL Lillian K8CKI, and nephew Gene W8UQI.

W1AW SPRING-SUMMER SCHEDULE
(April 29—October 28)

The Fall-Winter schedule, effective October 28, will appear in November.

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 1 P.M.-1 A.M. EDST, Saturday 7 P.M.-1:00 A.M. EDST and Sunday 3 P.M.-11:00 P.M. EDST. The station address is 225 Main Street, Newington, Conn., about 7 miles south of Hartford. A map showing local street detail will be sent upon request. If you wish to operate, you must have your original operator's license with you. The station will be closed May 28, July 4, and September 3.

Times/Days *GMT*	*Sunday*	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*	*Saturday*
0000	.....	← CW BULLETIN[1] →					
0020-0100[4]	.....	.....	3.7 Nov.[5]	14.080	14.080	7.15 Nov.[5]	14.080
0100	OSCAR[10]	← PHONE BULLETIN[2] →					
0105-0130[4]	.....	.....	3.990	50.190	145.588	1.820	21.390
0130	← CODE PRACTICE[1] (35-15 wpm TThSat, 5-25 wpm MWFSn) DETAILS BELOW →						
0230-0300[4]	.....	.....	3.580	.....	1.805	.....	3.580
0300	RTTY BULL.[3]	.....	← RTTY BULLETIN[3] →				
0330	PHONE BULL.[2]	.....	← PHONE BULLETIN[2] →				
0335-0400[4]	.....	.....	7.290	3.990	7.290	3.990	7.290
0400	CW BULL.[1]	.....	← CW BULLETIN[1] →				
0420-0500[4]	.....	.....	3.7 Nov.[5]	7.080	3.990	7.15 Nov.[5]	3.580
1240	.....	← OSCAR[9] →					.....
1300	.....	CODE PRACTICE[1] (5-25 wpm MWF, 35-15 wpm TTh) DETAILS BELOW					.....
1700-1800	.....	21/28cw[7]	21/28ssb[8]	21/28cw[7]	21/28ssb[8]	21/28cw[7]	.....
1800	.....	← OSCAR[9] →					.....
1900-2000	.....	7.080	7.290	14.095 RTTY	7.290	7.080	.....
2000-2030	OSCAR[11]	21/28ssb[8]	21/28cw[7]	21/23ssb[8]	21/28cw[7]	21/28ssb[8]	.....
2030	.....	.....	CW BULL.[1]	.....	CW BULL.[1]	.....	.....
2100-2130	.....	7.15 Nov.[5]	21.1 Nov.[5]	7.15 Nov.[5]	21.1 Nov.[5]	7.15 Nov.[5]	.....
2130	.....	.....	RTTY BULL.[3]	.....	RTTY BULL.[3]	.....	.....
2200	.....	CPN[6]	7.095[4] RTTY	3.625 RTTY	14.095[4] RTTY	CPN[6]	.....
2300	.....	.....	CN[6]	RTTY BULL.[3]	CN[6]	.....	.....
2330	← CODE PRACTICE (10-13-15 wpm) DETAILS BELOW →						

[1] CW Bulletins (18 wpm) and code practice on 1.805, 3.580, 7.080, 14.080, 21.080, 28.080, 50.080 and 145.588 MHz.
[2] Phone Bulletins on 1.820, 3.990, 7.290, 14.290, 21.390, 28.590, 50.190 and 145.588 MHz.
[3] RTTY Bulletins, on 3.625, 7.095, 14.095, 21.095, and 28.095 MHz. Bulletins repeated when time permits.
[4] Starting time approximate, following conclusion of bulletin or code practice.
[5] W1AW will tune the indicated bands for Novice calls, returning the call on the frequency on which called.
[6] Participation in section traffic nets.
[7] Operation will be on one of the following frequencies: 21.02, 21.08, 21.1, 28.02, 28.08, 28.1 MHz.
[8] Operation will be on one of the following frequencies: 21.260, 21.390, 28.590 MHz.
[9] When an OSCAR satellite is in orbit, daily updated orbital data is sent at 18 WPM on cw frequencies.
[10] OSCAR orbital data for the coming week, on RTTY frequencies.
[11] OSCAR orbital data for the coming week, on cw frequencies.

W1AW CODE PRACTICE

W1AW transmits code practice according to the following schedule. Approximate frequencies are 1.805 3.58 7.08 14.08 21.08 28.08 50.08 and 145.588 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.

Speeds	*Local Times/Days*	*GMT*
10-13-15	7:30 PM EDST dy 4:30 PM PDST	2330 dy
5-7½-10-13-20-25	9:30 PM EDST SnTThS 6:30 PM PDST	0130 MWFSn
5-7½-10-13-20-25	9:00 AM EDST MWF 6:00 AM PDST	1300 MWF
35-30-25-20-15	9:30 PM EDST MWF 6:30 PM PDST	0130 TThS
35-30-25-20-15	9:00 AM EDST TTh 6:00 AM PDST	1300 TTh

The 0130 GMT practice is omitted four times a year on designated nights when Frequency Measuring Tests are sent in this period. To improve your fist by sending in step with W1AW (but not over the air!), and to allow checking the accuracy of your copy on certain tapes, note the GMT dates and *QST* practice text (from the issue 2 months previous) to be sent in the 0130 GMT practice on the following dates:

Oct. 10: It Seems to Us
Oct. 16: Correspondence
Oct. 19: League Lines
Oct. 25: ARPS
Oct. 31: World Above
Nov. 5: YL News

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firmative, the only one that was enough so to indicate definite action was the separate line on the message form for a telephone number; and we just have this feeling that most of these votes were more for including a telephone number than, necessarily, for having a separate line on the message form for it. So it would appear we're in pretty good shape as we are, at least insofar as those specific questions are concerned. The only votes that were really decisive were those for status quo. Of the others, the staff will now give further consideration to implementing those on the affirmative side – and pass along to the Contest Advisory Committee the result of the vote on counting Maritime provinces as separate multipliers. – *W1NJM.*

IN A COMMUNICATIONS EMERGENCY, MONITOR W1AW FOR SPECIAL BULLETINS AS FOLLOWS (times in GMT).

Phone: On the hour.
RTTY: At 15 minutes past the hour.
CW: On the half hour.

DX CENTURY CLUB AWARDS

Radiotelephone listings follow the general-type "New Member" and "Endorsement" listings – July 1-31, 1973

New Members

W7SGN	339	JA2CXF	233	W4HGH	142	WA1OYK	117	WA8OBG	109
PY2PE	323	G3VBL	230	W7WMY	134	WA7ISP	116	WØUV	106
W4AUH	306	JH1LPF	220	W4ACY	133	K4KH	115	JA1BFN	106
WA2BED	299	W4BBP	218	DL2DA	121	WØEIA	115	K1BUR	106
JA1RJW	295	KS6DY	192	W4BAA	120	DK3SH	113	CX5B1	104
K4II	290	K9MBR	179	WA3OFR	119	OH2BME	113	VO1KF	103
W9KNI	277	W2QL	166	HS4AGN	118	WA2JLM	113	WA1NSF	103
JA2HGA	263	W6IZU	160	EA4MY	117	G4AMT	112	ZL4OP	103
SM2EKM	253	I6CCI	155	EA7KI	117	F9CF	109	JA1AHO	101
W6DKQ	237								

PY2PE	322	WA9HPJ	229	W6AZQ	143	DK3SH	111	YV3VU	105
W4AUH	304	K6LJK	217	W2QL	138	GM3EDZ	110	CX5BT	104
WA2BED	299	SM2EKM	217	CX1BBR	136	WA5ZRB	110	JA1QER	103
JA1RJW	293	WB2VYA	205	W4HGH	135	JA2LHG	109	JA7OP	103
W8EX	271	JH1LPF	204	K9MER	131	G4AMJ	107	K1BUR	103
W5ZWX	254	JA2CXF	173	W9KNI	129	LU1DAR/W3107		W1CMH	102
K4II	250	WAØVZH	173	W7AAW	121	WØEIA	107	W2Y	102
JA2HGA	243	KS6DY	172	CX6AM	120	9Y4PH	107	W6LRI	102
W6DKQ	237	CT1TV	160	WA2MBP	120	LU8DMS	106	WAØVZG	102
CT1MK	230	I6CCI	153	JH3FHY	115	PY7BSR	106	K4AI	101
G3VBL	229	VE4SW	153			IITBE	105	VP2VAP	101

WB6VNR	101				
XE1WF	101				
9H1CV	101				
KL7HGR	100				
VQ9HCS	100				
HI3LMG/W2	100				
WB2GUQ	100				
WA3OTZ	100				
WB4JFK	100				
WA5JVO	100				
WØGMO	100				

Endorsements

In the endorsement listings 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.

DL6EN	340	W6TXL	300	K6NM	250	WA9AUM	220	WB9BGJ	180
W5NMA	335	ZL3AAD	300	K8CSG	250	DK9WB	200	WAØLWE	180
PY7YS	330	SM6CJK	290	OH8SR	250	4X3YP	200	YU2LA	180
W4CKB	330	W3KV	290	VE5JS	250	K2QMF	200	G3DLH	160
W1IAS	325	K9CUY	280	W5KHP	250	W1CT	200	JH1AGU	160
W8ARH	325	YU2MD	280	W6EIF	250	W1HRJ	200	K2DW	160
ZL4BO	325	W1DXB	280	W6ZYC	250	W1UQO	200	K6DQF	160
W5UR	320	W3AC	280	W7ZHZ	250	WB2AQC	200	LA8CE	160
ON4PA	315	W9YYG	280	WA8VFK	250	W4MIA	200	SM4EMO	160
W2PTM	315	CX1RY	270	KØIEA	240	W4YKH	200	DL2AA/W1	160
SM5FC	310	K4EKJ	270	W3KJ	240	WA5EEM	200	W3EAI	160
WA3ATP	310	KØGXR	270	WB5BID	240	W8QQL	200	W6OXS	160
K6BCE	305	SMØMC	270	W5UNF/6	240	YU1ODO	200	WA7PEZ	160
KØBUR	305	JA1DQT	260	WA6CMX	240	YU4HA	200	WA9IEU	160
PY1MB	305	K4DXO	260	WA6JVD	240	DL7DX	180	WB9EEF	160
WA2FQG	305	K6HTM	260	HA5FE	220	JA1WSA	180	DF1QX	140
WA2BRI	300	W5LPO	260	K2MFY	220	VE4SW	180	DJ7MX	140
WA2IDM	300	W5QIX	260	VE2UN	220	W2QIP	180	K6CBL	140
WB2VYA	300	WA6CXK	260	WA5ZNY	220	WA2MBP	180	W1CMH	140
W6ADP	300	K6BIA	250	WA6TAX	220	W4EXO	180	WA1NSJ	140
W6MUM	300			W9BMD	220	W7GYP	180		

DJ2BW	330	W3CRE	290	CP1FW	250	DK9WB	200	I6PEJ	160
WØQGI	320	W5UR	290	K8CSG	250	DL6QT	200	JA3LKB	160
DL7FT	315	9M2DQ	290	W6ZYC	250	K4BNC	200	K4CEE	160
ZL3OY	315	KP4CQB	280	WA8VFK	250	K7RDH	200	WB5BID	160
SM5FC	310	W4BKP	280	K3GZE	240	VE7TL	200	WA7FFS	160
W1AA	310	WA4FDR	280	K6BCE	240	W6EIF	200	W9WNB	160
WA3ATP	310	K6GA	270	K9CUY	240	WB9EBO	200	WB9BGJ	160
KØBUR	305	W3AC	270	W3KJ	240	ZL2AFT	200	6Y5LA	160
SM6AEK	305	WA6RTA	270	DL8OH	220	HA5FE	180	W1WXZ	140
JA7MA	300	K6HTM	260	OZ8EA	220	HC8GS	180	W2MOY	140
WA2BRI	300	K6MOO	260	W6TXL	220	OE2WR	180	WB2LCZ	140
ZL4BO	300	SMØMC	260	WA6TAX	220	WA9FZQ	180	W3CKU	140
OA4BS	290	WA8LUC	260	YV4WT	220	YI8BL	180	W3GIA	140
PY1MB	290								

W3JPT	140				
W3KV	140				
VE7XY/W6	140				
WØWAM	140				
WBØBBR	140				
YA1AH	140				
K2TKR	120				
W3TL	120				
W4ACY	120				
WA5FVI	120				
WA6BCD	120				
WA7OIJ	120				
YV5BJ	120				

ARRL Instructor Corps. In Jan. '72 *QST* (p. 104) this column ran an item entitled "Class Instruction," in which an embryonic proposal for an ARRL Instructors Corps was presented. The response was somewhat limited, and what with the press of other matters it has not been possible to do much with it since then. Now, however, we feel it is time to put out additional exploratory tentacles on this matter.

The League already maintains an information file on clubs conducting classes on a regular basis, and attempts are made to keep these records up to date through questionnaires which affiliated clubs are requested to fill out annually. This is a continuing program, and additional efforts along this line will of course be encouraged. But most clubs conducting classes are in metropolitan areas where club-member instructors are readily available

New A-1 Operators

WA2UOO W4BUW K7YDO DL6VP
GM3KPD ZL2AQO
YU3EY

and students are numerous enough to make such regular classes on a more or less formal level feasible.

As far as the AIC (like the initials?) is concerned, a greater need is to find qualified instructors in non-metropolitan (e.g., rural) areas where the nearest amateur, much less an organized club, may live many miles away. Training in these areas does, by necessity, take place on a one-to-basis, the problem being getting the one trainee together with the one trainer. Assuming that the budding amateur knows of the existence of ARRL and writes for assistance, the League faces the problem of locating a "helper" for him.

Thus, the ultimate goal of the ARRL Instructor Corps is to maintain a list of qualified and willing amateurs in out-of-the-way places to help prospective hams in the same out-of-the-way places. The catchword here is *willing*. Not all hams have the time, attitude or qualifications necessary to train others. Typical headquarters practice, in situations where the inquirer cannot be referred to a club, is to check rosters for an SCM appointee in the area. If this comes up blank, it might be possible to get a name from the ARRL membership file, but this is a last resort, because many members would prefer not to be bothered by such requests. The idea is to list those persons who might be willing to help if called upon. An amateur registering in the AIC would not, of course, obligate himself to assist anyone who happens along at any particular time. Headquarters would merely put the prospect in touch with the instructor, or vice versa, and they would take it from there personally.

This writer recalls learning the code at age eleven, studying a *Handbook* and *License Manual*, and then driving around town with his father looking for someone with a ham antenna in the back yard — someone who could administer the novice exam. These days such a procedure would not be so effective because of the proliferation of CB antennas! However, had there been a note in the *License Manual* suggesting writing to ARRL Headquarters for assistance, many of us probably would have utilized it in our earlier days. Also, this technique would perhaps put more people in touch with the League even before they receive their novice tickets. Recruiting League members has one similarity with learning the code: the younger they are, the easier it is.

If you have a desire to assist a prospective ham, and this approach interests you, just send a postcard to ARRL Headquarters indicating your interest, along with name, call, address, class of license, teaching qualifications or experience, if any, phone number (if you don't mind being called), and anything else pertinent. We will keep you posted on the results of this new appeal, and after a sufficient lapse of time we will, hopefully, have enough names to compile a respectable list. After that, it will be a band-wagon proposition. How about it, you hams in Podunk Hollows? There may be a ham-to-be right around the corner. Give him a hand, just as you were once given one or wished you had. *WA9AUM.*

5-BAND AWARDS

(Updating the August 1973 listing.)

5BDXCC: (Starting with number 271), DL1KB DL6QX W9HJ WA2IDM.

5BWAS: (Starting with number 256), WA5VDH WA4EYR.

Staff Changes. Our long-time Training Aids handyman, Jerry Pinard, is leaving the staff after 20-odd years to go into business for himself (no, not in Training Aids). His replacement is Jim Cain, WA9AUM, writer of the above piece on the Instructor Corps. Jim is familiar to most active operators, and especially to contesters as a former member of the Contest Advisory Committee. His function, in addition to handling Training Aids bookings and maintenance, will be in the field of training and education in general, including creation of new material, and in gradually assuming other functions in the affiliated club field. His XYL Rosalie, also a ham (WB9FJT), takes over as clerical assistant in the DXCC Branch, replacing Judy Mann, WA1JCN, who leaves to take care of matters best known to herself and WA1FCM. — *WINJM.*

SCM ELECTION NOTICE

To all ARRL members in the Sections listed below.

You are hereby notified that an election for Section Communications Manager is about to be held in your respective sections. This notice supersedes previous notices.

Nominating petitions are solicited. The signatures of five or more ARRL full members of the Section concerned are required on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must have been both the holder of amateur Conditional Class license or higher (Canadian Advanced Amateur Certificate) and an ARRL full member for at least two years immediately prior to receipt of petition at headquarters. Petitions must be received on or before 4:30 PM Eastern local time on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given herewith. The complete name, address, Zip code of the candidate and signers should be included with the petition. It is advisable that a few extra full-member signatures be obtained, to insure that it will be valid.

Elections will take place as soon after the closing dates specified as full information on the candidates can be obtained. Candidates' names will be listed on the ballot in alphabetical order.

The following nominating form is suggested. (Signers should be sure to give city, street address and Zip code.)

Communications Manager, ARRL (Place and date)
225 Main St., Newington, Conn. 06111

We, the undersigned full members of the . . . . . ARRL Section of the . . . , division, hereby nominate . . . . as candidate for Section Communications Manager for this Section for the next two-year term of office.

(Continued on page 110)

Operating Events ..... de W1YL

OCTOBER

3 *W6OWP Qualifying Run* (W6ZKJ, alternate) 10-35 wpm at 0400 GMT on 3590/7090 kHz. This is 2100 PDST the night of October 2. Please note that dates are always shown at least two months in advance and times are always the same local "clock time," i.e. 9 PM local Pacific time. Underline one minute of the highest speed copied, certify copy made without aid and send to ARRL for grading.

6-7 *California, Missouri New Mexico QSO Parties; CQ-WE*, p. 109 Sept.

11 *W1AW Qualifying Run* (10-35 wpm at 0130 GMT) on 1.805 3.580 7.080 14.080 21.080 28.080 50.080 and 145.588 MHz. This is 2130 EDST (9:30 PM EDST) the night of October 10. Underline one minute of top speed copied, state no aids used (typewriters OK) sign and mail to ARRL with your full name, call (if any) and complete mailing address.

13-14 *CD Party*, phone. This is a quarterly event open to all ARRL appointees and officials, notified separately by bulletin. (It starts 2300Z Oct. 13 and ends 0500Z Oct. 15.) Contact your SCM, page 6, to see if you can qualify for an appointment. *CARTG RTTY SS*, p. 58 Sept. *RSGB 21/28 MHz phone, Mass. QSO Party*, p. 109 Sept.

17-18 *YL Anniversary Party*, p. 110 Sept.

20-21 *RSGB 7 MHz DX Contest cw, NC QSO Party*, p. 110 Sept.

27-28 *CQ WW, phone.*

29 *W1AW Special Evening Qualifying Run*, 0230 GMT (this is 2130 EST the night of October 28. All other details as under the October 11 listing.

NOVEMBER

1 *W6OWP Qualifying Run.*

1-2 *YL Anniversary Party* phone, p. 110 Sept.

3 *KP4USN Hobby Fair*, held at the U.S. Naval Station, Sabana Seca, Puerto Rico. All stations are invited to contact KP4USN at the following times and frequencies: 14,300-14,325 between 1400-1700Z; 21,400-21,425 between 1700-2100Z. QSLs will be sent to all stations worked.

3-4 *Worked All El Paso Contest*, the period 2300Z Nov. 3 to 2300Z Nov. 4 (10-meter phone, only). This is primarily for stations in the El Paso County area but will also allow others to make the necessary 15 El Paso contacts to qualify for the Worked All El Paso Award. Endorsements are available for 50, 75 and 100 El Paso Contacts. The affair is sponsored by the El Paso ARC, W5ES. *RSGB 7 MHz DX Contest* phone, p. 110 Sept.

5-11 *QRPp CW QSO Party* from 1300Z Nov. 5 through 2300Z Nov. 11. QRP ARC International Club members send RST, state/province (or country) and QRP no., others use NM for non-member and power in lieu of QRP no. Frequencies plus/minus 5 5 kHz: 3540 7040 14065 21040 28040. Multipliers: under ½ watt output, X 1.5; under 2 watts, X 10; under 5 watts X 5; 5 watts and over, no multipliers. Stations may be worked once per band for multiplier points. Member contacts count 2 points, NM contacts count 1 point. Scoring example: M/NM points X states/countries X power multiplier = score. Appropriate certificates. Logs must be readable and show contact, date/time, exchanges, band and power used. A cover sheet should show your computation of score, description of equipment used and your statement that all rules were observed. Logs must be postmarked by Dec. 3, and sent to: Earl R. Lawler, W5JLY, Route 2, Box 24-K, Burnet, TX 78611.

10 *Frequency Measuring Test*, open to all, begins with a callup at 0230 and 0530 GMT Nov. 9. (Please remember that this is the evening before, local time!) The period for measurement start at 0237 (80 meters), 0245 (40 meters) and 0253 (20 meters); for the late run, 0537, 0545 and 0553, respectively. Each measuring period lasts 5 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 3527, 7078 and 14,079 kHz. Late-run frequencies are 3563, 7083 and 14,072 kHz. Your entry must be received by Nov. 21 to qualify for the *QST* report of the competition. W1AW will start transmitting the official readings Nov. 11.

10-11 *Sweepstakes*, phone. Full rules, this issue. *EX-G Contest* to publicize reciprocal operating privileges worldwide and to promote links between the EX-G Club and those in and outside the U.K. Three sections: 1) reciprocal operators, 2) non-reciprocal operators, 3) those operators within the U.K. Each station may operate a total of only 24 hours during the 48-hour period. Full details from J. Kasser, G3ZCZ;W3, 1701 East-West Highway, Apt. 205, Silver Spring, MD 20910.

16 *W1AW Qualifying Run.*

17-18 *Sweepstakes*, cw, this issue.

24-25 *CQ WW, cw.*

DECEMBER

1-3 *Telephone Pioneers QSO Party.*

5 *W6OWP Qualifying Run.*

8-9 *160-Meter Contest, EA Contest (cw).*

11 *W1AW Qualifying Run.*

23 *HA5-WW.*

27 *W1AW Morning Qualifying Run.*

31 *Straight-Key Night.*

Jan. 5-6, VHF SS.

Jan. 9-10, DX-YL to Stateside YL Contest cw, 1800-1800Z. Exchange QSO no., RST, country or state. Call CQ DX YL. (full rules next month).

Jan. 12-13, CD cw.

Jan. 19-20, CD phone.

Jan. 23-24, DX-YL to Stateside YL Contest phone.

Jan. 26-27, Simulated Emergency Test.

All sponsors of the above activities are reminded to seek all possible avenues of publicity for them, especially methods of letting the general public know what is going on.

Operating News

(Continued from page 109)

You are urged to take the initiative and file nominating petitions immediately.

George Hart, W1NJM, Communications Manager

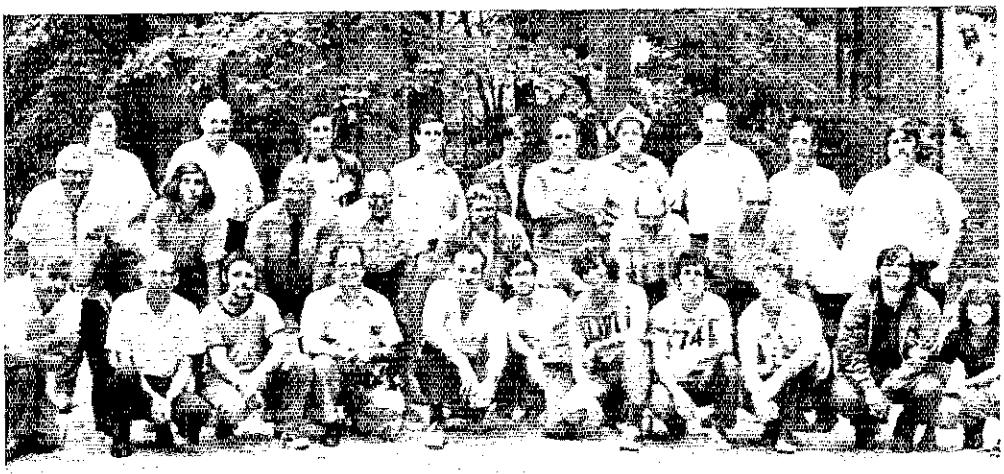
Section	Closing Date	Current SCM	Present Term Ends
Canal Zone	11/9/73	J.L.McMillen, KZ5ZZ	9/10/73
Maritime	11/9/73	W.D.Jones, VE1AMR	9/10/73
N.C.	11/9/73	C.H.Brydges, W4WXZ	9/13/73
Ind.	11/9/73	W.C.Johnson, W9BUQ	1/11/74
NYC-LI	11/9/73	F.J.Brunjes, K2DGI	1/13/74
Vt.	12/10/73	J.H.Viele, W1BRG	3/1/74
S.NJ	12/10/73	C.E.Travers, W2YPZ	3/4/74
Ohio	12/10/73	W.E.Clausen, W8IMI	3/29/74

SCM ELECTION RESULTS

Valid petitions nominating a single candidate were filed by members in the following sections completing their election in accordance with applicable rules, each term of office starting on the date given.

Ala.	J.A.Brashear, Jr., WB4EKJ	7/11/73
Miss.	W.J.Coffey, W5NCB	7/11/73
S.Barb.	D.P.Gagnon, WA6DEI	9/2/73
W.Va.	D.B.Morris, W8JM	9/18/73

In the Alaska Section, Mr. Roy Davie, KL7CUK and Mr. Ken Klopf, KL7EVO were nominated. Mr. Davie received 62 votes and Mr. Klopf received 60 votes. Mr. Davie's term of office began August 17, 1973. QST



The crew that attended the New Jersey Net on July 28 are pictured here. Standing, left to right: W2ZEP (NJN Manager), W2JI, K2EFA, WA2GMH, WA2CCF, WA2FVH, W2RUX, WA2CLB, WA2WLN, WB2AEH, WB2VPR, WA2BAN, WA2SRQ, WA2QNT, WB2FEH, WA2UOO and WA2CXY. Kneeling: WA2PQL, WA2TRK, WA2RYD, WB2RJJ, WB2NOM, WA2NLP, WB2OYV, WA2NKK and WB2FCD. *(Photo by W2CVW)*

ARPS

(Continued from page 80)

reaching the person proved unsuccessful. W8SLY contacted WA5ZVL in Houston who called all people with the last name given by W8SLY. After more than 30 calls the person was located and returned to Ohio that night. - (W8SLY)

■ On Aug. 6, K4SDV stopped to help a motorist broken down on a bridge in Tampa, FL. K4RMU and WA4s AKH/4 FPS WZW arranged for assistance for the car.- (WB4TUP, EC Hillsborough Co.)

■ While mobiling on I-77 near Akron, OH, WA8ETX spotted an auto accident. Using WR8ABH, assistance of the police was summoned by K8GRO. WB8HIW/mobile stood by to assist. - (WA8ETX, Asst. SCM OH)

■ The WA4ZAU repeater was used during a weather watch and alert in the Norfolk, Va, area on July 28. At 1630, the alert was announced by WA4BUE and stations checked in reporting flooding and other information. Liaison was established with several clubs. The alert was cancelled at 1733. A dozen amateurs participated. - (WA4BUE, RO Norfolk)

■ *June Special Events.* Twenty-eight amateurs expended 781 man hours in providing communications for the Owensboro (KY) Unlimited Hydroplane Regatta, June 14-17. - (W4OYI) AREC members in the Toledo, OH, area set up numerous checkpoints along the route for the Glass City Marathon, held June 17. During the race, W8KDK reported an injured runner and an ambulance was dispatched. (WB8JJU, *Ham Shack Gossip*)

■ *July.* On July 8, 8 members of the Hillsborough Co. (FL) AREC lent support for a 78-mile motorcycle endurance race by setting up portable stations at checkpoints. - (WB4TUP, EC) At Brooks AFB, TX, on July 15, three amateurs furnished communications for a sports car autocross. - (WB5CIT) Several clubs were involved in communications for a 35-mile canoe race on the Flint River in Michigan, on July 22. Nine amateurs took part. - (WA8WQU, EC) Butler Co. (OH) amateurs supported an antique car parade with surveillance of the route by more than 30 amateurs, on July 28. Eight members of the Apricot Net assisted in celebration and parade during the 175th birthday events for Burton, OH, on July 28-29. - (K8ONA)

■ We received 35 SEC reports for July representing 11,948 AREC members. That near-dozen-K figure is a mere 16 more than the number of members "covered" last year, but 3 SEC reports less. Sections reporting: Ala, Alta, Ariz, Colo, Conn, EBay, ENY, EMass, Kans, Ky, Mar, Mich, Miss, Mo, Nebr, Nev, NFla, NTex, Ohio, Okla, Org, Oreg, SV, SDgo, SCV, Sask, SDak, SFla, STex, Utah, Va, Wash, WMass, WNY, WPa.

At mid-year (end of June), 242 SEC reports had been received from 49 different sections. This compares to 244 reports from 45 different sections at the same time last year. Sections with a solid reporting record so far this year are: Alta, Ariz, Conn, ENY, EMass, Iowa, Kans, Mar, Mich, Miss, Nebr, Nev, NFla, NNJ, NTex, Ohio, Okla, Org, Oreg, SV, SDgo, Sask, SDak, SFla, Utah, Va, Wash, WMass, WNY, WPa. QST

Short Waves

(Continued from page 93)

worked 2BWT to mention a few. *QST* proudly announced:

> BANG!! — and the reports echoed from coast to coast. The CQ Party held by members of the ARRL on March 24th and 25th was a great success fellows. The gang is absolutely "nuts" about short waves. We have actually made use of the waves below 200 meters.

That's the way it all got started — 50 years ago — but nobody, even today, can possibly anticipate how far it will go. QST

Station Activities

All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

DELAWARE — SCM/SEC, Roger E. Cole, W3DKX — RM: W3EEB. PAM: WA3GSM. MDD QNS yearly record shows Del. stations K3KAJ 1st, W3EEB 3rd, WA3GSM 6th and WA3DUM 10th. WA3SKP has a high check-in percentage on D3RN. WA3DUM is the new DTN mgr, and has added 160-meter capability and another net to his schedule. W3BHG received a Satellite Achievement Certificate for contacts through Oscar 6. 2-meter fm activity is increasing rapidly as Army MARS members get RF 403 Transceivers in operation and a new local repeater on 31-91 joins WR3ABA (13-73) in Wilmington, and WR3ABP (19-79) in Dover. The New Castle County Zoning Board "shot down" the proposed ordinance covering amateur radio antennas despite the efforts of K3YHR and others. PSHR: (July) WA3DUM, K3KAJ. DEPN — QNI 40, QTC 7. DTN — QNI 147, QTC 34. Traffic: WA3DUM 67, WA3GSM 48, K3KAJ 47, W3EEB 39, W3DKX 26, WA3OJU 18.

