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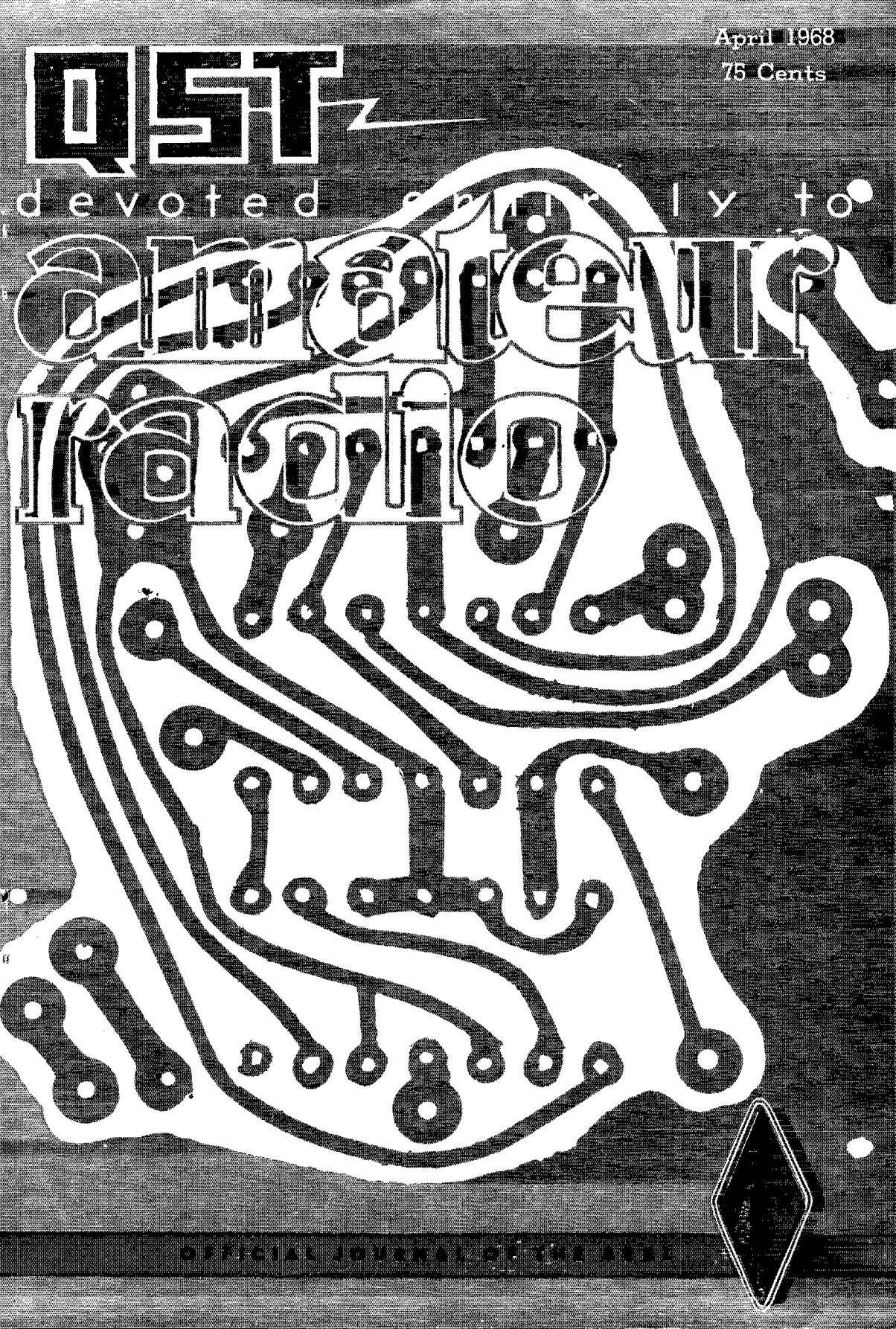

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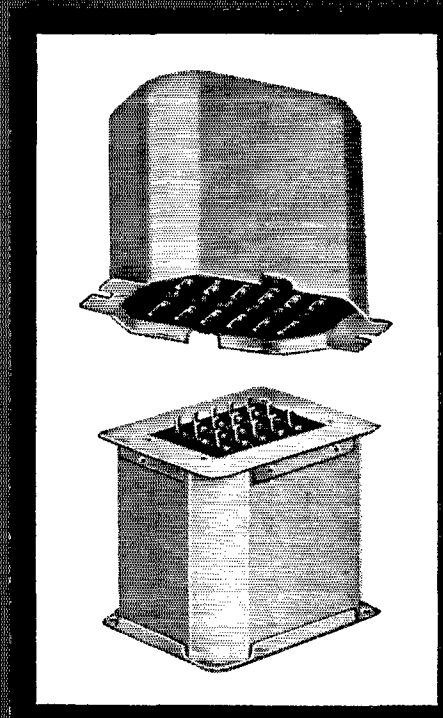

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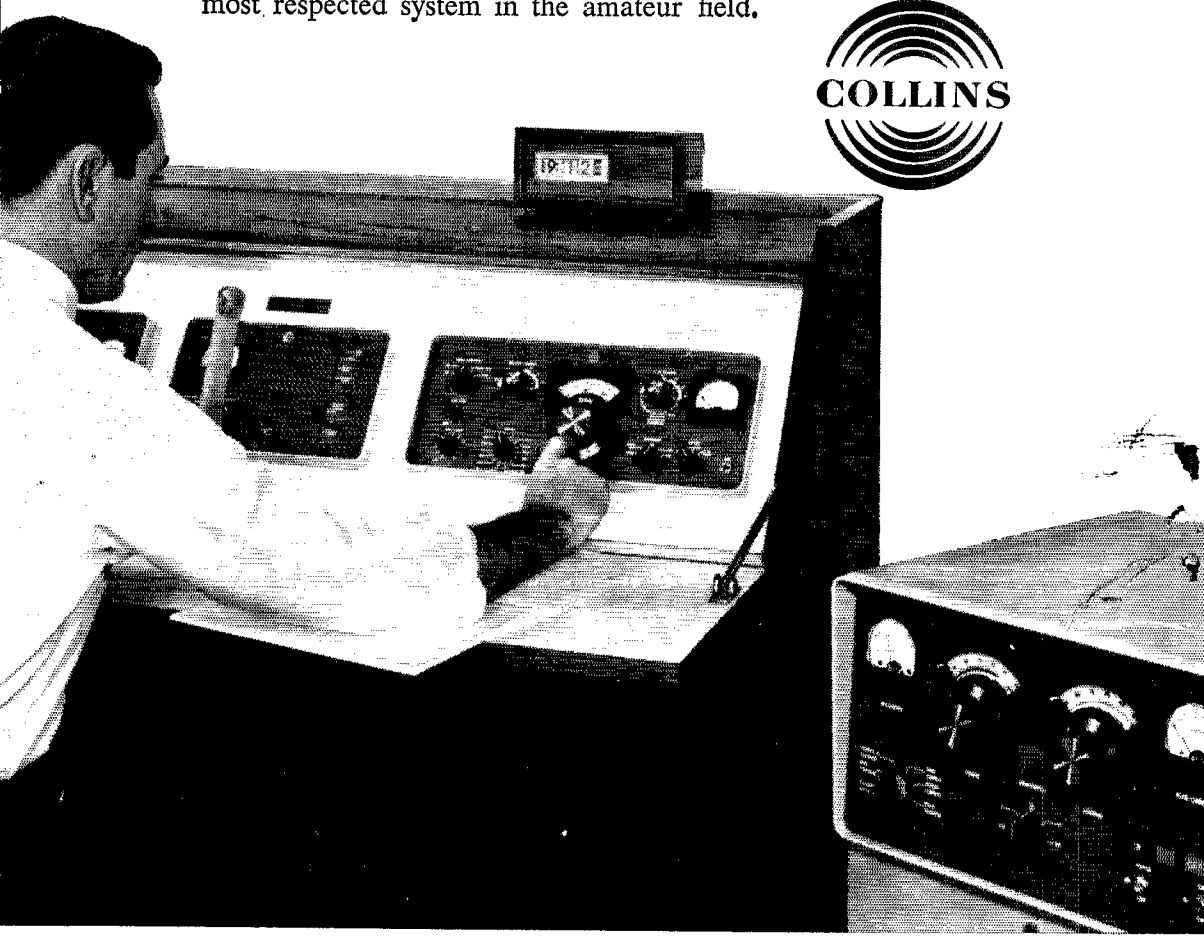


QST

APRIL 1968

VOLUME LII NUMBER 4

PUBLISHED MONTHLY, AS ITS OFFICIAL ORGAN, BY THE AMERICAN RADIO RELAY LEAGUE INC., NEWINGTON, CONN., U. S. A. OFFICIAL ORGAN OF THE INTERNATIONAL AMATEUR RADIO UNION

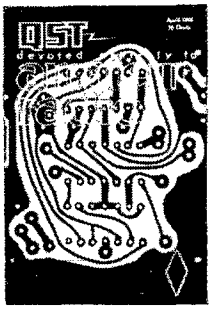
OFFICES

225 Main Street
Newington, Connecticut 06111
Tel.: 203-666-1541

Subscription rate $7.50 per year postpaid, U.S. funds, in Canada and U.S.; $8 elsewhere. ARRL Membership, including *QST*, available only to individuals with a bona fide interest in amateur radio: $6.50 per year, U.S. funds, in Canada and U.S.; $7 elsewhere. Single copies, 75 cents. Foreign remittances should be by international postal or express money order or bank draft negotiable in the U.S. and for an equivalent amount in U.S. funds.

Second-class postage paid at Hartford, Conn. and at additional mailing offices.

INDEXED BY
Applied Science and Technology Index
Library of Congress Catalog Card No.: 21-9421



OUR COVER

Circuit-board projects are fun. This one belongs to the IC keyer shown on page 22.

—CONTENTS—

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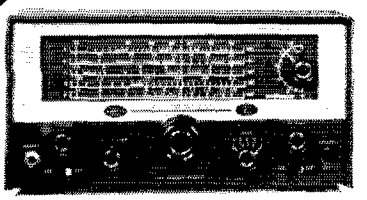

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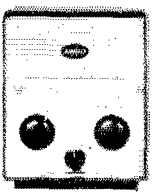

VFO-621

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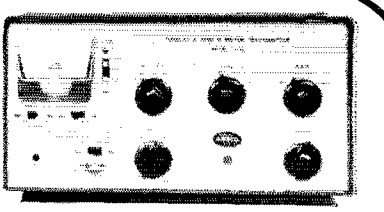

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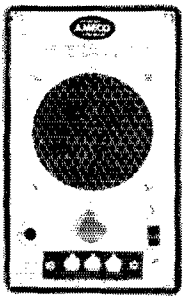

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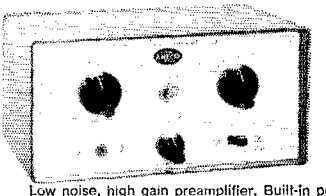

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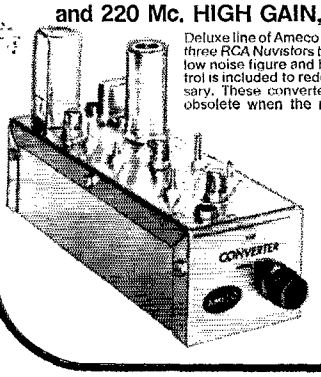

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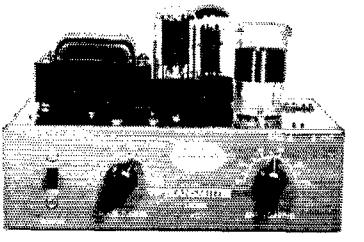

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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. 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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Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisite, although full voting membership is granted only to licensed amateurs.

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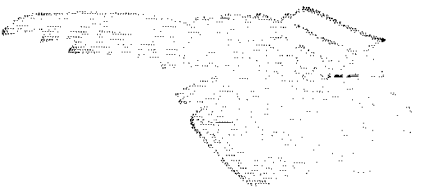
"It Seems to Us..."



Third of a Series

ARRL And The COMMUNICATIONS DILEMMA

The word "communications" has specific connotations for League members — first, as it applies to the art itself in which we as amateurs are engaged, and second, as it relates to the special functions of our Communications Department.

But communications has a broader meaning, and in this sense, oddly enough, it is one of the special problems in ARRL affairs.

Amateurs generally, and we League members in particular, tend to hold rather strong opinions where our ham activities are concerned. This may be attributable in part to our dependence upon a government regulatory agency, or in part to the independent nature of amateurs themselves. In any case, to a disconcerting degree, these strong opinions occasionally seem to be predicated on dubious information or judgments too quickly formed. With our instant communications, a particularly juicy rumor or hot bit of gossip gets very rapid circulation indeed. Somehow, a colorful fallacy is almost always more fascinating than a dull fact. And quite often "the League" — or to put it more accurately, the Board and/or the headquarters staff — finds itself right smack in the middle.

Psychologists tell us that opinions are formed on the basis of what we understand or believe to be the facts. Understanding or belief, in turn, is the product jointly of the quality of the information received, related judgments already made, and the emotional involvement in the situation. There are probably not very many hams, for example, who get very excited, one way or the other, about Zulu heraldry. Or the practice of witchcraft in New Guinea.

The fact that controversy often occurs in the League is evidence of (1) a very proprietary interest on the part of its members — which is exactly as it should be, (2) an active rather than a passive management approach to the current and future problems of the organization, and (3) a vigor and vitality that are the best possible assurance of continuing strength. Controversy is certainly desirable and can be enormously productive so long as it is based on well-informed, sound judgment.

Perhaps what we need is not so much instant communication as it is instant perspective. QST

The basic Murphy's Law is, "If anything can go wrong, it will." And with the publication of "Edsel Murphy's Laws" in February QST, it did. The piece is largely a duplication of an original by Dr. Donald L. Klipstein, Vice President of Engineering, Measurement Control Devices, Philadelphia which appeared in the August 1967 issue of "EEE," a Mactier publication. W5ACL did indicate to us the source of his material, but we failed to follow through with a request for permission and use of a credit line. The article is first-rate, as evidenced by our readers' comments. But to Dr. Klipstein and "EEE" belong the plaudits.

Mail delay problems, again. To some areas, New York and New Jersey in particular, QST has taken as long as a month in transit. (And it works both ways; from Ridgefield, Conn. to Hq., one piece of mail took 12 days -- in the same state yet! -- and a first-class letter from W4KFC in Virginia took ten.) Newspaper and magazine publishers and printers are complaining vociferously to the Post Office -- but no results yet.

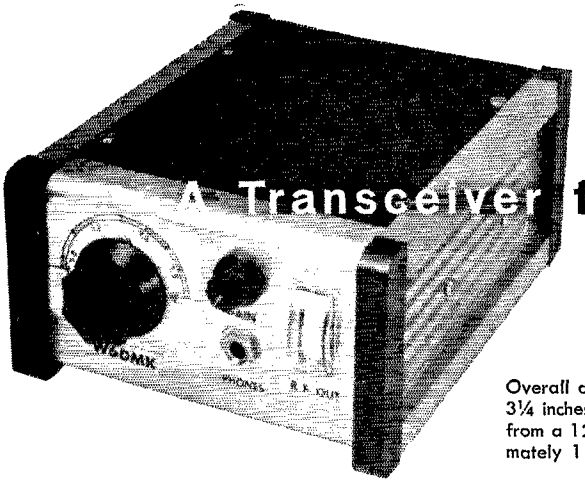
Even parcel post is getting a beating -- literally. Despite use of the same careful packing which worked well for years, our 1968 Handbook individual shipments have produced some amazing results. One broke open in transit and was repacked by the Post Office -- with two radio books from Howard Sams! A similar incident brought a ham, in our Handbook carton, a sweater! We wonder what pretty young thing may be somewhat confused by receiving a Handbook from some apparel company?

On a brighter note: For several years the League, along with many other non-profit societies, was under detailed appraisal by the Internal Revenue Service to determine whether any revenue activities -- in particular the sale of publications -- fell under the classification of "unrelated business income" and would thus be taxable. We are pleased indeed that, after extensive filings and conferences with IRS personnel, a ruling has been issued in our favor, in effect confirming long-standing decisions of the Treasury Department. As an entirely separate matter, however, IRS has decreed that advertising revenue from publications of all non-profit societies will henceforth be taxable.

Each month we receive one or more notices of hamfests or other special affairs just too late to get into QST in time to be useful. We're as sorry as you. Please remember -- normal deadline is the 15th of the second month preceding date of issue. E.g., for the June issue, we should have material by April 15.

We've compiled an initial list of active v.h.f. stations, with calls, frequencies, power, etc., as a help to those who would like to make more contacts, both on the air and in person. A business-size (#10) self-addressed stamped envelope to Hq. will bring you one.

A perennial problem of democratic institutions -- from the Government to membership societies -- is the contention that "one small voice among so many just doesn't count, so why try." As a League member, you have not one but several channels for registering your opinion where it will be heard and where it will count. Your ballot is the most important, of course -- but there is also your SCM and other members of the ARRL field organization, your own affiliated club, and your division director who can represent you effectively only when you let him know your opinion. That's what he's there for, and he wants to hear from you.



A Transceiver for 7-Mc. C.W.

Overall dimensions of this transceiver are 5½ by 8 by 3¼ inches. Built for QRP c.w. work on 7 Mc., it operates from a 12-volt d.c. supply. Transmitter output is approximately 1 watt, and the superhet receiver has a crystal filter for high selectivity.

Solid-State Design for a Compact QRP Station

BY JOHN P. RASOR,* W6DMK

One would wonder why, in this age of high power, that consideration should be given to a low-power transceiver. There are several reasons. By full utilization of inexpensive solid-state components, a practical design can be developed that will allow the construction of a complete transceiver in a small, lightweight package. Furthermore, because of the low energy requirements primary cells (dry batteries) are a practical source of power. Being independent of the power line or lead-acid storage batteries enables one to operate in locations and under conditions where a.c.-operated rigs would not be practical. Apart from this, a transceiver of this type makes an excellent standby unit for emergency purposes.

But still, there is no better reward for the time and effort of building a low-power rig than working your first DX station with a two-lantern-battery power supply!

The Receiver Circuit

The circuit of the transceiver is fundamentally rather simple. Figs. 1C and 1D show that the receiver section comprises an r.f. stage, mixer, intermediate-frequency amplifier with crystal filter, detector, and one stage of audio.

Of the foregoing, everything is straightforward with the possible exception of the use of complementary circuits in the r.f. and i.f. amplifiers. The complementary circuit was favored after a number of earlier r.f. amplifiers had been bugged with instability when maximum gain was required. To insure stability with common-emitter circuits it is usually necessary to introduce some form of mismatch — i.e., connecting the transistor collector completely across the coil, over-coupling, or swamping the collector coil with a resistor to lower the *Q*. With the complementary circuit the second transistor can be operated at maximum gain with no sign of instability. Also, with sufficient gain in the i.f. only one stage is required, which somewhat offsets the added components required by the complementary design. The complementary circuit requires a fixed bias potential of 1.4 volts. This is easy to obtain by using two cheap silicon diodes in series in the collector return circuits of Q_{10} and Q_{13}.

The crystal filter is a simple but effective one, and has the advantage that both the filter crystals and the b.f.o. crystal (Fig. 1A) can be of the same frequency and are easily obtained from a number of surplus sources. A 60-pf. trimmer capacitor is placed in series with one of the filter crystals. Sufficient frequency shift can be obtained by varying the capacitor to result in a

The advantage of the c.w. transceiver is, of course, that the transmitted and received frequencies are always the same. The oscillators are common, but as there is no need to make double use of an i.f. amplifier (as in the s.s.b. transceiver) the circuits are straightforward. This almost pocket-size transceiver has the stability and selectivity one needs for c.w. operating, and the transmitter develops a bit over 1-watt output for QRP work. It can be powered by a 12-volt d.c. supply giving a maximum current of 300 ma.

* 118 East Ave. San Juan, San Clemente, Calif. 92672.

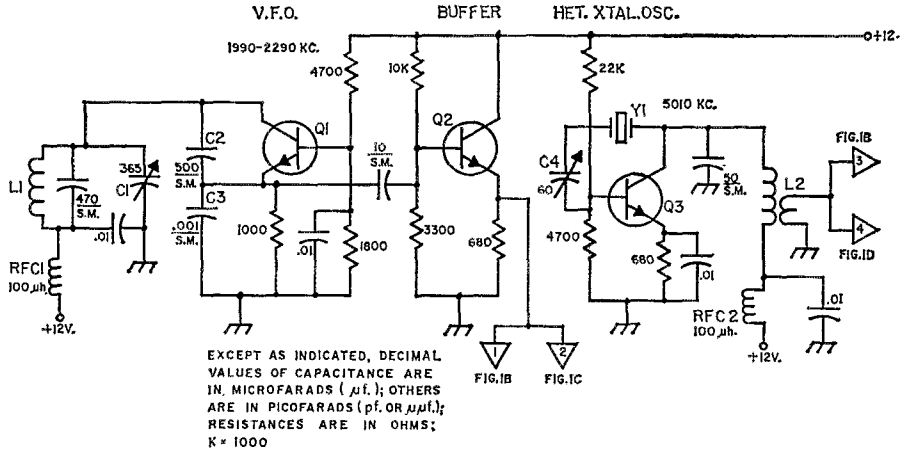


Fig. 1A—The v.f.o. and heterodyne crystal oscillator circuits. S.M. indicates silver mica capacitors; other fixed capacitors are disk ceramic. Resistors are ½-watt composition.

C_1—365-pf. variable, t.r.f. type.
C_2, C_3—For text reference.
C_4—8-60-pf. miniature mica trimmer (Arco-Elmenco 404).
L_1, L_2—See Table I.
Q_1—N-p-n, 2N1305 or equivaalent.
Q_2, Q_3—N-p-n, 2N3905 or equivalent.
RFC_1, RFC_2—Miniature 100-μh. choke, encapsulated.
Y_1—Approx. 5000 kc.

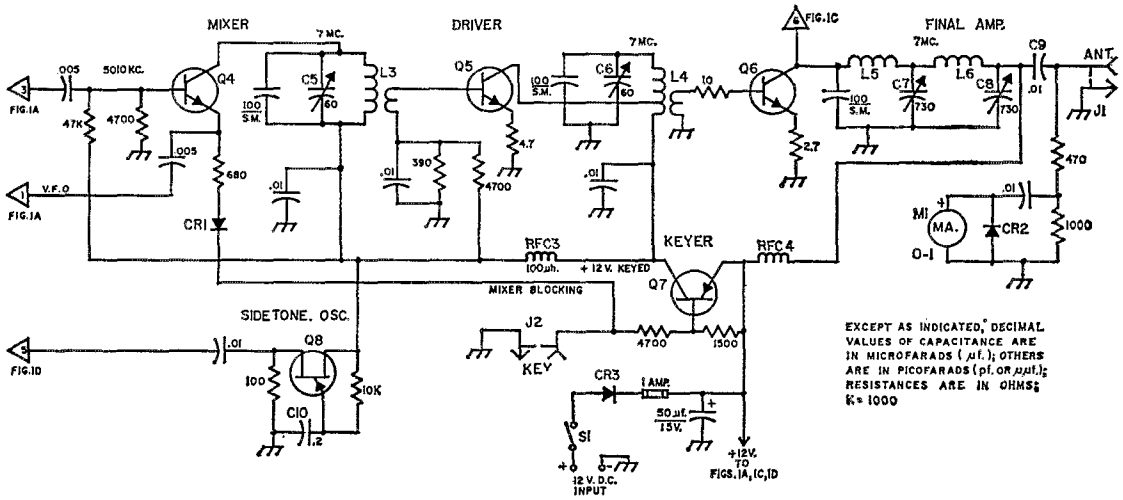
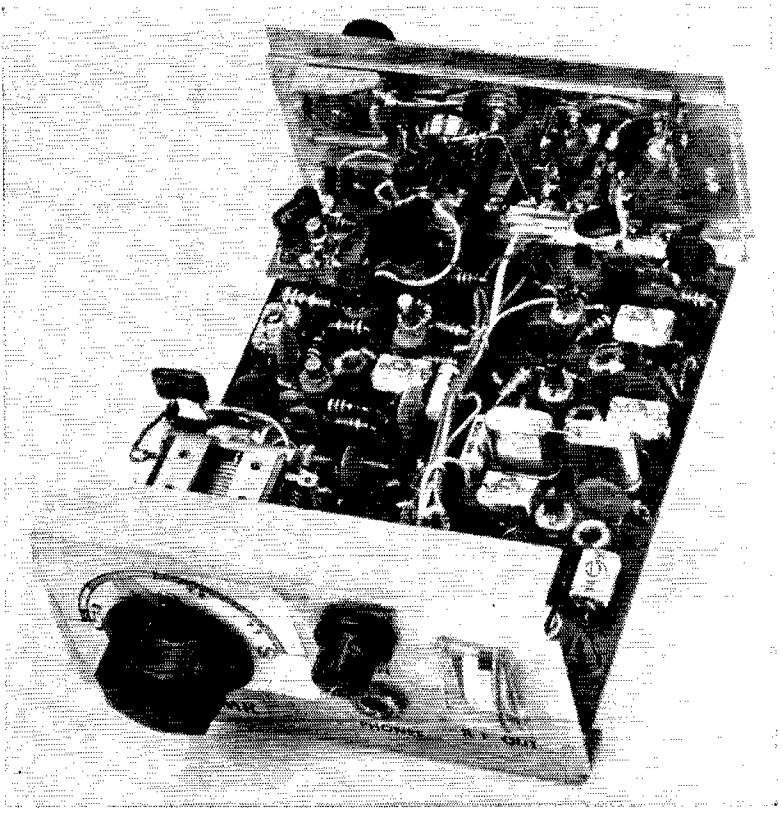


Fig. 1B—Transmitter mixer and amplifiers. Capacitors with polarity indicated are electrolytic. Except as indicated below, other fixed capacitors and resistors are same type as in Fig. 1A.

C_5, C_6—8-60-pf. miniature mica trimmer (Arco-Elmenco 404).
C_7, C_8—100-550-pf. mica padder (Arco-Elmenco 304) with 180-pf. silver mica in parallel.
C_9—0.01-μf. mylar, 400 volts.
C_{10}—0.2-μf. ceramic, 25 volts.
CR_1, CR_3—Silicon diode, 250 ma.
CR_2—1N34A or equivalent.
J_1, J_2—Phono connectors, chassis mounting.
L_3–L_8, incl.—See Table I.
M_1—0–1 milliammeter, edge mounting.
Q_4—N-p-n, 2N3905 or equivalent.
Q_5—N-p-n, 2N697 or equivalent.
Q_6—N-p-n, 2N2195 or equivalent.
Q_7—P-n-p, 2N1305 or equivalent.
Q_8—Unijunction, 2N2646 (GE).
RFC_3—Miniature 100-μh. choke, encapsulated.
RFC_4—See Table I.
S_1—S.p.s.t., on gain control, R_1, Fig. 1C.

very desirable passband for c.w., and by careful adjustment a satisfactory 2- to 3-kc. passband for s.s.b. is entirely possible. Adjustment of the filter can be made on received signals, but care should be taken to keep the input level down so as not to overload the filter.

The second detector is not operated as a true product detector but rather as a combination detector and amplifier. This choice was made because if the detector overloads on strong signals it does not impair readability in c.w. reception, and operating the stage this way results in appreciable gain. The audio stage is conventional, with the collector operating directly into the magnetic earphones. More than enough gain is available to "rattle the cans."



Interior view from the panel end. The receiver occupies the right-hand half of the etched-board chassis, with the r.f. amplifier at the rear and subsequent stages in order progressing toward the front. The transmitter, the left half, begins at the panel with the v.f.o., the final amplifier being at the rear. The final tank circuit is mounted on the left-hand half of the rear wall of the cabinet.

Powdered-iron-core toroids are used for all of the r.f. tuned circuits except the v.f.o. The toroids offer a number of advantages, both from the standpoint of economics and, even greater, in operation and installation. The electric field is concentrated within the toroid so that coils can be placed close together with little if any field interaction. As the core permeability is high, fewer turns are required for a given frequency and, of course, the Q is very high. For the home builder, winding an i.f. transformer is a simple matter with the toroid cores.

The Oscillators

The v.f.o. uses the familiar Colpitts circuit, Fig. 1A, followed by an emitter-follower stage for isolation. Silver-mica capacitors are used in the tuned circuits. By proper adjustment of the d.c. bias on the base of the v.f.o. transistor, Q_1, good frequency stability can be achieved for collector-voltage changes between 12 and 14 volts. With a 365-pf. tuning capacitor and a 15-μh. adjustable inductor, the 40-meter band (7.0 to 7.3 Mc.) occupies 160 degrees of the dial. An inexpensive 6:1 ratio planetary ball-bearing vernier (Jackson Bros. type 4511-DAF) provides exceptionally smooth tuning. These drives can be purchased from Arrow Electronics[1] and are well worth the $1.50 price. The output of the v.f.o. is lightly coupled to the emitter follower, Q_2, which stage feeds both the receiving and transmitting mixers.

Operating the v.f.o. at a relatively low frequency has some definite advantages — better stability with temperature variations, less frequency shift due to collector voltage change, and higher output with a high-C tank circuit. However, the problem of harmonics and "birdies" from mixed products between the v.f.o. and the fixed heterodyne oscillator can become a problem with low-frequency v.f.o.s. In this transceiver, a v.f.o. range of 1,990 to 2,290 kc. was chosen so that the third and fourth harmonics lie below and above the output frequency of 7000 to 7300 kc. To complete the v.f.o. isolation an r.f. choke is included in the collector supply lead; transistor circuits are low impedance, and signals can pass along the power leads between the various stages.

The heterodyne crystal oscillator and b.f.o., Q_3, uses a very simple circuit in which the crystal is placed between the collector and the base of the transistor. The collector coil is fixed-tuned because it is not critical and a variable capacitor is eliminated. A 60-pf. trimmer is in series with the crystal so the frequency can be changed slightly to make the b.f.o. conform with the filter passband.

[1] 900 Route 110, Farmingdale, New York 11735.

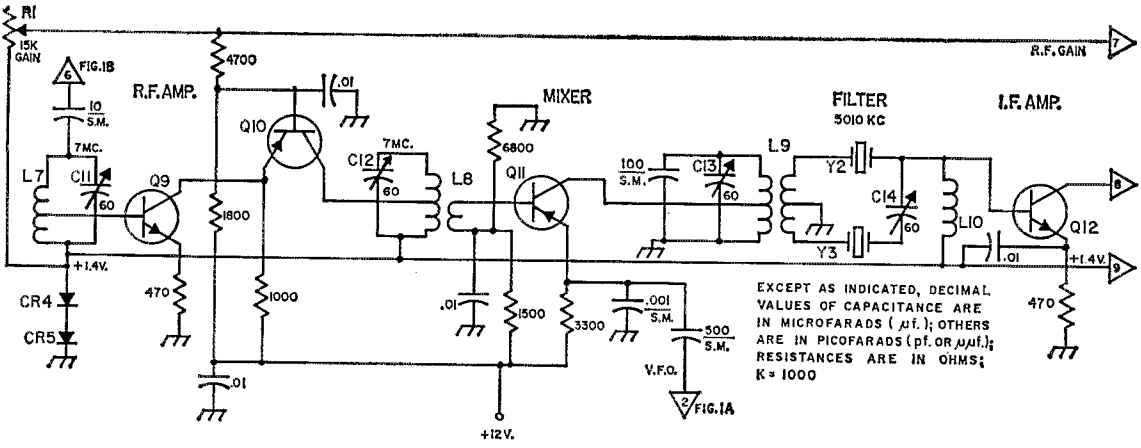


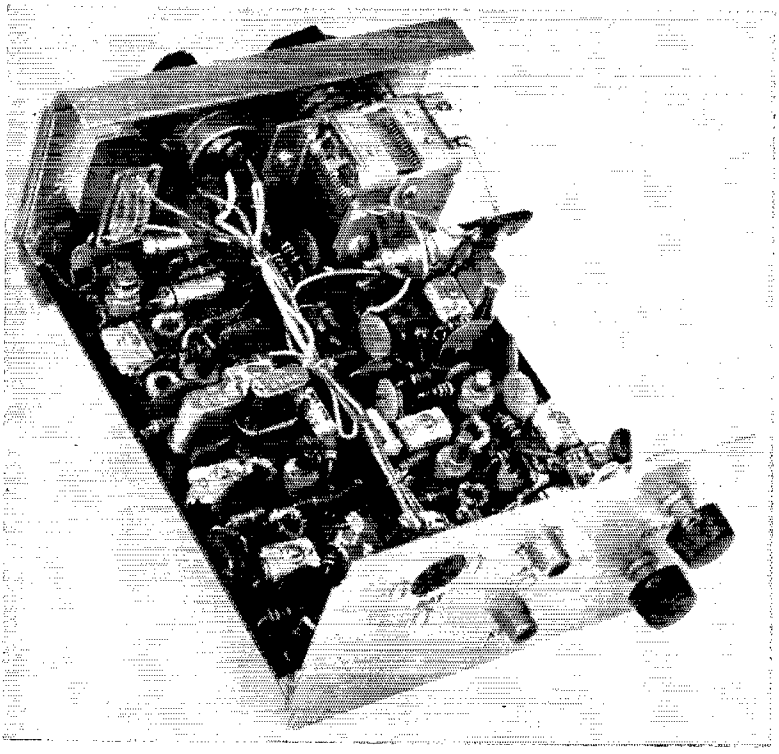
Fig. 1C—Receiver front end and i.f. filter. Fixed capacitors and resistors are same type as in Fig. 1A.