EASTERN PENNSYLVANIA — SCM, George S. Van Dyke, Jr., W3HK — SEC: W3FBF. RMs: W3EML, WA3QLG, K3MVO, K3PIE. PAMs: K3BHU, WA3PLP. OBS reports from W3CL, WA3AFI. OVS reports from W3CL. OO reports from W3NNC, K3OIO, K3RDT, W3KCM, W3CL, W3KEK. PSHR: WA3RKH, WA3ATQ, WA3MQP, WA3QLG, K3OIO. BPLs: W3CUL, W3VR, WA3QLG, W3EML, WA3ATQ, WA2NPL/3, WA3PZO. Net reports are not getting through, either the mails are bad or the message routing isn't working. Remember the deadline so your net report is printed on time. Nets reporting are EPA QNI 330 and QTC of 447, PTTN with QNI of 77 and QTC of 40, PFN QNI 473, QTC 367. Glad to report that W3EML is nearly fully recovered and back in full swing. Sorry to lose WA3OGM back to school! WA3ATQ along with other skeds gave EPA, PH and TN a hand. K3PIE reports a little confusion with summer vacations and no back ups! WA3QLG will be taking over the PTTN RM job. A hearty "well done" to WA3AFI. WA3QLG has WAS and WAC next DXCC. K3MVO away ten days but still handles traffic! W3ADE is now sporting a 50-year certificate from ARRL. WA3RKH spent a few days working KJ3BSA. W3AXA getting back into traffic after open heart surgery! W3AMC is recovering from same type of operation. W3BNR just out after 3 weeks in hospital. W3BNR reports 2-meter fm a real boon while traveling. W3KEK going into the hospital for an extended stay, hope all works out OK. W3GMK now working DX on RTTY. W3LC says its QRP or boil in shack. W3HK just put in 200A service so he could run everything at same time if necessary! K3WEU reports he hears the traffic nets on good nites down in Jamacia. Whitehall ARC have a FAX Net Wed. evenings on 145.47 MHz. Join them if you have the capability. Traffic: (July) W3CUL 2121, W3VR 607, W3EML 518, WA3ATQ 463, K3PIE 295, WA3PZO 265, WA3NLP/3 195, WA3QLG 148, K3DCB 125, K3OIO 72, K3MVO 57, WA3MQP 37, K3BHU 25, W3CL 16, W3HK 12, WA3QOY 11, W3ADE 10, K3MNT 8, W3WRE 8, W3AXA 6, W3BNR 6, WA3RKH 6, W3EU 3, W3OML 3, WA3BJQ 2, W3GMK 1, W3KEK 1, W3LC 1. (June) K3OIO 103, W3BNR 1.

MARYLAND-DISTRICT OF COLUMBIA — SCM, Karl R. Medrow, W3FA — The section was saddened on July 27 when W3ECP became a Silent Key. Exotic vacation department had WA3QDH to Europe as F0AQG. W3ZNW to KH6-Land via the northwest; W3FCI and W3FCS to Maine and New England; W3QU to VT; WA3QIA to VE2; and W3LDD to activate those rare southern Md counties. New and better QTHs for WA3RDU and W3FZV with an outdoor antenna now. WA3SQQ is now K5FMF/3 on a roundabout way to getting a W3 call. He needs KL7 for WAS. WA3EOP teamed with WA3FYZ for the CD bash. WA3EOP is the mainstay on D3RN reporting lots of traffic and activity. A new 40-meter beam for W3CRE. WA3PJG has it locked for Vanderbilt and W4VSV activity next semester. W3EOV found FD setups a unique new experience. W3CDQ says the humidity is too much. WA3RJS reports Dist. Hgts. K3HDO is coming to life again. WA3MJF, active after the school year burden. W3BHE has got a thing going for fone numbers on all messages. WA3IYS was /2 in NJ for the summer. WA3SWS and WA3LQV are teaming up to provide a 2-meter repeater for the Teenage Emerg. Net. WA2QQN, prexy; WB2NOM/WA3TOM as veep run America U ARC with a new home for WA3URV in the Physics bldg. This club needs equipment. WA3LNW is active in our nets from Hagerstown. WA3EHK is busy on the RACES/MARS circuits. K3TNM has the Quad tamed and performing. WA3AFQ quietly getting all set for fall operations. The MDD-MEPN-MDCTN picnic was fun with 37 net certificates earned by members. Next year same place. WA3MSW enjoys a little time off from the school grind. MEPN had 21 sessions, QTC 129 and check-in average of 23.5 MDCTN met 18 times with 75 QTC, and an average check-in of 15.4. The MDD keeps the representation to 3RN nicely, and the fone nets are supporting D3RN with 96% representation. Traffic: (July) WA3IYS 621, WA3EOP 200, WA3SWS 200, W3FA 92, WA3QIA 86, K3TNM 68, WA3AFQ 64, WA3FYZ 43, WA3PJG 38, WA3QDH 33, WA3MSW 30, W3FCS 15, WA3LNW 10, W3CRE 7, W3BHE 6, WA3EHK 6, W3EOV 6, W3FCI 2, WA3RDU 2, WA3MJF 1, WA3RJS 1. (June) W3FZV 4.

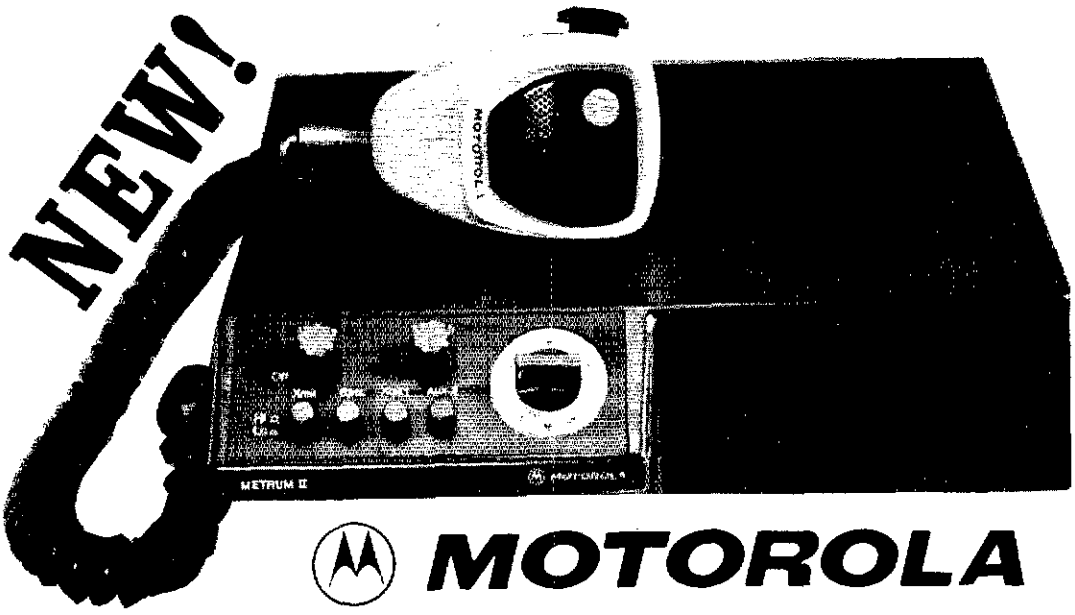
SOUTHERN NEW JERSEY — SCM, Charles E. Travers, W2YPZ — PAM: WA2TRK.

Net	*Freq.*	*Time(PM)*	*Sess.*	*QNI*	*Tfc.*	*Mgr.*
NJPON	3930	6 Su	5	89	10	WB2FIE

The NJN picnic was a very interesting affair, well planned and plenty of fun for all. Among those present were W2JI, WA2TRK and WB2NKK. W2ZI again was honored with a presentation from ARRL for 50 years of continuous service with the League. A recent OPS appointment went to WB2FCD, a member of the Princeton YMCA RC. Great praise must go to Fred Elbrecht (has a hearing problem) a member and chief electronics expert. During FD he kept the equipment on the air by seeing to it the generators were operating in top condition. In spite of his handicap he is working very hard under the tutelage of W2JI preparing for his amateur license. K2BG keeps us informed of the Burlington Co. Radio Club activities. The SJRA Hamfest was held Sept. 9 at Malaga, N.J. The Rancocas Valley ARC meets the first Tue. of each month at the Bridgeboro Methodist Church in Delran, N.J. K2AAR reports the regular meeting of the DVRA featured slides and films of the 1973 Field Day. WA2MEM of the GCARC reports the Aug. 1st meeting featured the outstanding film "Our Sun" produced by the Bell Telephone Co. Traffic: WB2VEJ 222, WB2FNK 160, WA2TRK 104, K2PWK 14, W2ZQ 14, WB2FCD 10, W2IU 10, W2YPZ 10, W2ZI 8, W2JI 6, WB2SFX 6.

WESTERN NEW YORK — SCM, Richard M. Fitzeruse, K2KTK — Asst. SCM: Rudy Ehrhardt, W2PVI. SEC: W2CFP. Our SEC is busily trying to fill in the holes in the WNY AREC plan. If your county needs an EC, why not volunteer your services to W2CFP. WA2TSR did a nice job at his first crack at NCS of NYPON. K2BEG/VE3 can be worked cruising the Trenton River in a houseboat. K2KAM/3 using a battery powered rig in a house trailer while vacationing. WA2CEA and WN2QYO were married July 20. Twenty-nine attended the first annual RAWNY picnic. K2KTK playing cave man with a Heath HW-7 — sorta like the old novice days. W2FR has challenged yours truly to a DXCC race with his HW-7. Seems everyone going QRP. WA2ICB does it crystal controlled with a half-watt on 40. ESS reports 107 pieces of traffic cleared with 325 check-ins for July. WB2ADW gets this month's sole BPL card. STARRS provided communications for the Regional/Glider meet and Powder Puff Derby down Elmira way. WA2EWC now HL9UU and would like to hear from old friends. His address is PFC Robert Kaefer, 107-46-0620, HHC 3rd BDE-FASC, 2nd Inf. Div, APO SF Calif. 96251. He is active on 15, 20 and 40 ssb and cw with 500 watts and looks forward to skeds with friends. Anybody need Korea on 40? NYS reports QTC 270 with QNI 524 — traffic continues to dwindle ominously. Let's not forget what ham radio is all about fellas and gals. K2LGJ scrambling for DXCC Honor Roll with 314 confirmed. Meanwhile K2LWR has 310 — on 80!

(Continued on page 120)



MOTOROLA

METRUM II 2M FM Transceiver

MOTOROLA – Big name, but now priced for the Ham. The Metrum II features high Quality and High Performance in the Motorola Tradition. The Metrum II has 12 Channel capability (146.94MHz supplied) And requires only one crystal per channel. Repeater operation is accomplished by installing an optional Repeater Offset crystal. In Repeat mode, the transmitter frequency is shifted.

Receiver specs are on par with their commercial models; Typical: .35uv-20db quieting (.25uv sinad), Intermod –50db, Spurious and Image rejection –65db. Very sensitive! – But provides "Garbage-free" reception in metro areas where some rigs are "Wiped out" by adjacent channel interference and intermod.

Available in two models – 10 or 25 watts output. Both have hi/lo power switch to reduce output to one watt. Other features include back-lighted control panel, polarity and antenna mismatch protection and 5 watts of audio power. Microphone and mobile mount included. Ready to go on 12vdc. 2¾" h, 9¼" d, 11" w.

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Crystals (one per channel)	9.00
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Among many features included are: • Mode selectors • Band selectors • Plate and antenna load matching controls • Selectivity and sensitivity controls • Hi-Lo power switch • Full break-in or semi-break-in CW with sidetone • VOX or PTT switch • Dual-ratio planetary tuning • Tuning eye and S-meters • Controlled AGC • VFO selector • and much more . . . practically every condition you'll ever want is at the control of your finger tips.

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- 2.7 kHz bandwidth

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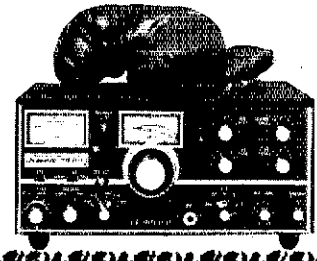
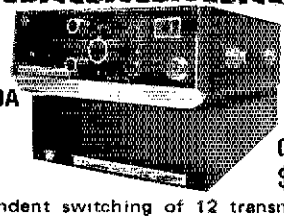


$569.95

SWAN FM-1210A and Power Supply



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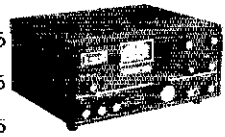
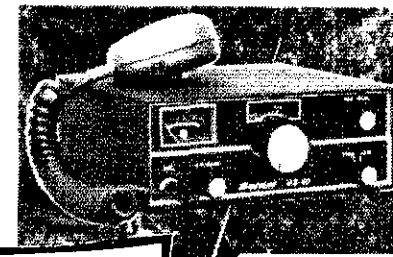
300B Cygnet *de novo* . . $499.95
VX-2, VOX unit $35.95
SWAN 14-A, converter . . $44.95





PACKAGE #2

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Select the MB-40 for 7.0 to 7.3 MHz use, or the MB-80 if you prefer to work 3.5 to 4.0 MHz. Whichever monobander you select, we'll include the correct single-band coil and whip antenna together with a bumper mount and microphone. A total value of $374.00 offered during this special holiday season for only $320. SAVE $54.00.

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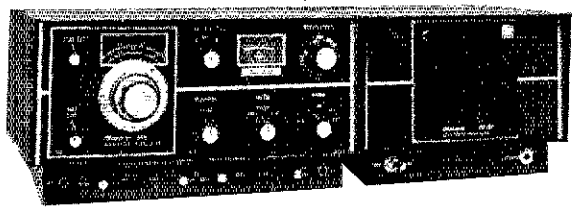

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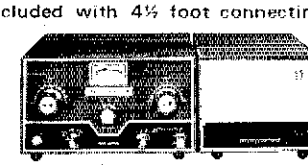

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☐ FM-1210A & AC Power Supply	$359.95	☐ SS-16B, Super Filter	$79.95
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☐ 300B Cygnet *de novo*	$499.95	☐ FP-1, Phone Patch	$48.95
☐ VX-2, VOX Unit	$35.95	☐ WM-1500, Wattmeter	$49.95
☐ 14-A, DC Converter	$44.95	☐ 55C, Mobile Antenna	$129.00
☐ SS-15 Solid-State Transceiver	$579.00	☐ 45, Mobile Antenna	$79.00
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WV-4 RF Wattmeter (20-200 Mc)	73.50
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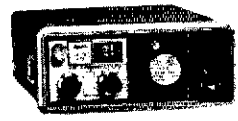
SW-4A AM Shortwave Receiver (tube)	335.00
AL-4 Loop Antenna – BC Band	29.00
AN-5 Short Wave outdoor antenna	8.80
TV-42-LP 100w Low-pass Filter	8.95
TV-1000-LP 1000w Low-pass Filter	18.75
TV-300HP High-pass Filter	6.95
LN-4 Line Filter, 120v, 5 amp	8.00
Crystals for 2C, R-4C, SW-4A, T-4XC	5.00
Fixed-Frequency Crystals	7.50
729SRD Microphone with plug	19.95
SPR-4 Programable Receiver	579.00
ACCESSORIES FOR SPR-4	
5NB Noise Blanker	$ 65.00
DC-PC DC Power Cord	5.00
TA-4 Transceive adaptor for SPR-4	25.00
SCC-4 Crystal Calibrator	20.00
RY-4 Teletype adaptor	10.00
DIAL Crystal Selector - plain	2.35
CRYSTAL KITS FOR SPR-4	
Aeronautical Overseas – 7 crystals	$ 32.00
Amateur Bands – 6 crystals	27.00
Citizens Band – one crystal	5.00
Marine Bands – 11 crystals	49.00
MARS – 5 crystals	22.00
Teletype Commercial – 4 crystals	18.00
Time & Freq. Std. WWV – 5 crystals	22.00

TR-72



TR-22

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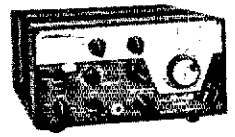
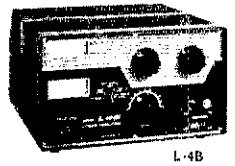


R-4C



L-4B

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- GECC Revolving Charge Plan. Only 10% Down. LOW Monthly Payments – for Examply: $10 a month finances up to $300: $20 up to $610. Write for complete information and credit application.

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TR-22 2m FM	$10 Bonus	SPR-4 Receiver	$40 Bonus
TR-72 2m FM	$20 Bonus	TR-4C Xcvr	$50 Bonus
R-4C Receiver	$40 Bonus	C-4 Console	$40 Bonus
T-4XC Xmtr	$40 Bonus	L-4B Linear	$100 Bonus

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Expiration DATE *Master Charge Interbank number (4 digits)
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Address:
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☐ Send used gear list

WA2EXX of NNJ been vacationing up these parts in Unadilla. ZF1RR and ZF1KW were really WA2BCK and WA2EKW in disguise. WB2AIO experiencing "everything interference" in new apartment. WB2LVW has acquired a TR-22 and joins the 2-meter fm set. Welcome to the Saratoga County RACES Asso., a new ARRL affiliated club. Traffic with * indicating PSHR: (July) WB2ADW 477, W2OE* 327, W2RUF* 257, W2FR* 171, WA2AYC* 123, WA4PDM/2 106, W2MTA* 86, WA2EXX/2 48, W2RQF* 46, K2UIR 42, WB2VND 38, WA2PUU 31, W2EAF 18, W2RUT 18, K2KTK 17, K2IMI 16, W2PVI 16, WA2LCC 11, WA2MPC 11, K2OFV 7, WA2AJV 5, WN2HGG 5. (June) WA2EXX/2 14.

CENTRAL DIVISION

ILLINOIS – SCM, Edmond A. Metzger, W9PRN – Asst. SCM: Harry J. Studer, W9RYU. SEC: W9AES. PAMs: WA9CCP and W9PDI (vhf). RM: W9MUC. Cook County EC: W9HPG.

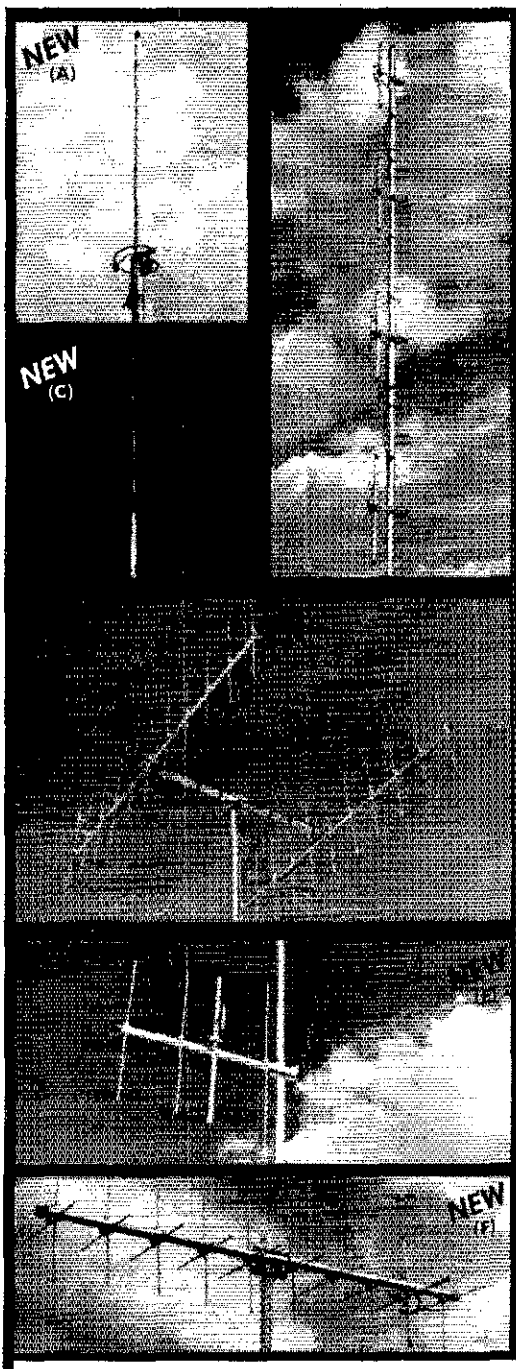
Net	*Freq.*	*(GMT)Days*	*Tfc.*
ILNN	3720	0000 Dy	100
ILN	3690	0300 Dy 2330 Dy	227
NCPN	3915	1300 MS 1800 MS	159
Ill PON	3915	1430	398
Ill PON	145.5	0200 MWF	11
Ill PON	50.28	0200 M	0
IEN	3940	1400 Su	no report

New ORS and OPS appointment this month is K9ZTV. New Novice in the Chicago area is WN9MQS (XYL) of WB9FBZ. Naomi Sturgeon, XYL of W9MUL was named Fulton County's Woman of the Year. W9AOV is recovering from a serious auto accident and is now back on the air. Our sympathy to the family and friends of K9HWI (ex-YA2HWI) who recently passed away. W9SXL now retired. WB9HAD has an SB220 and new wide spaced beam to roll in the DX. The Peoria Radio Club's annual Hamfest was well attended as usual with their nite before dinner with an EB gang in attendance. K9AWG, W9JXV, W9AES, W9UFR, K9BML, W9HSD, WN9IKD and W9JRY participated in the Powder Puff Net to help with the Annual Powder Puff Derby the week end of July 13-16. WA9VNW, WB9IDJ, K9YST and W9DJZ are the new officers of the York Radio Club. Their meetings are now held in Room 001 in the Elmhurst College Science Center. The York Radio Club and the Wheaton Community Radio Amateurs held their joint club picnic on Aug. 25. All Lake County amateurs are invited to the LAMARS Club which meets at the First National Bank of Lake County in Libertyville on the 1st and 3rd Thur. at 8:00 P.M. WN9KEN is now WB9KEN. WA9YOY and W9MON are now Advanced Class licensees. WN9MYN is a new Novice in Libertyville. W9KUJ's new QTH will be Bremerton, Wash. WB9HPC gave a talk on the art of wine making at the Aug. meeting of the Chicago Amateur Radio Club. WB9FHL is the only BPL recipient for the month. Traffic: (July) K9MWA 437, W9KRR 220, W9NXG 199, W9AES 126, WB9JPS 118, WB9FHL 117, W9JXV 104, W9MUC 88, K9AVQ 77, W9LNQ 66, WB9HEG 64, W9LDC 52, W9OYZ 38, K9KDQ/WB9AIE 32, WB9ITK 21, W9PRN 20, W9KR 19, WB9HAD 15, W9RYU 14, W9HOT 12, K9BGL 9, WA9ELP 6. (June) W9LNQ 81.

INDIANA – SCM, William C. Johnson, W9BUQ – SEC: WA9YXA. PAMs: WB9FOT, vhf W9HWR, W9PMT. RMs: WB9LHI, W9HRY, WB9KVN.

Nets	*Freq.*	*Time(Z)/Days*	*Tfc.*	*Mgr.*
ITfcN	3910	1330-2300 Dy 2130 M-S	464	WB9FOT
QIN	3656	0100-0400 Dy	253	WB9LHI
IPON	3910	1300-2130 Su 2000 S	11	WB9AHJ
IPON VHF	50.7	0100 M-F	09	WA9ULH K9QHO
IPON CW	3712	0000 Dy	24	WB9KVN
IPON SSB	50.2	0200 Dy	34	WB9CYU
Hoosier VHF			19	W9PMT

Ohio Valley Teenage Net meets daily 3968 at 2230Z. W9DZC Net Control for INttN Sun. session at 1330Z 3910 kHz visiting Park in Ind. has been able to run the net from his camper. WA9OAD, WB9KVN are back on the air after a vacation. W9GX on July 12 celebrated his 60th year as an amateur. IRCC meeting Oct. 7, at Indianapolis Red Cross Bldg. at 10th & Central Ave. Spring Mill Hamfest at Spring Mill State Park Oct. 14. LaPorte ARC furnished communication for the July 4th Parade. Those participating were WA9OCQ, K9ZUV, WB9CHR, WA9GOP, WB9BSL, WA9HIA, WA9GKA, K9WHF, WA9OKS, K9LHC and WA9ZDN. All amateur radio clubs should belong to Indiana Radio Club Council. Those who do not please send a representative to fall meeting listed above. OIN Honor Roll W9EI, K9HYV, WA9EED, WB9KVN. OIN Opera-



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AR-2	100 watts	135-175 MHz		$14.50
AR-25	500 watts	135-175 MHz		18.50
AR-220	100 watts	220-225 MHz		14.50
AR-450	100 watts	420-470 MHz		14.50
AR-6	100 watts	50-54	MHz	19.50

(B) 4 POLE: A four dipole gain array with mounting booms and coax harness 52 ohm feed, 360° or 180° pattern.

AFM-4D	1000 watts	146-148 MHz		$46.50
AFM-24D	1000 watts	220-225 MHz		44.50
AFM-44D	1000 watts	435-450 MHz		42.50

(C) FM MOBILE: IMPROVED Fiberglass ⅝ wave mobile antenna with new molded base and quick grip trunk mount. Superior strength, power handling and performance.

AM-147T	146-175	MHz	mobile $26.95

(D) POWER PACK: A 22 element, high performance, vertically polarized FM array, complete with all hardware, mounting boom, harness and 2 antennas.

A147-22	1000 watts	146-148	MHz	$56.50

(E) 4-6-11 ELEMENT YAGIS: The standard of comparison in VHF/UHF communications, now cut for 2 meter FM and vertical polarization. 4 & 6 Element models can be tower side mounted.

A147-4	1000 watts	146-148	MHz	$11.95
A147-11	1000 watts	146-148	MHz	19.95
A220-11	1000 watts	220-225	MHz	17.95
A449-6	1000 watts	440-450	MHz	11.95
A449-11	1000 watts	440-450	MHz	15.95

(F) FM TWIST: A Cush Craft exclusive — it's two antennas in one. Horizontal elements cut at 144.5 MHz, vertical elements cut at 147 MHz, two feed lines.

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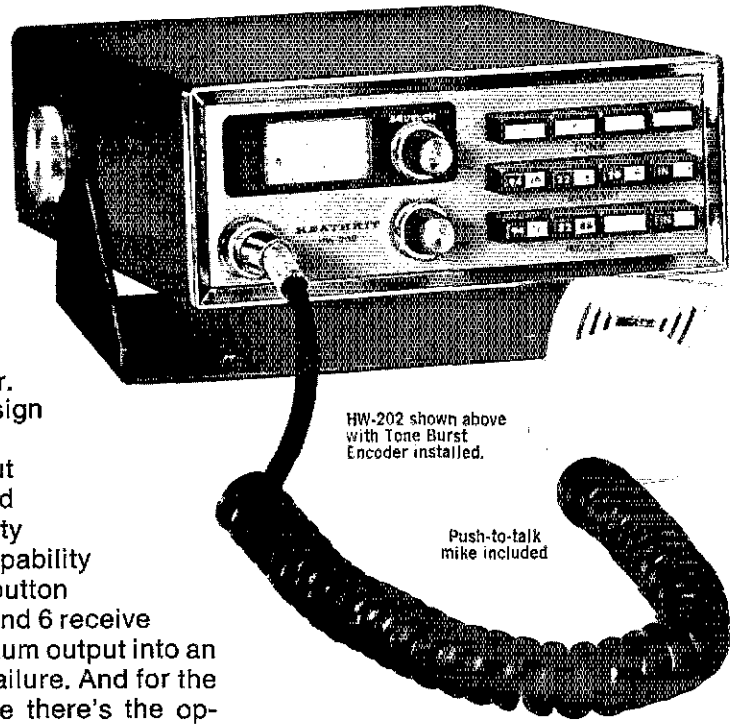


HW-202 shown above with Tone Burst Encoder installed.

Push-to-talk mike included

Start with the HW-202 2-Meter FM Transceiver. It's an all solid-state design that you can build and completely align without special instruments. And this compact little beauty gives you 36 channel capability with independent pushbutton selection of 6 transmit and 6 receive crystals. 10 watts minimum output into an infinite VSWR without failure. And for the ultimate in convenience there's the optional tone burst encoder for front panel selection of four presettable tones. The HW-202 kit includes two crystals for set-up and alignment and simplex operation on 146.94; push-to-talk mike; 12-volt hook-up cable; heavy duty clips for use with temporary battery; antenna coax jack; gimbal bracket, and mobile mounting plate.

Kit HW-202, 11 lbs, mailable **179.95***

Kit HWA-202-2, Tone Burst Encoder, 1 lb. **24.95***

Kit HWA-202-1, AC Power Supply, 7 lbs. **29.95***

Kit HWA-202-3, Mobile 2-Meter Antenna, 2 lbs. **17.95***

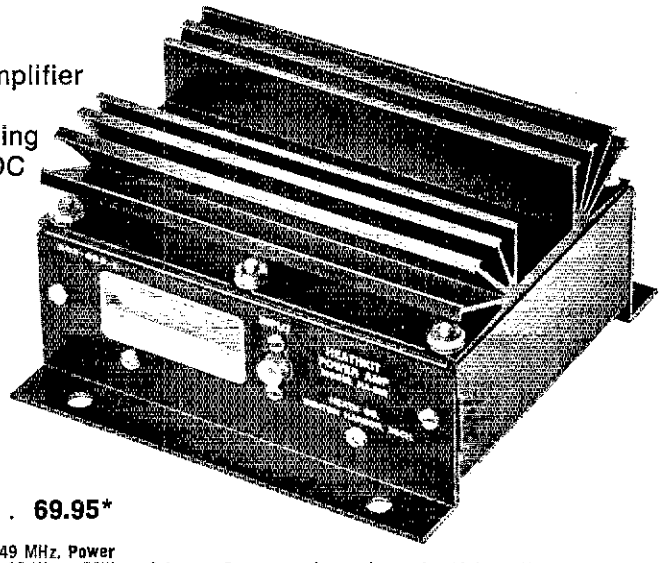
Kit HWA-202-4, Fixed Station 2-Meter Antenna, 4 lbs. **15.95***

HW-202 SPECIFICATIONS — RECEIVER — Sensitivity: 12 dB SINAD* (or 15 dB of quieting) at .5μV or less. **Squelch threshold:** 3 μV or less. **Audio output:** 2 W at less than 10% total harmonic distortion (THD). **Operating frequency stability:** Better than ±.0015%. **Image rejection:** Greater than 55 dB. **Spurious rejection:** Greater than 60 dB. **IF rejection:** Greater than 75 dB. **First IF frequency:** 10.7 MHz ±2 kHz. **Second IF frequency:** 455 kHz (adjustable). **Receiver bandwidth:** 22 kHz nominal. **Deemphasis:** −6 dB per octave from 300 to 3000 Hz nominal. **Modulation acceptance:** 7.5 kHz minimum. **TRANSMITTER — Power output:** 10 watts minimum. **Spurious output:** Below −45 dB from carrier. **Stability:** Better than ±.0015%. **Oscillator frequency:** 6MHz, approximately. **Multiplier factor:** X 24. **Modulation:** Phase, adjustable 0-7.5 kHz, with instantaneous limiting. **Duty cycle:** 100% with ∞ VSWR. **High VSWR shutdown:** None. ***GENERAL — Speaker impedance:*** 4 ohms. ***Operating frequency range:*** 143.9 to 148.3 MHz. **Current consumption: Receiver** (squelched): Less than 200 mA. Transmitter: Less than 2.2 amperes. **Operating temperature range:** −10° to 122° F (−30° to +50° C). **Operating voltage range:** 12.6 to 16.0 VDC (13.8 VDC nominal). **Dimensions:** 2¾" H x 8¼" W x 9⅞" D.

*SINAD = $\frac{\text{Signal + noise + distortion}}{\text{Noise + distortion}}$

. . . and here's 40 watts out for your 10 watts in

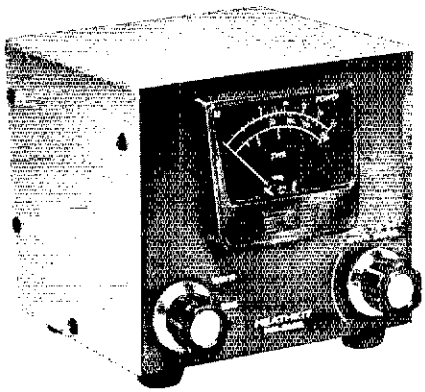
The Heathkit HA-202 2-Meter Amplifier works with any 2-meter exciter delivering 5-15 watts, while pulling a meager 7 amps from any 12 VDC system. No additional power supplies are required. All solid-state components mount on a single circuit board for easy two-evening assembly. Manual shows exact alignment procedures using a VOM or VTVM. Connecting cable and antenna cable are included.



Kit HA-202, 4 lbs. **69.95***

HA-202 SPECIFICATIONS — **Frequency range:** 143-149 MHz. **Power output:** 20W @ 5 W in, 30W @ 7.5W in, 40W @ 10 W in, 50W @ 15 W in. **Power input (rf drive):** 5 to 15W. **Input/output impedance:** 50 ohms, nominal. **Input VSWR:** 1.5:1 max. **Load VSWR:** 3:1 max. **Power supply requirements:** 12 to 16 VDC, 7 amps max. **Operating temperature range:** −30° F. to +140° F. **Dimensions:** 3" H x 4¼" W x 5½" D.

. . . then there's this perfect 2-meter tune-up tool



The Heathkit VHF/SWR Bridge tests transmitter output in power ranges of 1 to 25 watts and 10 to 250 watts ±10% of full scale. 50 ohm nominal impedance permits placement in transmission line permanently with little or no loss. Built-in SWR bridge for tuning 2-meter antenna for proper match, has less than 10-watt sensitivity.

Kit HM-2102, 4 lbs. **29.95***

HM-2102 SPECIFICATIONS — **Frequency range:** 50 MHz to 160 MHz. **Wattmeter accuracy:** ±10% of full-scale reading.* **Power capability:** To 250 W. **SWR sensitivity:** Less than 10 W. **Impedance:** 50 ohms nominal. **SWR bridge:** Continuous to 250 W. **Connectors:** UHF type SO 239. **Dimensions:** 5¼" W, 5⅛" H and 6½" D, assembled as one unit.

*Using a 50 Ω noninductive load.

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tor for The Month W9BDP, BPL: WA9EED. Traffic: (July) WA9EED 531, K9FZX 253, W9EJ 191, WB9KVN 164, WB9FOT 155, WB9CAC 134, W9FWH 110, K9HDP 86, WB9GVT 71, W9QLW 55, WA9TJS 38, K9YBM 37, W9KT 36, W9UEM 36, W9JBQ 35, W9PMT 34, K9RWQ 33, WA9OHX 30, K9JQY 29, WRBUQ 28, K9CBY 22, W9HWR 21, K9PSL 20, W9DZC 14, WB9BAP 12, W9DKP 12, W9RTH 9, K9DJY 6, K9ILK 5, W9BDP 5, WA9ULH 5, WA9OKK 5, W9KX 3, WA9BEE 1. (June) WB9GVT 85, W9BDP 1.

WISCONSIN – SCM, Joseph A. Taylor, W9OMT – SEC: W9NGT. PAMs: K9FHI, WA9OAY, WA9QKP. RMs: W9UCR, K9KSA, K9LGU.

Net	*kHz*	*Time(Z)/Days*	*QNI*	*QTC*	*Mgr.*
WSBN	3985	2230 Dy	1022	141	K9FHI
WIN(E)	3662	0000 Dy	206	118	W9UCR
WIN(L)	3662	0400 Dy	173	71	K9LGU
BEN	3985	1700 Dy	236	160	WA9QKP
BWN	3985	1145 M-S	428	255	WA9OAY
WSSN	3662	2330 MWF	*	*	K9KSA

*Summer vacation. Thanks to W9ESJ for filling in for WA9QKP as mgr. for the BEN during vacations. The WSSN, our section training net for CW net operations, is presently on summer vacation but look for it to start up again soon. In the meantime K9LGU and W9UCR welcome your participation in the WIN both early and late sessions. W9OMT has joined the portable fun on 2 meters with a new standard HT. W9AYK took time off this month for a camp trip to Colo. K9UTQ now has a tegency HR-2A with twenty-two-element beam up 70-ft. W9CXY reports that because of erratic conditions on 7090, CAN has QNY to 3670 kHz. WB9FMR has been busy working on a two-element quad for 20 meters. K9KSA has been touring the state this summer with the Educational Radio Network, working both 2 and 75 meters portable. W9PJT has a new R4C/T4XC combination. WB9ELH, K9DAF and W9PJT report they have been busy county hunting. W9QYH has a new Drake transmitter on the air. With winter just around the corner, now might a good time to make sure our antennas are all in good shape and remember when working on towers and antennas "Switch to Safety". Traffic: W9CXY 362, K9LGU 146, W9ESJ 130, W9MFG 88, WB9EWQ 86, W9UCR 85, K9FHI 55, W9DXV 43, W9IHW 33, W9DND 31, W9KRO 31, K9KSA 21, WB9FMR 16, W9GF 14, K9UTQ 14, W9AYK 11, W9PJT 8.

DAKOTA DIVISION

NORTH DAKOTA – SCM, Harold L. Sheets, WØDM – SEC: WAØAYL. OBS: KØPVG/Ø RM: WAØMLE. OO: WØSUF was given an award for outstanding service to RACES by the State CD dept. and WØDM was voted Outstanding Ham of the year. WØHI TEN Mgr. and WAØMLE also were present. DX visitors were KH6GF a former Grand Forks teacher and FAA retiree and KS6DH from Somoa whose home is in Sharon. Next year it will be held on the Canadian side. Congrats to WAØSJB, KØPVG/Ø,WØBHT, WAØRWL, WØFNZ and VE4SR on an FB job. WAØGQI, helped by WAØOVW erected a 90-ft. tower with a 20-meter mono-bander on top. WØDM received the other Novice call in his class from Norway WNØKSB where she and WBØBUF were spending some time. More Novice calls are WNØKTU, WNØKVG, WNØKVH and WNØKZT.

Net	*kHz*	*CDT/Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
RACES	3996.5	1830 M-F	22	455	25	WBØATJ WAØSJB WAØSUF
PON	3996.5	0900 S 1830 S-S	14	317	9	WAØSJB

Traffic: WAØMLE 153, WAØSUF 26, WBØBCZ 21, WBØBIJ 12, WØBM 7, WAØJPT 3, WØMXF 3.

SOUTH DAKOTA – SCM, Ed Gray, WAØCPX – WAØNZA was active during the June '72 Rapid City flood on cw and made three trips to Rapid City during that time. Lyndell has been active in S.D. cw traffic handling for many years. He is now getting on ssb with an HW-100. WBØDGA recently received his Extra Class license. The Black Hills Repeater Assn. of Rapid City has received the first license under the new repeater rules in S.D. with the call WRØABL. WØRWE of Sioux Falls, reports cw FD operation of 441 contacts. WAØRIQ reports the Sioux Falls repeater activates during severe WX from the National Weather Service. The Sioux Falls Repeater is now on .16/.76. Net reports: Morning – QNI 381 and 29 QTC; NJQ Net – 366 QNI and 21 QTC; Early Evening – 343 QNI and 3 QTC; Late Evening – 1062 QNI and 46 QTC; SDN CW – 169 QNI and 125 QTC. Traffic: WAØROK 316, WØHOJ 114, WAØUEN 50, WØIG 27, KØAIE 24, WØMZJ 19, WBØDGA 13, WAØRIQ 10, WBØDAH 3.

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DELTA DIVISION

ARKANSAS – SCM, Jimmie N. Lowrey, WA5VWH – RM: W5ELJ. PAM: WB5FDP. We are all very sorry to hear of the passing of WB5FOW. His passing will leave a vacancy hard to fill by those who knew him. In his short time as a ham he made many friends who will miss him. The Ark. Repeater Coordinating Assn. is still very active in the Ark. area and anyone interested in or planning a repeater is invited to contact this group so that problems relating to frequency coordination and area covered can be limited. Anyone interested in starting a repeater or currently active in repeater operations is invited to contact WA5EJH, freq. coord. or W5GKO, chmn. With the coming of winter and the contest period last minute antenna changes should be completed while we still have a few nice warm days remaining. Repeaters: Forest City, WB5FKF 146.16/76; Fort Smith, WA5YUT 146.34/94; Little Rock, W5DI 146.34/94; Hot Springs, WA5BRF 146.28/88; Jonesboro, W5RHL 146.34/94; Fayetteville, WA5SNO 146.16/76. Traffic: WN5IGF 12.

LOUISIANA – Acting SCM, Louis A. Muhleisen, Jr., K5FVA – SEC: K5SVD. RM: W5GHP. PAM: WA5NYY. VHF PAM: WA5KND. As reported in last month's column, the LARC in cooperation with other New Orleans area ARCs will sponsor the first hamfest to be held in New Orleans since the Delta Division Convention in the early sixties. The hamfest will be held Oct. 7 at the Metairie Playground, and the "Warmup" Banquet will be held at the Ramada Inn at Causeway Blvd. & I-10 on Oct. 6 from 7-10 P.M. Further details may be obtained from WA5WEY. K5DZE/5 in Ruston, reports new officers of La. Tech ARC are K5EXZ, pres.; K5DZE/5, vice-pres. & act. chmn.; WA5YRM, secy-treas.; WB5EXF, repeater comptroller. WA5EXH has returned to Miss. to attend Law School. K5DZE/5 active on Oscar 6. WA5ZVB moved back to Lafayette from Houston. K5DPG, WA5OOC and WA5SNA received Certificates of Recognition, for outstanding performance in AF MARS, at the recent Cen. Div. AF MARS conference held at Springfield, Mo. W5HHT installing a six-element 20-meter beam on his 125-ft. tower. K5AGI and WA5TTH doing well in their new home at Seattle. Traffic: W5GHP 259, WA5NYY 32, WA5QVN 23, WB5IDV 1.

MISSISSIPPI – SCM, Walker J. Coffey, W5NCB – Asst. SCM: Gene McGahey, WA5JWD. SEC: WA5FII. PAMs: W5JHS, WA5KEY. RMs: WA5YZW, WB5EIN. Hard work by Jackson ARC members, their XYLs and others, led by W5OPE, made the Hamfest super. Big prize winners were WA5SNX, WN5HYR and W5HTV. Miss. Dist. Dir. for Army MARS is WB5AHY; for Navy MARS it is WA5UBQ. Big news is ECHO Repeater Assn. new call, WR5ABT, 146.28-147.12 now and 28-88 later. Congratulations to WB5IPZ and WB5HVY on General Class license. WB5DCY added 40 meters to his TA33 at 70-ft. WB5AHL also has a 40-ft. tower. W5PDG is one away from his phone DXCC. Was it 500 or 600 contacts by a coast station in the July CD? Please check in on our nets. PSHR congrats to WB5EIN, WB5DLW, K5YTA and WB5FML. Election of Dir. and VD coming up in Delta Div.

Net	*Freq.*	*Time(Z)/Days*	*QNI*	*QTC*	*Mgr.*
MTN	3685	2345 Dy	178	162	WA5YZW
MNN	3733	2400 MWF	—	—	WB5EIN
GCSBN	3925	2330 Dy	—	—	W5JHS
CGCHN	3935	0100 Dy	1342	142	WA5VVV
MSPON	3970	2345 MS	297	24	WA0GVO/5
MSBN	3987.5	0015 Dy	749	70	WB5BUE

Traffic: W5SBM 132, WB5DLW 120, WA5YZW 119, WB5FML 109, WB5EIN 81, W5EDT 72, W5NCB 66, K5YTA 63, WA5THM/5 42, WN5HFA 24, WB5BUE 22,. WA0GVO/5 19, WB5BKM 9, W5BW 9.

TENNESSEE – SCM, O.D. Keaton, WA4GLS – SEC: WB4DYJ. PAMs: W4PFP, K4MOI, WA4EWW, WA4NEC. RM: W4ZJY. The Crossville Hamfest was a success as usual. First prize taken home by K4YZV, and the second by WA4CLN. The Tenn. Amateur of The Year Award was presented to WB4MPJ. The CW Operator of The Year Award and the Section Traffic Award went to WB4YCV; WA4WVW was the recipient of the Section Net Participation Award. The Novice Net's QNI and NCS awards went to WN4YDY. The Tenn. Council of Radio Clubs elected the following officers for the next year: W4CYL, chmn.; WB4MUZ, vice-chmn.; WA4KYT, secy.-treas.

Net	*Freq.*	*Time(Z)/Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
TPN	3980	1145 M-F 1400 SSatH	30	1314	54	W4PFP
TSSBN	3980	2330 M-S	26	1022	54	K4MOI
FTPN	3980	1040 M-F	21	533	32	WA4EWW
TPON	3980	2330 Su	4	109	9	WB4BHZ
TN	3635	2300 Dy	22	613	76	WB4YCV
TNN	7135	2300 Dy	17	40	8	WB4NIR
FTVHFN	50.7	2300 MWF	13	157	0	W4SGI

2nd generation slo-scan

Venus Scientific brings ten years of space-age technology development to the production of the latest breakthrough in HAM Equipment... the SS2 Slo-Scan Monitor. The following unique features of the SS2 have been designed to offer the HAM operator the maximum functional performance in SSTV.

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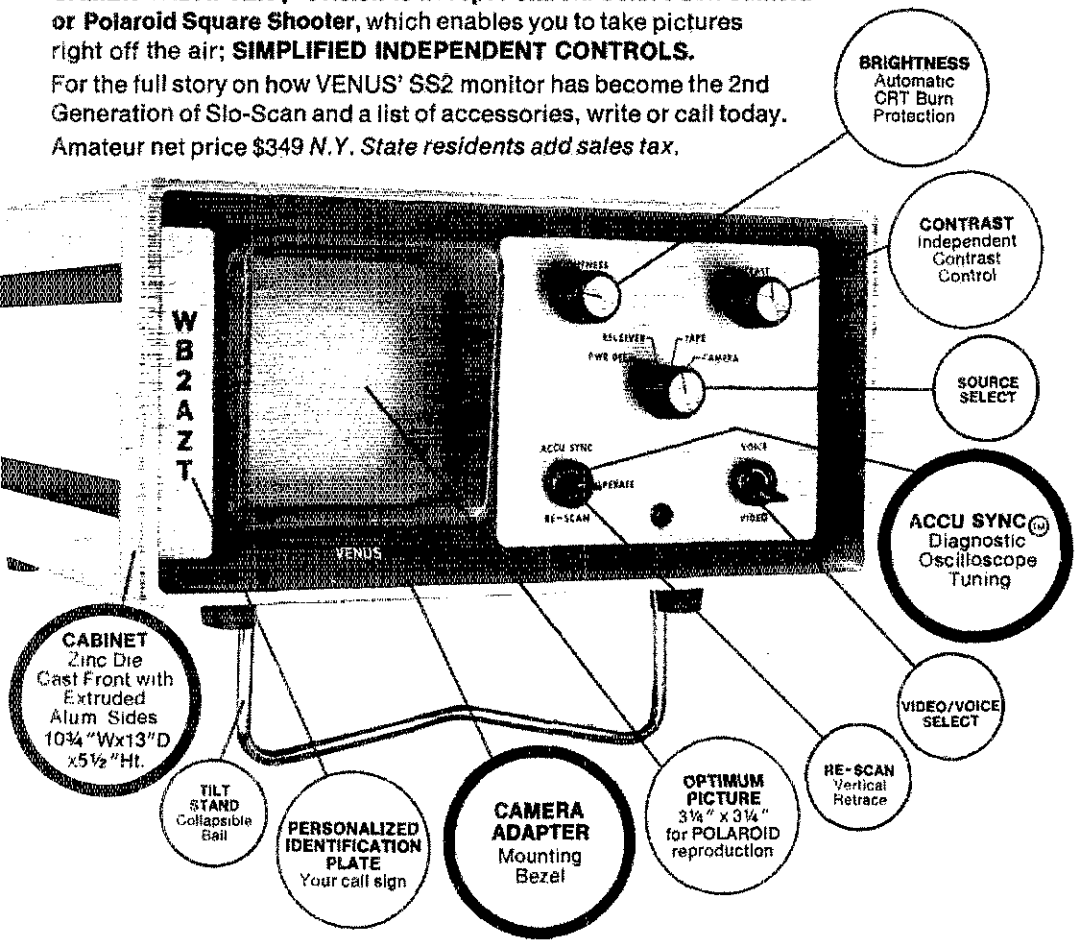
Amateur net price $349 *N.Y. State residents add sales tax.*



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ETTMN	28.7	0100 W&F	8	36	0	WB4NFI
MTTMN	28.8	0100 T&Th	7	50	0	W4EAY
ACARECN	146.28 146.88	0000 M	4	62	0	WA4BXK

Everyone plan to attend the Memfest '73 on the 6th and 7th. Come prepared to take part in an ARRL meeting on Sat. night. Traffic: K4CNY 190, WB4NIR 113, W4OGG 108, W4ZJY 26, K4VVE 22, WA4GLS 21, W4RUW 18, WN4AVD 15, W4CYL 13, WB4DYJ 8, K4SJV 8, WB4ANX 7, WB4MPJ 4, WB4UZD 2, W4WBK 2.

GREAT LAKES DIVISION

KENTUCKY – SCM, Ted Huddle, W4CID – SEC: WA4GHQ. Appointed: W4IQZ as ORS; WA4VZZ and WA4WSG as ECs. BPL: *WB4ZMK.*

Net	*QNI*	*QTC*	*Net*	*QNI*	*QTC*
KRN	820	32			
MKPN	566	34	KNTN	108	72
KTN	1084	186	KPON	64	33

The Owensboro group was recently involved in a search for a drowning victim. Active in the search were: K4UDZ, WB4PVC, *WA4JQC, WA4FMY, W4EWM, W4OYI, W4LUB, WB4ZSA, K4IV,* WA4BKB, WB4TNZ and WA1KAJ/4. The FCC logjam on new repeater licenses has broken. New calls are WR4s ACO and ACP in Owensboro; ACO in Ashland and ACR in Lexington. Ashland's WR4ACO is a new machine on 34/94 while the others replace older calls. Roses are in order for WA4JQS for another successful Somerset Hamfest. Lexington's 'fest had to endure some rain but was still enjoyed by a reasonable crowd on July 1. Traffic: W4BAZ 280, WB4ZMK 178, WA4VZZ 76, WB4EOR 73, W4CID 67, WA4AVV 56, WB4AUN 43, WA4GHQ 38, WB4ZML 32, W4CDA 26, WA4FAF 25, K4LOL 20, W4OYI 16, W4IQZ 15, WB4ZDU 14, WB4NHO 13, WA6KTN/4 7, WB4WCM 7, WB4ZSA 7, W4BTA 6, K4AVX 5, WB4MQS 4, WA4UMR 2, WB4FOT 1, WB4GCV 1.

MICHIGAN – SCM, Ivory J. Olinghouse, W8ZBT – SEC: W8MPD. RMs: W8JYA, W8WVL, W8RTN, K8KMQ, W8GLC. PAMs: W8GVS, W8NDI. VHF PAMs: K8AEM, WA8WVV.

Net	*Freq.*	*Time/Days*	*QNI*	*QTC*	*Sess.*	*Mgr.*
QMN	3663	2200 Dy	619	501	62	W8JYA
WSBN	3935	2300 Dy	703	100	31	W8GVS
BR/MEN	3930	2130 Dy	726	109	30	W8NDI
UPEN	3920	2130 Dy	529	31	30	W8IEH
GLETN	3932	0130 Dy	851	161	31	WB8CHE
PON	3955	1500 Dy	1018	358	31	K8LNE
PON/CW	3645	2300 M-S	138	29	26	VE3DPO
Mi.6M	50.7	2300 M-S	123	26	16	WA8VXF

The SW Michigan report – 6M.WX Net held 4 drills, 26 QNI, K8ZWR mgr. and the 2-Meter Nets held 10 sessions, 124 QNI, 1 QTC with W8CVQ and WA8WVV mgrs. The Michigan Nets picnic at Midland was a big success. New officers for FR/ME Nets were installed at the Net meeting. WB8MFG, WB8PLQ and WB8JFT are new Net Controls on the BR Net. More than 400 attended the ARRL State Convention and everyone had a good time. Meetings were well attended. Even the weather cooperated. New officers for the UP Nets elected at the meeting for 1973 are W8IEH, mgr. W8BPQ, asst. mgr. W8UOQ attended the County Hunter's Convention at Ft. Wayne, Ind. July 6-7. W8IBX operated portable in Huron Co. while on vacation. 1973 officers for Great Lakes Emergency and Traffic Net are WB8CHE, mgr.; WB8HPZ, asst. mgr. W4PVG, secy. WB8IVI has new SB-220 and DXCC award. WN8ONX new HW-101; WB8MJI CP 25 wpm. Field Day was a great success in Mich. according to reports in club bulletins, very good scores and everyone had a good time. WB8HIB is getting settled at his new QTH in Bloomfield Hills. Traffic: (July) WA8WZF 338, WB8ITF 186, K8LNE 137, W8GLC 125, W8ZBT 122, K8DYI 116, W8JYA 116, WB8FBG 79, K3SJL/8 71, WA8RXI 69, WB8MJI 66, W8TZZ 59, WB8IMI 57, W8NDI 53, W8MO 52, WB8BYB 51, W8OW 51, W8VFS 51, W8NOH 48, WB8HPZ 45, WB8HQS 44, K8TAK 44, WA8ENW 43, W8GVS 37, W8IBX 35, K8JED 35, WA8OJI 34, W8IVC 31, WB8DKQ 26, WB8NCD 23, WA8KHB 20, K8WRJ 20, WA8IXJ 19, K8LJS 18, W8EU 16, W8QWN 16, WA8VXF 16, W8FZL 15, WB8DJS 14, W8VXM 14, W8VIZ 13, K8AYJ 11, WB8FKA 11, WB8GWK 10, K8GXV 10, WB8MFG 10, WB8NII 10, W8OKW 10, W8QBF 9, WB8APN 8, WA8FXR 8, WB8IVI 8, K8TIY 8, W8DCN 7, K8RNP 7, WA8WVV 7, K8ACO 6, WA8CUP 6, W8TBP 6, WB8AUQ 5, WB8DRT 5, W8HKL 5, K8PYP 5, W8SH 5, WB8EUN 4, K8JHA 4, W8UOQ 4. (June) WB8EUN 9, K8AEM 2.

OHIO – SCM, William E. Clausen, W8IMI – Asst. SCM: Kenneth

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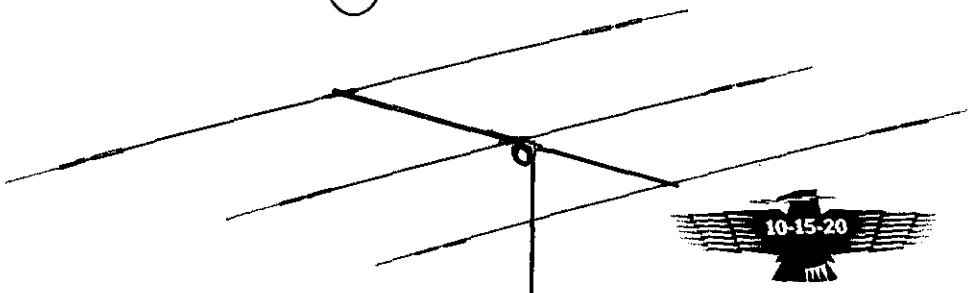

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Superior construction and performance make the difference in Hy-Gain's popular 3-element Thunderbird.

- Thunderbird's "Hy-Q" traps provide separate traps for each band. "Hy-Q" traps are electronically tuned at the factory to perform better at any frequency in the band—either phone or CW. And you can tune the antenna, using charts supplied in the manual, to substantially outperform any other antennas made.
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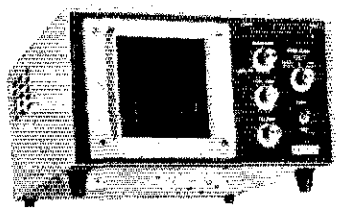

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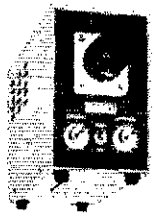

① MODEL 70 A SSTV MONITOR

Displays amateur standard pictures from any SSTV audio source: station receiver, tape, camera. Six inch (diagonal) display.

Front panel controls for easy station operation. Connectors for receiver, transmitter, microphone, tape, waveform monitor, tuning indicator, and auxiliary demodulated SSTV output for external monitoring.
All solid state except cathode ray tube.

$295

② MODEL 80 A SSTV CAMERA

Generates amateur standard SSTV pictures and fast scan video for viewfinders. Controls for contrast, brightness, vidicon beam, SSTV signal level, black/white reversal, ¼-½-full frame selection.
All solid state except vidicon. All station cabling included; requires suitable C-mount lens.

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③ VIEWFINDERS

Choice of 4 inch diagonal (Model 60) or 6.5 inch diagonal (Model 61) display to fit your station.
Displays fast-scan video pictures to simplify setting camera focus and field of view. All solid state except cathode ray tube. Tripod mountable (Model 60 only).

Model 60: **$249**
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Two piece detachable hood. Fits monitor bezel to block outside light.
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Three inch reel or cassette tape recording aids setting monitors and cameras to SSTV standards.

Cassette **$4** Reel **$3**

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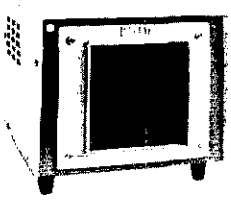
④ LENSES

Lens	Focal Length m m.	Min. f stops (All 22 max)	Min. focus (in inches)	Price
A	12.5	1.9	10	$ 49
B	25	1.9	24	$ 25
E	25	1.4	6	$ 54
F	50	1.9	42	$ 43
G	150	3.2	96	$ 79
H	18-90	2.0	60	$220



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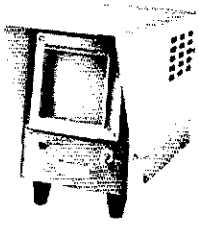

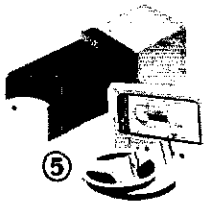

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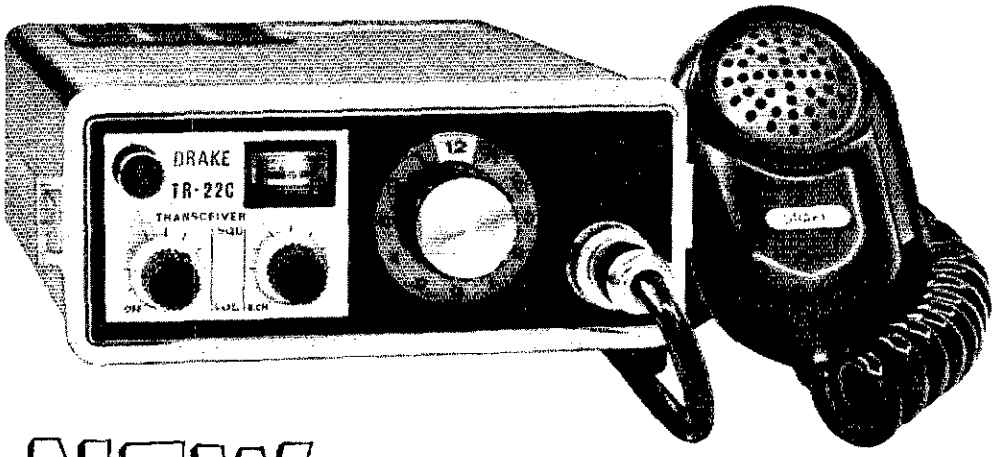
L. Simpson, WA8ETX. SEC: WA8COA. RM: WA8WAK. PAM: K8UBK. VHF PAM: WA8ADU.

Net	*QNI*	*QTC*	*Sess.*	*Freq.*	*Time(Z)*	*Mgr.*
OSSBTN	2145	964	83	3972.5	1430/2000/2245	K8UBK
O6MtrN	631	84	31	50.16	0100	WA8ADU
8N	490	316	62	3577	2245/0200	WA8WAK
OSN	153	80	27	3577	2210	WB8KKI
8NR	100	20	31	3605	2200	K8NCV
OH NOV.	71	42	31	3740	2330	WN8MZZ

Note the new times for Ohio Slow Net and the early Buckeye Net session. New appointees: WB8KKI OSN Mgr.; WA8OBN EC – Guernsey, Muskingum and Noble Co.; WB8IPV EC – Hamilton Co.; K8UMN EC – Miami and Shelby Co.; W8TRI EC – Jackson, Gallia and Meigs Co.; WA8YVF OVS; W8ETU OBS. Renewals: K8RMK OO; WB8AYC OPS. If you worked WO8HO send an SASE to Curt Mencer 4157 Chandler Dr., Columbus 43213 for a QSL. W8GOE and W8PMJ are producing the new Buckeye Traffic Bulletin, successor to the Buckeye Net Bulletin. It will cover traffic and emergency activities in general and will include pictures. Contact Editor W8GOE for more details and a free copy. The Treaty City (Greenville) ARA videotaped the Annie Oakley Parade to rerun for the handicapped. WB8AYC is the new mgr. of the Ohio Valley Teenage Net which meets daily at 1730 local time on 3968. Make sure your club participates in the Oct. 13 meeting of the Ohio Council of ARCs by submitting at least one formal proposal approved by the club membership. The meeting is at the Columbus YMCA at 10 A.M. and WA8COA can supply minutes of the last meeting and the council's newsletter. The Apricot Net participated in the convention of the American Assn. of Workers for the Blind and the 175th birthday celebration of the city of Burton. Support your Daytime National Traffic System; D8RN at 2000Z on 3940 and CTN at 1730Z on 14.315. Contact WA8MCR for more information. Franklin Co. RACES and Central Ohio AREC worked together to provide CD and Red Cross communications during June flooding. The Parma Radio Club will hold an auction in Oct. – contact W8DFL. The Miami Valley FM Assn. provided communications for Dayton Motor Boat Racing Assn. Regatta. Northwest Ohio AREC helped with communications for the Glass City Marathon. The Toledo area's "Ham Shack Gossip" reports communications for the Mills Trophy Race on Lake Erie were provided by the 160-Meter Net and the Critical Bias Radio Club. Butler Co. AREC supplied communications for tthe largestantique car parade in America. Traffic: (July) WA8MCR 643, W8SUS 246. WA8YLW 240, W8CUT 209, W8QCU 209, WA8HGH 176, W8PMJ 175, WB8HUP 156, WB2FWW/8 138, K8MLO 130, K8BPX 126, WB8KKI 123, WB8JGW 108, W8MGA 108, WA8WAK 105, WB8KXV 103, WB8AYC 102, WB8BZX 100, K8UBK 95, WB8NRC 93, W8ENI 87, WA8VWH 86, W8IJ 77, WA2ASM/8 75, W8UF 63, W8QZK 62, WA8ETX 61, W8MOK 59, WB8MLH 56, WB8MKZ 53, WB8KZD 47, WB8ALU 46, W8IMI 46, WB8IWE 45, WA8UPI 42, K8JDI 35, K8BYR 32, W8OE 31, WA8BCX 30, WB8ADU 28, W8ARW 28, WA8DWL 26, WA8SED 26, WB8GGR 21, WA8KPN 15, WB8AKW 14, WA8MIH 12, WN8MYA 12, W8WEG 12, WA8SSI 11, W8FGD 9, WB8FWF 9, W8LZF 8, W8MGC 8, WA8FCQ 6, K8CKY 5, W8NAL 5, W8BHL 4, WA8MGI 4, WA8ESX 1, K8PBE 1. (June) W8QCU 187.