C_{11}–C_{14}, incl.—8–60-pf. miniature mica trimmer (Arco-Elmenco 404).
CR_4, CR_5—Any silicon diode.
L_7–L_{10}, incl.—See Table I.
Q_9, Q_{12}—N-p-n, 2N3905 or equivalent.
Q_{10}, Q_{11}—P-n-p, 2N3906 or equivalent.
R_1—15,000-ohm linear control, with switch (S_1 Fig. 1B).
Y_2, Y_3—Approx. 5000 kc. (Y_1, Y_2 and Y_3 should be identical in frequency, but frequency chosen for the group is not critical).

Transmitter Section

The 2-Mc. v.f.o. and 5-Mc. b.f.o. outputs are mixed in Q_4, Fig. 1B, to produce the 7-Mc. output frequency. The transmitting mixer feeds a driver stage, Q_5, which is biased slightly forward for optimum gain and harmonic reduction. The output from the driver is fed to the final amplifier, Q_6, which is zero biased. The collector of the final has a double-pi network in the output circuit which, with the values shown, will load 20- to 80-ohm antennas very easily. A number of other output circuits were tried but all had excessive harmonic content.

The b.f.o. and v.f.o. outputs are fed into the transmitting mixer with r.f. voltage levels of approximately 1 to 2 volts peak-to-peak. The



Another inside view, showing the rear-panel controls and connectors. The components mounted on and near the front panel are visible in this photo.

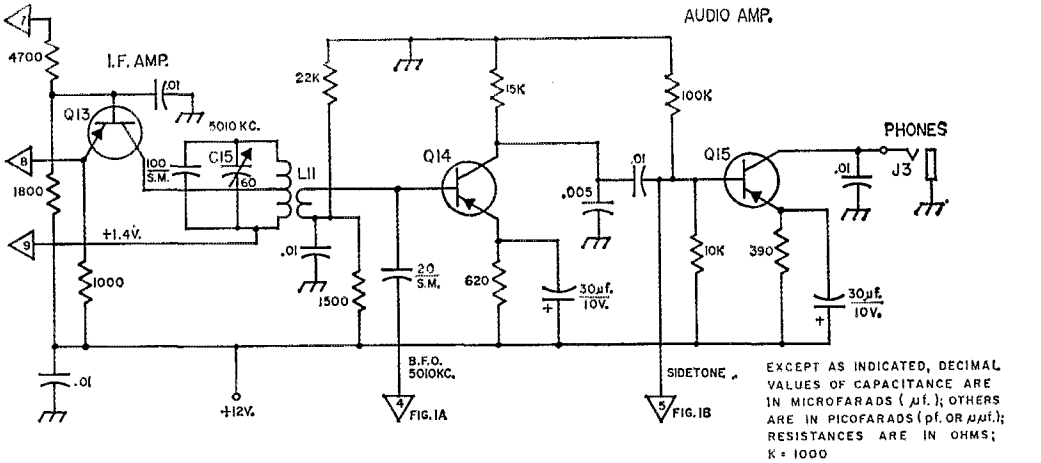


Fig. 1D—I.f. output, detector and audio amplifier. Fixed resistors and capacitors are same type as in Fig. 1B.

Table 1
Coil Data

L_1 — Approx. 15 µh.; 20 turns No. 27 enam. close-wound on 3/8-inch diam. slug-tuned ceramic form (Miller 4400). Note: No. 26 or 28 wire may be substituted by modifying the number of turns, if necessary, for the desired frequency range.

L_2 — 25 turns No. 28 enam. on toroid core (Arnold A4-380-125EP); 4-turn link.

L_3 — Same as L_2, except 3-turn link.

L_4 — 25 turns No. 28 enam. on toroid core (Arnold A4-380-125EP); tapped 8 turns from cold end; 2-turn link.

L_5, L_6 — 3.4 µh.; 13 turns No. 20 enam. on toroid form (Arnold A4-680-250EP).

L_7 — 30 turns No. 28 enam. on toroid form (Arnold A4-380-125EP); tapped 2 turns from cold end.

L_8 — Same as L_7, but tapped 12 turns from cold end and with 6-turn link.

L_9 — 30 turns No. 28 enam. on same type form as L_7, tapped 10 turns from cold end; link 8 turns center-tapped.

L_{10} — 29 turns No. 28 enam. on toroid form (Arnold A4-380-125EP).

L_{11} — 30 turns No. 28 enam. on same type form as L_{10}, tapped at center; 6-turn link.

RFC_4 — App. 0.5 µh.; 11 turns No. 22 enam. on toroid core (Arnold A4-380-125EP).

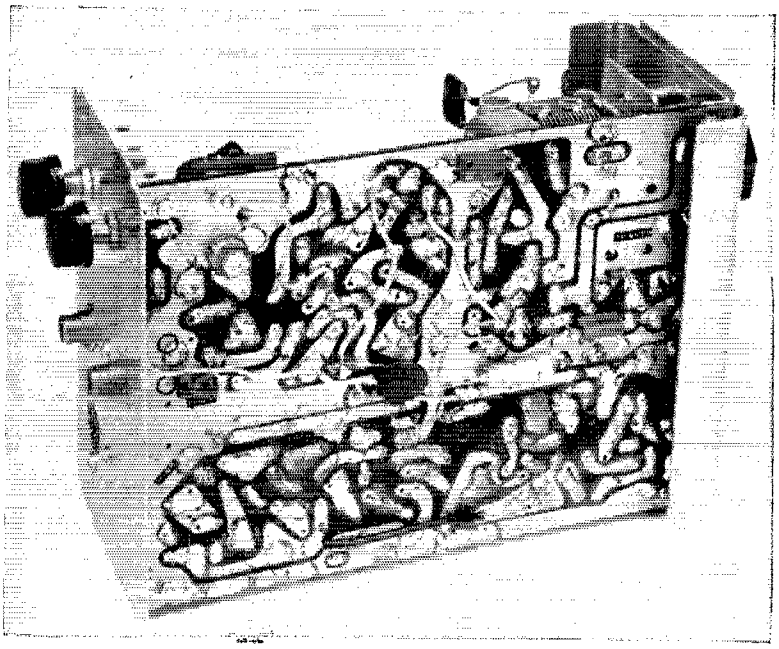
Note: Arnold A4-380-125EP cores are 3/8-inch diam. by 1/8-inch thick, with 3/16-inch diam. center hole. A4-680-250EP cores are 11/16-inch o.d. and 1/4 inch thick, with 3/8-inch center hole. The cores are made by Arnold Engineering, Marengo, Ill. 60152. See January 1968 *QST* for data on equivalent cores made by other manufacturers.

C_{15}—8–60-pf. miniature mica trimmer (Arco-Elmenco 404).
J_3—Open-circuit phone jack.
L_{11}—See Table I.
Q_{13}, Q_{14}—P-n-p, 2N3906 or equivalent.
Q_{15}—P-n-p, 2N1305 or equivalent.

mixer is link-coupled to the driver transistor Q_5, which transistor is biased slightly forward so that the no-signal level of collector current will be between 30 and 35 ma. with a collector supply voltage of 12 to 13 volts.

An unbypassed emitter resistor of 4.7 ohms is used in the driver circuit, and it might be well at this point to consider emitter resistors in the interests of saving transistors. An unbypassed emitter resistor does several things for a common-emitter transistor amplifier. First, and most important, it supplies degeneration which tends to stabilize the amplifier, although it does so with a loss of gain. However, at best, an r.f. transistor amplifier like this is a compromise between gain and stability, and for the experimenter a loss in gain for the sake of stability is very desirable. The emitter resistor also raises the input impedance, which in many cases is desirable for matching power-amplifier stages. In general, beware of r.f. power-amplifier circuits without emitter degeneration, as they are real transistor destroyers when used with power supplies of low internal resistance.

The final-amplifier circuit is operated zero bias (beyond cutoff) which allows it to be connected to the collector supply at all times. This eliminates the necessity for running the high current of the final amplifier through the keying transistor, Q_7 (see below). The collector (output) circuit of the final is a double pi net which the writer thinks is the minimum circuitry for adequate harmonic suppression. Transistor r.f. amplifiers are more effective harmonic generators than their tube counterparts, and for this reason more than ordinary care should be taken to sup-



Bottom view of the etched circuit board. A few small components are on this side of the board — so located either as "afterthoughts" or for convenience.

press harmonics. Rather high capacitance values are required in the pi net, but these can easily be secured with variable compression-type capacitors which, in addition to their high capacitance, are very small in size. This output network will fully load a mobile antenna and a full-size dipole, a good range of matching.

The 2N2195 final amplifier requires a heat sink. Any of the clip-on commercial types will be adequate for the collector current range of this amplifier.

The transmitter and tone oscillator are keyed through the keying transistor, Q_7, which supplies collector current for the transmitting mixer, driver and tone oscillator. The very simple sidetone oscillator circuit comprises a uninjunction transistor, Q_8, two resistors and a capacitor. The values shown will produce a 500-cycle tone. This tone is capacitively coupled to the receiving audio amplifier. As can be surmised, this system provides instant and complete break-in and is a real joy to operate.

An inexpensive 0-1 milliammeter with a diode and resistors is utilized for an output indicator, which aids loading adjustments.

Construction Details

Although this particular rig is assembled on a printed-circuit board, etched-circuit construction is not essential; a prototype model was built on Vectorboard with plenty of spare room. The transceiver is housed in one of a new line of enclosures which is now being marketed especially for home builders by Justin, Inc.[2] It is called the "Gear Box," and a number of sizes are available. The 3 × 5 × 7-inch size was chosen for this project. With this enclosure, the top, bottom and sides can be removed so that access to the underside of the circuit board can be had without unfastening either the front or rear panel assemblies — a very handy arrangement for the home-brew artist.

The board was divided into three sections, approximately one half being allocated to the receiver from the r.f. to and including the audio amplifier. The other half has sufficient space for the v.f.o. and follower, b.f.o., transmitting mixer, driver and final amplifier. The pi-network components, antenna jack, key jack and utility plug are mounted on the rear panel. A seven-pin miniature plug provides connections for the power supply and such useful external connections as may be wanted. The front panel controls include the tuning dial, r.f. gain control with on-off switch, phone jack, and r.f. output indicator.

Check Out

For those of the fraternity who are just getting their feet wet with transistor circuits, there are several precautions that should be taken to prevent losing a handful of transistors. There is no such thing as a "smoke test" with this type of gear, because the semiconductors are long gone before anything can even get warm. Do not use a power source of very low internal resistance, such as a lead-acid or ni-cad battery, for check-out because this is to invite trouble. A much safer way is to use an ordinary dry-battery source, such as two lantern batteries, so that in case of a wiring short components will not be damaged. Always connect a silicon diode in series with your power source so as to prevent damage to transistors in case of an accidental polarity

[2] 2662 No. Lee Ave., South El Monte, Calif. 91731.

reversal. The latter is not too serious when the transistors are running at low level, as in a receiver where there is a large value of emitter resistance to prevent excessive current flow, but in the case of driver and power stages where built-in protection does not exist, a polarity reversal would be fatal to the transistors.

Once the v.f.o. is operating, adjust the tank coil, L_1, so that the 365-pf. tuning capacitor will tune the range 1990 to 2290 kc., which range should cover about 160 degrees of the dial. With the values shown, the receiver should peak up nicely from the r.f. to and including the i.f. stage. If one of the tuned circuits does not peak with capacitor adjustment, resonance should be checked with a grid-dip meter. With toroidal coils this operation requires a little different technique than with ordinary cylindrical coil construction. The coil should be wound with the appropriate number of turns, leaving about a 2-inch-long lead on one end. This large end can be formed into a loop about ¾ inch in diameter. The two coil ends are then connected to the capacitor and the grid-dip meter coupled to the loop to indicate resonance. The coils have very high Q, and a sharp dip will be seen at resonance.

By careful adjustment of trimmers C_{14} in the crystal filter and C_4 in the crystal oscillator, an extremely sharp cutoff of the upper sideband can be obtained, resulting in a true "single-signal" receiver. Sensitivity, signal-to-noise ratio, and sideband rejection are excellent, and the receiver suffers only to a degree with some cross-modulation which seems to be inherent with transistor front ends in which field-effect types are not used. However, cross-modulation and front-end over-load can be reduced to a very low value by use of the r.f. gain control.

After the receiver is operating, the transmitting section is ready for tuning up. This requires a receiver (with b.f.o.) that can be tuned from 7 to 7.3 Mc. and which has an r.f. gain control. The final amplifier and driver transistors should be removed from the circuit and the transmitting mixer tuned to maximum at 7.1 Mc., as indicated in the external receiver. Keying the mixer should produce a clean stable c.w. signal.

The driver and final-amplifier transistors both are operated at a rather high power level, and with this type of operation these transistors should be loaded during tune-up — or, as a matter of fact, at any time. An effective method of loading the driver without affecting the output circuit is to disconnect the collector of the final-amplifier stage. The final amplifier can easily be loaded with a 2-watt, 47-ohm resistor. Flashlight bulbs will indicate relative r.f. out, but it should be remembered that they also change impedance with current, and do not always look like 50 to 70 ohms when illuminated.

The driver should be tuned in the same manner as the mixer and a peak noted when the stage is tuned through resonance. The normal collector current level of the driver should be 30 to 35 ma.

With a dummy load in the output jack, and using the output meter to indicate maximum, the pi network of the final can be adjusted. With a collector supply of 12.5 to 13 volts the collector current of the final amplifier should be from 125 to 150 ma., depending upon the gain of the driver and amplifier transistors. With the 2N2195 in the final the supply voltage should not be higher than 14 to 15 volts for safe operation.

Operating QRP

Operating at very low power levels can be either frustrating or a really satisfying experience, depending upon the equipment and the operator using it. C.w. operation is much the better mode for QRP because the intelligence can be received with a passband of minimum width. A receiving station that has sharp filters or a Q multiplier can zero in through QRM and make copy on c.w. when a phone signal would be completely unintelligible. Also, by nature and by operating experience, it seems that a c.w. operator will exercise more patience in working through QRM than the phone man who would much prefer "armchair" copy. The present phone operating tendency in the low-frequency bands toward round tables makes a weak-signal intruder less than welcome.

In a band such as 40 meters a crystal-controlled QRP transmitter is at a distinct disadvantage, because the majority of listening after a CQ is done on or very close to the transmitting frequency. Also, calling CQ with low power is a rather unproductive way of making contacts because on a practical basis a station scanning the band will choose a stronger signal to answer unless he is looking for DX.