HUDSON DIVISION

EASTERN NEW YORK SCM, Graham G. Berry, K2SJN – Asst. SCM/PAM: Kenneth Kroth, WB2VJB. SEC: W2URP. RMs: WB2IXW and WA2FBI, RTTY RM: K2DN. Nets: NYS daily at 0001Z and 0300Z on 3.675 MHz; ESS daily at 2300Z on 3.590 MHz (10 wpm) Novice Training Net Tue. at 0045Z on 3.677 MHz; RTTY daily at 2330Z on 3.613 MHz open to all; Hudson Division PR Net 2nd and 4th Sun. at 2200Z on 3.925 MHz; NYSPT&EN daily at 2300Z. Watch for changes in local time at end of Oct. As new club season starts it's time for wrap-up of congratulations around the section – W2DPV to Advanced Class; WA2EAH got the last QSL card in for WAZ to join his 5BDXCC. W2URP now member of ARRL Advisory Committee on Emergency Communications. NY Phone Net for a 6 months total QNI 8095, QTC 1239 in 201 hours 4 minutes of operations. WA2FBI and WA2EAH spearheaded NY QSO party – first tabulation indicates high scorers in state were WA2LQZ, WB2LYR; W2RR (WA2DHS op.) K2VGR and WB2PYM. Out-of-state leaders K1OME, WB2RKK; WA0TKJ; WB4OGW; K3HXS. WA2IQO new net mgr. for Clearing House Net for '73-'74 season. Coming Events: Communications Club of New Rochelle Holiday Dinner Nov. 24, details from W2YLE. Hudson Division moving ahead on plans for National Convention in July 1974 at Waldorf Astoria in NYC. Details from WA2CCF. SCM visit



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2 Meter FM Transceiver

New Features

- 12 Channels
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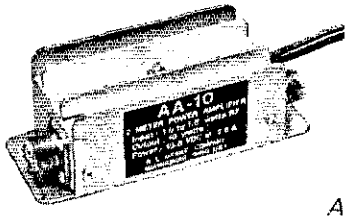
SPECIFICATIONS

GENERAL: • **Frequency Coverage:** 144 through 148 MHz. 12 Channels, 2 supplied: (1) Receive: 146.52 MHz, Transmit: 146.52 MHz; (2) Receive: 146.94 MHz, Transmit: 146.34 MHz • **Power Requirements:** 13.0 Volts DC±15% • **Current Drain:** Transmit: 450 mA, Receive: 45mA • **Antenna Impedance:** 50 Ohms • **Dimensions:** 5⅜" x 2 5/16" x 7½" (13.6 x 5.8 x 19.1 cm) • **Weight:** 3.75 lbs (1.7 kg)

RECEIVER: • **Sensitivity:** Typically .5 microvolt for 20 dB quieting • **IF Selectivity:** 20 kHz at 6 dB down; ±30 kHz channel rejection greater than 75 dB down. • **First IF:** 10.7 MHz with 2-pole monolithic crystal filter. • **Second IF:** 455 kHz with ceramic filter. • **Intermodulation Response:** At least 60 dB down. • **Modulation Acceptance:** ±7kHz. • **Audio Output:** At least 1 Watt at less than 10% distortion. • **Audio Output Impedance:** 8 Ohms

TRANSMITTER: • **RF Output Power:** 1 Watt minimum • **Frequency Deviation:** Adjustable to ±10 kHz maximum, factory set to 6.0 kHz. • **Multiplication:** 12 Times



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penciled in for Albany-Schenectady area Oct. 12. Hope to see all appointees in or near Capitol area at AARA that night. ECs busy planning for 1974 Simulated Emergency Test; get in touch now with your county coordinator. Individual activities: WB2AEQ to school in Albany area. K2BK back from W6 and XE area. RM WB2LXW running 2 watt rig in spare time – best DX to date 450 miles on 80 and 40 feeding 25-ft. random. W2AZO has new two-element tribander. New Radio O for Westchester County. K2GTY working toward complete RACES up-date pending new FCC regs to come. Regret to report WA2MJM joined Silent Keys during July. To school groups, have a good year! Traffic: (July) WA2CNE 591, W2GPH 101, WA2PJL 72, WA2IQO 38, WB2KDE 35, K2UYK 25, K2SJN 24, WB2BWE 18, W2URP 11, WA2EAH 7, WB2LXW 6. (June) WB2LXW 2.

NEW YORK CITY AND LONG ISLAND – SCM, Fred J. Brunjes, K2DGI - Asst. SCM: John H. Smale, WB2CHY. SEC: K2HTX. RM: WB2LZN. PAM: WA2UWA. VHF PAM: WB2RQF.

NLI*	3630 kHz	1900/2200 Dy	WB2LZN Mgr.
NLS*	3730 kHz	1830 Dy	WA2CLB Mgr.
VHF*	145.8 MHz	1930 MTWThF	WB2RQF Mgr.
NLI Phone*	3928 kHz	1730 Dy	WA2CXY Mgr.
Clear House	3925 kHz	1900 Dy	WA2VYT Mgr.
All Svc.	3925 kHz	1300 Dy	W2OE Mgr.
Mic Farad	3925 kHz	1100 Dy	W2OE Mgr.
NYSTPEN	3925 kHz	1800 Dy	WB2QAP Mgr.

*Denotes section nets; all times local! Congratulations to WA2LLF, WB2LYB and W2JUP on their appointments as OOs; to WA2KXE as OVS. In the "what's new" department: WB2CHY and XYL are proud parents of a harmonic (boy); WB2SLH was married in June. Congratulations to W2EC on reaching 50 years membership in ARRL. Ferd joined in 1914! Congrats also to the members of Nassau County AREC/RACES for placing third in the Nation in the 1973 SET. Let's hope we can put the entire section in first place next year! W2AML has been rather busy these days, what with the construction of some new antennas, and joining with WA2VXN in getting their FAX equipment in operation on the local FAX Net on Tue. at 8 P.M. on 145.8 MHz. The Net has about 20 stations in regular attendance and more checking in every week. If you are interested in FAX, check into the Net on am and see how easy the conversion is (May 1972 QST). Technical help is available, just ask questions! WB2LZN tried his luck at being DX (?) operating WB2LZN/1 from Conn. while on vacation! W2PF reports resumption of the QCWA luncheons at the Engineer's Club, 32 W. 40th St., N.Y.C. Call him for reservations and further details. WB2FIG appears to be "hooked" on traffic that is! It appears we'll have to keep track of another of our NLI members in Fla. Skip, as K2EP is retiring to the wilds of Orlando. Congratulations to WA2THV on passing his Advanced Class exam. He also has a new homebrew keyer in operation, and is looking for some help on how to send with it Hi! If you hear a QLF type signal from W8EDU this semester, it's probably THV getting some practice in! Congrats to WA2THV on his OPS appointment! WB2OYV has earned a 30 wpm sticker from ARRL. WA2CXY, WA2CLB and WB2NWX operated July CD CW Party as Multi-op (?). Amateur radio courses are again offered at the Hall of Science, in the Worlds Fair grounds this season. Contact WB2FHN for all details and schedule. Classes from Novice through Advanced are offered. It's not too early to plan for the ARRL National Convention at the Waldorf Astoria next July, it's only nine months away! If you didn't get to Tarrytown in '72 you know by now what you've missed. Don't miss out on this one! Contact Convention Hdqtrs., 303 Tenafly Rd., Englewood, NJ. 07631 for early information. The Convention Committee has been hard at work to give you the biggest and best ever for this one, so don't miss it! Traffic: WB2LZN 313, W2EC 102, WB2LGA 98, WB2OYV 91, WB2CHY 44, K2JFE 26, WB2FIG 12, K2FV 11, WB2DAR 8, WB2BYY 7, W2PF 7, WA2THV 7, WA2KXE 5, WA2OJK 5, WA2PLI 5, WB2RQF 4, W2EW 3, WA2VXN 2.

NORTHERN NEW JERSEY – SCM, John M. Crovelli, WA2UOO – SEC: K2KDQ. RM: W2ZEP. PAMs: K2KDQ and WA2FVH.

Net	*kHz*	*Time(PM)/Days*	*Sess.*	*QNI*	*Tfc.*	*Mgr.*
NJN	3695	7:00 Dy	31	423	195	W2ZEP
NJN	3695	10:00 Dy	31	294	102	W2ZEP
NJSN	3730	8:15 Dy	16	87	16	WA2NKK
NJPN	3950	6:00 M-S	31	510	193	WA2FVH
NJPON	3930	6:00 Su	5	89	18	WB2FJE

Endorsements: K2KDQ as SEC; WA2OJU as ORS and OPS; WA2UDT and K2DOT as OVSs. Union City Amateur Radio Week was a big success. 44 lectures to over 800 students were given with over 350 signed up for Novice classes in the fall (122 of which are YLs). Participating were WA2JUL, WA2SQQ, WA2SGP, WA2BQV, WA2MVR, WA2GFN and WA2SER. The Thomas A. Edison Radio

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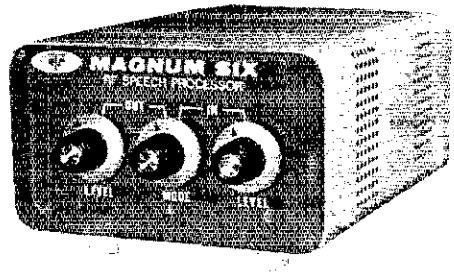

- The human voice is a "raspy" signal with high peaks and long, low valleys. If used to modulate an SSB transmitter directly, the low power of the valleys limits the average power output to 12-15% of the transmitter's PEP rating. Operating above this level, the peaks overdrive the transmitter, cause band splatter and poor quality.

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Assn. meets the 3rd Thur. of each month and they also have a weekly roundtable Thur. nights 21425 at 0100Z. The Wireless Institute of the Northeast (WIN) is now an ARRL affiliate. WA2UDT has built a new Mosfet 144 MHz coverter and a general purpose 12 volt power supply for future additions. K2AGJ is active on the YL International SSB System daily. QQ reports from WB2IEC and WB2TFH. WB2JVN passed the General and WB2GTW the Advanced. Congratulations. EC WB2CST of Fair Lawn has appointed WB2HJW asst. EC for VHF activities. Sixty-three messages were originated from the Amateur Radio week Exhibit at the Ocean County Fair July 24-26. Participating were WN2FIS, WN2KKU, WN2NXR, K2UJX, W2FZV, WA2KYT, WA2WMR, WA2TMZ, WA2WYR, K2CXH, WN2HBD, WB2FRH, WA2ITB, WB2AYE, WA2EIF, WA2LUR, WA2AUU and WB2QYS/2. Note that the local repeater WR2ABR was used to pass local traffic. WA2EXX has a new vfo and bug. WB2IEC qualified for 5BDXCC and the 35 wpm code proficiency. He also has added a TR22 to the shack. W2CVW is building a portable carrying case for his Ten-Tec transceiver. WBØJMS/2 is a new arrival to Brookside. An 80-meter dipole is keeping him active on phone and cw nets. YL WA2OPY and W2IXD are sharing NCS duties on KARCN. The NJN Picnic held July 28 was again blessed with excellent weather. Present were W2ZEP, W2JI, K2EFA, WA2GMH, WA2CCF, WA2FVH, W2RUX, WA2CLB, WA2WLN, WB2AEH, WB2VPR, WA2BAN, WA2SRQ, WA2QNT, WB2FEH, WA2UOO, WA2CXY, WA2PQL, WA2TRK, WA2RYD, WB2RJJ, WB2NOM, WA2NLP, WB2OYV, WA2NKK, WB2FCD and W2CVW. The softball game and the water balloon throw at your SCM were the highlights. WB2NOM made BPL for July and qualifies for the BPL Medallion. WA2UOO has joined the A-1 Operator Club. Traffic: (July) WB2NOM 331, WA2SHT 181, WB2AFH 142, W2ZEP 100, WA2EXX 48, WA2UOO 47, W2CVW 36, K2OQJ 36, WB2RJJ 22, WA2OJU 18, WB2CST 17, WA2ONT/2 15, WA2CCF 14, W2CU 14, K2ZFI 11, WB2AKU 10, W2OPE 9, WBØJMS/2 3, WA2BSU 2, WA2EUO 2. (June) WA2DWB 26, WN2OVE 8, W2WOJ 5, W2OPE 3.

MIDWEST DIVISION

IOWA – SCM, Al Culbert, KØYVU – SEC: KØCLI. News is rather sketchy this month, have been vacationing in VY6- and VE7-Land. Congratulations to WØYUA, featured in a nice article in the Iowa REC News concerning the electronic organ which he home-brewed. WNØHIY is awaiting his General ticket. KØYUX has been admitted to the Oakdale Sanitarium. KØPSC and WBØBPH attended a 3-day conference of the Central States Army MARS group at Columbia, Mo. The Northeast Iowa ARA at Waterloo received some good publicity for their role in providing communications during the Powder Puff Derby. The Des Moines AREC/RACES group was called into action several times in July to provide traffic control communications for a Navy Blue Angels air show and also to provide communications for sandbagging after a 5 inch rain fell in the West Des Moines area. Remember the Midwest Convention at Lincoln, let's have a good Iowa turn-out.

Net	*QNI*	*QTC*
Ia 75 Meter (noon)	1334	108
Ia 75 Meter (eve)	972	53
TLCN	119	49
TLCN (June)	95	49

Traffic: (July) WA3PWL/Ø 202, KØDDA 144, WAØAUX 123, KØAZJ 62, WAØVZH 57, WAØTAQ 36, WØLCX 25, WØWSV 23, WBØDBG 20, KØYVU 16, WBØFEW 5. (June) KØAZJ 81, WAØVZF 8.

KANSAS – SCM, Robert M. Summers, KØBXF – SEC: KØJMF. RM: KØMRI. PAMs: WØGCJ, WBØBCL. VHF PAM: WAØTRO. KØLPE was named the Kans. Amateur of The Year at the Concordia Hamfest. Earl was presented The Raymond E. Baker Memorial Award for his past efforts given to our hobby through his tenure as SEC. The gang who attended the Sat. evening get together before the hamfest had prepared a 25-year Anniversary party for Wanda and myself. Many thanks again to all concerned. County Fairs seems to be the thing about this time of year, a lot of the clubs are taking advantage of the opportunity to display amateur radio to the public and give some of that public service we are able to perform. KWN reports for July 31 sessions, 495 QNI and 128 QTC. KSBN 26 sessions, 633 QNI and 91 QTC. KPN 11 sessions, 191 QNI, 15 QTC. QKS 62 sessions, 511 QNI, 234 QTC. Mid States Mobile Monitor QNI 1539, serving 116 mobiles, 79 QTC and 91 phone calls or patches in 88 hours. The Kans. Slow Speed Net now graduating quite a few of their members and it is hoped they will continue to remember where they got the start in traffic handling, by continuing the QNI to QKS-SS as well as QKS. Oh yes, how about recruiting 2 people to replace you on the QKS-SS Net. QKS-SS QNI 179, QTC

366 for July. Traffic: WBØGVR 306, WØOYH 203, WBØHBM 187, WNØHTR 184, WØHI 154, KØMRI 105, WØFIR 102, WØCHJ 83, WØINH 75, WØGCJ 65, WØMA 53, WNØHTH 47, KØJMF 39, KØBXF 37, WBØBIY 32, WAØLBB 30, WBØCZR 24, WNØJIQ 20, *WØOF 15, WØPB 15, WBØCUY 13, WØRBO 9, WAØOWH 7, KØYTA* 7, WBØDOX 5, WBØFGV 4.

MISSOURI – SCM, Larry S. Phillips,* KØVVH – Asst. SCM: Clifford Chamney, KØBIX. SEC: KØHNE. New appointments: KØAEM as ORS; KØBIX RM; KØPCK PAM. Appointments renewed: KØBIX as EC; KØLCB OVS; WAØTAA PAM.

Net	*Freq.*	*Time(Z)/Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
MOSSB	3963	2300 M-S	26	880	48	KØPCK
MOPON	3963	2200 M-S	26	509	90	WAØTAA
HBN	7280	1705 M-F	27	254	15	WØGQR
MON	3585	0000 Dy	31	176	83	WØBV
MEN	3963	2230 MWF	12	157	13	WØNUT
MON2	3585	0245 Dy	31	133	52	WØBV
PHD	50.45	0130 T	5	68	11	WAØKUH
JC2AN	146.28/88	0330 T	5	46	0	WAØRVT
WEN	28.6	0130 M	4	21	0	WA5KBH/Ø
MOAREC	3963	2245 M	2	17	0	KØBIX
MOPON (June)	3963	2200 M-S	24	539	37	WAØTAA

The Missouri Slow Speed Net resumed operation daily on Sept. 15 at 0030Z, everyone is invited to QNI. Congratulations to WØGBJ on receiving his 40-year ARRL pin. All amateurs are invited to join us in the Missouri AREC Net on 3963 kHz at 2245Z on Mon. in case of any emergency in the section all amateurs are again reminded to tune either 3585 kHz or 3963 kHz for emergency nets. Glad to see WØFOE back on the air after a session in the hospital. Traffic: KØONK 1098, WØBV 166, KØBIX 110, WØOUD 57, WAØVBG 57, KØVVH 52, WAØFMD 43, WAØTAA 32, KØPCK 17, WØGBJ 14, WAØKUH 10, KØJPR 8, WBØFQM 5.

NEBRASKA – SCM, V.A. Cashon, KØOAL – Asst. SCM: Velma Sayer, WAØGHZ. SEC: KØODF. Endorsements: WØIRZ as PAM; WØYFR and WAØLXD as OPSs.

Net	*Freq.*	*GMT/Days*	*QNI*	*QTC*	*Mgr.*
NEB I	3700	0000 Dy	84	19	WAØGHZ
NSN I	3982	0030 Dy	976	20	WAØLOY
NEB II	3700	0245 Dy	59	28	WAØGHZ
NMN	3982	1230 Dy	1213	38	WAØJUF
WNN	3950	1300 M-S	485	63	WØNIK
AREC	3982	1330 Su	199	15	WØIRZ
CHN	3980	1730 Dy	1085	22	WAØGHZ
SHN	3950	1830 M-S	175	4	WØDJO
NAN	3980	2000 M-F	69	0	WAØAUX
NSN II	3982	2330 Dy	846	22	WAØLOY

Central Nebr. RC had 126 amateurs with a total attendance of 300 at their annual Steak-fry at Victoria Springs. Lincoln RC held their picnic at Holmes Park July 11. Welcome new Novices WNØZLY and WNØBLT. WNØGKM dropping "N" from call. WAØIXD recuperating at home. WØUOV and son WØWLO operated FD at home using emergency power and antenna. WØLCE putting up 60-ft. pole for Inverted V. Wøs KH, MW and FOB scored in that order in recent QCWA contest. WØNVE vacationed in Estes Park while WØNZ visited his 94 year old Mom in Denver during June. WØVEA attended Rocky Mountain Division Convention. Nebr. Afternoon Net (NAN) resumed regular sked after Labor Day. Midwest Division Convention in Lincoln Oct. 5, 6, 7. Traffic: WAØCBJ 33, WØSGA 31, WØHOP 28, WØHTA 21, WAØQEX 17, KØABT 15, WAØGHZ 15, WØNIK 14, WØRJA 14, WØAFG 10, WØDJO 7, KØOAL 7, WØDMY 6, WØFQB 6, WØGKK 6, KØHNT 6, WØJDJ 6, WØMW 6, WØVYX 6, WAØHQQ 5, WAØPCC 5, WØLWS 4, WØPQP 4, KØSFA 4, WAØYGZ 4, WAØOQX 3, WAØEEI 2, WØHBS 2, KØPTK 2, WØBNY 1, WØIRZ 1, WAØJKN 1, WAØLOY 1.

NEW ENGLAND DIVISION

CONNECTICUT – SCM, John McNassor, W1GVT – SEC: W1HHR. RM: K1EIR. PAM: K1YGS. VHF PAM: K1SXF.

Net	*Freq.*	*Time/Days*	*Sess.*	*QNI*	*QTC*
CN	3640	1900 Dy 2200	62	521	330
CPN	3965	1800 M-S 1000 Su	31	506	250
VHF 2	145.98	2200 M-S	22	53	23
VHF 6	50.6	2100 M-S	22	94	2

High QNI: CN – W1BYW, W1CTI and W1MPW. CPN – W1BFY, WA1LIR, W1MPW, WA1PHF, WA1QZH, K1SXF and K1YGS. SEC W1HHR busy and available on CPN and FM Repeaters – be sure *your EC is active, contact W1HHR for AREC info. Director W1QV* requests you read the ARRL Board Meeting Minutes in Sept. QST. Directors worked very hard to convey so many points of interest to

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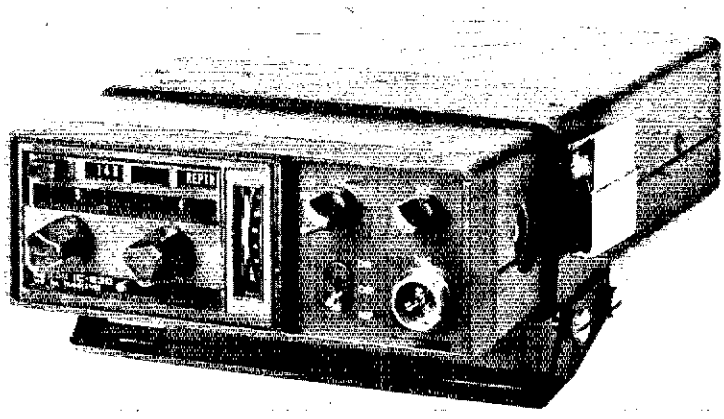

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us. Daylight Traffic Net on 3965 at 4 P.M.; please help, contact WA1PHF or WA1FCM for details. OO appointees are asked to provide the special monitoring required in our task to preserve the 224-225 MHz band for amateurs. Please read and act on W1NJM letter to you! New officers: Conn. Wireless Assn.: W1BIH, pres.; W1FTX, vice-pres.; WA1FCM, secy.; W1BDI, treas. Shoreline ARC: K1QWB, pres.; WA1EFY, vice-pres.; WN1PUB, jr. vice-pres.; WA1PRJ, treas.; W1BDN, secy. Hope you were able to make the ARRL Convention in Hyannis! Congratulations to: WA1MBK for Advanced Class; WA1PHF new Net Mgr. for DIRN; W1BFY for July BPL both ways; W1MPW for high QNI CN and CPN July; and WA1OFL who now has his original call W1BDN! Clubs are back on regular meeting skeds and shack time should be on the increase. It's been a wonderful summer, use some time now to improve your ability as an amateur — we have the worlds best hobby! Traffic: (July) W1BFY 538, WA1OZH 304, W1EFW 231, WA1LIR 223, WA1PHJ 196, WA1FCM 115, W1MPW 103, WA1GFH 97, W1CTI 77, WA1JZC 72, WA1MBK 64, K1YGS 60, W1AW 59, K1SXF 50, W1GVT 46, WA1PHF 42, WA1NLD 36, WA1NNC 31, W1KV 25, W1DGL 15, W1BDI 12, W1QV 12, W1CUH 10, K1EPW 10, WA1QMI 7, WA1HYN 4, WA1JCN 3, WA1OPB 3.. (June) WA1GFH 151, WA1JZC 35, WA1OPB 4.

EASTERN MASSACHUSETTS — SCM, Frank L. Baker, W1ALP — SEC W1AOG received reports from ECs: K1UAQ, W1UJF, WA1DMC. W1DFS in the hospital. W1LJT, W1NZO, W1LHZ/DIL are Silent Keys. W1BIO and W1ALP moving to Halifax. W1POL, W1AOG were up in VFI-Land. W1EUJ moved to NH. K4IRD is ex-W1PGK, K4IKW ex-W1CLS. W1ILC on 2-meter fm. K1YKT visited ARRL. K1CLM on Intruder Watch. WR1ABV is ex-WA1KGS. W1NF has a spectrum analyzer. W1IPZ has retired and is a member of the "Honey Dew Club." WB2CHO/1 c/o WA1PHF is mgr. of the DIRN, meeting daily at 2000Z on 3930 kHz. WN1RFD, WA1PGY handling traffic on 80, W1BHY working out of town. WA1IGL/1 helping traffic nets from Falmouth. WA1DJC moved to PA. K1EPL has HW-12A mobile. WN1ROG has new HG10B vfo, on 15, 40, 80. WA1IFE/1 worked a lot of DX while on vacation, on 6, WA1s: OZI, OAM running a 2-meter moonbounce station at the old W1BU site in Medfield, a pair of 4-125s to a 28-ft. dish, looking for EME skeds for Sept. through Dec. WA1DFL worked some DX on 6. New officers of Chelmsford ARA: WN1QAA, pres.; K1CIJ, vice-pres.; WN1QAB, secy.; WA1EMN, treas.; K1OKE, trustee; WA1CSF, officer-at-large. They are having a club picnic in NH. WA1LAD did a nice job during the flood up in Plymouth, VT; handling emergency traffic from his car, WA1EAT also helped. K1UIW is a new OO. WA1PGY new ORS. WA1DEC/DED endorsed as OPSs; K1CLM, K1YKT, WA1QMZ, ORSs; W1AYG OO, also W1SR/MTQ. WA1DMC as BCs. Massasoit ARA had the ARRL film about "Ionisphere," W1KVO in the hospital. K1UIW got some FAX machines for members of the Massasoit MARA, and the repeater is ready for tests. WA1DDN is editor of the Whitman ARC paper "The Spectrum." Capeway RC held their meeting at K1BUR's QTH. WA1IFE now in Braintree with new XYL. Norwood ARC holding transmitter hunts. K1HRV moving to Walpole. WA1FWO writes from Naples, Italy and says that the phone patching back here from the USS Holder is working great. WA1RBO is a new OO. Visitors to our EM2MN: WA1s NXY, QWF, IHK, ONB, NCV. Theory and code classes begins Oct. 7 by the Chelmsford ARA, call the secy. at 256-0664, for Novice class. W1UMM working in Framingham and W1UQB in Andover.

Net	*Freq.*	*Time/Days*	*QNI*	*QTC*	*Mgr.*
EM2MN	145.8	2000 M-F	107	89	WA1OWQ
NEEPN	3945	0830 Su	122	9	K1EPL
EMN	3660	1900/2200 Dy	379	173	WA1MSK

Traffic: (July) W1PEX 373, WA1MSK 303, WN1RFD 140, WA1OWQ 137, WA1IGL 131, WA1OAM 106, WA1MXV 97, W1CE 76, WA1PGY 36, WA1DJC 33, WA1OML 32, W1ABC 20, K1EPL 13, WA1IFE 13, K1LCQ 5, WA1FNM 4, WN1ROG 1. (June) W1OJM 120.

MAINE — SCM, Peter F. Sterling, K1TEV — SEC: K1CLF. PAM: K1GUP. RM: W1BJG. The OOTC Luncheon held June 30 at the Brick Tower Inn at Concord, N.H. with 84 attending. The Northeastern Area Barnyard Net held their annual meeting at the above location and new officers are W1CTR, mgr.; W1EFY, asst. mgr.; K1TLR, chief op. K1GUP again is portable 1 from Dover-Foxcroft. W1CTR and XYL visited VE1ACD while touring New Brunswick, on the way home CTR visited W1GWF. W1LNI now active on 2-meter fm and is operating from his 185 year-old house at Winn Mountain in Sebago Lake. WA1PEN will attend Wentworth Univ. this fall. K1GAX is working DX with his new Kenwood transceiver. K1MTJ now has his 60-ft. tower up and ready to work anyone on meteor scatter. New hams in Maine are WN1SFE,

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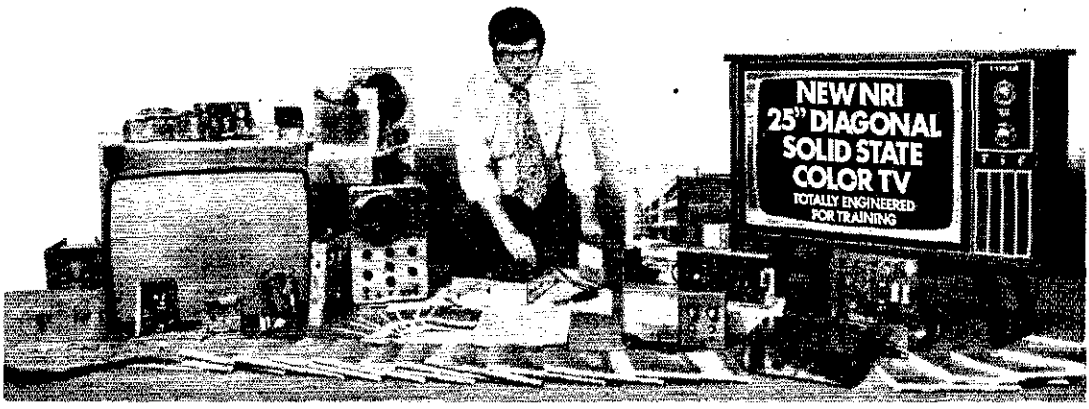

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WN1SGT. Congratulations fellows. Northeast Area Barnyard Net reports 26 sessions, 2 traffic, 787 check-ins for month of July. K1MZB, ex-WA1QHU is back in Maine, hopes to be active soon. Want an appointment? Get in touch with your SCM. Traffic: WA1NKE/1 8, K1TEV 6.

NEW HAMPSHIRE SCM, Robert C. Mitchell, W1SWX – SEC: K1RSC. RM: W1UBG. Welcome to WA1SFF, Hindsdale. W1JB reported the Medicare Net was on standby during the recent flood emergency in NH, VT and Maine. W1UBG says 40-meter DX is picking up. W1BYS in Fla. K1ACL and WA1FJE operated W1TA/1 at The Carpenter Hotel Convention of the National Assn. of Physically Handicapped. Several showed interest in amateur radio. W1EUJ has moved to Pelham from Mass. WA1JSD is awaiting crystals for an HW202 for 2-meter fm. WN1RKH is on 40, 20 and 15 with an HW-7 QRP transceiver. Congratulations to the reorganized Concord Brasspounders on their generous donation to the ARRL Blind Amateurs Fund. The summer doldrums of the NHVT Net show only 24 check-ins, 46 traffic in 11 sessions. W1SWX received, at last, the rare 80-meter QSL of JD1YAA of Minamitorishima Island. WA1JSD moved into his new hamshack and getting ready for fall activities. WA1CFT has a new HR2-B. Traffic: K1YMH 102, W1UBG 43, K1ACL 6, W1JB 6, K1PQV 6, WA1JSD 3, WA1QGA 3, W1SWX 2.

RHODE ISLAND – SCM, *John E. Johnson*, K1AAV – *The R.I. Slow Net* would like all hams interested in forming a Phone Net to contact WA1RET or the Providence Radio Club and let them know what band, time and any other information to help get the Net started. The R.I. Slow Net meets Wed. through Sun. at 2330 GMT on 3715 kHz. All R.I. stations are invited to participate. Traffic 21, QNI 91, sessions 21. New R.I. Novices: WN1s RUZ, RVH, SBR, SBQ, SAX and SAS. New Techs: WA1s SBJ, RVH and RVX. Traffic: WN1POJ 45, WA1QOG 21.

VERMONT – SCM, James R. Viele, W1BRG – SEC: W1VSA.

Net	*Freq.*	*Time(Z)/Days*	*QNI*	*QTC*	*Mgr.*
VTSB	*3909*	*2200 M-S*	*619*	*155*	*W1ZCJ*
		1130 Su			
VTPO	3909	2200 Su			K1BQB
Carrier	3932	2100 M-S	339	12	W2DSK
Green Mt.	3932	2100 M-S			W1JLZ
Vt. Phone	3932	1330 Su			W1KKM

Welcome new amateurs WN1SDJ Springfield and WN1SFG Fairlee. W1SOV is father of a beautiful baby daughter. Congrats, Joe. WA1KAH has been working at WCAX-TV this summer. K1RMI and K1SFO active with RC cars. K1BQB is missed on many nets, transmitter problems. Traffic: WA2DGZ/1 1.

WESTERN MASSACHUSETTS – SCM, Percy C. Noble, W1BVR – SEC: WA1DNB. CW RM: W1DVW. 75 Meter PAM: WA1ITL. VHF/UHF PAM: W1KZS. WMEN held 5 sessions with QNI 85 and traffic 3, NCS WA1DNB, WA1ITL. WMN held 31 sessions with QNI 161 and traffic 150, Top 5 in attendance: W1BVR, W1DVW, WB2SEZ/1, W1TM, WA1OUZ. WMPN held 22 sessions with QNI 225 and traffic 56, NCS WA1ITL, W1BBI, W1ESG. 2-Meter Berkshire County AREC held 2 sessions with QNI 24, NCS W1KZS. WA1RFA now has 41 states on 6 meters, WA1LNF has a new SB-650 frequency counter. WN1ONC got into some poison ivy while putting up an antenna on FD. WA1LUX got a nice write-up in The Berkshire EAgle for his work in MARS. From CMARA: new members are K1RKP, K1MHD. The Holden repeater has been moved to Shrewsbury. From NOBARC: The YL 2-Meter Net (K1EFK) is celebrating its first anniversary. K1VPS has completed eight 2-meter cavities, aided by WA1NSQ. West. Mass. Section Nets: WMEN (Emergency Net), Sun. 8:30 AM, 3935; WMN (CW Traffic Net), daily, 7:00 PM 3562; WMPN (Phone Traffic Net), Mon.-Fri., 4:30 PM 3935. In emergency situations these nets will be on the air continuously. A good way to get used to their operation is to check into them before an emergency! Ditto on your 2-meter repeaters. Mass. QSO Party sponsored by MIT Radio Society, W1MX takes place Oct. 13 and 14. Traffic: WA1KHP 232, W1BVR 140, W1TM 101, W1DVW 77, WA1LNF 66, W1KK 32, WA1OUZ 14, W1BBI 11, W1STR 3, WN1LEL.

NORTHWESTERN DIVISION

IDAHO – SCM, Donald A. Crisp, W7ZNN – SEC: WA7EWV. The Idaho-Mont. Net meets at 6:30 PDT on 3583 kHz week days. The FARM Net meets at 7:00 P.M. PDT each day on 3935 kHz. The Idaho RACES Net meets week days at 7:15 A.M. PDT on 3990.5 kHz. WA7QVP passed the Extra Class exam and was recently married. W7OWA has installed a new 20-meter four-element wide spaced beam and a 15- and 10-meter dual band beam on a 70-ft. tower. Idaho P.O. Net reports 12 sessions, 96 check-ins, 10 traffic.

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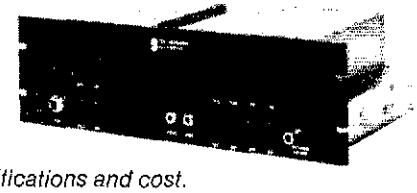

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Idaho FARM Net reports 30 sessions, 969 check-ins, 51 traffic. Traffic: W7GHT 163, WA7BDD 86, W7ZNN 27, W7IY 10.

MONTANA – SCM, Harry A. Roylance, W7RZY – Asst. SCM: Bertha A. Roylance, K7CHA. SEC: W7TYN. PAM: WA7IZR. WA7OBH is living in Hardin and is with the Highway Patrol. The WIMU Hamfest was held at Macks Inn, Idaho and was well attended. Next year's pres. is W7RZY and WA7IZR vice-pres. K1BCS is collecting amateur call license plates and any contributions would be appreciated. Bozeman repeater has been off and should be back with the starting of the school year. WA7UPI has his repeater on in Great Falls, frequency of 31-91. Capital City Radio Club had a nice picnic on McDonald Pass. WA7KHM is the new net mgr. of the Mont. Traffic Net. WA7OBH has been endorsed as OO for the next year. Butte Radio Club is raising funds for a new repeater. W7PGY attended the WIMU Hamfest. Mont. Traffic Net handled 17 formal pieces of traffic with 715 check-ins and 20 sessions. IMN Net held 22 sessions with 102 check-ins and 36 pieces of traffic handled. Traffic: WA7IZR 5.

OREGON – SCM, Dale T. Justice, K7WWR – SEC: W7HLF. RM: K7GGQ. PAM: K7RQZ. Section net reports: WA7NWV reports for the BSN for July sessions 62, traffic 115, contacts 193, check-ins 1100. WA7RWM reports for the AREC Net (3993.5) sessions 31, traffic 7, contacts 37, check-ins 327. K7OUF looking for check-ins to the OSN (cw) on 3585 kHz at 0145Z. K7IFG has his five-element 20-meter beam working well, especially during the DXTN. K7ADW has a KWM-2 and likes being on the hf bands again. W7OEM moved to Downey, CF and is now W6POL. WA7MHP is learning about LASERS in HI. Traffic: K7QFG 173, K7OUF 117, K7IFG 85, WA7NWV 75, WA7TXV 47, WA7JUH 40, WA7IFS 31, W7ZB 23, WA7MOK 15, WA7KRH 10, K7WWR 6, W7MLJ 5.

WASHINGTON – SCM, Mary E. Lewis, W7QGP – SEC: W7UWT. RM: W7JWJ. PAM: W7PWP. VHF PAMs: K7BBO, K7LRD.

Net	*Freq.*	*Time(Z)*	*QNI*	*QTC*	*Sess.*	*Mgr.*
WSN	3590	0145	247	107		K7OZA
NSN	3700	0200	180	66	30	WA7OCV
NWSSB	3945	0230	807	48	31	W7SVV
WARTS	3970	0200	1837	216	31	W7QGP
NTN	3970	1930	1256	71	31	W7PWP

Northwest Tech Net convened Sept. 9, for it's tenth year. July was a busy month of vacations and hamfests. The OM W7JWJ, WA7BBJ and W7QGP included Glacier-Waterton at Sommers, Mont. WIMU at Mack's Inn, Idaho to our usual WARTS-Noontime, and Okanagan International Hamfests skeds. Tacoma Radio Club's Ham Fair '73 was held Aug. 18, 19 at Graham, Wash. Skagit Radio Club Salmon B-Q on Sept. 8 in Oak Harbor, Wash. City Park, and Walla Walla Hamfest Sept. 22 and 23 in Milton-Freewater, Ore. Attendances were down as a whole but still good turnouts. We enjoyed seeing so many of you again this year and hope to do so again in '74. Northwestern Country Cousins have organized a smaller group. They felt a smaller group was needed so members could check in and still have time to socialize. The group meets nightly on 3980 at 2000 PST. W7JWJ is pres. and K7NZO is secy.-treas. Net controls are always needed. W7TUZ reports his father WN7VWB is a new Novice licensee. QCWA museum display setup at the Tacoma Mall July 25 through the 28th was very well received by all. Traffic: W7DPW 172, W7PI 125, WA7OCV 118, W7FQE 64, WA7KNW 59, W7APS 56, K7OZA 50, W7GYF 45, W7PWP 39, W7FIM 38, W7GVC 34, K7OXL 34, W7BUN 28, WA7DZL 27, W7IEU 27, W7AXT 23, W7BQ 20, WA7RCR 10, W7AIB 9, WA7RYQ 8, W7EBU 4, WA7GVB 3, WA7LQV 2, K7VNI 2.

PACIFIC DIVISION

EAST BAY – Acting SCM, Charles Weber, WB6RPK – ECs: WB6NMZ, W6HSY. I believe I join with many other amateurs in East Bay in giving WB6DHH, a vote of thanks for his many efforts on behalf of the League in our section. We will miss you, Paul. Who says RACES is dead? Mr. H.R. Temple, who heads up the Calif. State's Office of Emergency Services announced on June 24, that his organization was hiring six full-time communications coordinators for their six Regional Offices, to revitalize the AREC/RACES program in Calif. This will provide a state-wide communications network for OFS. Along the same lines, Lt. Hagan of the Alameda Co. Sheriff's Dept. and our own EC WB6NMZ are holding meetings for all interested amateurs at the Co. CD Training Center, 150th Ave. in San Leandro, to up-date the Alameda Co. Disaster Communications AREC/RACES program. Alameda Co. Red Cross Disaster Communications committee officers for 1973/74: WB6RPK, chmn.; WA6BMT, 1st vice-chmn.; WB6NMZ, 2nd vice-chmn.; WB6GWQ, NET Inc., Carl Hall, VHF Repeaters, Inc., WA6OJR, CB Coordinator, Robert Crum, Mobile Communications

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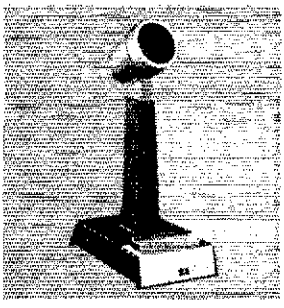

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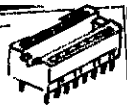

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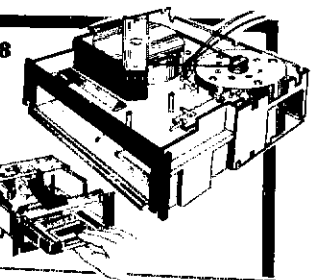

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☐ LM-320	Minus 12V 1-amp V.R.*	1.95
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☐ LM-350	Dual peripheral driver	.59
☐ LM-370	AGC squelch op amp	1.49
☐ LM-371	R-F, I-F, op amp	.69
☐ LM-373	AM-FM, SSB, I.A.D.	3.75
☐ LM-374	AM-FM, SSB, IVAD	3.75
☐ LM-380	2-watt audio amplifier	1.95
☐ LM-3070	Chrome regenerator	1.50
☐ LM-3071	TV chroma IF amp	1.50

*TO-3 case, — others TO-5

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☐ 531 Hi slew rate op-amp (TO-5)	$2.50
☐ 532 Micro power 741 (TO-5)	2.50
☐ 533 Micro power 709 (TO-5)	2.50
☐ 536 FET input op amp (TO-5)	3.95
☐ 537 Precision 741 (TO-5)	2.50
☐ 540 70W pwr driver amp (TO-5)	2.50
☐ 550 Precision 723 voltage reg. (DIP)	1.17
☐ 556 $ Times faster than 741C	2.10
☐ 558 Dual 741 (mini DIP)	1.00
☐ 560 Phase lock loops (DIP)	3.25
☐ 561 Phase lock loops (DIP)	3.25
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☐ 565 Phase lock loops (A)	3.25
☐ 566 Function generator (A)	3.25
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☐ 710C Differential amp (A)	.49
☐ 711C Dual diff. comp (A)	.49
☐ 723C Voltage regulator (A)	.95
☐ 733 Diff. Video Amp	1.75
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☐ 741CV Freq. comp 709 (Mini DIP)	.49
☐ 747C Dual 741C (A)	1.25
☐ 748C Freq. adj. 741C (A)	.49
☐ 748CV Freq. adj. 741C (mini DIP)	.49
☐ 753 Gain Block	1.75
☐ 709-709 Dual 709C (DIP)	1.00
☐ 739-739 Dual stereo preamp	1.98
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☐ 745512 Dual line driver	.39
☐ PA265 5-Watt voltage regulator	1.95
☐ ULN2300M Op amp with SCR	1.50
☐ CA3065 Video Audio system	1.50

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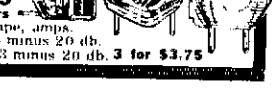

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* Plastic case

* Red needle indicators

☐ Balancing, stereo, tape, amps.

☐ VU, side mtg, plus 3 minus 20 db.

☐ VU, front mtg, plus 3 minus 20 db. **3 for $3.75**

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Van, George Hodges, Hayward RC, WB6GFK, vice-chmn. Rumor has it that the Hayward RC was going great guns on Field Day until Sun. morning when some little kid wandered along and pulled up their ground rod. Grizzley Peak ARC officers are WA6CNS, pres.; K6TMH, vice-pres.; WA6JLJ, secy., WA6CCG, treas.; WA6AGA, trustee; WA6UBW, editor; W6FKQ, WB6JOQ, W6NDA, board. Congrats to GPARC, WB6AAE on their new repeater call, WR6ABM. Visited the new Vallejo Radio Club. It's nice to see an energetic young group enjoying amateur radio as a family activity. Oakland RC had lots of Field Day action. Congrats! If you want more club news in this column send me your club newspaper, Charlie. WB6RPK 1087 Via Honda, San Lorenzo, CA 94580.

HAWAII – SCM, Lee R. Wical, KH6BZF – SEC: KH6BZF. RM: KH6AD. PAM: KH6GJN. VHF PAM: KH6GRU. SRC: KH6FOX. OSL Mgr.: KH6DQ.

Nets	*Freq.(MHz)*	*Time(GMT)*	*Days*
Hey Bruddah	*21.295*	*2000*	*S/Su*
Friendly	7.290	2030	All
Confusion (Patches)	21.400	0030	M-W-F
Pacific Interisland	14.305	0800	All
S.E. Asia	14.320	1230	All
Moonbounce	21.415	2200	S
Marine Corps	21.430	1900	All
Cal/Hawaii Tropo	14.225	0400	All

Many KH6 stations took part in what many say was the longest Tropo opening ever recorded between Calif./Hawaii. For little more than three days (July 28-31) the 2 meters band was opened and it will have VHF DXers talking about it for years. Not since the 1957 opening when the late W6NLZ was heard by KH6UK has a thermal/duct been observed. As Hurricane Emily moved from Baja Coast toward Hawaii it appeared the frequency selective, turbulent duct made KH6EQN Hilo repeater (.16/.76) accessable to K6DYD who appears to have been one of the first stations to note the historic Hawaiian opening. All coast stations are asked to join in on 14.225 MHz at 0400Z daily to exchange their observations. Those involved in KH6 end were BZF, IJ, GRU, HLP, AFS, FNB, FOX, GXB, CLV, BTV, EQN, FOO, IAA and BWT. On the West Coast were W6PZJ, K6YNB, K6DYD, WA6JRA, K6QEH, W6YDF, WA6EIR, K6KSY, W6KQG, WA9OZF/6, WB6OBB, W6HUT, WA4APG/6, K6FAZ, W6TYP, WB6OLY, WA6SIN and WB6MSC. Remember ARRL Pacific Div Convention at Santa Cruz's Dream Inn on-the-beach, Oct. 13-14 '73. Contact WA6HCL or W6WGO at Box 238, Santa Cruz, CA 95061 for more details. See you there? Traffic: KH6BZF 14, W4YJK/KH6 1, KH6BWT 1, KH6CU 1, W6FZJ 1, KH6IAC 1, W6RSY 1, K6YNB/6 1.

NEVADA – SCM, Harold P. Leary, K7ZOK – SEC: WA7BEU. WA7TYY passed Advanced Class exam mid July, also won QLF contest at Ariz. hamfest. W7ILX has new TD for 100 wpm on MARS and 60 wpm on ham bands. WA7MRS passed General Class test before FCC examiner. W7OK and XYL W7CDH have returned from 7000 mile trip to son's QTH. Son is WB4RLK. W7BES operated KJ7BSA at Boy Scout Jamboree in Idaho. WA7RPZ, WA7LVX and W7HQT have all returned from vacations in Mont. and Idaho. WA7MVY is busy printing fine QSLs. Ed Gebbs looking for WN7 call. W7JRW using extended Zepp working DX. W7HJ has new Ultratransmatch. SNARS has new repeater call, WR7ABI. W7RB has multi-channel HT! WA7HWA/6 has new harmonic, as does WA7GVF. W7JLV now retired using free time for hobby use. W7TA touring Europe. WA7HVK and WA7LGP flying up to High Sierra's. WA7JVO is new dir. for SNARS. W7DNX starts code class. Traffic: W7ILX 145, WA7TYY 5.

SACRAMENTO VALLEY – SCM, Norman A. Wilson, WA6JVD – SEC: W6SMU. Yolo Co. EC, WA6TQJ, reports progress on the RACES/AREC 2-meter repeater and hopes it will be operational by this reading. Those interested in a 2-meter net in the Redding area may contact W6NHV. Recent antenna improvements include a three-element quad at WB5ISA/6; four-element tribander at K6KWN; two-element 40-meter yagi at WB6MDP and a 40-meter GP at WB6QCE. The Sacramento ARC is trying to assemble a permanent station at the Red Cross bldg. for future emergency use. WR6DZP has recently donated a teletype printer but they need more gear. Any donations? W6CEI recently assumed ORS duties and is very active in both fone and cw traffic nets. WA5KUD/6 has been transferred to Del, with the USAF. He intends to erect a good antenna system and continue traffic/contest work. Sad to lose an *ORS. The Northern Calif. Net meets daily at 7:00 and 8:30 P.M.* local time on 3630 kHz and is always glad for check-ins from this section. Remember the Calif. QSO party is on Oct. 6, 8. Stations in the more remote counties will be especially welcomed by US and DX co. hunters. Think sunspots. Traffic: K6KWN 2.

SAN FRANCISCO – SCM, Thomas A. Gallagher, W6NUT – Active appointees as of Aug. 1 are W6BIP, W6BWV, WA6BYZ,

LITRONICS-MONSANTO-OPCOA LED Readouts

All fit 14-pin IC sockets. .5" to 28 mils, 0-to-9 numerals, plus letters & decimal. With spec sheets.
*Monsanto Equiv. **MAN-1**.
**MAN-1 Specs.
†35-Diode Array.

MONSANTO "ALL LED" Type	Size:	Color Display	Decimal	Driver	Each	Special
☐ MONSANTO MAN-1*	.27	Red	Yes	SN7447	4.50	3 for $12.
☐ MONSANTO MAN-2*	.32†	Red	Yes	2513	6.50	3 for $18.
☐ MONSANTO MAN-3*	.115	Red	Yes	SN7448	2.25	3 for $6.
☐ MONSANTO MAN-3*	.115	Red	No	SN7448	1.49	3 for $3.
☐ MONSANTO MAN-4*	.190	Red	Yes	SN7448	2.95	3 for $8.
☐ MONSANTO MAN-4*	.190	Red	No	SN7448	1.79	3 for $5.
☐ MONSANTO MAN-5*	.27	Green	Yes	SN7447	6.50	3 for $18.
☐ MONSANTO MAN-8*	.27	Yellow	Yes	SN7447	6.50	3 for $18.
"REFLECTIVE LITE BAR" (SEGMENT) LED READOUTS! **** Decimal right or left						
☐ LITRONIX 707** (MAN-1)	.33	Red	Yes	SN7447	3.50	3 for $9.
☐ LITRONIX 704*** (MAN-4)	.33	Red	Yes	SN7448	3.50	3 for $9.
☐ OPCOA SLA-1** (MAN-1)	.33	Red	Yes	SN7447	3.50	3 for $9.
☐ OPCOA SLA-1** (MAN-1)	.33	Red	No	SN7447	1.95	3 for $5.
☐ OPCOA SLA-3H Giant Digit	.70	Red	Yes	SN7447	8.60	3 for $24.
☐ OPCOA SLA-2 Plus/Minus/1	.33	Red	No	SN7447	3.50	3 for $9.
☐ OPCOA SLA-11C (MAN-5)	.33	Green	****	SN7447	4.95	3 for $13.
☐ OPCOA SLA-12 Plus/Minus/1	.33	Green	—	SN7447	4.95	3 for $12.

☐ **$5.95** 3 for $15.

SPERRY "ORANGE" TWIN DIGIT ARRAY

Type SP332, each digit is individually controlled, operates off 180VDC, 100 ua, 200 mw. Color: ORANGE, 7-digits, glass protection over digits. Character height: 0.33. P.C. mounting. Size: .4" x .7". 9-pins per digit. Driver: SN7447.

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☐ 1*	
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☐ 3*	
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☐ 6*	
☐ 7*	
☐ 8*	
☐ 9*	
☐ CE†	
☐ CL†	
☐ − †	
☐ + = †	
☐ ÷ †	
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☐ .	

LED GaAs INDICATORS

☐ 2-MV1*, Amber, visible jumbo epoxy lens upright	$1.00
☐ 1-MV2*, TO-18, Dome, green, visible	1.00
☐ 1-MV-2*, green small dome, green diff. lite	1.00
☐ 1-MV-2*, clear small plastic dome, green diff. lite	1.00
☐ 1-MV-3*, micro-mini 'pin head' dome, TO18, green lite	1.00
☐ 3-MV3*, visible, "cross pin pak", red, mini dome lens	1.00
☐ 1-MV4*, stud, high power, red, 2-watts	3.95
☐ 1-MV4H*, stud, high power, hi-dome, red, 2-watts	3.95
☐ 3-MV10B, visible, red, clear, dome lens, TO-18	1.00
☐ 3-MV10C visible, red, diffused, dome lens, TO-18	1.00
☐ 3-MV50*, axial leads, micro-mini dome, clear, red	1.00
☐ 3-MV5012*, visible, red, small dome lens	1.00
☐ 3-MV5022*, jumbo red dome, TO-18, visible	1.00
☐ 3-MV5020*, jumbo clear dome, TO-18, visible, red	1.00
☐ 1-MV5040*, 4-LED red array, with 8-lead pak	1.49
☐ 3-MV5054*, visible, red, jumbo dome lens, upright	1.00
☐ 2-MV5080*, TO-18, micro-mini, clear dome, red	1.00
☐ 4-MV5082, visible, red, clear flat lens, TO-18	1.00
☐ 1-MV5222*, green hi plastic dome, diffused green lite	1.00
☐ 1-MV5222*, clear hi dome, diff. green lite	1.00
☐ 1-MV5222*, jumbo dome, green, panel snap-in	1.49
☐ 1-MV5322*, jumbo dome, GaAsp, panel snap-in Yellow	1.98
☐ 1-MV9000*, cartridge panel lamp, sealed, red, clear lens	1.49
☐ 2-MT-2*, Photo Transistor, light sensor, TO-18	1.00
☐ 2-ME-1*, infra-red, parabolic lens, pin type	1.00
☐ 3-ME-4*, infra-red, "invisible", TO-18, diff. dome	1.00
☐ 3-ME60*, infra-red, "invisible", axial, micro-mini	1.00

3 for $27

☐ **9.95**

☐ Etched calculator board with holes, as above, less switches .... $2.50 Board

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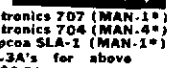
☐ **Cal Tech 5001** 12-digit calculator 28-pin DIP for **9.95**
☐ **Keyboard, 5001** "chip", and 12 MAN-3's, specs **35.00**
☐ **Twelve MAN-3's** for above **17.50**
☐ **Twelve MAN-4's** for above **32.00**
☐ **Twelve MAN-1's** for above **42.00**

MUX'D DIGITAL CLOCK PC BOARD



Each board properly multiplexed for 6 digits, to hold MAN-1's, MAN-3's, MAN-4's, Litronics 707 (MAN-1) and 704 (MAN-4), and Opcoa's SLA-1 (MAN-1). Board 6⅞" long with spec sheets.

Your choice **$2.50**

☐ MAN-1 ☐ Litronics 707 (MAN-1*)
☐ MAN-3 ☐ Litronics 704 (MAN-4*)
☐ MAN-4 ☐ Opcoa SLA-1 (MAN-1*)
☐ 6-MAN-3A's for above board. $9.50.

* Elec. char. same as Monsanto devices MAN-1 or 4.

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☐ CT5001 Chip ☐ **9.95** 3 for $27.

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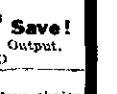

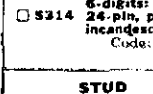

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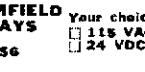

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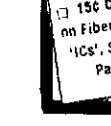
☐ 5311	28-pin, ceramic, any readout, 6-digits: A-B-D	$12.88	*With
☐ 5312	24-pin, ceramic, any readout, 4-digits: C-D	$12.88	Spec
☐ 5313	28-pin, ceramic, any readout, 6-digits: A-C	$12.88	Sheet!
☐ 5314	24-pin, plastic, LED and incandescent readouts, 6-digits: A-B	$12.88	Save!

Code: A—Hold Count. C—1 PPS Output.
B—Output Strobe. D—BCD



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READOUT	Char.	Maker	*Your choice of 5 red LED readouts! Only
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☐ MAN-4	.19 h.	Monsanto	
☐ 707*	.33 h.	Litronics	
☐ 704**	.33 h.	Litronics	
☐ SLA-1*	.32 h.	Opcoa	

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* Pin-for-pin MAN-1. ** Pin-for-pin MAN-1 elec. char. same

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50	☐ $.65	☐ $.85
100	☐ .85	☐ 1.05
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W6EAX, WB6JOP, W6OAT, W6RNL, W6WLV and WAØSIG/6, ORSs; W6BWV, W6GGR, W6PZL, W6RNL, W6SLX and WAØSIG/6, OPSs; W6EAJ, W6RQ, W6WB and WAØSIG/6 OOs; WA6DJI and WB6NMT , OVSs; WA6AUD and W6SG, ORSs; W6PZF, EC; W6EAJ/W6YSK, asst. SCM; WA6PYN, VHF PAM. Drop me a line if you are interested in an appointment and aren't on the list. RM WAØSIG/6 operates the K6NCG club station on Treasure Island. K6HWI is EC for San Francisco. WA6PYN sent in a fantastic report on 6- and 2-meter openings (including EME) from W6 to KH6. Further details may be found in the VHF column this issue. Mike was active on 50 through 432 MHz in the June VHF Contest. Sorry to learn our section's top VHFer WB6NMT has moved to So. Calif. But perhaps W6KOG, who recently moved to the section, can take up where Louis left off. If you have the expertise and time, the Hearing Society of the SF Bay Area needs volunteers to repair hearing aids. Call Bob Caldwell (415) 542-7284. W6RQ, K6BI, K6NCG and W6BIP/VE8 were active in the CW CD Party. Are you QRV for next month's ARRL SS Contest? Bear in mind that the gang south of the SF city limits are in the SCV section. If you have any doubts as to your section, drop me a line. Traffic: K6NCG 75, W6RNL 62.

SAN JOAQUIN VALLEY – SCM, Ralph Sarovan, W6JPU – WB6DSK is active on 6 meters ssb and is looking for stations in the Modesto area. WB6RZI has an FPM-300 and is traveling in Mont. K6QHC is experimenting with a 432 MHz mixer and is on ssb. K6QHC has 39 states on 6 meters. W6PSQ has 179 countries confirmed. WB6GVQ back in Fresno and is active on 2 meters fm. WB4DHA now WA6VEC and teaching electronics at the Naval air station in Lemoore. W6NTK is on 2 meters fm. Members of the Delta Amateur Radio Club provided communications for the Annual Horse Run. 2 meters fm was used with great success. W6IBC gave a talk on zoning restrictions on antennas around the Stockton area at the Delta Amateur Radio Club. WA6IIA and WA6UAA gave a talk on the operation of their 2-meter repeater at the same meeting. WA6QEJ and WB6VGB received a plaque from the Veterans of Foreign Wars for handling over 100,000 Viet phone patches. WB6PTE activated Mono Co. on 6 meters. W6YKS is on 160 meters. WA6CPP has made over 20,000 contacts, and has worked 2000 counties. WA6JMW has an SS15. Traffic: WA6CPP 17, W6YKS 6.

SANTA CLARA VALLEY – SCM, James A. Hauser, WA6LFA – SEC: WA6RXB. RMs: W6BVB, W6REF. W6BVB reports NCN had 561 check-ins in July with 269 pieces of traffic handled. W6RSY made BPL. W6NW is active on the NTS. W6AUC has been busy with phone nets and OO activities. W6REF reports business on NCN 2 slow during the summer. W6DEF active on NCN and the ARPSC nets. W6MMG reports that WN6NDN was operated portable in Fla. in July. W6OII says the CD party in July was a good one but would have been better if 40 had been better! WB6TYA is active on NCN. W6ZRJ bulletins Thur. evening as follows: CW, 15-20 wpm, 7:30 local, 3590 and 7129 kHz; SSB, 8:30 local, 3815 kHz, RTTY, 850 Hz shift, 9:00 local, 3615 kHz.

NCN	NTS	3630 kHz	7:00/8:30 PM Dy
SPECS	AREC	146 MHz	7:45 PM M
SCV	AREC	146 MHz	8:00 PM T
GORILLA	AREC	146.25 in 146.85 out	10:27 PM Su

Traffic: W6RSY 515, W6YBV 118, W6BVB 111, W6NW 66, W6AUC 56, W6REF 55, W6DEF 39, WB6TYA 20.

ROANOKE DIVISION

NORTH CAROLINA – SCM, Chuck Brydges, W4WXZ – PAM: WB4JMG. VHF PAM: K4GHR. RM: WB4ETF. Appointments: K4AI, WB4QOM, WA4DLF, WB4CES, WA4UQC, W4PCN, W4EHF, W4IRE, WA4LVB, W4LEN, W4FMN, WA4HFW, W4AJT, WB4NXS, WA4JCS, WA4YBP, WB4JLP, K4NUG, W4OEO, WA4VNV as ECs; K4JO, K4MSG, WA4WZO, W4ACY, K4GHR, WA4KWC, K4RI, *WB4KPD OVSs; K4BE, K4MPE, K4CIA, WB4TNC, WB4MLI,* K4KH, K4GQS OOs; WB4ETF, W4VTR, WB4BGL, K4EZH, W4TYE, W4WXZ, W4EVN, W4IRE, K4MC ORSs; W4BUZ, WB4OXT, WB4VVP, K4RJ OBSs; WA4VNV, K4ZKO, W4WCG, K4TTN, WB4HDS, WA4KWC OPSs. My sincere appreciation to the above appointees without whom our section would be a lost cause. Regretfully W4EVN had to retire as SEC because of business and *my special thanks to Hank for a great job this past two years.* The new call for the Cullowhee ARC is WA4KFG. K4AI is sporting a new TR4C. The NCSSBN had QNI of 888 for June and WB4OXT is net mgr. The Mecklenburg ARS had a covered dish picnic on July 29 at Waxhaw. Did you know K4AI is a 50-year ham? Yes, and Joe says he never heard propagation so bad – I think we all agree! WN4EXZ was featured on the cover of the Raleigh ARS News. Her

OM is WA4ZZN. A listing of the new Repeater Calls will be presented as soon as available. I speak for the entire section in expressing sympathy to WB4QQY on the loss of OM WB4MTG, to Silent Keys. Traffic: WAØYDJ/4 315, W4WXZ 64, WA4CBE 30, W4WCG 28, WB4JMG 22, WB4VVP 16, W4ACY 15, K4EZH 15, K4VBG 15, WB4OXT 11, WB4VSA 4, W4VTR 2.

VIRGINIA – SCM, Robert J. Slagle, K4GR – Asst. SCM: A.E. Martin, Jr., W4THV. SEC: WA4PBG. Asst. SEC: WB4FDT. RMs: W4HIR, W4SQQ, W4SHJ, WB4PNY, K4EBY. PAM: WB4RZW. Regret to announce resignation of WB4PNY as RM of D4RN. WA4EPH wants to start Va. CH Net. Anyone with all Va. counties, please advise me. W4JVN reports 2897 total counties to W4JUJ's 2871 and WA4EPH 1004. VFN (June) QNI 593, (143 different stations) QTC 11. VN (July) QNI 327, QTC 215. K4JM reports fishing is F/B. W4HIR's sked is very tight through summer. K4KA exercising homebrew counter. WB4DRB has new Tempo 1. K4JYM finding sumptious DX. W4UQ off to Mich. for a month. W4SQQ losing out to grass, and W4KX reports too much QRM from his lawnmower. WN4BOP mobiling with TEN TEC. W4YZC has new antenna for 160. K4IKF now K4UK; WN4WOJ now WB4WOJ. WB4FDT and WA4QEL dual opped for 150K in open CD CW party. Va. was K4JKK's 48th section in CD Party; N.C. was his 50th, W. Va. 51st and S.C. his 52nd! Good month for K4GTS. Dir. W4KFC attended July Board meeting and W. Va. convention. W4BSB received 40-year ARRL pin. W2GHK/4 has new tower up. W8VDA/4 reports conditions atrocious. W4MK retired HQ129X for new R4C. Vienna Wireless Society is printing its newsletter by a computer. WB4FDT Tex. bound for school. The Richmond Ham for Aug. has a fine list of electronic gear house-cleaning for check off – write RARC, PO Box 73, Richmond 23201 for a copy.

VSMN	3947 kHz	0715/1630 EDST M-F
VSBN	3947 kHz	1800/2200 EDST Dy
VSN	3680 kHz	1830 EDST Dy
VN	3680 kHz	1900 EDST Dy
VFN	3947 kHz	1930 EDST Dy
VRN	3625 kHz	2000 EDST Dy
VPON	3905 kHz	2215 GMT T

Traffic: (July) K4KNP 187, WB4SGV 175, WA2ICU/4 152, WB4KSC 149, WB4PNY 131, W4SQQ 131, WB4FDT 128, W4UQ 122, W8VDA/4 103, K4IAF 85, W4HIR 71, K4GTS 41, WB4RDV 36, W4KFC 34, K4GR 31, W4YZC 30, WB4KSG 29, WA4EPH 10, W4MK 7, K4JM 6, W4KX 2. (June) W4SQQ 112, K4KA 46, WB4DRB 26, WA4EPH 13.