A v.f.o. in a transmitter greatly extends its usefulness. Again, rather than call CQ at great length (which is poor operating anyway), it is much better to tune for a station calling CQ or to call a station which is signing off with another. As a normal thing, one can assume that loud received signals indicate that the propagation is good between you and those transmitting stations, and your chance of making a contact is much greater than when a received signal is weak. This thesis seems to hold rather well, because even high-power stations sink rapidly in strength when the propagation is poor.

The best operating time on 40 meters, when using low power, appears to be during the daylight and early evening hours. Later the skip gets longer and the general level of signals lowers. Daylight paths of from 30 to 600 miles seem very stable, and c.w. stations with one watt are able to make plenty of contacts within this range.

For the DX man, watching the general level of signals on the band at night will give a clue to the possibility of 2000- to 4000-mile contacts. This condition occurs rather often, and when it does that is the time to go after it. The author has worked many east-coast stations with a very ordinary antenna system — and believe it or not, many 200- to 600-mile stations from the car, using a mobile antenna of standard commercial design. QST

A Multiband Ground-Plane Vertical Antenna with Tuned Feeders

BY ARTHUR S. GILLESPIE, JR.,* W4VON

In recent years, the multiband tuned-line center-fed antenna has enjoyed a return to popularity. Yet, few amateurs realize that the same principle may be applied to a vertical ground-plane configuration. For several years, the author has experimented with several versions of this antenna and has found them to be most satisfactory. The antenna shown in Fig. 1 provides not only outstanding performance on 10, 15 and 20 meters, but performance on 40 and 80 meters equivalent to most mobile-antenna installations. Full efficiency on these latter bands can be realized by making the vertical and radial portions proportionately longer.

The antenna system consists of the radiating element, ground-plane radials, an open-wire feeder of any convenient length, a transmatch capable of either series or parallel tuning, and an antenna s.w.r. bridge. This combination is shown in Fig. 2.

*317 East Second Ave., Gastonia, North Carolina 28052.

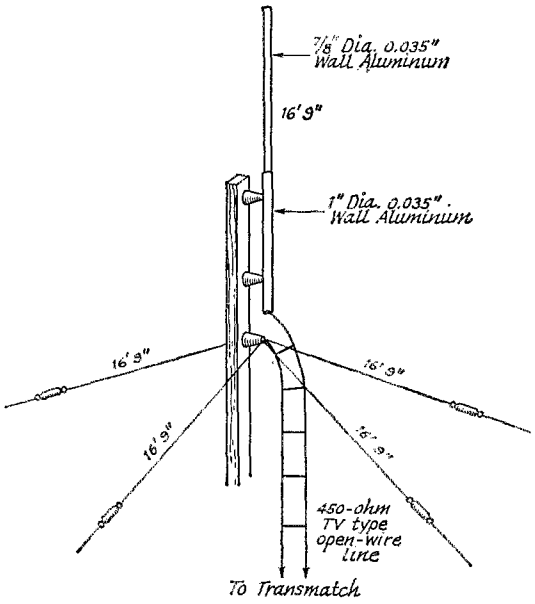


Fig. 1—Sketch of W4VON's simple multiband antenna

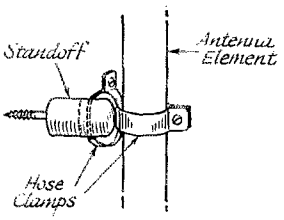


Fig. 3—Suggested method of mounting radiator element without drilling holes in aluminum tubing.

Antenna and Radial Lengths

The author preferred to cut the antenna for resonance on one particular ham band (20 meters), but it is not necessary that the antenna be resonant on any band. Efficiency will suffer, of course, on bands where the length is significantly shorter than ¼ wavelength. Whatever the length chosen for the antenna, the radials should be of about the same length.

Construction

Constructional details are shown in the sketch of Fig. 1. In the event the specified aluminum tubing is not available, thin-walled galvanized electrical conduit, aluminum conduit, or copper pipe may be used.

It is recommended that the vertical element not be supported by drilling holes through the tubing, as this will substantially weaken the structure. An alternative mounting arrangement is shown in Fig. 3. The insulators are porcelain standoff types with a lag-screw insert. They will be found at electrical supply houses (also at Sears), and are sometimes referred to as "saddle"-type insulators. The hose clamps are stainless-steel gear type.

Adjustment

Operation of the antenna is simple. The transmatch (a suitable one, including s.w.r. bridge, is described in the 1966, 1967, and 1968

(Continued on page 170)

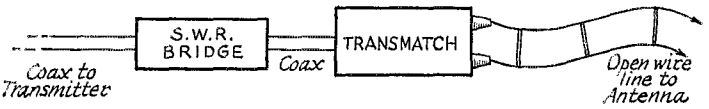


Fig. 2—Recommended setup for coupling antenna line to low-impedance transmitter output.

An RTTY Bandpass Filter For 2125-2975 c.p.s.

Modern Filter Design Applied to Standard Tone Frequencies

BY EDWARD E. WETHERHOLD,* W3NQN

Up to now, the only RTTY 2125/2975 c.p.s. bandpass filter designs available were those of W2JAV, first published in 1956[1], and K3NIO, published in a *QST* article[2] in 1965. The attenuation responses of these two filters are plotted in Fig. 1 along with the response of an entirely new bandpass design of the elliptic-function type. This article will review some of the aspects of the bandpass filter requirements and will discuss the design and construction of the elliptic-function filter.

Bandpass Filter Requirements

In the *CQ* RTTY column of April 1961 and on page 178 of the *New RTTY Handbook*[3], the importance is discussed of the bandpass filter attenuating those tones whose harmonics, accentuated by the TU limiter, would fall into the 2125 and 2975 c.p.s. channel filters of the converter. An example is given of the second harmonic of a 1500-c.p.s. beat note causing interference in the 2975 c.p.s. space-channel filter. The solution is to attenuate the unwanted 1500-c.p.s. signal before it gets to the limiter. One of the requirements, therefore, of a 2125/2975 c.p.s. bandpass filter is to have, if possible, maximum attenuation at one-half the channel frequencies or at 1063 and 1488 c.p.s. The next important requirement of the filter is a bandwidth sufficient to accommodate both the 850 c.p.s. frequency shift and at least the third harmonic of the 60-w.p.m. keying frequency. On page 24 of the *New RTTY Handbook*[3], the optimum bandwidth is calculated to be between a minimum of 987 c.p.s. and a maximum of 1200 c.p.s.

Unfortunately, the simple elliptic-filter design to be discussed can provide a maximum attenuation at only one of the two previously mentioned frequencies. To obtain the best skirt selectivity, 1488 c.p.s. was chosen as the desired maximum-attenuation frequency. In addition to the minimum filter bandwidth of 987 c.p.s., an extra 150 c.p.s. is provided to allow for signal drift, inaccurate tuning and filter component tolerance variations. This makes the final filter bandwidth requirement about 1140 c.p.s. The following discussion will demonstrate how these requirements of the bandpass filter are met through the application of modern filter design procedures.

Filter Circuit Design Procedure

The tables of elliptic-function filters, A4–1 and A4–2 on page 145 of Geffe's *Simplified Modern Filter Design*,[4] were investigated to find a design which would simultaneously meet the requirements of the 1140 c.p.s. bandwidth and the 1488 c.p.s. attenuation peak. After some experimental calculations, a design based on the tabulated data of Table A4–1 for $A_s = 35$ db. was found to be the optimum choice. The selected prototype design parameters, from which the bandpass design is derived, are: $f_{co} = 1140$ c.p.s., minimum stopband attenuation (A_s) = 35 db., maximum passband attenuation (A_p) = 1.0 db., and source and load resistances = 600 ohms. The low-pass prototype filter component values were calculated from the normalized tabulated values of L_1, L_2, L_3, and C_2 which are associated with the filter prototype schematic of Fig. A4–2 on page 145 of Geffe's book. The reader is referred to Chapter 3 of this book for details regarding the prototype-to-bandpass transformation procedure. The final bandpass filter schematic and component values are shown in Fig. 2.

The calculated parameters of the bandpass

Making use of inexpensive 88-mh. toroids, both modified and unmodified, for the inductances, the author has worked up a filter having steeper skirts than designs previously available, along with a low-frequency rejection point to suppress the subharmonic of 2975 c.p.s.

* Honeywell Inc., Annapolis Operation, Test Instruments Division, P.O. Box 391, Annapolis, Maryland 21404.

[1] Kretzman, page 88, *CQ*, April, 1961.

[2] Hoff, "Mainline TT/L F.S.K. Demodulator, *QST*, August, 1965.

[3] Kretzman, "The New RTTY Handbook," *CQ Technical Series*, Cowan Publishing Corp., Port Washington, N. Y.

[4] Geffe, *Simplified Modern Filter Design*, John F. Rider Publisher, Inc., New York City, 1963.

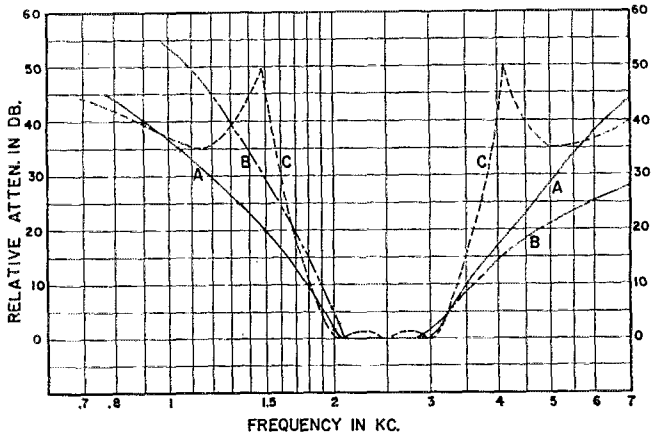


Fig. 1—Relative attenuation vs frequency for three types of 2125-2975 c/s bandpass filters.

A—W2JAV filter, R_o = 600 ohms; B—3-pole Butterworth filter, R_o = 3300 ohms; C—Elliptic-function filter, R_o = 600 ohms.

filter design are: f_{co} = 1978 and 3118 c.p.s., f_{mean} = 2480 c.p.s., skirt frequencies at 35 db. attenuation = 1583 and 3918 c.p.s., and the frequencies of theoretically infinite attenuation = 1488 and 4138 c.p.s. The bandpass filter values of A_s, A_p, and R_o are the same as for the prototype filter. Fortunately, the resulting design is such that all inductance values may be realized conveniently and inexpensively with six surplus 88-mh. toroids.

Construction

It is suggested that two packs of 88 mh. toroids, five per pack, be obtained from Buchanan[5] at a total cost of only $3.00 postpaid. (Note that Buchanan has reduced the price of a pack of five toroids from $1.75 to $1.50 postpaid). Of the ten toroids received, only six will be used and of these six, four will be modified by removal of turns to achieve the desired inductance.

The two 155-mh. inductances are made up of an unmodified 88-mh. toroid connected in series with a modified toroid. The modified toroid has 48 turns removed from each of the two windings, which are then connected in series aiding to give an inductance of 67 mh. To obtain the 17.9- and 20.4-mh. values, remove 37 turns from both windings of an 88-mh. toroid and 13 turns from both windings of another 88-mh. toroid; then, for both toroids, connect the windings in *parallel* aiding. This completes the modification of all the toroids.

The required capacitances are made up of either mylar or polystyrene capacitors connected in parallel, where necessary, to obtain the design values within a few per cent.

Two phenolic boards, 1⅞ × 4¼ inches, were cut from a sheet of 32AA18 Vectorbord and the toroids sandwiched between the boards as shown in the photographs. Additional construction details may be obtained from a previous article in which the construction of a similar type of bandpass filter was discussed.[6]

Filter Performance

The elliptic-function filter was evaluated in a 600-ohm system and the measured attenuation response is shown in Fig. 1.

The accuracy of modern filter design procedures in predicting the attenuation response is demonstrated by comparing the calculated parameters with the measured parameters of the filter. The bandpass cutoff frequencies were predicted to occur at 1978 and 3118 c.p.s., which means that at these frequencies the rise in attenuation will just begin to exceed the maximum passband attenuation (A_p) of 1.0 db. Referring to the measured attenuation curve, this increase in attenuation is seen to occur at about 1970 and 3120 c.p.s. Equally good agreement is noted between the calculated and measured values at the 35 db. skirt frequencies and the frequencies of maximum attenuation. Also, the minimum attenuation of 35 db. in the stopband and the slightly greater than 1.0 db. attenuation in the

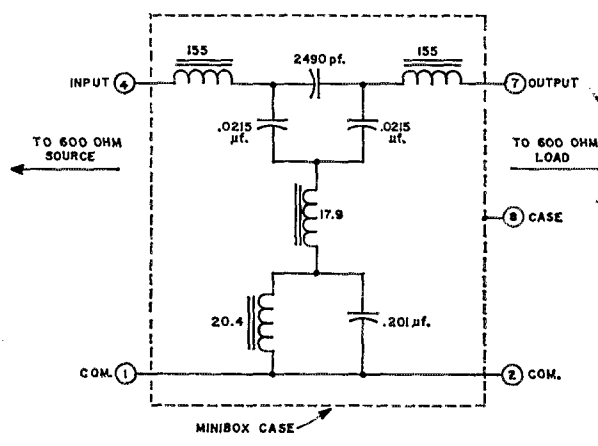
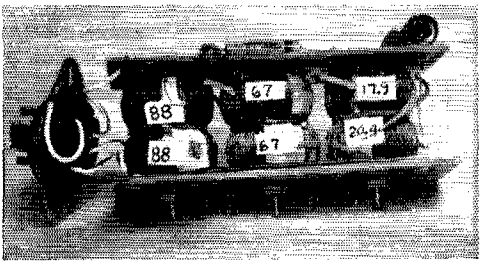


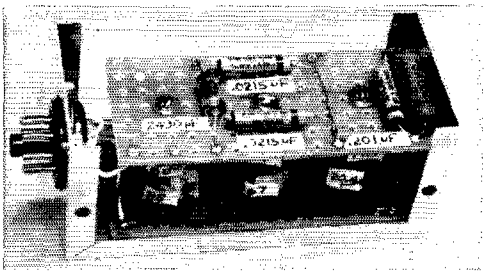
Fig. 2—Circuit of the 2125-2975 c/s bandpass filter. Inductances are in millihenrys and capacitances are as indicated. Circled numbers indicate octal-plug pin connections (see photographs).

[5] Buchanan and Associates, 1067 Mandana Blvd., Oakland, California 94610.

[6] Wetherhold, "An RTTY Bandpass Filter for 1275/2125 c.p.s," *QST*; August 1967.



The bandpass filter assembly before mounting in the Minibox. If a plug-in unit is not necessary, the Minibox and octal plug may be omitted, simplifying construction.



Completed bandpass filter assembled in a Minibox, less cover. Interconnections between the 2490-pf. and 0.0215-μf. capacitors, mounted on the top side of the perfboard, can be seen in this view.

passband are in accord with the predicted filter performance.

For comments regarding the resistive termination of the filter input and output terminals, the reader is referred to the author's previous RTTY bandpass filter article.[6]

To achieve the expected shape of the attenuation response, it is imperative that the shunt inductors of 17.9 and 20.4 mh. have Q's in the order of 100 at about 2 kc. In comparison, the series inductors of 155 mh. may have a much lower Q, at least 25, without degrading the attenuation response shape. The main effect of the lower Q of the series inductors will be merely to increase the overall insertion loss of the filter by one or two db., which is relatively unimportant. This distinction in the Q specification between the shunt and series inductors is important. It means that the relaxed Q requirement of the series inductors permits the use of a much smaller inductor than the large-sized surplus toroids specified, and if a single standard inductor can be found with 155 mh., a much more compact filter will be possible.

Bandpass Filter Comparisons

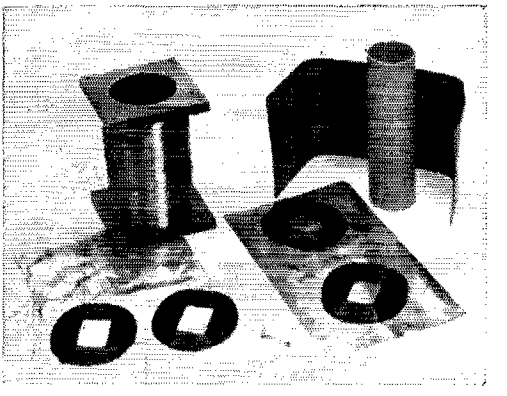
Comparing the response of the three types of bandpass filters, each is seen to have several particular advantages and disadvantages. The W2JAV filter is simple to construct, has symmetrical attenuation and the desired 600-ohm impedance level, but lacks selectivity. The 3-pole Butterworth filter is also simple to construct, has excellent low-frequency attenuation but has a poor high frequency attenuation and a nonstandard 3300-ohm impedance level. The elliptic-function filter has the most selective response of all, provides the highest attenuation at 1488 c.p.s., and has the standard 600-ohm impedance level; however, the filter response drops to a 35-db. minimum and some care in the selection of capacitors is required to achieve the desired attenuation response.

The RTTY experimenter-operator now has three 2125/2975 c.p.s. bandpass filters to choose from. He must determine what particular characteristics of the filter are desired and then select the filter which best meets his requirements. QST

• New Apparatus

ATV Research Focus-Deflection Coil Kit

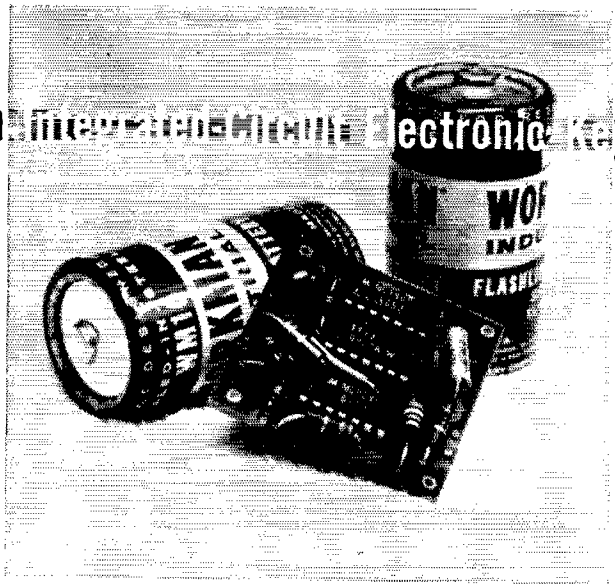
FOR many years kits have been available for those interested in receiving and transmitting a.m., c.w. and s.s.b. Now kits are being marketed for the slow-scan TV buff. The No. 65A/S focus-deflection coil kit shown in the photograph is sold by ATV Research, P.O. Box 396, South Sioux City, Nebraska 68776, for less than $20. It includes one focus coil, two vertical deflection coils, two horizontal deflection coils, a shielded target connector, a yoke form, an aluminum electrostatic shield for the yoke, a brass electrostatic shield for the focus coil, and a mu-metal magnetic shield for the focus coil. Also provided, but not pictured, are complete assembly instructions, and a reprint of a three-part construction article on a slow-scan TV camera.[1] The components



furnished are of good quality and the directions are clear. It appears that it shouldn't take more than an hour or so to put the kit together. — *W1YDS*

[1] Macdonald, "A Slow-Scan Vidicon Camera," *QST*, une, July and August, 1965.

An Integrated-Circuit Electronic Keyer



Completed keyer chassis with two flashlight D cells for size comparison. The shiny black object in the upper left corner is the epoxy-cased 2N4888 output transistor.

RICHARD P. HALVERSON, WØZHN* and RONALD A. STORDAHL, KØUXQ**

ALTHOUGH many solid-state electronic keyer articles have appeared in the literature in the last few years, the circuit described here has several novel features which should be interesting to those "home brewers" who like to explore the frontiers of technology. The basic transistor circuitry of the keyer, exclusive of the output transistor, is contained in three inexpensive integrated logic circuit chips. These circuits allow construction on an etched circuit board about two inches square, in a volume of about one cubic inch.

There is no weight control. The self-completing dots and dashes are timed by a reliable logic timing chain which drives integrated flip-flops to form perfectly-spaced code independent of speed adjustment. The timing chain starts in proper phase relationship by closure of the paddle contacts, and shuts itself off at the proper time when a character is completed. Speed is adjustable with one control over a range of about 8–60 w.p.m. using the component values shown, and could easily have a wider range if desired.

The best feature is the cost. All parts for the keyer, exclusive of paddle, can be purchased for less than ten dollars amateur net! Since the circuit uses a total of 39 high-quality transistors (in four packages), that's much less than a comparable discrete-component unit with the same performance features.

Basic Logic Circuits

The basic logic devices in the keyer are integrated RTL (Resistor Transistor Logic) or more properly, modified DCTL (Direct Coupled Transistor Logic) circuits which are now available from several manufacturers [1] in very inexpensive injection-molded epoxy cases. The Motorola units used here have a 14-pin lead configuration in the "dual in-line package" which lends itself well to homemade etched circuit construction.

Figs. 1A and 1B are schematic diagrams and logic symbols for the basic circuits used. Resistor values are such that the transistors operate either saturated or cut off. If either or both inputs of the 2-input gate are high, their corresponding transistors conduct and draw the output down to a low level, within about 200 mv. of the emitters. If both inputs are low neither transistor conducts, and the output is drawn to the high level, near $+V_{CC}$, by the collector load resistor.

If one defines a high level as a logic 1 (true) and a low level as a logic 0 (false), then the circuit performs a logic OR followed by a logic inversion or negation. In logical nomenclature, the output

[1] Motorola Semiconductor, Fairchild Semiconductor.

The electronic-keyer circuit described in this article fits on a circuit board less than two inches square, less the speed-control variable resistor and flashlight-cell power supply. Three integrated circuits (total cost $4.16 in the 1968 catalogs), seven fixed resistors, two miniature capacitors, and one transistor complete the circuit. For simplicity of assembly and low cost it's hard to beat!

* 21 Barton Ave. S. E., Minneapolis, Minn. 55414
** P. O. Box 126, Thief River Falls, Minn. 56701

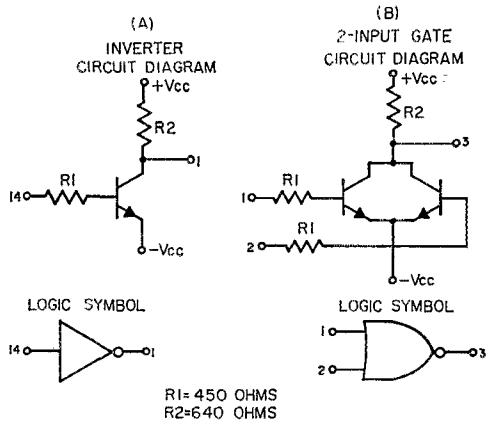


Fig. 1—Schematic diagrams and logic symbols for (A) the integrated inverter (one of six in the MC789P package) and (B) the integrated 2-input NOR gate (one of four in the MC724P package). Transistors normally operate either saturated or cut-off. Typical circuit delay is 12 nanoseconds.

is "not true" (false) if input 1 is "true" *or* if input 2 is "true."

The logic symbol for the circuit, Fig. 1B, shows the logic functions performed. The shield (triangle with curved edges) is the standard symbol for a logic OR; the circle at the output represents logic negation. The circuit is called a 2-input NOR (*Not-or*).

The basic flip-flop (one of the two units in the MC790P) circuit is shown in Fig. 2A, and its logic symbol in Fig. 2B. This bistable multivibrator has basic *set* (*S*) and *clear* (*C*) inputs which are gated by a negative-going voltage transition on the *trigger* (*T*) input. The small circles on the logic symbol at these inputs mean that logic inversion takes place there; that is, the set and clear are actuated by "false" (i.e., low-level) external inputs. When the flip-flop is set (by a low-level *S* input grated by a negative-going *T* input), it is said to store a logic 1 or "true" value.

The outputs are also negated; thus when the flip-flop is set to logic 1, the output from its 1 side is low or "false" after the logic inversion represented by the circle at the output. Each flip-flop also has a noninverted, nongated preset input shown at the side (pins 10 or 12).

This type of bistable is called a J-K flip-flop in the industry. This term means that if both set and clear inputs are actuated (low level) when the gate pulse appears at *T*, the flip-flop will "toggle" or change state. Thus if both *S* and *C* are at a low level with the flip-flop in the set condition, a negative-going trigger input will cause it to change to the cleared state; the 1 side output (e. g., pin 9) will change from low to high, and the zero side output (e. g., pin 8) will change from high to low voltage.

Bottom view pin connections to the three integrated circuits used are shown in Fig. 3.

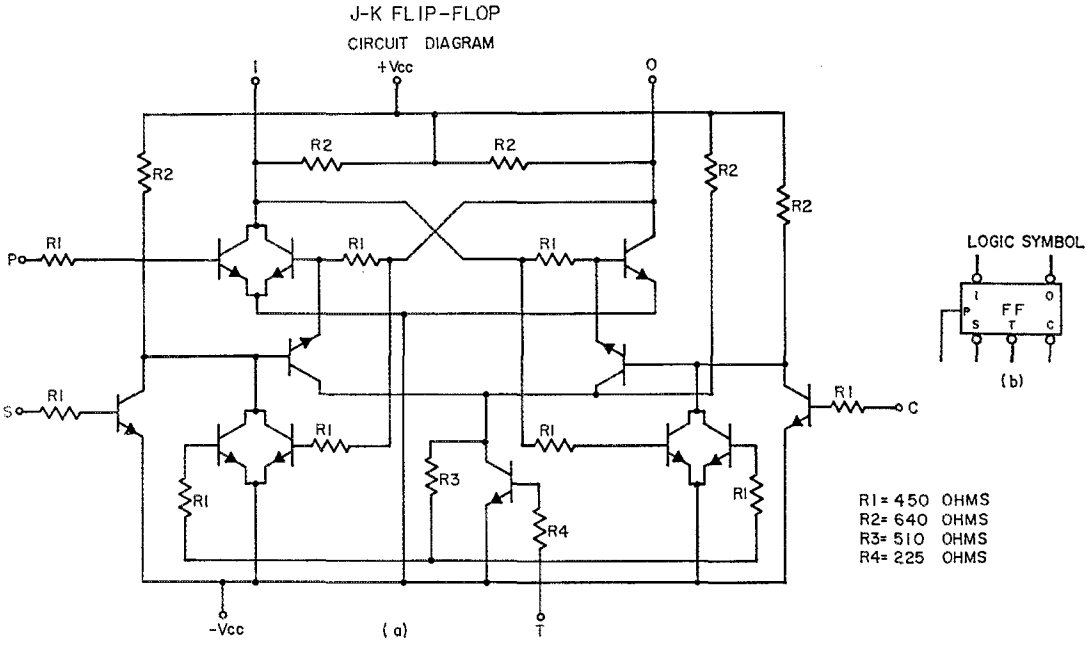


Fig. 2—Schematic diagram and logic symbol for the integrated J-K flip-flop (one of two in the MC790P package). Negative set (S) or clear (C) levels are gated by a negative-going trigger (T) input. If both S and C are at low level, the T input causes the flip-flop to toggle, or change state.

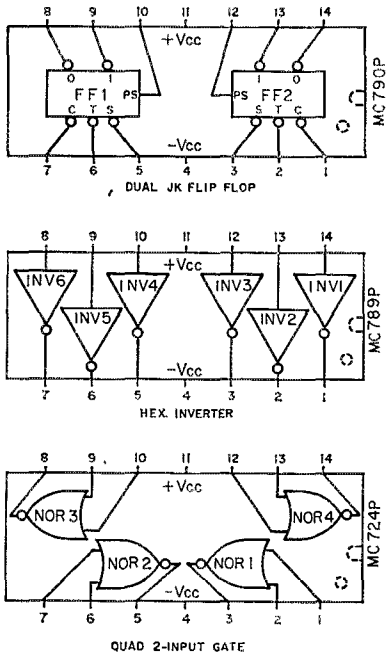


Fig. 3—Bottom-view pin connections to the three integrated circuits used.

The Keyer

A logic diagram of the keyer is shown in Fig. 4. There are two principal sections: the timing chain consisting of inverters INV_1, INV_2, INV_4, and gates NOR_2, NOR_3, NOR_4; and the dot-dash forming section consisting of flip-flops FF_1 and FF_2, inverters INV_3, INV_5, INV_6, gate NOR_1, and the 2N4888 output transistor.

The timing chain generates negative-going trigger pulses at INV_2-pin 2 to actuate the dot flip-flop FF_1. The width of these pulses is about 8 milliseconds as determined by the R_3C_2 combination. The time between pulses, which determines the code speed, is controlled by C_1 R_1 R_2. This time varies from about 15 milliseconds (over 60 w.p.m.) to 150 milliseconds (about 8 w.p.m.) under the control of the speed potentiometer, R_1.

The timing chain starts and stops under control of circuits NOR_3 and NOR_2–NOR_4 which actually make up a cross-coupled flip-flop with set inputs to NOR_2–NOR_4, and clear input from INV_4 to NOR_3. This flip-flop is set whenever the dot (pin 6) or dash (pin 13) levers are pressed, or when a character is in process (pin 12). INV_4 tries to clear the combination during every space interval. A successful clear by INV_4 stops the timing chain action after the space is concluded.

FF_1 generates the basic dot timing. Since both set and clear inputs are low (at $-V_{CC}$), trigger

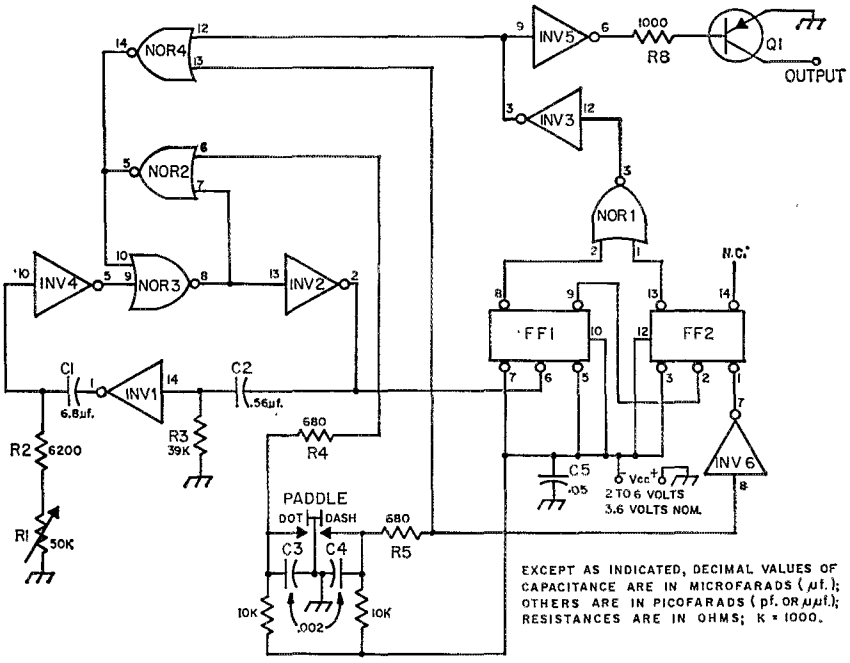


Fig. 4—Keyer logic diagram (positive logic). Pin 11 (V_{CC}) of each integrated circuit is grounded, and Pin 4 ($-V_{CC}$) is connected to the negative supply voltage. Q_1 is a high-voltage p-n-p transistor which switches a negative-potential key terminal to ground.

C_1—6.8-µf. tantalum, 15 volts.
C_2—0.56-µf. tantalum or ceramic, 3–10 volts.
C_3–C_5, incl.—Disk ceramic.
FF_1, FF_2—Both in dual J-K flip-flop (Motorola MC790P).
INV_1–INV_6, incl.—All in hex inverter (Motorola MC789P).
NOR_1–NOR_4, incl.—All in quad 2-input gate (Motorola MC724P).
Q_1—High-voltage p-n-p transistor (Fairchild type 2N4888, 2N4889; or 2N398).
R_1—50,000-ohm control, reverse log or linear-taper.
R_2–R_8, incl.—Composition, ½ watt or less.