WEST VIRGINIA – SCM, Donald B. Morris, W8JM – SEC: WA8NDY. RM: WB8BBG. PAMs: W8DUW, W8IYD. CW Net Mgr.: W8HZA. Phone Net Mgr.: WB8DQX. K8HHV, WA8NWN, K8OFQ and WA8NDY dividing their time between 2-meter activity and RC airplanes. W8HZA, K8TNY, W8JWX and WB8MZI building up the WVN CW Net. Net meets nightly at 0000Z on 3570 with 26 sessions in July, 68 stations, passed 29 messages. WVN Phone Net in 31 sessions with 290 stations, passed 71 messages. WB8EKG active, after summer in Alaska. It is with regret, I report the passing of WA8MQI of Huntington. Northern Panhandle ARC of Wheeling now has WR8ABQ for 2-meter repeater. K8LGS moved to Wellsburg and will be an instructor at Bethany College. WN8MKL made BPL twice and starting 8RN Novice Net, Sept. 1st on 3730 at 2230Z. K8QEW, WA8HVM and K8BCF on Nominating Committee for 1974 officers for State Radio Council. W8DUV, Council pres. will announce date of Fall Council meeting on Phone and CW Nets, and reports 1974 West Va. State ARRL Convention will be held at Jackson's Mill on July 6 and 7. Traffic: W8HZA 54, W8JWX 23, WB8DQX 14, WA8YCD 7, W8JM 6, WN8MKL 5, K8QEW 5, WB8BBG 4, K8KNY 4, W8DUV 3, K8ZDY 3, K8BCF 1, WB8CPU 1, WB8CYB 1, WB8DXF 1, WB8EKG 1, WA8HSW 1, WB8IHA 1, W8KWL 1, W8NBG 1, W8NNK 1, WA8OKG 1, WA8POS 1, WB8THS 1, WA8WCK 1.

ROCKY MOUNTAIN DIVISION

COLORADO – SCM, Clyde O. Penney, WAØHLQ – SEC: KØFLQ. RM: KØOTH. PAMs: KØCNV, WAØWYP, WAØYGQ. WBØDOR is the proud owner of a new General ticket. The Hi-Noon Net now has two sessions daily, one at 3940 kHz and the other at 7240 kHz. The Northern Colo. Amateur Radio Club has acquired the call of an old timer in the area, now a Silent Key, WØUPS, as a memorial call. KØSPR, now Region 12 receive station for DNTS, had the misfortune to lose his 40-75-meter antenna in a severe hail storm on July 20. WAØSZW passed his 2nd class phone exam and is hoping for his 1st class ticket very soon now. WBØHCK is the newly elected Net Mgr. for CCN. It is with deep regret that we add the call WØTV to the list of Silent Keys in Colo. Cecil was a most active

FIG. 1

FIG. 2

FIG. 3

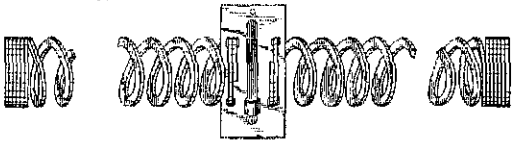
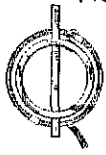


FIG. 5

FIG. 4



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QTC de W2KUW

amateur, very well known and admired in the area. He will be sorely missed. Net traffic for July: Columbine QNI 852, QTC 59, informals 126, 27 sessions. Hi-Noon QNI 740, QTC 17, informals 82, 29 sessions for 724 minutes. Late Net traffic for June: Hi-Noon QNI 578, QTC 14, informals 65, 24 sessions for 637 minutes. Traffic: (July) WØWYX 994, WBØHSZ 133, WBØHCK 107, KØOTH 68, WAØTMA 51, WBØCCB 39, WAØZPP 29, WBØDMF 26, KØSPR 22, KØJSP 20, WØNZL 20, WØSIN 20, WØYCD 19, WAØYED 19, WØJRW 15, WØLAE 13, WØKEH 10, WØNFW 7, WAØWYP 5, WØBY 3. (June) WBØHCK 52, KØJSP 20.

NEW MEXICO – SCM, Edward Hart, Jr., W5RE – RM: W5UH. PAM: W5MYM. NMN meets daily 3570 kHz at 1845 MDT, WB5CSO/5 is new net mgr. New Mexico Road Runners Net meets 1800 MDT on 3940 kHz with W5MYM as mgr. W5PDY and the explorer group were involved in a search using the explorers dogs and repeater, with 75 meters being used to get around the mountains. *K5DAA is in the hospital but expects to be up and* atound shortly. W5NON moved to Washington, D.C. in Sept. He is with the FAA. Your new SCM is trying to get things organized. Please send reports of traffic and any other activities to W5RE not later than the 5th of the month. Reports from all stations, appointees or not, are welcomed. Traffic: K5MAT 141, WB5CSO/5 82, K5KPS 42, W5PDY 39, W5TLK 39, W5RE 38, W5UH 38, W5YQ 22, W5HRS 11, WA5MJY 11, WA5OHJ 9, W5NON 4.

UTAH – SCM, John H. Sampson, Jr., W7OCX – SEC: W7GPN. RM: W7UTM. BUN meets daily at 1830 GMT on 7272 kHz, 839 check-ins, 39 messages. UCN meets daily at 0130 GMT on 3575 kHz, 196 check-ins, 41 messages. The Utah Novice Net welcomes new check-ins. WA7QAR transmits Official ARRL Bulletins at 2230 GMT on 7280 kHz, MWThF. He would like a report from anyone copying his bulletins. K7CLO now an Advanced Class licensee and studying hard for the Extra Class exam in Dec. W7UTM has erected a 40-ft. tower, has a new antenna installation and getting better signal reports on both 40 and 80 meters. Many of our Utah hams attended the WIMU Hamfest at Mack's Inn. W7DBR is doing a fine job as mgr. of the Utah Amateur Radio Public Service Corps Net. A better statewide *coverage* is desired. UARPSC Net meets each Sat. and Sun. at 1400 GMT on 3987.5 kHz. Some of the county EC's report a slackening of interest in AREC activity. Amateur radio owes much of its existence to public service work. Get in there and do your share in traffic handling or the ARPSC or ARFC. Try it! You may like it! Traffic: W7UTM 91, W7OCX 51, K7CLO 42, WA7OAU 40, W7DKB 35, WA7MFL 28, W7IOU 17, WA7HCQ 14, WA7OAR 9, WA7WIB 7, WN7SIV 1.

WYOMING – SCM, Wayne M. Moore, W7CQL – SEC: K7NQX. WA7OEC and the Lander/Riverton Radio Club did an excellent job on the hamfest this year. Had a very good attendance, nice program *and fellowship and not a complaint from anyone attending. K7VFW* gave a very good demonstration of slow-scan TV. Perhaps we will have some other stations on ATV in the near future. The Laramie club has volunteered to host the 1974 hamfest and are now starting to work on it, make your plans for the 3rd week end in July. WA7GOV of Casper came away with the grand prize at the Cheyenne Convention. WN7TVW of Rawlins has left his teaching job and moved to Los Alamos, New Mex. Yours truly enjoyed an extended vacation in Canada during the month of Aug. Traffic: K7VWA 100, W7SDA 60, WA7HAB 10, W7SOT 4.

SOUTHEASTERN DIVISION

ALABAMA – SCM, James A. Brashear, Jr., WB4EKJ – SEC: W4DGH. PAM: WB4WAI. RM: W4HFD. Did you notice the "special" recognition Ala. section received in the Public Service Diary (end of the article) in Aug. '73 QST? Actually, there is no reason why an Ala. SEC report could not be routine instead of unusual. The SEC must receive a report in order to forward one and his source is the *Emergency Coordinators. Unless the EC's submit* their monthly Form 5, no report gets to Hq. on the AREC organization in our section. This sounds as if EC's are the only ones who should report; not so! All appointees should submit monthly reports. Sorry to hear WB4WAI will be moving from our section. WA4AFM has a new HW-101, HP-23B and SB-600 and is active on AENP and AENM nets. WB4SVH busy with band practice and *reports he has a new Heath 2-meter rig ordered. Hope the Jet! Dave* HS ARC can recruit some new members and continue their club. W4WLG has changed his QTH, should be better for his 2-meter operations – per information received from K4UMD. The Tuscaloosa ARC reelected WB4BAP, pres.; W4HCV, vice-pres.; WB4SVH, secy-treas. Clubs who plan on "traffic booths" to handle Christmas traffic should start making contact with stores, malls, etc. to lay the

ground work. Welcome to the following new hams: WA4BZD, WN4s ERK, FRL, ERM, ESN, ETZ, EUD, EUN, EVX, EVY, EVZ, EWD, EXC, EYM, FAR, FBA, FAB, FEY, FGD and FQM. Endorsed W4GET and WA4VEK as ECs. Traffic: WB4LKJ 195, WB4SVH 95, WB4JMH 80, K4AOZ 76, WB4KSL 27, WB4ZQF 22, WB4ADT 16, WA4AFM 8, WA4AJA 7, WB4POD 4, k4UMD 3, K4HJM 1.

GEORGIA – SCM, Ray LaRue, W4BYG – Asst. SCM/RM: John H. Boston, III, WB4RUA. SEC: WA4VWV.

Net	*Freq.*	*Time(Z)*	*QNI*	*QTC*	*Mgr.*
GSN	3595	0000/0300/1130	597	278	WB4RUA
GSBN	3975	0100	588	35	K4VNV
GTN	3718	2400	90	7	WB4TVU

WA4MDS has been working regular schedules with PY7ZAA in Recife, Brazil helping to set up the citizens exchange trip for 500 Georgian and Brazilian citizens. Albany RC now has 30 members, had a fish fry July 21, with 75 people. Their code and theory class just graduated six. Any other classes going? WB4NTW now OVS and ORS. WB4TVU and WB4UPW now ORSs. WA4RAA also OKS. He's real pleased with his new double bazooka antenna on 80 meters. WB4MWC made BPL for third time and will get a medallion. OVS WB4WMT reports a successful two month 80 MHz sked with K8BBN five nights a week, good results along the 650 mile path, plus the Dixie Six Meter SSB Net meets Wed./Sun. at 9 P.M. EDT 50,110. WA4NJP is working 144 MHz EME using eight 14-ft. Yagis on an azel mount, W4JM now mobile with a Swan 500. K4HQI has a new HW-202 on 2 meters. The Eatonton repeater now WR5ACX. Athens machine (13/73) now WR4ABJ. WB4JCC has passed her Advanced Class exam. Send activities reports and items of news to me each month before the fifth. Radiogram or pony express is fine. Traffic: WB4MWC 169, WB4RUA 90, WA4BAA 67, WA4NMU 63, WB4WXX 57, W4CZN 30, W4BYG 22, W4AMB 19, W4EEP 16, WA4LLI 9, W4JM 9.

NORTHERN FLORIDA – SCM, Frank M. Butler, Jr., W4RKH – SEC: W4IKB. RM: WA4BGW. RTTY: WA4WIW. PAM: WA4-12M/75, W4SDR/40. It was a pleasure to visit clubs in Daytona Beach, Gainesville/Ocala, Inverness and New Port Richey this month. Glad to see W4IYT appointed as W4 rep on ARRL ECAC. K4WKY is new FAST Net Mgr. The 6-Meter VHF Net had an SET, planned by WB4ZPC. WA4JNA, WB4ZPC, WA4BMW, WB4PKR, WB4SKJ and WB4MUS are on 450 MHz fm. K4LAN works 2-meter mobile from railroad caboose. WN4EPR and WN4FAO are new Novices. W4JNI and W4OXE returned to Eglin area. W1ESH/4 now is K4JEM. Unknown signals on 2 meters recently prompted a couple of transmitter hunts. WA4NRP now is W4AEC. New TARC officers are WB4VDM, pres.; W4MQO and WB4VDL. WB4ZQC appointed ORS/OPS. W4WSZ again active with new rig and hamshack. NOFARS held a picnic at Hanna Park. W4DFP renewed ORS; he also meets 15-meter and 20-meter ssb nets. Gator RC, W4DFU, has a new home. They passed over 1100 messages during Engineer Fair. WA4SYD was appointed EC for Marion Co. WN4FEV, age 14, is a new Novice. WB4GMB moved to new QTH. WB4HKP applied for ARRL LM. WB4KST/4 earned TPTN Net Certificate. WB4VAP got some good photos of the FD operation. WA4BXT reports a new 40-meter ssb net on 7280 at 0100Z. EC WA4WBM and nearby ECs picked 146.58 MHz for intercounty use. Citrus County Net is on 146.52 and 28.650. K4FYD is active from Spring Hill, in Hernando Co. Traffic: (July) WA9QVU/4 273, WB4WHK 192, WB4OMG 160, K4BSS/4 156, W4SDR 129, WB4VYD 109, K0BAD/4 104, WB4DXN 89, WA8ZDF/4 88, W4RKH 81, WB4SKJ 48, WB4OAA 47, WB4IER 46, WB4NJI 38, W4GUJ 36, W4NGR/4 36, WA4VCK 33, WA4EYU 32, K4IZT 27, WA4EJA 23, WB4ZPC 17, WB4HKP 12, WA4BXT 11, W4DFP 11, K4EZE 11, WB4FJY 11, W4LDM 10, W4LSR 10, K4OER 10, WA4CT 8, W4IKB 8, WA4VZF 8, K4RNS 5, WB4BYJ 4, WB4VAP 4, K4FLV 3, (June) WB4OAA 56, WA4VCK 46, W4GUJ 21, W4DTV 14, W4LSK 14, WB4HKP 7, WB4WTL 2.

SOUTHERN FLORIDA – SCM, John F. Porter, W4KGJ – Asst. SCM: Woodrow Huddleston, K4SCL. SEC: W4IYT. Asst. SEC: W4SMK. RMs: K4FAC CW and K4FBI RTTY. PAM: W4OGX. K4WKY made BPL this month. K4FBI RM RTTY is planning a joint RTTY meeting at the Miami Hamboree in Jan. All interested parties are urged to mark their calendar for this event. The Fla. RTTY Net meets nightly at 7:30 P.M. on 3620 kHz. WA4MXC, past pres. Tampa ARC, joined Silent Keys July 16. New state OCWA chmn., W4UKA, Ocala, made statewide visit to various chapters. K4IZT and WA4CGQ giving extra support to the FAST Net. Both rank high in check-ins. Nice going fellows! WA4UNV and WA4NBT earned FAST Net Certificates. K4MFF just returned from a 7000 mile holiday trip throughout the USA mobiling all the way. The Tampa Bay Repeater Assn. now have their auto-patch in service. Call WB4HAE. Palmetto ARC of Miami received their new repeater call, WR4ACC. First in South Fla. WB4OSN reports outstanding

openings on 6 meters. He now has ssb WAC plus 49 states confirmed on cw – Dade Co. ARPSC (W4EHW) now has a permanent home in CD center of North Miami City Hall. They have two stations ready for any emergency. All reports indicate the Manasota Emergency Net is going great on 2 meters in Manatee County. W4KKY joined Silent Keys this past July, Fla. Net reports: FMTN QNI 570, QTC 192, OFN QNI 746, QTC 437, TPTN QNI 256, QTC 150, FAST QNI 940, QTC 341, GN QNI 222, QTC 155, FPTN QNI 401, QTC 82, OFTN QNI 233, QTC 85. K4NE got 66,000 points in CD party. KF4DT was activated from Dry Tortugas during Fla. Amateur Radio Week. Operators were W4OZF, WA4RLS, WB4LAX, WB4CKX, WB4CKY. Over one thousand QSOs were made. About half ssb and half cw. The New Dade Co. ARPSC emergency manual of operation is a step in the right direction. Other counties should think about doing the same. Contact W4IYT for information. Have you checked into one of our Fla. Traffic Nets lately? EVeryone should learn to handle traffic just in case of emergency. Traffic: (July) K4WKY 405, WA4SCK 387, K4SCL 248, WB4GHD 243, WB4AJL 84, W4FF 63, W4DVO 58, WB4SMA 51, W4BM 46, W4EH 45, WB4HJW 40, WB4TRI 40, WA4IDH 31, W4IYT 28, K4NE 28, K4BLM 25, WB4AID 24, W4GDK 24, WA4BPE 23, W4KGJ 22, WA4IJH 20, WA4CJM 19, W4DQS 14, WA4ASJ 13, WB4QID 8, W4OGX 7, W4TUP 6, W4LK 5, W4TJM 5, WB4CPZ 3, W4MML 3, W4NTE 1. (June) W4IYT 18, W4FF 10, W4MML 4, K4KQ 2, K4GFW 1.

WEST INDIES SCM, Pedro J. Piza, Jr., KP4ASR – KP4BOL got a new tower and is active on 20 meters. KP4BNP is active on 2 meters from Yauco. KV4FZ needs two more countries on 160 for DXCC. KP4CLB moved to a new QTH. KP4ANH has new R-4C line. KP4DPB is getting ready for 2 meters. KP4DBR has a new amplifier. HI7FCL/KP4 is back on the air.

SOUTHWESTERN DIVISION

ARIZONA – SCM, Gary M. Hamman, W7CAF – The Ft. Tuthill Hamfest was attended by over 300 amateurs including Director Griggs, W6KW, and all had a great time in cool Flagstaff. The Arizona Amateur of the Year was announced at the hamfest as K7WIP and the plaque was presented to him at the Aug. 8 meeting of the Old Pueblo Radio Club by K7UJV. A club has been formed in Prescott, the Prescott Amateur Radio Assn., with W7LL as chmn. and W7IXM as secy.-treas. Club members who provided communications for the Powder Puff Derby were W7DFY, WA7EHS, W7HWX, W7HXM, W7IVZ, W7IJC, W7JSZ and W7LL. Active clubs and their meeting days and locations are: Ariz. ARC, 1st Thur., 1510 E. Flower, Phx. Ariz. Repeater Assn., 4th Tue., 4702 N. 24th St., Phx. Hualapai ARC, 3rd Wed., DPS Building, Kingman. Maricopa C.D., 4th Thur., 2035 N. 52nd St., Phx. Old Pueblo ARC, 2nd Wed., Randolph Park Clubhouse, Tucson. Phx. VHF ARC, 1st & 3rd Wed., 1510 E. Flower, Phx. Prescott ARC, 1st Tue., Prescott Youth Center, Prescott. Scottsdale ARC, 4th Mon. 7201 E. McDowell, Scottsdale. Sun City ARC, 3rd Tue., 14601 N. Del Webb, Sun City. Section Net Awards were earned by WA7IXC, WA7KQE, K7NTG. Traffic: K7NHL 154, K7NTG 80, W7PG 54, W7DQS 43, WA7KQE 9, W7CAF 8, WA7TZO 7, K7ZMA 6, K7HGH 5, WBØHZE 2.

LOS ANGELES – SCM, Eugene H. Violino, W6INH – Asst. SCM: Leigh Jones, WB6OLD. RMs: W6LYY and WB6ZVC. It seems that W6LYY will have to resign his position as RM for our section. We are looking for new RM appointees. Those interested should contact W6LYY or myself. We can use PAM, OPS appointments to phone nets right now. We have good liaison with WPS and MTN nets which are working very well. Thanks to Don for a job well done, we will miss W6LYY's cooperation and faithfullness to SCN. The TRW club made two Oscar contacts on Field Day, also 75 contacts per hour for two hours. The Telco Amateur RC has issued members a new 1973 Roster. The United ARC of San Pedro reports that now Field Day is over they again have antennas for rent. Hi. The United ARC also planning to have a booth at the Convention in Oct. WA6DSN constructed a frequency Synthesizer for his two-meter fm rig and has managed to get excellent spread out of his commercial mobile rig. WB6MWT again active in RTTY and has the club machine on the air. WB6OLD reports the West Valley RC had over 3000 QSOs with 4 transmitters on FD, also reports WB6VZI has new Henry 2K-3; K6OVJ plans four-element tri-band quad and two-element 40-meter beams with heavy duty crankup. W6HX built a Signal one CX7A from spare parts. The Santa Clarita ARC had good picnic at the Ventura State Beach Park, many XYLs and kiddies attended. The Ramona Club has a repeater site ready to go in the Monterey Park Hills, with 220 MHz control link, it will be shut down however pending receipt of new WR call. W6BXR is

available to help adjust TTY mark and space sigs if any of you gents need expert assistance. We had a visitor this month from W8IMI who was attending special course at UCLA. W6SZH reports that his Carson High School Radio Class is going great guns and those interested should contact John. W6AWP our very popular Radio Inspector has retired from the FCC, is very active on two meters and in the United Radio RC. WB6QFE worked XE2RYT mobile below Tijuana from San Gabriel on 450 MHz. By the time you read this the West Valley RC will have its Novice license course in full swing, those interested should contact WB6OLD. WB6OYN says he enjoyed his first CD party. Congratulations on the merging of two hams K6ASK and WB6SNQ who are planning marriage very shortly. WA6ZNP has installed a genuine two meter antenna on his truck. WA6MEM has successfully worked into the satellite and had confirmation of his first contact, now looking for DX via same. Traffic: K6UYK 204, W6INH 160, W6LYY 156, WB6OYN 113, WA6IDN 90, W6QAE 68, WA6BCO 33, WA6ZKI 27, WB6KGK 26, W6OEO 23, W6NKE 15, W6USY 12, W6OAW 9, WB6YIZ 8, WB6OLD 7, K6CL 4, W6DGH 2, W6IVC 2.

ORANGE – SCM, William L. Weise, W6CPB – Asst. SCM: Richard Birbeck, K6CID. SEC: WA6TVA. PAM: K6YCI. RMs: WB6AKR, W6BNX. W6FB reports possession of a new fm rig and Desert RATS repeater organization is awaiting FCC action – who else is waiting? K6GMI is new member of Army MARS and on acceptance will be mgr. Daytime Sixth Region Net, ARRL National Traffic System. If you want to get a job done look for a busy man – K6GMI checks in on at least 8 traffic nets. W6BUK received a beautiful plaque for his 50 years membership in ARRL. Congrats. Silent Keys: WB6CCP and W6FS. Our condolences to their families. W6QBD was happy to find Lucerne Valley listed on page 78 of July QST. W6BUK reports no gas problems when attending MTN roundup in July. Course he didn't drive to Colo. either. Hi. Vacation time has reduced information input from members. Will be looking for activities when the cool weather sets in. Do not forget the Novice Net on Sat. at 9 A.M. local on 3730 kHz. Citrus Belt ARC reports some 30 Novices in their area. Check in and learn about traffic handling. PSHR: K6GMI 34, WB6AKR 36, WA6TVA 52. Traffic: (July) K6GMI 194, W6ISC 123, WB6AKR 103, WA6YWS 40, WA6TVA 31, K6GGS 14, W6CPB 7, WB6VTK 6, W6BUK 5, W6QBD 3. (June) WN6THH 6.

SAN DIEGO – SCM, Paul C. Thompson, W6SRS – With the summer drawing to a close it looks as though we will be in for a dry and hazardous fall in our section. I hope that each of you have prepared yourself for possible activation anywhere in the section in the event that the fires, that are a constant threat this time of year, do break out. With the growth of the past winter grass and brush the possibility is even greater. Aug. was the month for picnics by Palomar and El Cajon clubs. The North Shores heard about Nuclear Power. SOBARS held a nice get together. Weather was warm for IVARA. SDDX had a nice program. SANDRA held nominations for elections. El Cajon ARC is the proud owner of a new Club Station Building in El Cajon. Congratulations. K6DYD worked a number of stations in Hawaii direct. W6DEY and W6PJU assisted with the Powder Puff Derby. New ORS appointments go to WB6LJO and WB6PVH. W6INI has been appointed to the Emergency Communications Committee for ARRL. Remember the Southwestern Division Convention, Oct. 20 and 21. See you there. Traffic: W6BGF 271, W6VNQ 105, WA6AMK 101, W6DEY, 36, WB6PVH 35, W6GHF 3, W6SRS 2.

SANTA BARBARA – SCM, D. Paul Gagnon, WA6DEI – SEC: W6JTA. RM: W6UI. PAM: K6EVQ. Greetings from the Land of the Rising Sun. Untortunately I am herein Japan on business rather than pleasure but still had the opportunity to visit several of the local JAs and KAs. KA2AI recently acquired Slow-Scan TV and is giving many stations their first slow scan contact with Japan. He also made the DXpedition to Iowa Jima and helped operate KA1CQ. I operated the Mike and Key club station KA2NY and worked W6PN in Santa Barbara and heard WA6DHS in Baywood Park. Propagation from Japan is quite interesting. A Japanese Field Day was held in Aug. and groups were all over the place including the side of Mt. Fuji. These people know what a hurricane or tidal wave can do. Consequently they all participate in emergency communications drills and have portable gear at the ready. I apologize for lack of station activities or traffic totals. We will double up next month. The Santa Barbara section picnic is now past. Thanks to all of you who participated and thanks to general chmn. K6YHK for another great job. I have been elected SCM for another two years. Thanks to the many of you who have provided great support these past 2 years.

WEST GULF DIVISION

NORTHERN TEXAS – SCM, L.E. Harrison, W5LR – Asst. SCM: Frank Sewell, W5IZU. SEC: K5QKM. RM: W5QU. Our sympathy goes out to W5QXY who was seriously injured recently in an accident involving a tower mishap. The Tex. Traffic Net fish fry will be held at Davis resort, west side of Lake Whitney Sept. 29-30 as per W5BGE. It looks as if Novice Round Table (mentioned in Ignition Noise of Lubbock) is about to have another try and the suggested time and frequency is twice weekly on 28.150 MHz as per editor, WN5IRI. All amateurs in the Ft. Worth area please note the article: May Day, De, W5TI, in July "Kilocycle Club news Bulletin," WA5UOC, editor. The editorial in July Collector and Emitter, by W5JJ should be read or heard by all amateurs interested at all in maintaining our status quo and rights. RE The Coffe Quest and Trunk Sales of ARC is changed to Mama's, located Abrams & West as per editor, WA5UOB. An interesting situation has come to the attention of this writer concerning the number of amateurs emanating from the Stennett family of Ft. Worth, Tex. They are WB5FGM, Mother; WB5FGN, Father; WA5QQQ and WA5QQR, son-in-law and daughter and K5UZU, son. Three new ECs in the Northern section are W5ATG, Fannen Co.; W5BCB, Hopkins Co.; K5ZVZ, Bowie Co. SEC WA5YXS So. Tex. and his XYL WB5CUR have returned from a very exciting vacation. K5TEY taking a very well earned rest after reporting the arrival of Military Recruits into various parts of the service to their families for many years. Traffic: (July) WA5NSJ 97, WA5QGE 56, K5QKM 19, W5SOQ/5 6, W5YK 6. (June) WB5GRZ 8.

OKLAHOMA – SCM, Cecil C. Cash, W5PML – Asst. SCM/SEC: Leonard R. Hollar, WA5FSN. RM: W5RB. Asst. RM: WB5EEY. PAMs: W5MFX, WB5CWX and K5DLE. July was just another slow month with one very pleasant exception and that was the all nets picnic at Lake Overholster Park in western Oklahoma City. A good time was had by all and the date set for next year is in early June. The State MARS (Army) meeting in Oklahoma City was held in Aug. Mr. Albright and I met with the Miami ARC. From there I went fishing with my son. A correction to the May report – WA5WRC is pres. of The Tulsa Electron Benders ARC. It is a different Tulsa club than The Tulsa ARC. Sorry John about the mistake. W5JJ was one of the main speakers at the Air Force MARS Conference in Springfield, Mo. Aug. 4 and 5. K5ONM working hard on his DXCC, has 62 worked but only 17 confirmed at present, all on cw that is. Congrats to WN now WB5JML all the way from Novice to Advanced. Congrats to new Generals WB5GZE, WB5GZF, WB5HUP and WB5IOQ, all from Novice to Generals! Traffic: W5RB 99, WB5EEY 52, W2FIR/5 48, K5IEY 31, W5MFX 28, WB5ELG 24, W5PML 24, WA5CUJ 20, K5OYM 18, WA5JGU 12, W5FKL 10, WB5AZS 9, WA5ZOO 7, WA5FSN 4, WA5WRC 2.

SOUTHERN TEXAS – SCM, Arthur Ross, W5KR – SEC: WA5YXS. RM: W5ABQ. PAM: W5HWY, WS5MSC made more than 2000 QSOs from NASA during SKYLAB. ORS K1ONW/5 reports TVI problem cured. OPS WA5VBM handled one message of over 150 words! ORS W7WAH/5 making progress on DXCC. SEC WA5YXS now has fone patch for 2 meters. ORS WA5ZBN reports over 100K points in July CW CD party! EC W5TFW working on repeater license. OO/ORS W5RBB reports no violations noted in July! OO W5NGW says fishing good in White Mts., awaiting No. 280 confirmation on DXCC. WB5CIT will be operating from W5AC during school months. W5ALL is mayor of Cloudcroft, NM, and over 50 years a ham. W5LHX built transistor oscillator – super stable. WB5GJD moving from Bertram to Stillhouse Lake. WB5FID, K5MYY and K5GSF new on 2 meters. K5FRK has new KWM-2 and 30L1. TEX CW Net had FB picnic and business session; planning report in '74. W5KLV retired June 30. WB5DDP reports work progressing on 2-meter link Dallas-Odessa. ORS/OBS WB5BWV has new 50-ft. mast. WB5GZG moved from Novice to General. K5YHX is new OPS. OOs reporting for July: WA5MIN, W5NGW, W5RBB. Riding lawn mower threw K5RDP; he is recovering nicely. Traffic: WB5CUR 235, W5TQP 184, K1ONW/5 174, WA5VBM 162, W5ABQ 127, W7WAH/5 120, WA5YXS 103, W5QO 84, WA5YEA 80, WB5FMA 67, WB5DBK 64, WB5AMN 52, WA5TJI 36, WA5ZBK 36, WA5ZBN 35, K5YHX 33, WA5ZBJ 27, W5TFW 19, WB5FQU 18, WB5DQF 17, W5UKN 15, WB5GVO 13, W5RBB 10, WB5IOG 6, K5RVF 4, WB5CIT 2, WA5TKR 2, WA5CBT 1.

CANADIAN DIVISION

ALBERTA – SCM, Don Sutherland, VE6FK – Asst. SCM: Mrs. Donez Booth, VE6YL. SEC: VE6XC. APSN PAM: VE6ALQ. CREN PAM: VE6AMC ECs: VE6FM, VE6AGZ, VE6ATY, VE6WJ,

VE6AXH. OPSs: VE6HN, VE6YL, VE6FS, VE6AXH, VE6VS, VE6ADS, VE6ASL. ORSs: VE6YL, VE6WG, VE6LZ, VE6BAT. OOs: VE6MJ, VE6HM, VE6TY. OBS: VE6MJ. OVS: VE6MX. With deep sorrow I report the passing on Aug. 1 of ex-VE4CY-ex-VE6CY. Sam will be greatly missed by his many old time friends. We have lost another link with the early days of radio. Amateur radio is comparatively young and too often records of the past are lost so please keep VE6EA of Edmonton and VE6AP of Calgary informed of any records or pictures you may have. Todays news is tomorrows history. Does anyone have recent news of ex-C4GT? I do know he was a VE7 several years ago. Does anyone know anything about WAC certificate No. 4? Quite a contingent from Calgary, headed by VE6AII and VE6DE, attended the International Hamfest at Somers, Mont. Besides publicizing the Can. Div. Convention in Calgary Aug. 1, 2, 3 of 1975, VE6LZ won the homebrew prize, VE6ATA a hidden transmitter hunt and VE6AMR the cw receiving contest. The APSN is fighting summer QRN but still managing to pass some traffic. Traffic: VE6FK 22, VE6FS 7, VE6AXH 2.