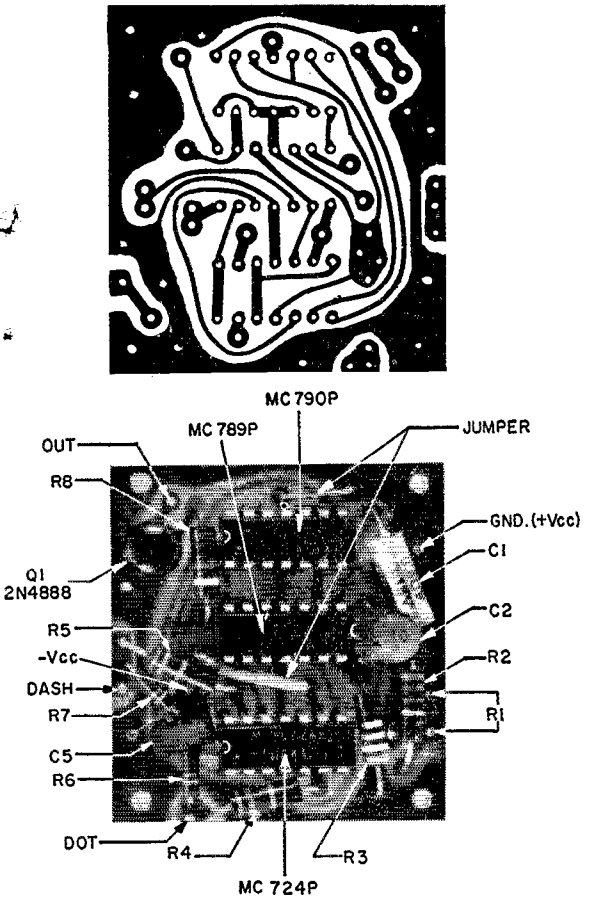


Fig. 5—Suggested etched circuit board layout (viewed from bottom) and top-view photograph of the keyer, actual size. Note the two jumpers required. C_3 and C_4, Fig. 4, are not included in this layout but their use is recommended.

pulses at pin 6 toggle FF_1 to produce successive, equal-length dot and space time intervals.

Pressing the dash lever raises the input to INV_6; this inverter places a low voltage at the clear input (pin 1) of FF_2 which is normally at rest in the set condition. In this case, the low-going output of the one side of FF_1 (pin 9) during dot initiation causes FF_2 to toggle to the clear condition. Cleared FF_2 presents a logic 1 to gate NOR_1 during a complete dot-space cycle of FF_1. Initiation of the second dot period in FF_1 produces another negative-going trigger pulse to FF_2 which sets it (regardless of its clear input level since it will either unconditionally set if pin 1 is high, or toggle to the set condition if pin 1 is low). During this third interval, FF_1 holds pin 2 of NOR_1 high to complete a 3-interval dash. Dashes override dots when both paddles are pressed.

The output of NOR gate NOR_1 passes through INV_3–INV_5 to the 2N4888 output transistor which turns on, raising its collector to near ground potential. The delay here is negligible (approximately 12 nanoseconds per inverter). The output of INV_3 also holds NOR_4 pin 12 high to allow timing chain continuation until a complete dot or dash cycle is concluded.

The output transistor is a new silicon p-n-p made by Fairchild Semiconductor which is rated at 150 volts V_{CER} and 300 milliwatts free-air collector dissipation. This transistor easily switches 50 ma. (within the collector dissipation rating) and replaces the 2N398 often used here. The transistor must see a negative potential with respect to ground, as is typical in grid-block keying systems. However, it can easily drive an n-p-n transistor or a relay to switch positive voltages.

Although the design-center supply voltage for these circuits is $3.6 \pm 10\%$ volts, experiments have shown that the keyer performs well over a voltage range of 2 to 6 volts. Occasional errors due to flip-flop malfunction can be detected at voltages below about 2.5 volts; this serves as a check on supply voltage in case batteries are used. Two flashlight batteries in series (positive ground) make an adequate power supply; however, battery life is not great since the keyer draws about 60 ma. at 3 volts. Two size D cells will last several weeks under a normal operating schedule before errors can be detected.

The logic circuits are rugged and hard to damage by misapplication of voltages, soldering-iron heat, or mechanical shock. Reversed power supply polarity caused no damage during one unscheduled experiment. However, the low voltage swings and fast response of the circuits makes their error-free performance somewhat sensitive to free r.f. in the shack. Bypass capacitors C_3, C_4, and C_5 are recommended, and it would be wise to mount the board in a grounded metal box.

Construction Hints

A suggested etched-circuit board layout and a completed board are shown in Fig. 5. All holes except the four corner mounting holes can be drilled with a No. 60 drill (0.040″). However, the professional machinist may want to use the proper size, No. 72 (0.025″), drill for the integrated circuit connection leads.

Good drilling practice with these small drills is to use a drill press with a small chuck (¼-inch or smaller), run at high speed, and let the drill cut its own way through the board at minimum pressure. However, a quarter-inch hand drill will work if a very light touch is used.

Soldering of leads to the back of the board should be done with a 30- to 50-watt iron with a small tip; the inexpensive imported irons available at many hardware (or grocery or drug) stores work very well. Of course, a printed-circuit soldering pencil is ideal. After soldering all leads, check for solder bridges and reheat such joints to let excess solder drip off.

Values are not critical, except of course that the timing (speed) range is determined by $R_1R_2C_1$. A larger value of C_1 would allow a

(Continued on page 168)

Getting Rid of Low-Frequency Harmonics

Four Easy-To-Build Half-Wave Filters

BY LEWIS G. McCOY, W1ICP*

Unless the unsuspecting Novice is lucky he may find himself in difficulties with the FCC because of harmonic radiation. Here is some cheap and easy insurance.

ONE of the requirements for Novice operation is that the transmitter be crystal-controlled. Crystal control helps the Novice make sure that he is transmitting on a band he is supposed to be on. However, crystal control only helps; it doesn't provide positive insurance against off-frequency radiation.

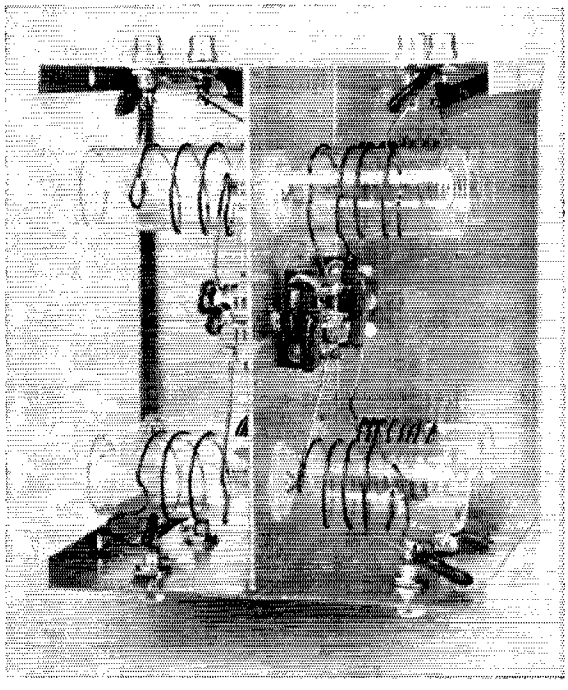
Let's take a typical Novice station consisting of a crystal-controlled, two-stage rig, operating at 3725 kc. and feeding a multiband vertical antenna with one end of the coaxial line connected to the transmitter and the other end to the base of the antenna. This setup probably sounds familiar to many Novices. How can such a transmitter-antenna combination, *with* the transmitter crystal-controlled, cause signals on other than 3725 kc. to be radiated? Believe it or not, it is quite easy.

One of the problems in generating radio-frequency energy is that while we only want one signal to be produced, we usually generate many undesired signals along with it. For example, in addition to the 3725 kc. signal in the final amplifier, multiples of that frequency also will be present. There would be energy at 7450 kc., twice the fundamental, and at 11,175 kc., three times the fundamental, and so on. If these signals are strong enough, and if there isn't enough selectivity in the transmitter tank circuit or in the antenna circuit to discriminate against them, they will reach the antenna and be radiated — and quite likely cause interference to some other radio service, since the frequencies are all outside the amateur bands. If you are lucky, an ARRL Official Observer will spot your signal and let you know. If you're unlucky it will be a "QSL" from the FCC — and none of us want that type of confirmation!

Spurious Radiations

In addition to the harmonic problem there are other types of signal that can be generated. These are called "parasitics." It is quite possible to have parasitics and not know it. The most common type is the very-high-frequency parasitic, a self-oscillation usually occuring above 50 Mc. Incidentally, any signal other than the fundamental or desired one is classed as a "spurious" radiation; the term includes harmonics as well as parasitics.

In addition to generating spurious signals, a trouble that many Novices get into is mistakenly tuning up on the wrong band. Even though your transmitter may be switched to 80 meters, for example, it is quite possible that it can be tuned to 40 with the same band-switch setting. Another, and even more common, mistake is to tune up on what you think is 15 meters but actually is 20 or 10 meters.



The pill boxes are mounted on the dividing wall by means of screws and nuts. At the right rear are the two 40-meter coils and the two front coils are the 20-meter units. On the left side at the rear are the 80-meter coils with the 10-meter coils at the front.

* Novice Editor.

Harmonics and mistuning are not necessarily the fault of the transmitter. The output of every transmitter has harmonic content, to greater or lesser degree, and mistuning can happen, depending on the antenna load.

How To Tune Your Transmitter

First of all, if your transmitter is commercially made, be *sure* you read the instruction manual that comes with it. The manufacturer may have special precautions you must observe — and you can be assured that the instructions are there for a purpose. Let's suppose we are going to tune up on 80 meters. First, if your transmitter has an adjustable loading control in the tank circuit, and most Novice rigs these days have such a device, the loading control will be a variable capacitor. In some transmitters, in addition to the variable there will be fixed capacitors that can be switched in or out as required. The first step is to switch all the capacitors into the circuit and set the variable at maximum capacitance (plates fully meshed). Don't depend on the dial markings; they can be misleading. Actually look at the capacitor to make sure it is meshed. Next, adjust the tuning capacitor for a "dip" (minimum reading) in the plate current. If two dips occur be sure to take the one near maximum capacitance; the other dip is likely to be the 40-meter resonant point. Next, gradually reduce the loading capacitance, and as the plate current increases keep the circuit in resonance by dipping the tuning control. Gradually bring your plate current up to whatever the rated amount is (by your instruction book). Also — and this is important as far as harmonic generation is concerned — do not use more than the rated grid current or drive as specified in the instruction manual. Too much drive will increase the harmonic output of the final amplifier.

Such tuning procedure will usually result in operation on the right band, but since nothing is certain, the safest thing to do is to actually check the frequency. One way of doing the job is with an absorption wavemeter or a grid-dip meter. These are very handy instruments for this purpose and are easy to make[1,2].

However, even a wavemeter or grid-dip meter won't provide a positive indication of *harmonic* radiation. But one thing you can be sure of — if either instrument shows a harmonic on the feeders or antenna, that harmonic is strong enough to be heard somewhere far off.

Are Your Harmonics Getting Out?

If you have a ham friend a couple of miles away, get him to listen on the harmonic frequencies. Not a ham next door or very close by, because your fundamental will be so strong that his receiver is likely to overload, causing it to generate harmonics within itself. If a ham a few miles away hears any harmonic signal you *know* you have too much harmonic being radiated.

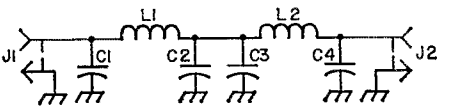


Fig. 1—Circuit diagram of the half-wave filter.
C_1, C_2, C_3, C_4—3.5 Mc.: 820 pf. mica, 500 volts.
7 Mc.: 470 pf. mica, 500 volts.
14 Mc.: 220 pf. mica, 500 volts.
21 Mc.: 150 pf. mica, 500 volts.
J_1, J_2—Phono jacks (8 required).
L_1, L_2—3.5 Mc.: 8 turns, close wound.
7 Mc.: 8 turns, 8 turns per inch.
14 Mc.: 4 turns, 4 turns per inch.
21 Mc.: 3 turns, 3 turns per inch.
All coils wound with No. 18 enamel. Coil forms are 1-inch. diam.

However, even if the ham a few miles away *doesn't* hear any harmonics it doesn't necessarily follow that you are clean. The only safe assumption is that you do have harmonics and must do something to clean them up.

How To Get Rid Of Harmonics

What is needed to clean up harmonic radiation is additional selectivity in the output stage of the transmitter. One method is to use a transmatch between the transmitter and antenna. The transmatch will provide the required selectivity to attenuate any undesired harmonics to a point where they shouldn't cause interference. For those interested in this device a recent *QST* article[3] described construction of a transmatch plus a multiband antenna.

Still another system of attenuating harmonics is by using half-wave filters in the coaxial line feeding the antenna. Many types of filters have to be matched to the impedance of the line they are used with — or to put it another way, the standing wave ratio on the feed line must be very low in order for the setup to work properly. This isn't true of the half-wave filter. The impedance that it "sees" at its output end will be repeated at the input side. Therefore, the filter can be inserted in the line without upsetting the load on the final amplifier.

The half-wave filter isn't critical of the s.w.r. on the line, and a single design will work equally well in either 50- or 70-ohm coax. Mismatches of about 3 to 1 can be tolerated in the line without upsetting the performance of the filter. The only reason for this limit is that when a mismatch exists higher than normal voltages and currents are developed and the components in the filter are likely to be damaged.

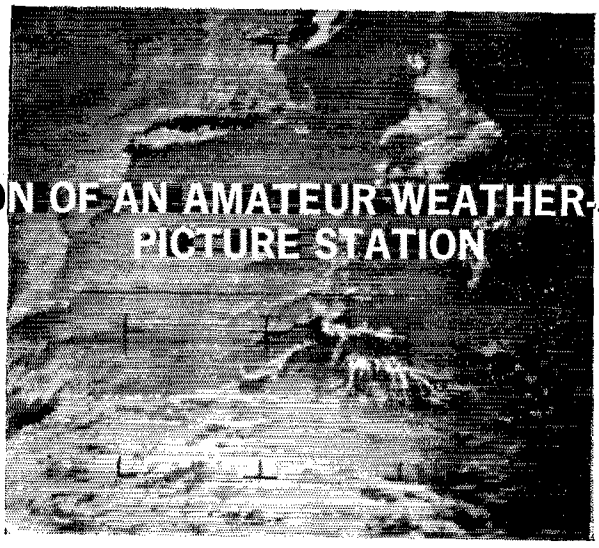
One disadvantage, but not a serious one, is that a separate filter is required for each band. In other words, when you change bands you must change filters. However, this is easily taken care of by using phono connectors on the

(*Continued on page 172*)

[1] McCoy, "A Field-Effect Transistor Dipper," *QST*, February, 1968.

[2] McCoy, "Are you Putting Out On The Correct Band?" *QST*, March, 1967.

[3] McCoy, "Novice or General — TVI Can Be Tough," *QST*, March, 1967.



EVOLUTION OF AN AMATEUR WEATHER-SATELLITE PICTURE STATION

BY CHARLES H. McKNIGHT,* W4MKM

THE elusive but fascinating pursuit of satellite weather pictures began at W4MKM early in 1966, inspired and guided by K2RNF's brilliant article in November 1965 *QST*.[1] The writer had been looking for a challenging project in tune with the times to fill his retirement years; and leisure time, a bulging junk box, and a little money for radio still in the budget made up his assets.

Progress in the project may be divided into three stages: The first, the initial building and testing period at the writer's Richmond, Va. QTH, extended over the first quarter of 1966. The second stage was marked by a move to Chesapeake Bay near Deltaville, Va., the erection of a helical antenna, receiver improvements, construction of a dark room, and the printing of many pictures from ESSA II signals. The third period, from early 1967 to date, involved experimental work aimed at faster operating techniques with positive printing from Nimbus II.

W4MKM was one of the first to go to work on Wendell Anderson's rolling-pin picture reproducer described in November 1965 QST. *He has obtained many successful pictures from weather satellites, and just recently shifted over from negative to direct-positive readout, using ordinary photographic enlarging paper. This is the story of his experiences in setting up an amateur weather-picture station.*

Initial Building and Testing

All of the circuitry of K2RNF's article was assembled on a dismantled sideband chassis measuring 11 by 17 by 3 inches. The panel, a stiff power supply good for 300 volts at 200 ma., an auxiliary filament transformer, and a VR-105 arrangement for negative biasing voltage were left in place. Some tube sockets were relocated for better layout. The countdown chain for Fig. 9[2] was built on a 5¼ by 3 by 2-inch Minibox with its base bolted to the back of the panel well above the chassis, with tubes mounted horizontally to the rear, and with control knobs on the upper side for access. The isolation of this circuit proved advantageous. To the main chassis were added three VR-150s and a four-stage Class-A amplifier with a tube line up consisting of a half-12AT7 preamp., 6C4 driver, 6L6 driver, and 6550 output. The last three were given fixed grid bias, with 250 volts on plates and screen grids. The 6L6 was first tried as the output tube but the 6550 had to be added to take the drum motor load at 115 volts a.c. with a good sine wave. The impedance match was good at 2600 ohms, with the motor fed through five 1-μf. 600-volt capacitors in parallel. The motor holds sync speed down to about 80 volts. The 1-volt peak-to-peak from the count-down is controlled at the 12AT7 grid to regulate the voltage output to the motor.

No great difficulty was encountered except that synchronization became restless at times. To cure this a separate small power supply

*Stove Point, Deltaville, Va. 23043.

[1] Anderson, "Amateur Reception of Weather Satellite Picture Transmissions", *QST*, November, 1965.

[2] This and other single-digit figure numbers throughout this article refer to circuits and drawings in the article referenced in Footnote 1. Drawings accompanying the present article have three-digit numbers.

was built with two VR-150s separately feeding Figs. 8 and 9. At K2RNF's suggestion the grid of the 6CL6, Fig. 6, was isolated by a 1000-ohm resistor with a 30-μf. electrolytic behind it to ground the wide voltage fluctuations at the 6CL6 grid.

If it were being done over again, all four of K2RNF's circuits would be built in separate shielded boxes with a VR-150 on each box. Good isolation, however obtained, is important.

Before going further, a few changes made by K2RNF after publication of his article should be mentioned. These are given below, together with minor changes in facsimile construction made by the writer and an explanation of certain control functions.

Drum Assembly

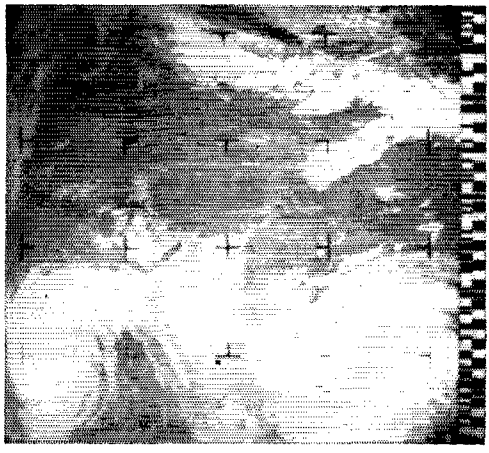
The drum and carriage assembly of Fig. 5 was built on a 13- by 29-inch piece of ¾-inch marine plywood with black Formica applied to the upper surface with pressure cement. Two ¾-inch square rails were cut from the base material and fastened to the base with screws to form the track. Formica pieces ¾ by 1 inch were glued to the bottom and sides of the front and rear carriage legs to provide smooth bearing surfaces. All burrs were sanded smooth. The rolling pin was equipped with two ¼-inch stub shafts of drill rod. After the shafts were cemented in with epoxy, the drum was mounted in ¼-inch ball bearings in the end pieces of the carriage. A small pulley was temporarily fixed to a shaft end and the drum was driven in its bearings for sanding to a smooth concentric finish of uniform diameter. A small planetary universal joint, made of thin sheet rubber of extreme flexibility, was used to couple the drum to the motor, which was mounted with adjusting screws for alignment. The 3/16"-24 transverse screw was carefully selected for straightness. It was coupled to the motor shaft with a short piece of 3/16-inch i.d. tubing cemented to the motor shaft and screw with epoxy. The screw was lined up true, with minimum wobble, just before the epoxy glue set. The drum magnet, about 3/16 inch square by ¾ inch long, came from the corner of a cloth potholder. The pickup coil was made with a ¼-inch stack of ¼-inch U laminations cut from E's, with about 1200 turns of No. 42 enameled wire.

It was found later that even a slight wobble in the screw caused banding in the picture, while a slight misalignment of the drum motor shaft caused the drum to oscillate with resultant wiggles in the picture, most apparent in the fiduciary marks. The black strip of tape shown on the drum in Fig. 5 is used to locate one edge of the film, which is fastened to the drum with double "stickum" tape applied to the upper and lower back edges of the film. The lower edge is pressed down on the drum against the edge of the black tape guide and then wrapped around the drum, and the other edge pressed down to hold the film firmly on the drum. It would appear that overlapping to some degree is advantageous, depending, of course, on the size of film used. The guide tape must be located experimentally with respect to the magnet, depending also on the film size and direction of rotation.

The two black squares near one end of the drum in Fig. 5 are part of 15 equally spaced markings of uniform size around the drum. When viewed under a stroboscopic lamp with line a.c. voltage these marks stand perfectly still when the drum is rotating at 240 r.p.m. or 4 revolutions per second, the speed synchronous with the frequency of 60 c.p.s. divided from the satellite carrier frequency of 2400 c.p.s. The markings, although remaining relatively stationary, may oscillate to some degree. This is usually caused by slight binding of the drum motor shaft. In aligning the motor by means of the adjustment screws the disappearance of oscillations will coincide with very little or no noise from the motor gear train.

Receiver

While the electrical circuitry and facsimile were being built a single dipole cut for 137.5 Mc. and fed with 52-ohm coax was erected about 15 feet above the roof. An Ameco 2-meter converter very similar to the 144-Mc. converter described in Chapter 16 of the ARRL *Handbook* was used. No difficulty was experienced in peaking the converter for 137.5 Mc. in and 43 Mc. out for the i.f. strip of a modified TV chassis to which a tunable oscillator was added. As the i.f. strip was an open-air job and 43 Mc. is just off the Virginia State Police frequency, this interference coupled with the traffic noise in the center of Richmond made the receiver impractical, although it did work well in the absence of QRM. A wide-band Monitoradio Receiver (Model MRC-33B) was purchased and the converter crystal changed for a clearer spot between 45 and 50 Mc.



An unusual satellite view of two hurricanes, Doria and Chloe at left and right in the lower half of the picture, over the Atlantic Ocean. This direct-positive print is from a tape recording of the signal transmitted from Nimbus II on September 16, 1967. The pattern along the right-hand margin is a code which gives Nimbus II's orbit number, the date, and time the picture was taken.

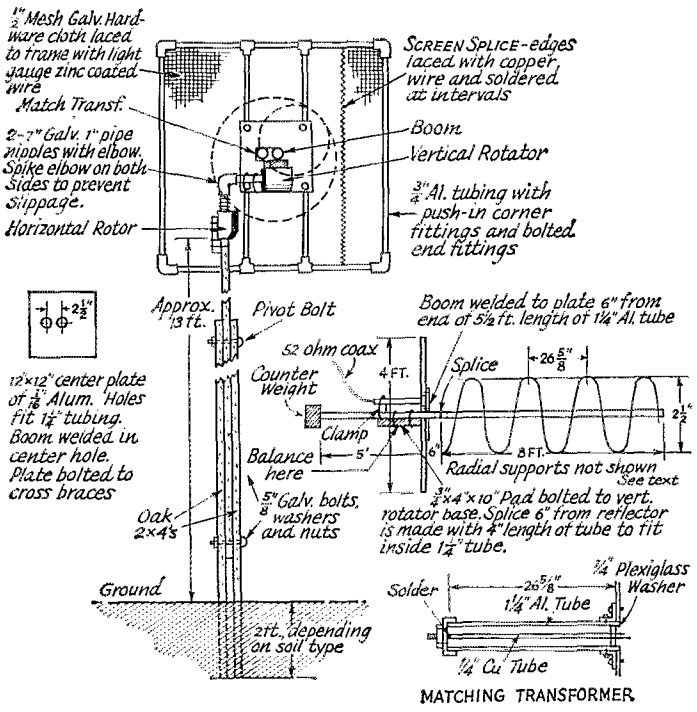


Fig. 101—Sketch of the helical antenna built for weather-satellite reception by W4MKM. Dimensions are for 137.5 Mc. The tubing and fittings used in the frame were obtained from Sears. Rotator shafts are clamped tight to pipe nipples with U bolts; rotator leads and coax cable are fastened to the pole and looped at the top to clear the counterweight. The antenna end of the matching transformer is fastened in the hole in the center plate with screws and nuts, using four angle clamps held on the tube with short sheet-metal screws. After assembly the Plexiglas washer should be doped with epoxy for waterproofing. The aluminum end cap is made of sheet material fastened to the tube with sheet-metal screws, and is mounted after the inner conductor is soldered to the coax fitting. The cost of the antenna, exclusive of rotators, was about $20.

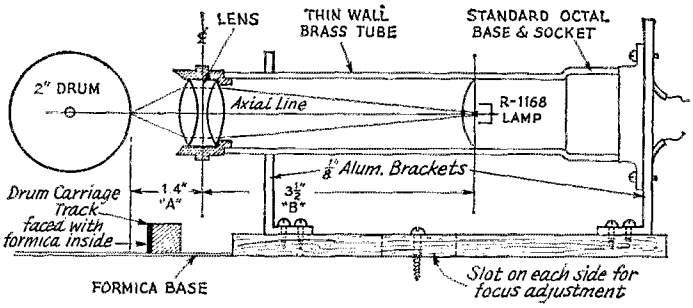


Fig. 102—Lamp and lens mounting. Dimensions are for a lens having a focal length of 1 inch. Height of this assembly should be adjusted carefully to put the light spot exactly on the drum center line, and the beam should be at right angles to the drum surface. For lenses of other focal length, dimension B should be three or more times the lens focal length. Then

$$A = \frac{BF}{B-F}$$

where F is the focal length.

The dipole brought in strong but rapidly fading signals from Essa II — enough, however, to peak the converter and test out the whole rig for synchronization, lamp modulation and general stability. No attempt was made to print pictures at this stage.

Having no experience in operating techniques, the writer arranged a visit with K2RNF at his New Jersey QTH. He generously demonstrated every phase of operations, to the extent of receiving and printing a picture from Essa II while his visitor looked on. A 4-turn helix antenna had recently been erected at K2RNF, its most original features being the rotator mountings and an axial boom of aluminum tubing. The writer made a few notes and resolved to build a similar antenna at his summer QTH on Chesapeake Bay as soon as possible.

Notes on Synchronization

In discussing the matter of synchronization, K2RNF suggested two changes in Fig. 7 of his article to improve the operation of the locked-phase oscillator: the addition of two 1N1763 diodes, back to back, in parallel with the 220K resistor at pin 4 of the 6SN7 clipper tube, and a 68K resistor instead of the 150K resistor at the 6BN6 plate, pin 7.

The writer's experience in attaining reliable synchronization involved the following procedures:

With a 7-volt peak-to-peak signal at Point A, Fig. 6, from a tape recording of a satellite signal with a 4-cycle pulse and 2400-cycle carrier, the vertical oscilloscope input was connected to the output of the oscillator, pin 5 of Fig. 8. R_2 was

adjusted until oscillations started and synchronized on the scope at 2400 c.p.s. The signal was removed and the frequency drifted. It was interesting to see the wave pull into synchronization when the signal was again applied to Point A. R_2 was carefully adjusted close to the sync point, and the d.c. voltage at pin 7 of the 6BN6 plate was measured on a v.t.v.m. R_1, the 8000-ohm resistor in the 6BN6 grid circuit, was then adjusted to give the same voltage both with and without a signal at Point A. After this the scope pattern remained unchanged for an appreciable time after the signal was removed to simulate a short fade in the signal from a satellite.

With the oscillator performing well in locked phase condition the dual potentiometers R_1R_2 in the countdown chain, Fig. 9, were adjusted to give a small 60-cycle output across the resonant tank, the capacitor of which (C_1) was adjusted to give an output of about 1 volt peak-to-peak. The 240-r.p.m. drum motor was connected to the Class-A amplifier, which was adjusted for 115 volts output. Rotating in response to the 60-cycle input, the drum showed the 15 equally-spaced lines on the drum surface as standing perfectly still, indicating good synchronization with the signal at Point A.

At this point the resistances of the dual potentiometers of Figs. 8 and 9 were measured. A pair of matched ½-watt resistors corresponding to the measured resistances of R_3 and R_4 was substituted for those potentiometers, which seemed to be noncritical. R_1 and R_2 were replaced by a 10,000-ohm dual pot with 6800 ohm 5% ½-watt resistors in series with each leg.

The 500,000-ohm pots were used to replace the 1-meg. dual pot R_2 of Fig. 8. Matched 470K ½-watt resistors were connected across the outer terminals of the 500K dual pot with no series resistors.

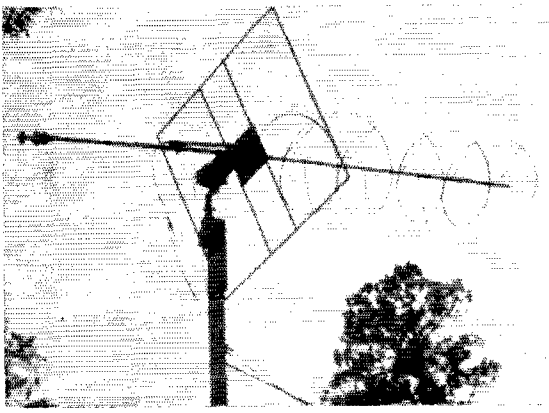
These changes made subsequent adjustments much easier. In discussing the changes with K2RNF, he remarked that he had used potentiometers on hand rather than invest in new ones. The writer appreciated this after first trying inexpensive pots only to find that the best available are none too good.

If after the above adjustments the synchronization is still unstable the trouble is probably due to the pulse getting into the countdown chain, most likely through the power-supply lines. This will explain why the writer went to extremes to isolate the 150-volt lines to the various sections of the overall circuitry.

The Helical Antenna

The second stage of progress began with the building of the helix at Deltaville, Va. A few details of the writer's method of construction will be given. Dimensions were calculated for 137.5 Mc. from data given by WICER in his article on helical beams.[3]

[3] DeMaw, "The Basic Helical Beam", *QST*, November, 1965.



The 137.5-Mc. circularly-polarized helical antenna built by W4MKM for reception of weather satellites. It is rotated in both azimuth and elevation.

The antenna is supported on a 2 × 4 pole mounted between two oak 2 × 4's, Fig. 101, anchored in the ground. The anchoring bolt at the lower end of the pole is removed when the antenna is lowered for servicing by means of a rope tied to the end of the pole. The bolt is replaced to provide a convenient hitch for the hauling rope.

When the boom was ready for the helix wire it was supported horizontally at a convenient height. Starting 9 inches from the screen, rings were scratched around the boom tubing at intervals of 7⅛ inch. Three notches 120 degrees apart were filed in the end of the tube, from which three lines were stretched taut and fastened to the screen so that they were parallel to the tube axis and 120 degrees apart all the way. At points of intersection between these lines and the circular spacing lines, ⅜-inch holes were drilled, with ⅛-inch holes at the opposite side of the tubing. These holes progress spirally at 120 degrees outward toward the end. Thirteen pieces of ⅜-inch doweling were cut to 14-inch length, and beveled slightly at both ends. A ¼ by ⅛-inch deep slot was filed in one end and a ⅛-inch hole drilled about one inch deep in the center of the other end. The inside ends were anchored with ⅛-inch nails pushed in lightly.