BRITISH COLUMBIA – SCM, H.E. Savage, VE7FB – Here we are in Disney Land, Calif., all three VE7SH, son James and yours truly VE7FB. Our asst. Dir. VE7LL and XYL in VE3-Land. Traffic and SEC's reports are missing until next report.

MANITOBA – SCM, Steve Fink, VE4FQ – The summer saw its usual amount of portable operation by VE4s as well as many visiting amateurs operating from here. With Fall now here we hope activity will return to normal. VE4PG now running a full gallon to help his traffic net activity. MTN certificates have been issued to VE4UN, VE4IL and VE4XA. We welcome VE4TY as a new ORS. With regret we record the passing of VE3EDK of Kenora, active for several seasons on MEPN.

Net	*kHz*	*Time/Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
MTN	3660	6:45 PM Dy	30	106	33	VE4LG
MEPN	3765	7:00 PM Dy	31	609	33	VE4FO

Traffic: (July) VE4TY 27, VE4PG 23, VE4OW 18, VE4JA 12, VE4JP 7, VE4UN 4, VE4HA 2, VE4IL 2, VE4OL 2, VE4QK 2, VE4WT 2, VE4XN 2, VE4IH 1, VE4HR 1, VE4PA 1. (June) VE4TY 26, VE4PG 21, VE4OW 5.

MARITIME – SCM, W.D. Jones, VE1AMR – SEC: VE1HJ. The White Cane picnic, followed by an evening of dancing was held at Moncton and enjoyed by all. Our thanks go to VE1YY, his XYL and YL; VE1ATQ and others whose efforts were much appreciated. The new executive for NBARA includes VE1ATG, pres.; VE1AAO, vice-pres.; VE1ADT, secy.; VE1APX, treas. The APN has enjoyed an increase in check-ins since reducing the speed to 15 wpm. Traffic: VE1AMR 85, CI1ARB 44, VE1ZH 16, VE1AWP 11, VE1AYJ 4, VE1AFM 3.

ONTARIO – SCM, Holland H. Shepherd, VE3DV – For so vital a question to the Canadian radio amateur it is very disappointing to me that only 43.3% of Canadian radio amateurs replied to the DOC Questionnaire. It must also be pretty evident to the Director of Telecommunications Regulations that the average Canadian radio amateur doesn't care one hoot about the effects of the HF Band Expansion on Canadian operations, OR, they just don't like questionnaires! In any case it is very evident that before any action is contemplated by DOC there will continue to be the close cooperation that was so evident in this precedent setting form of consultation. Look for a brand new approach by CEMO to obtain the unique services of the Canadian radio amateur to support the extensive resources of the Provincial EMO in peacetime emergency disasters. VE5CU, Director Saskatoon EMO, is doing a study that will go to ECMO on Sept. 15. I urge all Canadian radio amateurs to support your local AREC group and if you find that there is none in your town or city – start one yourself. All SCMs and SECs can provide you with full background information. In fact, they would be more than pleased to do so. While I am on the subject of emergency communications I would like to recommend that the International Mission Radio Association (IMRA) frequency of 14,280 MHz is ready, willing and certainly able to act as NCS in case of a repeat like the Managua earthquake. In the meantime Canadian radio amateurs should consider some form of loose organization that has interface with the Canadian International Development, Department External Affairs, Ottawa; the Provincial EMO Directors and AREC. VE2ALH has been appointed Deputy Mgr. of ECN effective Aug. 1, 1973. VE3GFN Mgr. OQN and EC for Metro Toronto led Canada in the Apr. CD Party on cw; received his 25 wpm sticker; received a citation for his work in the Managua disaster; ran an AREC exercise during Dominion Day parade for Scarborough and bought a 15-ft. canoe which he and his wife used during a wilderness tour through Algonquin this past summer. A pleasant welcome back to the traffic nets to VE3GCE. Traffic: (July) VE3FQZ 151, VE3EHF 142, VE3GJG 122, VE3SB 109,

VE3DPO 65, VE3AWE 49, VE3ASZ 24, VE3EHL 24, VE3GT 19, VE3EWD 15, VE3ATR 14, VE3GCE 14, VE3DVE 13, VE3DU 12, VE3FGV 6, (June) VE3GFN 76, VE3GT 20, VE3EWD 16.

QUEBEC – SCM, Joe Unsworth, VE2ALE – Correction: The Westminister ARC produced 11 new hams this year, 9 Que. and 2 Ont., VE2s DPO, DPI, BBQ, BYN, DPP, BKF, AQD, DPG, known only so far and VE2s BSZ, BPX, ABF with Advance. In July repeater VE2AT changed frequency to 146.640 in and 147.120 out. VE2ANK skeds his daughter at the QTH of DJ9GD. VE2BRW now has TH6 at 65 feet high. VE2DAD has contacted 4X4 (VE3MR) with 20-meter inverted "V" while VE2AED has relations living very near the 4X4 station. It would appear that members of the RAQI have very low interest in the AREC and also being members of the ARRL; if this is so how do they expect the ARRL to represent them on any changes or indications of changes as have been suggested in the last couple of months, or all Canadian amateurs of which only less than half which returned the question paper sent to them by the DOC. The P.L. Net (VE2HI) had their picnic at Long Sault Park on July 18 and MARC with a Hamfest at Ste. Anne de Bellevue Aug. 5 with over 300 attending. VE2BQF took home the TR-2200. VE2ZA is working on a slave repeater to VE2RM for extended coverage. VE3EU, former VE2EE is a Silent Key. VE2MH new QTH is Victora, B.C. VE2BB with new KW Atlanta. VE2NB trying an SB-102. VE2s XP and NB handled PL Net in July with VE2HI away on trip. PSHR: VE2APT 24, VE2ALH 34. Traffic: (July) VE2ALH 71, VE2EC 22, VE2DR 9, VE2APT 6, VE2ALE 3, VE2ATL 3, (June) VE2ATL 2.

SASKATCHEWAN – SCM, P.A. Crosthwaite, VE5RP – Many of our amateurs were on holidays for the summer months. Those who were traveling about may have run across some older Ham gear which may be of some use to our collections at the Western Development Museum. VE5HB is in charge of such collections and would be very happy to hear from those who may have leads as to the whereabouts of such gear. The display is small at present, so if you can help out please drop a line. I could use some more assistance in our section in improving our ARRL appointments which will increase our communications efficienty. For those who are interested please contact me for further information. Traffic: VE5HP 28, VE5BO 11, VE5QO 8, VE5HF 5, VE5KZ 5, VE5RB 4, VE5PD 3, VE5EO 2.

HAM-ADS

(1) Advertising shall pertain to products and services which are related to amateur radio.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters, be used which would tend to make one advertisement stand out from the others. No Box Reply Service can be maintained in these columns nor may commercial type copy be signed solely with amateur call letters. Ham-ads signed only with a post office box or telephone number without identifying signature cannot be accepted.

(3) The Ham-Ad rate is 50 cents per word, except as noted in paragraph (6) below.

(4) Remittance in full must accompany copy, since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham-Ads is the 20th of the second month preceding publication date.

(6) A special rate of 15 cents per word will apply to advertising which, in our judgement, is obviously non-commercial in nature. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 15-cent rate. Address and signatures are charged for, except there is no charge for zipcode, which is essential you furnish. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising so classified takes the 50-cent rate. Provisions of paragraphs (1), (2) and (5) apply to all advertising in this column regardless of which rate may apply.

(7) Because error is more easily avoided, it is requested copy, signature and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signature must accompany all authorized insertions. No checking copies can be supplied.

(8) No advertiser may use more than 100 words in any one advertisement, nor more than one ad in one issue.

(9) Due to the tightness of production schedules, cancellation of a Ham-Ad already accepted cannot be guaranteed beyond the deadline noted in paragraph (5) above.

Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QST *are unable to vouch for their integrity or for the grade or character of the products or services advertised.*

QCWA Quarter Century Wireless Association is an international non-profit organization founded 1947. Any Amateur Radio Operator licensed 25 or more years is eligible for membership. Members receive a membership call book and quarterly news. Write for information. Q.C.W.A. Inc., Box 394, Mamaroneck NY 10543.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't, police, etc, invited to join Society of Wireless Pioneers — W7GAQ/6 Box 530, Santa Rosa CA 95402.

FREE sample copy Long Island DX Assn. bulletin. Latest DX news. Business size s.a.s.e. to the L.I. DX Assn., P.O.Box 73, West Coram NY 11727.

EDITING a club paper? Need public relations help? You should belong to the Amateur Radio News Service. For information write: Rosemary Willis, 9276 Borden Ave., Sun Valley CA 91352.

AN invitation NYC area hams and SWLs are invited to attend NY Radio Club meetings — 2nd Monday of every month, Williams Club, 24 E. 39th St., near Madison Ave., at 8 PM — New members welcome. Interesting programs.

ROCHESTER NY 1974 WNY hamfest dates are May 17 and 18. Exhibitors: space reservations now being accepted. WNY Hamfest, Box 1388, Rochester NY 14603.

MEMPHIS area hamfests, Sunday October 7, at State Technical Institute, conveniently located on Interstate 40 at Exit 11. Tennessee Section ARRL Convention in conjunction. ARRL Forum, MARS meetings, Flea Market, XYL entertainment, Informal group dinners Saturday night. Talk-in on 34-94 and 3980. All your friends will be there!

CASH paid for your unused tubes and good ham and commercial equipment. Send list to Barry, W2LNI, Barry Electronics, 512 Broadway, NY NY 10012.

CALL Toll-free: (800) 327-7799. Ask for Bob Hoffman (Jaro Electronics Corp.) We buy all types of tubes. Top prices paid for Varian, Eimac, Amperex. Address: 412, 27th Street, Orlando FL 32806. In Florida call collect (305) 843-9551.

WANTED: An opportunity to quote your ham needs. 34 years a ham gear dealer. Collins, Drake, Galaxy, Tempo, Kenwood, Ten-Tec, Hy-Gain, and all others. Also $25,000 inventory used gear. Request list. Chuck, W8UCG, Electronic Distributors, Inc, 1960 Peck St., Muskegon MI 49441. Tel: 616-726-3198

SPIDERS for boomless quads. Heliarc welded aluminum. Al's Antennas, 1339 So. Washington St., Kennewick WA 99336

VERY in-ter-est-ing! Next 6 big issues $1. "The Ham Trader," Sycamore IL 60178

TELETYPEWRITER parts, gears, tape, supplies, toroids, tuning forks. Sase list. Typetronics, Box 8873, Fort Lauderdale FL 33310. W4NYF. Wanted: parts, late machines.

QSLs?? Largest variety!! Samples 35c, Deluxe 50c. Religious 35c. (Deductable). Sakkers, W8DED, Box 218, Holland MI 49423.

3-D QSLs — Increased returns assure users' satisfaction. Samples 25c (refundable). 3-D QSL Co., Monson 2, Mass. 01057.

TRAVEL-PAK QSL Kit — Send call and 25c; receive your call sample kit in return. Samco, Box 203, Wynantskill NY 12198

PICTURE QSL cards of your shack, etc. from your photograph. 500, $12.50. 1000, $16.25. Also unusual non-picture designs. Generous sample pack 30c Half pound of samples 60c. Raum's, 4154 Fifth St. Philadelphia PA 19140.

QSLs, samples 10c. Fred Leyden W1NZJ 454 Proctor Av. Revere MA 02151.

CREATIVE QSL cards. Personal attention. Imaginative new designs. Send 25c. Receive catalog, samples and refund coupon. Wilkins Printing Box 787-1, Atascadero CA 93422.

DELUXE QSLs, Petty, W2HAZ, PO Box 5237, Trenton NJ 08638. Samples 10c.

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QSL, SWL, WPE cards. Samples 25c. Log books, file cards, decals. Malgo Press, Box 375, Toledo OH 43691.

QSLs, SWLs, WPE samples 15c. Nicholas & Son Printery, PO Box 11184, Phoenix AZ 85017

FRAME Display, and protect your QSLs with 20 pocket plastic holders. 2 for $1, 7 for $3, prepaid and guaranteed. Tepabco Box 198T Gallatin TN 37066.

QSLs, multicolor glossy; choose Globe, Eagle or straight key. Report form on back, 100 - $5.50. QSL cards not personalized, 100 — $2. Rusprint, Box 7575, North Kansas City MO 64116

QSLs. Second to none. Same day service. Samples 25c. Ray, K7HLR, Box 331, Clearfield UT 84015.

QSL's 300 for $4.95! Samples 15c, Colourcard Box 326 Topanga CA 90290

QSLs — Dime or your present card brings samples. Alkanprint, Box 3494, Scottsdale AZ 85257.

RUBBER stamps, $1.75 includes postage. NJ residents add tax. Clints Radio, W2UDO, 32 Cumberland Ave. Verona NJ 07044.

QSLs catalog. Samples 35c. Ritz Print Shop, 5810 Detroit Ave. Cleveland OH 44102

200 TWO color QSLs $5.20, stamp for samples. Mark, WB6NKO, 2534 El Tonas Way, Carmichael CA 95608.

GREENE Center Insulators, with or without balun. A tough number to beat. Free flier. Kaufman Industries, Box 8170, Reeds Ferry NJ 03054.

NOVICES: Need help for General ticket? Complete recorded audio-visual theory instruction. Easy, no electronic background necessary. Write for free information. Amateur License, PO Box 6015, Norfolk VA 23508.

WANTED: tubes, transistors, equipment, what have you? Bernard Goldstein, W2MNP, Box 257, Canal Station, New York NY 10013

OFFER $10 for Radio News June 1919, Electrical Experimenter May 1915. Wayne Nelson, Concord NC 28025.

JEHOVAH's Witnesses who are amateurs write Bob Ellis WA4UQQ, 160 Lagoon Rd. SE, Winter Haven FL 33880 or call (813) 293-3595.

HAM Hawaii. Maui oceanfront three bedroom two bath luxury penthouse apartment for rent by week or month completely furnished plus Yaesu, TH6DXX and automobile. K6OE, Box 218, Carmel Valley CA 93924.

MOBILE ignition shielding gives more range, no noise. Kits and custom systems. Literature. Estes Engineering, 543-A West 184th, Gardena CA 90248.

WESTERN Union Desk-Fax Telefax transceiver manual: Complete theory of operation, adjustments, lubrication, preventive maintenance, troubleshooting, parts list. Includes all schematics and mechanical parts drawings. $3.80 postpaid. Bill Johnston, 1808 Pomona Drive, Las Cruces NM 88001.

CASH for ssb gear (working or repairable). State condition and price in first letter. Elvin Miller, Box 869, Marion IN 46952.

SELL Hallicrafters FPM-300. New. Retiree completely discouraged in learning code. I quit. Cashiers check — $525 UPS prepaid takes. Billy Parker, Route 1, Big Rock TN 37023.

MANUALS for most ham gear made last 25 years. Send SASE for quote. W0JJK, Hobby Industry, Box 864, Council Bluffs IA 51501.

WE BUY electron tubes, diodes, transistors, integrated circuits, semiconductors. Astral Electronics, 150 Miller St., Elizabeth NJ 07207. (201) 354-2420.

WANTED: ARC-5/vhf components. Mounting racks MT-65 and MT-71. Control unit C-42, junction box J-28. Also need connectors. WB8NLM, 146 Schonhardt, Tiffin OH 44883.

WANTED: Old QSL cards. Vendy Johnson, W6CWK, 4960 5th St., Fallbrook CA 92028.

60 YEARS accumulation of 50,000 dollars worth of radio and experimental equipment. World War I, World War II mica transmitting condensers, variable condensers, tubes, meters, etc. What do you want? John Stoddard, 4262 N.E. 124th, Seattle WA 98125.

CASH or trade for old radio receivers, magazines, books, handbooks, catalogs and parts. Erv Rasmussen, 164 Lowell, Redwood City CA 94062.

TRANSFORMERS rewound, Jess Price, W4CLJ, 507 Raehn, Orlando FL 32806.

STANDARD 146-A still in factory carton with warranty card, *battery pack stubby antenna incl.* — $248. *W4OAQ, Box 17222,* Nashville TN 37217. (615) 834-8999.

WANTED: Teletype No. 33, receivers 51J3, R-388, 51J4, R-390A, cash or trade for other equipment. We pay freight. Alltronics-Howard Co. Box 19, Boston MA 02101. (617) 0048.

YAESU transceiver owners — present and prospective. Join the international Fox-Tango Club. Send business size sase or IRC for information and sample newsletter. Milt Lowens, WA2AOQ, 3977-F Sedgwick Ave., Bronx NY 10463.

SELL 71 ft. heavy-duty free-standing Tristad tower. Power winch, perfect condx. W6ABN, 101 N. Ladera Vista, Fullerton CA 92631. (714) 871-0975.

QUAD kit — $12, kit contains beamless spider mount, precut, tuned wire elements for 15 meters and instructions. Spider mount alone — $9. WAC, 404 Saunders Rd., S.W., Huntsville AL 35802.

SWAN 500 CX-SS 16 filter — $460; 117XC — $89; 508 VFO — $95; VX-1 — $19. All like new. Swan 55B autotune mobile antenna — $85. Brand new. HX50A, all modifications — $250, brand new. Dumont 960 vhf 60-watt mobile — $100, brand new. Hammarlund HFM-30 vhf mobile — $50. Sase for test equipment list. W2ERV, 87 Bernice Drive, Freehold NJ 07728. (201) 431-2367.

RTTY one 28ASR, one 28RO, and one R390A rcvr. Many extras, spare parts, schematics, and manuals. Dave Nixon/K3ZNJ, 16101 Roblynn Court, Laurel MD 20810.

WANTED: tiltover tower, 204-BA antenna or similar, tribander, *rotator, Drake separates.* K3DOX.

ALIGNMENT service for receiver, transmitter. WA8SNF. (216) 745-7819.

WANT ship's Chronometer or Navigational watch for shack. Ted Denton, 3279 Ledgewood Drive, Hollywood CA 90068.

RADIO control systems, model airplane, accessories, big savings. Discount catalog — $1. Like to trade? We need ham gear, send for our catalog today — $1. Hobby Barn, P.O. Box 17856, Tucson AZ 85710.

FOR SALE: CQ-QST-R/9, etc. 1926 foreword. Some complete years. Make offer. W5BKU, 633 Stardust Lane, Richardson TX 75080.

It's Collins KWM2, It's better than new, send the dough, then you'll know, if you want the best, you can't do it for less. $595. W0BNF.

SELL: Heath SB-100, SB-600, HP-23 — $275; TO Keyer, paddle — $80; Heath Apache — $100; HQ110A — $100. Art Brostrup, 42 Harrison Terrace, Rochester NY 14617. (716) 544-4321.

GLADDING 25 2m fm ac supply. W1FDA, Shelburne VT 05482. (802) 985-2843.

DRAKE 2C, 2CQ, xtal calibrator, manual — perfect condition $195 FOB. Al Vazquez, 311 Harpertown Rd., Elkins WV 26241.

WANTED: Swan 350 with or without power supply. W4ZKH, Don Rose, 11 Ivanhoe Circle, Greenville SC 29607.

FOR SALE: KWM2 516F2 $695, and Henry 2K HD power supply $475. Price firm. Pick up only. Frank Andrews, Route 1, Box 193, Newfield NJ 08344.

MOTOROLA P33-BAC 5W handi-talkie, excellent condition with antenna, mike, Ni-Cads, 34/94 and 94/94 - $95. Heath HX20, HR20 and HP20, good condition — $195. FOB W5PNY, 2506A 35th St., Los Alamos NM 87544.

WANTED: (6) modified 1625s for the LA400, will consider 1625s that can be modified, RCAs won't do it. K5LIQ/4, 1587 W. Churchill Downs, Germantown TN 38138.

CRYSTALS *airmailed: general purpose, MARS — Novice, active* FT-243, all frequencies minimum five, 40 m 15 m, 10 m — 99c each, 80 m — $1.59 — Cover bands inexpensively — rock solid. Less than five, 80 m — $1.75 other $1.50. Novice — with VFO or no — four bands — eight crystal package just inside bands for QSO or band limits — $9.95. General purpose: FT-243 .01% 32 pF. 3500-8600 kilocycles $1.90, (five $1.75), (nets, ten same $1.45). 1700-3499, 8601-13000 fundamentals, 10,000-30,000 overtones $2.95. Add 50c each for .005%, 75c for HC-6/u above 2000. Airmail 15c crystal, 1st-cl 10c. Free listing. Bob Woods, W0LPS, "Since 1933" C-W Crystals, Marshfield MO 65706.

HEATH HW-16, excellent condition. Must sell — $70. Write David Dunn, Meadow Ave., Washingtonville NY 10992.

HEATHKIT SB-401 with crystal pack, SB-301 with cw filter. Both rigs expertly wired — $450, firm. WB4ONS, D. A. Danello, Rt. 2, Box 105, King George VA 22485. (703) 775-4915.

WANTED: Johnson 275W matchbox. W0DKX/4, 2941 Kedron, Winston-Salem NC 27106.

OX'ERS — New logarithmic speech processor. Nominal 8 dB increase in average power, less than 5% distortion @ 1 kHz. L/C filter. Hi—Z meter — $49.95. Also, low noise dual-gate MOSFET receiver preamplifier. Nominal 20 dB gain, 10-30 MHz — $39.95 with cabinets. Dynacomm, 1183 Wall Road, Webster NY 14580.

COLLINS filters: 2.1 kc @ 455 i-f (new S-line case — $21.50) K0ARV, 2925 Wildwood Ct., NE, Cedar Rapids IA 52402.

FOR SALE: SB-34 like new condition, never used mobile. $225. C. N. Tinsley, W5OSA, 4011-33 Ave., Meridian MS 39301.

WANTED: FB7 with bandspread or general coverage coils and tubes. Must be in excellent condition. Will pay top price. Also want AGS similar condition. M. M. Zemek, W5IK, 7857 LaSobrina Drive, Dallas TX 75240.

SELL HQ110A, 80-6 meter, double conversion. New tubes, industrial — $100. F.O.B. Kennedy, 791 Greenwich St., NYC 10014.

WESTERN Union Desk-Fax Telefax transceivers: Several extr machines (checked out) — $14 each, shipping collect. Bi Johnston, 1808 Pomona Drive, Las Cruces NM 88001.

COLLINS KWS1 — 1000 watt — $650; Collins 75A4 — 3 filte — $350; Collins 51J4 — 3 filters — $700; Heath Seneca — 10 watt — $125. Gary Anderson, 909 W. Nevada Ave., St. Paul M 55117. (612) 489-7385.

SELL: kW homebrew cw-dx station; 10-40 cw xmtr, capable 4000w output, enclosed in portable cabinet, tubes: 2-250t 2-100th, 1-813, 1-814, 1-VT127, 4-2EZ6, 2-866A, 2-872A; 280 volt pwr-sply, 4 low voltage 350-450 supplies; cw monitor, VFO bug. RCVR: 10-40 cw, 2 rf stages 15 & 20, 1 rf 40, trip conversion, separate pwr-sply. Wide-spaced 20 m beam wide-spaced 15 m beam; 2 washing machine motors-rotors, ma indicator control box, 4 selsons, 2-60 ft. telephone poles, mus be disassembled. Rig has wrkd 320 countries, exct condx! $900. Individual item-offers considered. K8VYY. (419 782-0891.

SELL Collins S-line: 30L1 with 572B's; 75S3 with 0.2, 2.1 an 6.0 kHz filters. 3283 with signal processor; 312B4; 516F2. A perform excellently. Demonstrations or sieds welcomed. A. F Gold, 242 East 89th Street, New York NY 10028.

FOUR element widespaced 15 m Yagi/AR22R 50' RG-8 — $8 Dumont 401R reconditioned scope — $70; Heath IC-200R calculator — $80. All perfect condition. Write for info. WB2PF 31 Crocus, Commack NY 11725.

ROHN 5D1-3-54G crankup tower used one month. Invoiced $560. First $290 takes. John Threadgill, Brady TX 76825. Te 915-597-2504.

COLLINS 32S-1, 75S-1, 516F-2, 312B-4, SM-1; old but excellent condition. First certified check for $950. Have origin cartons. W. Washburn, 3500 Melody Lane, Baltimore MD 2120 (301) 922-7430.

SELL: Heathkit GR-110 Scanner, 3 mo. old mint — $11 K3CQY, 409 Falcone Avenue, Roseto PA 18013.

FOR SALE: Collins 75S-1 — $230; Heathkit mobile pwr suppl HP-13A — $50. Both in excellent condx. WA1LNQ, Ja Rusgrove, 80 Boy St., Bristol CT 06010.

FOR SALE: SB-310 SWL receiver with a-m and ssb filter Factory aligned, in excellent condition — $225. Hugh McKnigh 901 Pyatt St., Georgetown SC 29440.

COLLINS MP-1 pwr supply new, never used trade for 516F2 PM-2, 312B4, HT220 or ST-6, want to buy 32S1. WB8IJX, Fre Slaughter, 3636 Douglas, Toledo OH 43613.

CHEAP ssb-Collins mechanical filters 455FA 21, 2.1 kHz, li $38, now $25; 455FA 05, 0.5 kHz, list $64, now $35. These a brand new plug-ins for S-line or homebrew rigs. Also s generator boards; BFO (USB, LSB, carrier) audio/bal, mod w/speech clipping, VOX. Both boards, wired, w/schematic, onl $10. WA1AYS, Steve Gilbert, 55 Hinckley Rd., Newton M 02168. (S.a.s.e. brings info.

VACUUM variable Jennings UCSX-700 12 kV 25-700 pF be offer or horsetrade to K7JKZ/1, 4 Oak Street Apt. 1, Brunswi MA 04011.

SELL: Webster bandspanner mobile ant — $15; WRLMM-10 ant, tuner — $4; Millen rf amp 90881 with coils — $25. Bel Slickville PA 15684.

HW-16 — $90; Apache TX-1 — $80, both excellent. WB9LA (608) 222-5044.

REPLY in writing, best offer, sell all at once, new and used WW Command receivers and tank transmitters, 10,000 misc. radi parts transformer, tubes, condensers, hardware etc. Mrs. Joh Suchara, 4104 Central Ave., Youngstown OH 44515.

SELL: Heath SB-610 monitor, perfect — $50. COD. WA5PSV 6209 Nasco Drive, Austin TX 78757.

WANTED: xfmer 10 V CT @ 5A, cheap. HR 10Rcvr. 18 AV vert. ant. WA3PHL, 257 W. Walnut St., Mariette PA 17457.

SELL: Kenwood T599 and R599 both for $675. R. Klausne 1155 Canton Rd., Akron OH 44312. (216) 733-6254.

CLEANING shack — for sale or trade: Hallicrafters S-7 w/manuals — $30; Elmac AF-67, PMR-7, PSR-612, w/manua and power supply — $75; Command transmitter 7-9 mc ar power supply — $20; Command receiver 3-6 mc — $5; Gons Converter 3.5-30 mc — $10; Homebrew 2-meter rec, w/pow supply — $20; Collins filters 300Z5, FX55Q 312S2 — best offe Want 6 or 2-meter gear. You ship. WN5JXD, 900 North Willar Altus OK 73521.

SELL: Drake R4B, MS4 speaker, mint — $325; Signal/O CX7A, both cw filters, maintenance manual, some spare parts $1100. *WA9AUM/1, c/o ARRL* or phone (203) 666-08 evenings.

SWAN 500C transceiver with ac and dc power supplies — $42 Clegg 22er — $90; Clegg 99er — $55; Gonset III, 6-met transceiver — $35. WB2GKF, Stan Nazimik, Jr., 506 Mou Prospect Avenue, Clifton NJ 07012.

HR-20, HX-20, HP-20, mike, speaker — $150; DX-40 — $3 SX-71 — $50; HW-29 — $20; 10/15 converter — $5. All in ve good condx. WA7EEH, 2249 SE 185th, Portland OR 97233.

HOOSIER Electronics — Your ham headquarters in the heart the Midwest where only the finest amateur equipment is so individual, personal service by experienced and active han Factory-authorized dealers for Clegg, Genave, Drake, Regenc Standard, Hallicrafters, Ten-Tec, Kenwood, Tempo, Midlan Galaxy, Hy-Gain, CushCraft, Mosley, Hustler, Ham-M, Sor plus many more. Orders for in-stock merchandise shipped t same day. Write or call today for our quote and try our person *friendly Hoosier service. Hoosier Electronics, R. R. 25, Box 3* Terre Haute IN 47802. (812) 894-2397.

FOR SALE: Hammarlund HQ-180 receiver, Hammarlund HX- ssb, a-m, cw transmitter, and P-104 microphone — $225 for t lot. Must pick-up. W2VSC, 5 Surryhill Place, Huntington 11743. Phone no. (516) 368-3885.

WANT old "skirted" Navy key. H.O.Cantrell. (915) 356-2664.

HICKOK Dynamic transistor tester Model 870, cost — $425. Trade for frequency counter, test equipment. Hamilton, 6050 North Oakley, Chicago IL 60659.

FOR SALE: Collins 75S-3B, 800 cycle filter, mint — $500; Heath IG-62 color bar dot Gen. — $65. R. L. Sipe, K8SDQ, Box 157 Willshire OH 45898.

5114/case, good operating condition, (could use peaking) — $350; CV-89A TTY converter, excellent, plus new comparator (for diversity) — $200; FOB my QTH or make offer. WA6MSO, 6931 Hartcrest, Palos Verdes CA 90274. fone (213) 541-2200.

HALLICRAFTERS SK-133 receiver almost new, plus speaker — $195 will ship anywhere REA FOB. WB2BVL, 7 Bowen Pl., Stonybrook NY 11790. (516) 751-8792.

SPECTRUM Analyser, Panarmic SB-15a/R 0-600 kHz — $100; frequency synthesizer, Manson Labs. EQ-370 100 Hz steps, 1-MHz range — $200; diode noise generator and noise figure meter, Airborne Inst. Lab. 07005 — $50; HW-22 40-meter ssb transceiver and mobile supply — $110. Dave Halbert, WB6TNT, 280 Las Miradas, Los Gatos CA 95030.

BRAND new Clegg 66 transceiver — $145. Jim LaTorre P.O. Box 521, Lawrence MA 01842. Tel at work (617) 475-5000, X3236.

FOR SALE: FTDX560 transceiver w/cw filter & speaker — $450; Hallicrafters SX117 w/speaker — $150; Gladding 25 2-meter transceiver w/ac pwr supply, two antennas — $200. Douglas Randall Scrubber — $50; Drake MN4 matching network — $40; Vibroplex Standard Keyer — $10; Grid-dip meter, Model 1.5DM-810 — $25. Contact L. Cummins, WA9UCC, 3231 Kinser Pike, Bloomington IN 47401. (812) 332-1074.

COLLINS 32S-3, 516F-2 — $650; Collins 32S-1, 516F-2 with speaker — $450; Swan 350, 117 X CPS. — $285; Heath HM-102 wattmeter — $20. All excellent, manuals. W2BEG. (201) 757-3091.

LOST entire station in fire — please all who worked WN1RCJ/1 between Oct '72 and July '73 re-QSL — also would like good deal on transceiver and antenna or any other ssb-cw equipment. Wilfred Smith, 16 Main St., Easthampton MA 01027.

WANT to buy: Hammarlund HX-50 transmitter, must be in good working order. WA6OSF/4, 418 W Oakridge Rd., Apt. 110, Orlando FL 32809. Tel. (305) 855-1237.

DRAKE T4XB, R4B, AC4, MS4 & HA-10 keyer — $800. Gene Crumrine, K3OFV, 18-W Front St., Media PA 19063. Tel. (215) 206-0934.

ATWATER-Kent Model 12-4910 (breadboard) receiver — $145; Navy RBG (Hammarlund HQ-120) receiver — $65; Collins 180L-3 automatic antenna tuner — $75; LM-15 frequency meter, calibration book, regulated ac supply, cables — $50; Hallicrafters SP-44 panadaptor — $10; Heathkit Q-5er — $5; BC-610 plate coils and tuning units (Make offer). All with instruction books. Shipping extra ARRL Handbooks, 1962, 1967 editions — $3 each. Want Drake RV-4. Lester Harlow, W4CVO/6, 5045 Delmonte Avenue, San Diego CA 92107. (714) 233-1108.

NOVICE station: Heath DX-60 xmtr — $45; HR-10 rcvr — $50; Hallicrafters HA-5 VFO — $35; SX-111 rcvr — $110. FOB. G. Hitchcock, WA1SIT, 343 Main St., Wakefield RI 02879.

SELL: SB-100; HP-23; HP-13; HS-24; GH12-A; SBA-100; PM-2,4 mobile antennas — $400 firm, no trades. W6KDI, Edward Van Bosch, 931 Kenilworth Court, Walnut Creek CA 94596.

WANTED: Heath linear, Yaesu FT-101, Yaesu linear FL-2100, triband beam, rotor. Must be in excellent operating condition. David Critchlow, Box 567, Union City TN 38261.

TRANSFORMERS for Swan 260-270-1200 — $8.50 ea.; Fluke 803BR VTVM — $50; Beckman 735OR Eput/counter — $45; Ballantine 316 Ptop VTVM — $30; 1000' RG-62/U coax — $17. Box 1143, Brevard NC 28712.

jHW-100 just back from factory servicing and alignment — $210; HW-16 in excellent condition — $90. Going to college. Buyer pays shipping. WA8ZRF/9, 360 Cottage Hill, Elmhurst IL 60126.

CLEGG 66er 6 m — $99; Clegg 22er 2 m — $139; Clegg Thor VI 6 m 75 w — $129; Heath HW-16 Novice rcvr — $89; Millen 300 w antenna tuner CE20 458 mint — $69. S.a.s.e. for list of others. John Kakstys, 18 Hillcrest Ter., Linden NJ 07036. (201) 486-6917.

SELL: HP415B VSWR meter — $30; HP-805A coax prevision slotted line — $60; Stoddard URM-17 field-strength receiver, 375-1000 MHz — $120. Dor Hesselgrave, ex-W8SCM, 1165 San Mateo Drive, Menlo Park CA 94025.

4CX250B tubes, new — $21, per pair postpaid. C. M. Pruett, Route 8, Box 399, Fort Myers FL 33901.

WANTED: Collins S-line, round emblem. K3DPQ, 45 Briar Road, Wayne PA 19087.

SELL: Hy-Gain antennas, 14AVQ/WB — $32; 402BA with balun — $95; DB24 — $130; TH6DXX — $120; Collins 75A2 receiver — $200 and Collins 34VI transmitter — $100 or best offer. Plus shipping. Also prop pitch motor. Keith Bryant, 115 Laffer, Sigourney IA 52591.

WANTED: Drake model SPR-4 must be perfect, give details. W. Peirce, R. D. 1, Box 62, Elverson PA 19520.

DONATE your ham gear for a school station and receive a certified tax write off. We need both Novice and General equipment: transmitters, receivers, antennas, parts, etc. What have you? Ray Bisio, KS6EE/6, Yavney Academy, 7353 Beverly Blvd., Los Angeles CA 90036.

SIGNAL/One CX7A with standard cw filter, Deluxe service manual, in original carton, just tweaked up by expert — $1500. James O. Davis, K9ECM/4, Box 292, Greensboro NC 27408.

PARABOLIC reflectors, 2', 3', 4', 6', dia. 432-1296 MHz. Other sizes custom built. Lightweight fiberglass const. For further info write: Antec Enterprises, K6VJB, 6646 Clifford Ct., San Jose CA 95129.

COMPLETE semiconductor and majority of parts (including pc boards) for fm pip-squeak and pip-squeak described in August and Sept. 1972 QSTs. WB5FTE, 2641 Butler Dr., Norman OK 73069.

COLLINS mech filters, 455, 220, 250, 500 kHz. USB and LSB sets. Crystal filters. Large selection, good prices. S.a.s.e. list. WB6ORT, C. Isham, 6275 Arnold Way, Buena Park CA 90620.

COOL it with a new 100 CFM muffin mark 4 fan. All units postpaid, guaranteed. Check or C.O.D. — $6 each to P. R. Electronic Supply, P. O. Box 203, Webster NY 14580.

WANTED: Final-Henry 2K3 or 2K4, SB-220 or similar. Also Murch Transmatch, SB-303, and Magnum Six for Heathkit. W9WAM, Kansas City, (816) 358-1148.

N. J. NYC hams: Swan-350 w/117XC supply — $360. WA2ONH, Chuck Belavitz, 56 Cedar Avenue, Highland Park NJ 08904. (201) 846-6450.

SELL: Eico xmtr Model 720 — $50; Heathkit rcvr Model AR-3 — $10; Hallicrafters SX-117 Hardly used, excellent condition — $130. Ed Paul, 47 Mill River Ave., Lynbrook NY 11563.

RANGER 1, f/w, no modifications. Condition excellent — $80. GR-617-C Interpolation Oscillator for frequency measurement — $75. S.a.s.e. for list. W1BGW, 28 Newhaven, Boston MA 02132.

TRADE — One Drake 2B E/W 2-ac calibrator fb condx for Hallicrafters HA-20 VFO . . . . W4DSW, 23 Towana Rd., Richmond VA 23226.

TV camera for ATV, CCTV. Brand new professionally aligned, boxed. 75-ohm and rf (ch. 5-6) outputs, automatic light level, high resolution, all silicon transistorized, 1" vidicon, Ready to plug-in and use, with coax, switcher. With 12.5 mm fl. 9 wide angle lens focuses to 10" — $175. With 25 mm — $165, less lens — $160. Schematic, literature — $1, refundable. S. Bases, K2IUV, 19 Standish Avenue, Yonkers NY 10710.

FOR SALE: Heath SB-220 amplifier — $310; Drake T4XB transmitter — $335; Ten-Tec Argonaut transceiver, Model 250 power supply, EV 641 mike — $280; Heath HW-7 transceiver — $55; Simpson 260 VOM — $45; Model 28KSR RTTY — $125; pickup only. I ship other items. All in excellent condition. No trades. Prices firm. Cashiers check or money order only. Frank Connelly, WA7GWL, Rt. 4, Box 2387 Bremerton WA 98310. Phone (206) 692-9296.

MINT one owner 75A4 with 2.1-1.5 .08 filters spkr, 2-3-4002 tubes cartons still sealed. WA0GUN, 3734, So. Poplar St., Denver CO 80237.

HW-16 (mint); HG-10B (near unassembled); HD-10; HS-24 all with manuals — $165 ppd. or trade? K8BRX, 1234-1/2 Titus St., Traverse City MI 49684.

DON and Bob: new guaranteed buys. Discount Prices plus full warranty. Write for low prices on following: antennas, Hy-Gain TH6DXX, TH3 MK3, 204BA, DB1015A, 402BA, 400 rotor; Mosley CL33, CL36, S402; Triex tower MW50, MW65, W51 (FOB Cal); 2 M fm; Clegg FM27B; Midland 13500; Midland 13520 W-T; Regency HR2B; HR212; SBE144 — $149; Standard 826MA; 146A W-T; CDE Ham-M — $99; TR44 — $59.95; AR2 2R — $31.95; Belden 8448 rotor cable 10c/ft.; Belden 8214 RG8 foam 17c/ft.; 8237 RG-8/U 15c/ft.; Amphenol PL259 — 49c; Hallicrafters FPM300 Demos, factory warranty needed — $460 ea.; Write quotes items not listed. Shipping charges collect. Madison Electronics, 1508 McKinney, Houston TX 77002. (713) 224-2668. Nite/weekend (713) 497-5683.

STARTER gear: code courses, xmtr, rcvr, oscillator, misc. Mint. s.a.s.e. F. C. Goodell, 9405 Westmoreland Ave., Manassas VA 22110.

SELLING out Collins 75S3 — $283; 516F-2 ac supply; 312B-4 station control — SM2 mike; HA-1 keyer, Hunter Bandit 2000C amp, manuals — $1000 firm also Mosley TA33 and V5 vertical — Ham-M — $120. W4WJK, 1642 Fair Haven Drive, Riverdale GA 30274.

jNEW Simpson 260-4 VOM — $35; 5 digit 10-MHz solid-state frequency counter with columned ne2 readouts homebuilt but with drawings works good — $35, include shipping. W2TJ2, Fuggensperger, 101 Christie St., Tenafly NJ 07670. (201) 568-1267.

SELL: Drake TR-4 34PNB used only 10 hours MS4, AC4, RV4, DC3, package deal only — make offer. K8YNO, 5632 Haughey, Wyoming MI 49508.

HEATH HW-32A 20-meter ssb transceiver with HP-23A ac supply. Mint condition — $110. Going QRP. Mike Ryder, WB9CQH, 201-1/2 Depot, Oregon IL 61061.

HALLICRAFTERS SR400 ac Model P500 supply; D104 mic with G stand; SB200 amplifier — $700. George Regis, 150 Walnut St., Natick MA 01760. Tel. 655-4474.

COLLINS 75S-3B receiver with speaker, good condition, serial no. 15347 — $600 FOB my QTH. Vance Rhodes, 1103 North Second St., West Monroe LA 71291.

R4B, perfect — $300 or offer. Tatar, 1625 North Park, Cleveland OH 44106. (216) 229-3755.

SELL: Drake ML-2 fully xtal'd mint — $230; Eico 435 dc 5 MHz Scope, excellent — $80; Sony TC252D tape deck — mint — $110; W9LUO SSTV Monitor s/ps — $80; flying spot scanner - needs p/m tube & optics — $40; 2 m 30W Prog Line tx Strip & ac-p/s — $45; you pick up. Steve Dick, WB2EGR, 3119 Bailey Ave., Bronx NY 10463. (212) 884-9694.

FOR SALE: Eico 720 xmtr, Hallicrafters S-119 rcvr, Lafayette HA-230 rcvr, EMI vedeo camera, Regency Range Gain transcvr, Hallicrafters CE-3A transcvr, (convert them to ten), HD-11 Q-Multiplier, Heath and Lafayette VFO's, All in mint condition. Any or all, make offer. Bill Taylor, 208 Union Street, Brooklyn NY 11231.

ACTIVE Hams — monthly mailer of reconditioned and new equipment specials. Sell, buy, trade. Write: Associated Radio, 8012 Conser, Overland Park KS 66204.

WANT Hal-ST6. WB8IJX 3636 Douglas,Apt.3, Toledo OH 43613

WANTED: Any coil for HRO60, SOJ-3 Select-O-Jet unit, NFM-83-50 fm adapter, 60TS speaker. W5KTJ, Billy Hyatt, Route 1, Box 49, Ruston LA 71270.

WANTED: for cash — two Heath SB500's; state price, condition. Prefer local deal. K4JQC, 10009 Nottingham, Huntsville AL 35803. (205) 883-1503.

MULTI Elmac Pkg (AF68, PMR8A, PS1070) — $130; Heath 6 m ssb pkg (SB110A, PS23A, PS13A, SR600) — $325; Heath Spectrum Analyzer SB620 — $100; Hammarlund HQ180AX — $300; Hy-Gain 6 m 6el beam — $30; All equipment, even the beam, absolutely mint, with manuals and cables. You pay shipping or will deliver within 150 miles. Prices not firm, make offer. Dan Roe, W8JSR, 24644 Madison Ct., Apt 227, Farmington MI 48024. Ph (313) 477-4846.

TOWER *wanted* — 70' *or higher, freestanding, either rigid or crank-up.* Send details to Robert Leo, 7151 Bel Air, Corona CA 91720.

PERFECT HR-2A 2 m fm xcvr (34/94/94; 52/52; 28/88) for sale. First check for $175 and I ship immediately. Tom Skelton, 130 Mountain View Lane, Clemson SC 29631.

DISCOUNTS on all Shure and Electro-Voice microphones. Shure 444 list — $51, only $24.57; E-V 619 list $59.50, only $2573. All units, postpaid, guaranteed. Check or COD. Other models available. Advance Sound Company, 188 Warner Road, Huntington NY 11743.

SELL: Heathkit HW-16 and HG-10B Novice gear, built by expert, used only 3 mos — $145 w/manuals. WA3TYB, 2190 Lehman St., Lebanon PA 17042.

SSB transceiver, Hallicrafter SR-150, ac and dc power supply with mobile mount. P & H Electronics LA-400C, 1 kW linear, manuals. Excellent working condition. Best offer. All offers answered. W8SZF, 3075 Scarborough, Cleveland OH 44118.

SELL: HW-12A — $55; HW-32 — $45; Eico 720 — $35; Heath metal locator — $52; manuals included, 2 m Motorola 41V — $55; Standard Vibroplex — $10. Pickup or you ship. Want: Tempo FMP. Cleveland, WA6WJV, 1263 Dartmouth, Claremont CA 91711. (714) 626-5629.

304TL's — $20: Klystrons and waveguide assembly, best offer; Want 32S-1. WN6VUD. (213) 346-5136. 3750 Degovia, Woodland Hills CA 91364.

DRAKE 2B, very mint — $160; Gonset GSB-100 ssb, a-m PM exciter, mint — $135; going mobile, need HP13 supply. All replys answered. Jon Croke, WB9HMD, 295 Berkeley, Winnetka IL 60093.

SELL: HW-16; HG10B, HS24 and more — $150. Write, WN9KMN, 344 Sherry, Park Falls WI 54552. DRAKE TR4 with noise blanker, RV4, AC4, looks and operates like new — $600. WB9EIE, 804 Jordan Place, Rolkford IL 61108.

NORTH to Alaska, must sell Drake R4B — $310; MS-4 — $10; MN-4 matching network — $40; Johnson TR switch — $10; Ten-Tec KR-20 keyer — $30; Rohn 10 ft. roof tower — $15. Many with manuals. Shipping included. Chris Daly, WA2BAN/6, c/o 160 Bellevue, Upper Montclair NJ 07043.

GOOD buys — Collins kW transmitter KWS-1 — $325; 75A4 — $250; both for $525; 75S3 — $325; Johnson Desk Pedestal kW amplifier; ssb, cw and full kW, a-m capability — $250; Johnson Ranger, xtal & VFO type Novice transmitter — $75. Prefer cash & carry otherwise certified check, FOB Albuquerque, W5RFO. A. J. Rokosz, 3704 Sara Rd., Rio Rancho NM 87124.

TAPE deck — Ampex 2160, excellent — $285; or trade for transceiver or ?. Give full details. W6TF, 7335 Donna, Reseda CA 91335.

HEATH 301 — a-m and ssb — $200; Heath 400 — $200; Heath 620 — $120; Apollo 6-meter linear — $125; Viking I — $40; Triplett 630 PL — $30. Cashier Check or M.O. You ship. WA8JSB, 1701 East Del Rio, Tempe AZ 85282.

STAINLESS Steel! Threaded, washer, hardware! Insulators. S.a.s.e, W8BLR, Wait, 29716 Briarbank, Shutthfield MI 48076.

SERVICE manuals most Hammarlund equipment since 1930 — $5 each postpaid. Will align your Hammarlund receiver to original specifications, 15 years factory experience. Wayne Cordell, K4HCS, Blue Ridge Communications, Rt. 4, Weaverville NC 28787. (704) 645-7070.

FOR SALE: Swan 500-C — $325; Swan 250-C with NS-1 noise silencer — $260, 117XC - a.c. power supply — $75; All in new condition. Packaged sale — $600. Perfer local sale. W6JFZ, 139 W. Alta Green Port Huenema CA 93041. (805) 487-0520 or (714) 536-0359.

YOU are wanted on 3910 kHz every Sunday morning at eight by the Central Texas Emergency Net. Check in for participation in training for emergency operation and emergency message handling. Good fellowship. Jim Brown, W5BOO, Net Manager.

HAMMARLUND 170 ac-vhf, 160 through 2 meters. Brand new in carton — $250 firm. Fred Bopp. 1 Shaw Street, Fall River MA 02724. (617) 674-9162.

WANTED: SP-600 receiver cabinet for table-top mounting; must be in good shape. W. E. Curd, 7124 Lakeland Rd., Las Vegas NV 89128.

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COLLINS 75S-3B rcvr with 200 Hz cw filter, SN 17 K, excellent condx — $650; Invader 200 ssb xmtr — $130. FOB Larry Laitinen, WA6JYJ, 217 Orchard Rd., Felton CA 95018.

HW-7 QRP rig/ac/phones/key — $50; Turner 454C — $12; Swan FM2X, new in the box w/Hy-Gain 263 whip — $175; HXL-1 linear, never fired up — $200; F. S. Eggert, Box 2154, Livonia MI 48151.

DRAKE TR-3, ac & dc power supplies; Hustler mobile antennas — 10, 15 & 40 meters; TR-3, just factory overhauled. Drake and components, sold as package — $500. Also, Ameco 2 & 6 meter transmitter, model TX-62, in use only 40 hours — $150. Call 745-5833, Kelly, 3 Varno La., Enfield CT 06082.

SELL: Drake ML2 fm transceiver 144-148 MHz, 12 channels, 10 *watts output* ac dc cord, new *condition. Complete* $150. Will ship. George Konnick, Pinecrest Apts. P2, West Main Street, Riverhead NY 11901.

QST January 1930 thru December 1970 for sale — $160; CQ January 1953 thru December 1970 for sale — $54. I will box, you pay freight. Can deliver to some areas Michigan, Ohio. Skip, W8HFA, 1462 Sodon, Bloomfield Hills MI 48013.

NATIONAL NCX3 transceiver and NCXA power supply, very *good condition, sole owner,* little used, cable, manuals and original cartons — $190. Will deliver Boston area or ship prepaid. Howard Reddy, 49 Rawson Road, Brookline MA 02146. (617) 232-1262.

WANTED: HRO-60 receiver coils E, F, G, AC, AD. R. Zerfass, 1802 N. Argonne Ave., Sterling VA 22170.

CX-7 — $1200; CX7A — $1300, used in good working condition. Brand new latest production CX7A — $2195; Ten-Tec RX-10 — $25; TH6DXX unpacked but never assembled or used — $100; new Hy-Gain 3 3L 20 m 204BA — $100; 153BA — $50; 103BA — $40; Motorola HEP-170 2.5 A, 2500 PIV diodes — $19.95/C. Factory authorized Collins sales and service center will buy or trade for S-line and KWM-2. New Collins, Tempo, Kenwood, Drake, Mosley, ETC. Douglas Electronics, Bob Douglas, W5GEL, 1118 S. Staples, Corpus Christi TX 78404. (512) 883-5103.

KWS-1 and 75A4 combo both late numbers — $900. Cash and pick up only. S.a.s.e. brings interesting list. Reveal, Lawrence Rd., Dover NJ 07801.

SELL: TCS transmitter, receiver, and heavy-duty ac power supply, A-m & cw, 1.5 thru 12 MHz, in 3 bands, 150 watts cw — $65; Early model HRO and power supply, 1.7 thru 30 MHz with 5 coil sets included — $45. K4GEE, 395 Garden Lane, Atlanta GA 30309. (404) 876-2715.

YAESU FT-101 cw filter and 160 m xtal installed. Under factory warranty until October. Will ship paid ups where possible. Owner transferred to Japan — $570. Al Ross. WA7UQE, 1935 Walker Rd., N.E. Salem OR 97303.

SIGNAL/One repair and alignment CX7 updating. References. Dick Cunningham, K9HHP, 1477 N. 96th Ave., Omaha NE 68114. (402) 391-6230 (nites).

MOBILE Ops — Write for info on shielded ignition systems and noise suppression components. Summit Enterprises, 36 Winchip Road, Summit NJ 07901.

GE MTS — Motorola PV speaker, TT pad, all accessories (except duplexer). Most reasonable offer — $240. GE ovens $3 each. Crystals 07/67 and 52/52 $7 pair. Dave, WA1IKN, RFD 1, Box 106A, Gales Ferry CT 06335 or (203) 464-0225 evenings.

HW-22, HP-13, cables, books, latest Webster "Bandspanner," — $130. Will *separate.* K1LEC, Box 73, N. Springfield VT (802) 886-7121.

COLLINS 30L1 round emblem — $395; mint, wanted 75S3B/C, 32S3, KWM2A round emblem only, wanted NCL-2000, for parts or operational, wanted MN-2000, waters Q-multiplier, Henry linear working or not. Call after 10 PM E.S.T, or write Bruce, W2RHE, 2609 Finlaw Ave., Pennsauken NJ 08109. (609) 662-6575.

Pacemaker, like new — $90; TR-44 rotor — $40; TA-32 beam — $50; you pay postage. Rick Genter, K4SKX, 7612-B Beth Road, Richmond VA 23228.

SELL: Heath HR-10B rcvr — $60; HRA-10-1 calibrator — $5; Eico 723 Novice xmtr — $30; Wanted: ant. matcher. WA4AFN, 2504 Monteview Dr., Huntsville AL 35803.

OLDEST Antique, Western Electric 231-D (like WD-12) new sealed carton, New Jan Magnetron 2J51 listed — $675. Barry's Green Sheet. Make offers. Want Pilot Super Wasp — W2ABE.

HEATH SB-303 mint with cw filter — $300; SB-401 in excellent condition with crystal pack — $270. SB-610 monitor used three hours — $70. You pay shipping or will deliver within 75 miles. WA2LOR, P.O. Box 271, Sound Beach NY 11789. (516) 744-7681.

HW-32 & HP-23 — $85; Gonset GR-212 rcvr — $50. K4UNU, Box 6, Turbotville PA 17772.

FOR SALE: KWS-1 No. 1451 — $850; 75A-4 No. 4856, 0.5, 3.1, 5.0 filters, spkr — $525; 30S-1, factory-sealed spare 4CX-1000 — $975. KWM-2A, PM-2 — $950. Wanted: Transformer No. 662 0157 00, for KWS-1. James W. Craig, 25 Sherburne Avenue, Portsmouth NH 03801. (603) 436-9062 (207) 439-0474.

YAESU FTDX560 transceiver with 600 Hz cw filter, 560 watt PEP, ssb, 500 watts cw. Excellent condition — $350. W1RML, 31 Midwell Road, Wethersfield CT 06109. (203) 529-2785.

HALLICRAFTERS SX-110 and Eico-723, Perfect Novice o QRP station. Mint condition w/manuals, crystals — $120. 3 Harvard Court, White Plains NY 10605. (914) 949-9164.

VIBROPLEX Deluxe Model for sale; or swap for Fibrokeyer o similar keyer. Norman Feiteison, 22 Darbrook Road, Westpor CT 06880.

NOVICE, non-technically oriented high school student desperate for inexpensive study aids to pass General. Davic WN2HTO, 17 Alfred Road West, Merrick NY 11566.

HEATH HW-16 & HG-10B VFO, year old, excellent condition - $115. Want Heath HW-100, 101 with power supply. Will answe all inquiries. Dave, WB9KXM, 404 Davis St., Chenoa IL 61726

WANT *to buy* Collins KWM2 and ac, must be clean and price right. Also have to sell clean Swan 250 and ac, Swan Mark 6 linear, both $700 or trade for KWM-2 outfit. Richard Scharl 417 North Ferry, Ottumwa IA 52501.

SELLING for the late Dick Carpenter, WA2BCI, Swan 500CX with ps; Deluxe Vibroplex, 18 V; Swan Doublet; DX-100; Johnson bypass filter; D-104 mike. No reasonable offers refused. WB2WII.

HOSS trader Ed Moory says he will not be undersold on cash deals! Shop around for your best price and then call or write the "HOSS" before you buy! New Regency HR-2B two-meter fm transceiver, 15 watts, amateur net — $229; Factory authorized dealer for new Drake, Collins, Swan, Regency, Galaxy, Hallicrafters, and others: write for quote! New Rohn 50 ft. heavy-duty foldover tower, prepaid — $255; New Mosley CL-33 and demo Ham-M rotor — $215; used equipment: R4-b — $309; T4-XB — $349; Ham-M — $85; TR-4 w/34NB — $459; mint KWM-2 — $650; 32S-3 — $649; FPM-300 — $489. Moory Electronics Co., P.O. Box 506, DeWitt, Arkansas 72042. Tel. (501) 946-2820.

SELL: DX-60 and R-100 with electronic T/R switch. Good condition — $100. Carl Buehler, WN9JWC, 3530 Lorene, Belleville IL 62223.

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WANTED: Ham with General Class license or better to manage amateur radio department. No phone calls. By appointment only. Send resume to Mr. C. J. Harrison, Hatry Electronics, 500 Ledyard Street, Hartford CT 06114.

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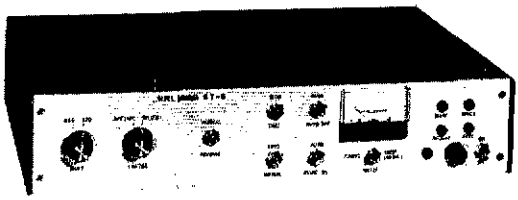

TOP QUALITY RTTY...WITH THE HAL MAINLINE ST-6 TU. Only 7 HAL circuit boards (drilled G10 glass) for all features, plug-in IC sockets, and custom Thordarson transformer for both supplies, 115/230 V, 50-60 Hz. Kit without cabinet, only $135.00; screened, punched cabinet with pre-drilled connector rails, $35.00; boards and complete manual, $19.50; wired and tested units, only $280.00 (with AK-1, $320.00).*

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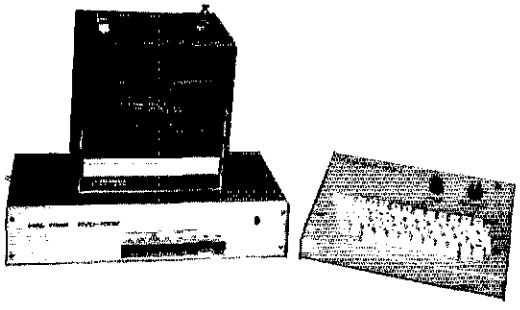

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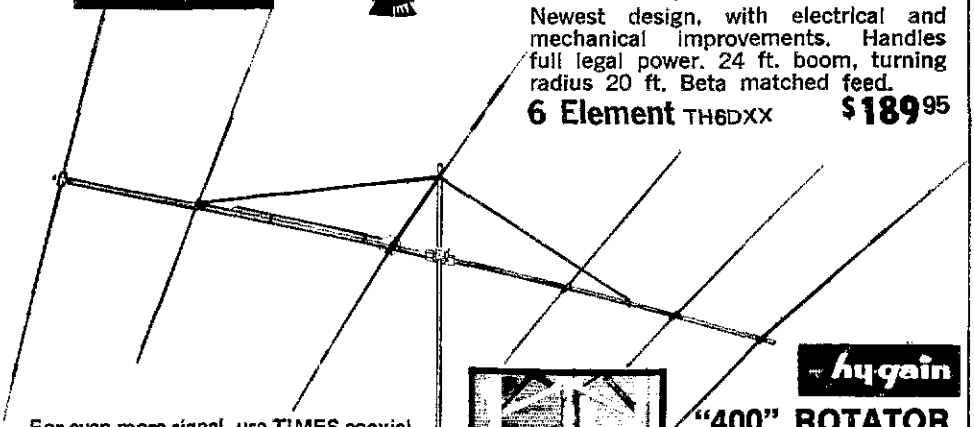

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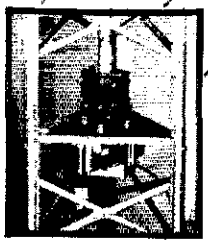

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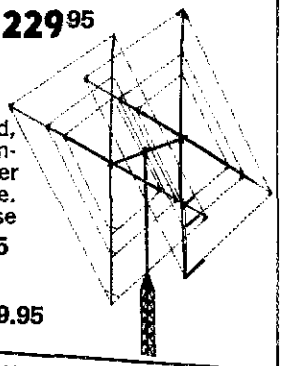

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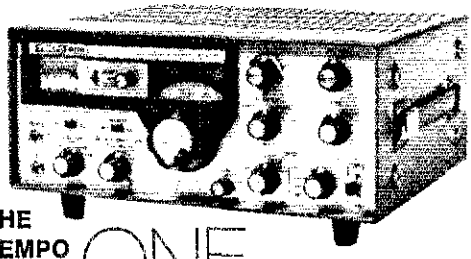

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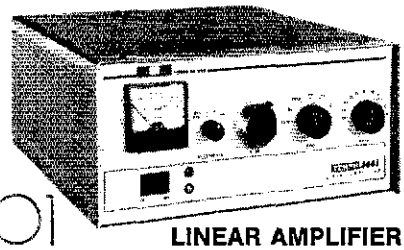

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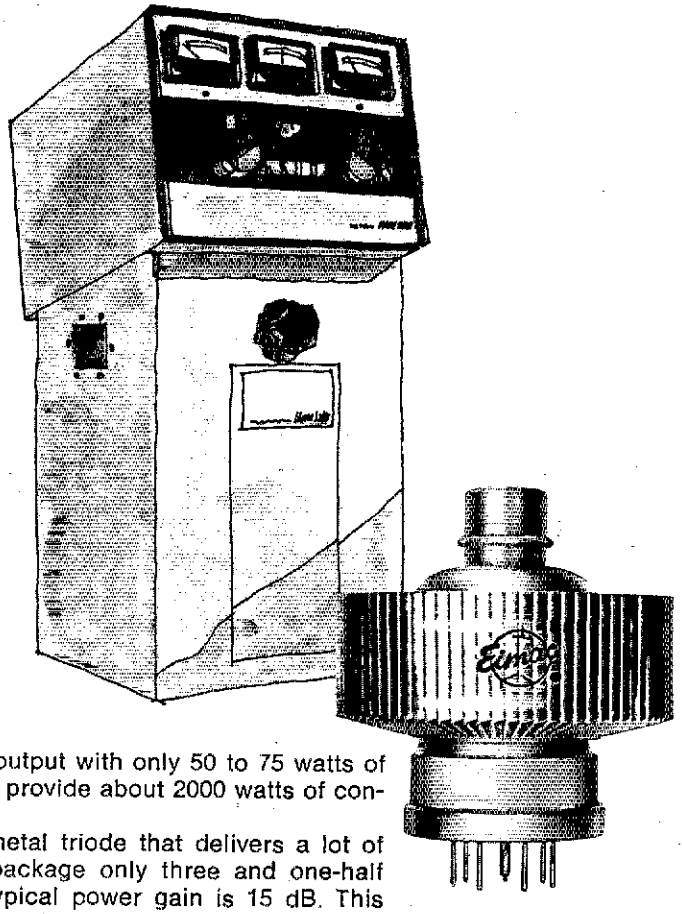
Butler, Missouri 64730 816/679-3127

EIMAC's rugged 8877 powers Henry Radio's reliable 4K Ultra linear commercial amplifier.



When Henry Radio set out to design a sophisticated linear amplifier for high reliability communications in the high frequency range, they chose EIMAC's high-mu 8877 power triode.

The result is the new 4K Ultra, which operates with 4000 watts input in heavy-duty commercial service. The 4K employs continuous variable capacitive and inductive elements tunable over the 3.0 to 30 MHz range. Optimum input and load conditions are provided for a wide variation in antenna systems. EIMAC's 8877 enables the 4K to deliver over 2500 watts of continuous SSB or CW output with only 50 to 75 watts of drive. For RTTY the 4K will provide about 2000 watts of continuous duty output.

The 8877 is a ceramic-metal triode that delivers a lot of power and linearity in a package only three and one-half inches high. At 30 MHz, typical power gain is 15 dB. This impressive gain is achieved with 3rd order intermodulation products −38 dB below one tone of a two equal-tone drive signal.

With Henry Radio, you know quality counts. And they know you can't do better than EIMAC. For full specifications on the 8877, write to EIMAC Division of Varian, 301 Industrial Way, San Carlos, California 94070. Or contact one of the more than 30 Varian/EIMAC Electron Tube and Device Group Sales Offices throughout the world.

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