In mounting the helix wire on the radials, a coil of about 35 feet of aluminum clothes line was worked out into a 30-inch diameter and one end hooked into the wire screen near the transformer terminal. The coil was then drawn out over the dowels and the wire loosely tied to the radial ends as the turns moved out. Then by working back and forth the helix was formed with uniform diameter and spacing and lashed firmly into the slots of the radial supports. The nails anchoring the radials in the boom and the wire lashings were doped with epoxy cement. The outer end of the helix was clipped at about ⅛ turn beyond four full turns, and the other end was curved down and inserted into the transformer inner tube. A small hole was drilled and tapped

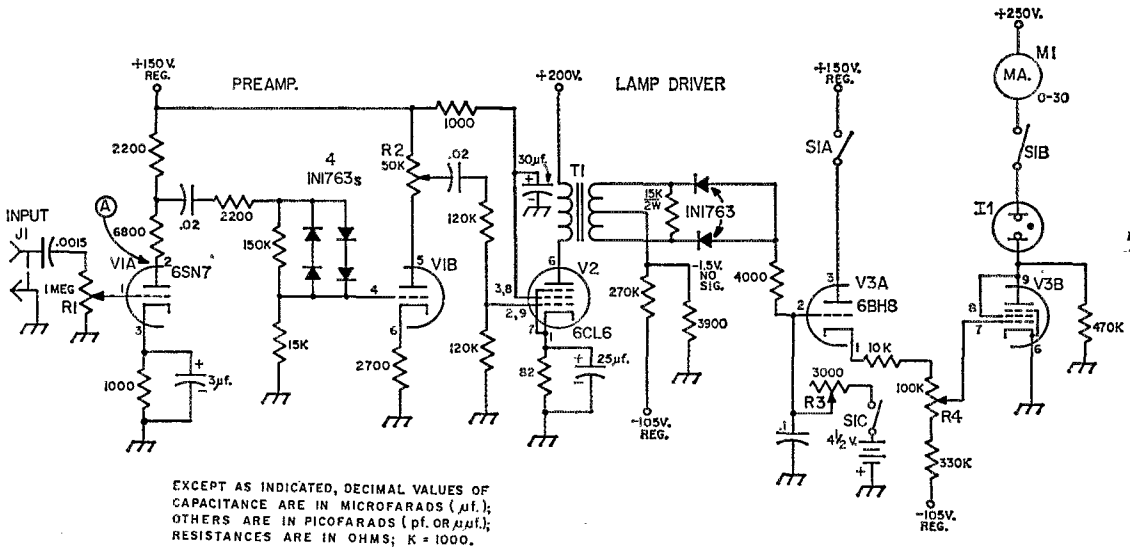


Fig. 103—The W4MKM lamp driver and preamplifier for positive printing. This circuit is a modification of Fig. 6 in K2RNF's article in November 1965 QST. The 6BH8 was substituted for the 6SN7-6AG5 combination in the original circuit because the pentode section of the 6BH8 has relatively high plate/screen current, desirable for the R-1168 lamp. Capacitors with polarity marked are electrolytic; others are ceramic or mica. Unless otherwise indicated, fixed resistors are ½-watt composition. The series resistance in the cathode circuit of V_{3A} (shown as 330K above) should be adjusted to obtain proper control of V_{3B} grid bias through R_4.

I_1—Modulation glow lamp, Sylvania type R-1168.
J_1—Phono connector.
M_1—0-30 d.c. milliammeter.
R_1—Audio-taper control.
R_2, R_3, R_4—Linear-taper control.
S_1—3-pole single-throw, any type.
T_1—Driver transformer, 3:1 primary to ½ secondary 30-ma. primary (Stancor A-4723 or equivalent)

through both members. A small brass screw and nut tightened the joint, which was then taped with plastic adhesive tape. A counterweight of about two pounds was fastened to the rear end of the boom. The dowel radial supports were varnished with spar varnish and the assembly set aside in a warm dry place where the epoxy would cure before being exposed to the weather.

In mounting the boom on its pad the rotators were lowered and the completed antenna was hauled into position. (Before raising or lowering, the rear boom extension should be tied to the pole to hold the boom parallel with the pole; this avoids undue strain on the rotator gears.) The coax cable was connected to the transformer and dressed together with the rotator control cable to avoid interference with the boom end when traveling in a vertical position. Good braking is necessary on the vertical rotator. Channel Master Rotators with updated automatic braking were used.

While the front-to-side ratio seems good, the front to back ratio is not very good. This could no doubt be improved by clipping the end and checking with a small signal from a remotely-located oscillator. In the present location this has not yet seemed necessary. The location is relatively free from man-made noises, but unfortunately is surrounded by tall trees with very little sky in the clear. Despite this the antenna works well in most directions. There is some fading from Nimbus II as it travels at a low angle from due south. This may be due to Doppler shift, as the receiver discriminator appears to be a little off center. There is no fading as the satellite recedes to the north where the forest is just as thick. This problem has yet to be explored.

Tracking is easily done visually since the antenna is only 25 feet from the shack and in plain view. K2RNF tracks successfully by watching the rotator indicator compass bearings. W4RNT has devised an ingenious device which tracks

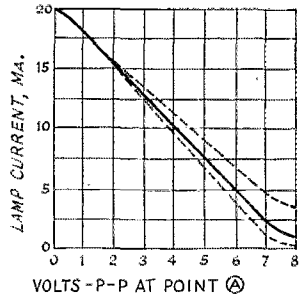


Fig. 104—Peak-to-peak a.c. voltage at point A, Fig. 103 vs. current in I_1. The curve was made by using a 2400-c.p.s. audio voltage applied through J_1. R_4 was set for 20 ma. lamp current with no signal, and R_3 was set for 2.5 ma. lamp current with 7 volts peak-to-peak at point A, in obtaining the solid curve. Dashed curves show effect of changing the setting of R_3 with R_4 left unchanged.

from a tape, punched for a predetermined orbital path. However, tracking has been one of the least of the writer's worries since most passes can be tracked with only four or five movements, and good pictures in certain directions have been made with no movement of the antenna for over three minutes.

Considering the fact that the helix is mounted directly under an ancient oak tree with a dozen or more tall oaks and pines within 50 yards in all directions, it would appear that man-made noises, especially automobile ignition noises, are the worst enemy to good reception and not intervening objects. Pictures have been made from signals 10 degrees above the horizon with trees running from directly overhead to a half mile in the direction of the satellite.

Receiver Changes

When the helical antenna was hooked up the receiver performed much better. In fact, quite a number of acceptable pictures were made from Essa II with this setup, including the hurricane shot shown in September 1966 *QST*. However, the absence of limiting made it necessary to ride the tuner — a bothersome chore — while watching the antenna for tracking.

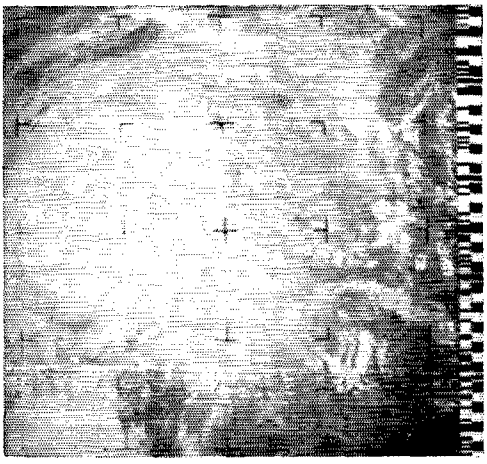
This led to a search for a receiver with double crystal control and good limiting qualities. Such a receiver was found. A Sensicon PA8616A-12 chassis bought at very low cost from a surplus list. It came with a front-end crystal in an oven, which called for a converter crystal to deliver 49.540 Mc. to the receiver. Two such crystals were obtained from International, for Essa II and Nimbus II. At the same time a small International transistor oscillator with interchangeable crystals for 136.95 and 137.5 Mc. output was purchased. This little oscillator has earned its cost as a check on antenna, converter and receiver performance.

The Sensicon "A" chassis with its 18 good tubes also had a second i.f. conversion crystal, two stages of limiting, a Permakay 8436A wideband filter, a differential noise silencer, and a convenient control-switch socket. The control switch was mounted on a small chassis with a 150-volt power supply and a 0-200 microammeter to indicate deviation. A high-impedance source was found ahead of the audio power tube for connection to the mike input of the tape recorder. Receiver audio output was adjusted to a medium level and volume controlled at the recorder amplifier.

Lamp Change

In midsummer 1966 a Sylvania modulation glow lamp, type R-1168,[4] having a rated life of 150 hours with an average current of 15 ma., was substituted for the AR-3 lamp. It was mounted in one end of a thin-wall brass tube with the lens fitted at the other end. The tube is supported on a sliding base for focusing.

[4] Available from Ionics Electronics Division, 65 Grove St., Watertown, Mass. 02172



Direct positive print of a Nimbus II transmission on September 19, 1967. This picture, centered just above the tip of Yucatan, shows Hurricane Beulah centered about 300 miles due west of the spot (indicated by plus mark) at which the picture was taken. Florida and Cuba are visible near the right margin.

The 800 picture lines on a 2-inch drum have approximately 0.008-inch spacing. A light spot of 0.006-inch diameter was thought to be about right. The lens mounting dimensions are given in Fig. 102.

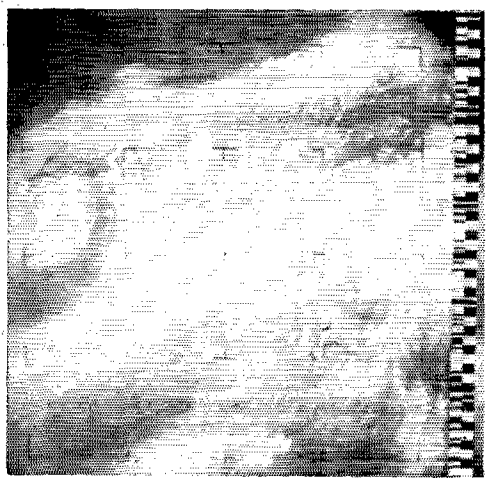
The thickness of the wooden base is such as to bring the light spot level with the drum center. Screws through the slots at each side are permanently tightened when the lens is in focus. The brass tube, a plumbing item, was found in a hardware store. One end is slightly larger than the main tube diameter and fits snugly over the R-1168 base. To avoid reflections from the glass tube end, the end is covered with black adhesive tape or paint except for a small circular aperture at the center. Diaphragm opening, not shown, is adjustable from f:32 to f:1.9. A 1-inch focal length lens is convenient for compact design, but lenses with other focal lengths can be used. The lens speed should be at least f:4. The lense is focused wide open and then stopped down according to the sensitivity of the film in use.

A darkroom adjacent to the operating bench has proved to be most convenient. A room four feet square was constructed of Masonite at one end of the bench, which extends through it. Inside the room, the top of the bench was enclosed for a height of 24 inches, with a sliding panel in vertical grooves for access to the enclosure. The drum mechanism is located on the bench inside this inner darkroom, and control wires run through the main darkroom wall.

A safelight in the outer darkroom is kept on while loading and unloading the drum. After the drum has been loaded and its position checked, closing the sliding panel makes the inner enclosure light-tight.

Positive Printing

With the helix antenna, a good receiver and the



The cloud formation at the left accompanied an intense weather disturbance over Michigan, another direct-positive reproduction of a Nimbus II transmission. The picture was made on the day when several sky divers were lost over Lake Erie.

R-1168 lamp in operation, many good pictures were captured during the fall of '66 — so many, in fact, that the cost of about 70¢ per picture for film and paper became a matter of concern. Also, working in total darkness and the long waits for films to dry were somewhat tedious. All of this created a state of mind that made the writer most receptive to W7UGV's scheme for positive printing, as outlined in "Technical Correspondence" in December 1966 *QST*. However, after mulling the situation over, it was decided to try for positive printing within the framework of K2RNF's circuitry.

First came the matter of finding a photographic paper with enough sensitivity to respond to the small amount of available light. Correspondence with the Eastman Kodak Co. brought sympathetic response from Mr. R. D. Anwyl, with samples of exceptionally fast papers, but with the notation that the papers were not available except in prohibitive minimum quantities. He suggested Kodabromide Grade 1 as our best chance. Some Kodabromide F-1 sheets were obtained and printed as negatives. With lamp-current peaks of 20 ma. some good negative prints were made.

The next step was that of inverting the lamp drive for positive printing. The diodes at the center tap of T_1, Fig. 6, were reversed. Then came the cut-and-try process of adjusting the bias of the cathode-follower tube, its cathode resistance, and the other circuitry of Fig. 6 to give a good grey scale. The final circuit as modified for positive printing is given in Fig. 103, and the lamp current in relationship to signal voltage at point A is charted in Fig. 104. All work was concentrated on optimum biasing for positive prints on Kodabromide Grade 1 paper. Fig. 103 shows the biasing arrangement as it is at present. Although there is no assurance that this is the final answer, scores of acceptable positive prints have been made from Nimbus II signals. Landmarks have shown up from the Pacific Coast of Southern Mexico to the eastern coast of Labrador. All of the past season's hurricanes were captured, some with landmarks to orient them accurately. The photographic work has been speeded up to the point where a picture shot by Nimbus II over Cuba can be inspected in daylight while signals are still coming in from the same pass to the north. The paper is insensitive to an amber safe light, so the paper can be applied to the drum and all photographic work done with fair visibility. Finally, the cost has come down to about 10 cents a picture. Kodabromide F-1 paper with standard processing using Ektol developer, a stop solution, and hypo fixer make up the photographic procedure.

Since duplicates are seldom needed it is the writer's practice to print the picture as it is being received. Recordings are useful, however, for checking synchronization or for making duplicate pictures. For this, the tape recording heads must be frequently cleaned and the reel tensions kept within specifications. However, even with the best of care the taped pictures are seldom as good as those printed directly from the satellite signals.

In Fig. 103, R_3 is used to adjust the lamp current to near cutoff with 7.5 volts peak-to-peak at point A. R_4 is used to adjust the maximum lamp current with no signal at point A.

Practice is required in adjusting the gain when pictures are printed directly, since adjustments during the transmission period usually result in banded areas. The signal level is more easily set with a tape recording, as a test run can first be made. In positive printing, experience is the best guide in setting R_3 and R_4 for the paper used. In addition to audible monitoring with a small speaker, the scope pattern at point A is observed, preferably on a calibrated scope. The writer has also monitored with a v.t.v.m. connected to point A, using a 14-volt peak-to-peak scale, but this gives only a rough idea of signal peaks because of meter damping. Here, also, some experience is helpful. This problem has not been completely resolved.

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In closing, it may be said that the endless opportunity for experimentation is one of the most appealing aspects of this activity. It is something new, and the surface probably hasn't been scratched.

At the N.A.S.A. Satellite Coordinating Offices in Washington and Greenbelt, Md. everyone has been most helpful in sending technical information, chart material for plotting orbital paths, daily predictions of the time and longitude of ascending nodes (sent bi-weekly), and similar information. Only recently N.A.S.A. sent notice giving W1AW transmission schedules covering WX Satellite Orbital predictions. There seems to be an outstretched hand at N.A.S.A. welcoming the amateur! QST

Magnetic Keyer Paddles

BY STEVE S. NURKIEWICZ,* WA2YBR

BECAUSE I've never been completely satisfied with the feel of commercially-made keyer paddles, I decided to try my hand at some improvements, beginning with a standard Vibroplex paddle.

As you can see from Photo A, I first substituted magnets for the spring that controls dot-lever tension. One of a pair of magnets from a couple of old b.c. receiver speakers was epoxied to the end of the lever and the other to a screw that was mounted on a threaded post. "Tension" is adjusted by changing the gap between the magnets, running the screw on which the movable magnet is mounted in or out. The closer the magnets approach, the more the force that's needed to make the dots.

I tried the same arrangement on the dash side too. It can be done, and it worked fine, but there isn't a great deal of spare space on the paddle so it got pretty cluttered up. Photo B shows this type of conversion on another Vibroplex paddle.

To improve the action further, I also removed the stock friction bearings on which the pivot normally rides, replacing them with tiny ball bearings — the kind which are normally used for hopping up model slot racers. You can get these bearings at any good hobby shop.

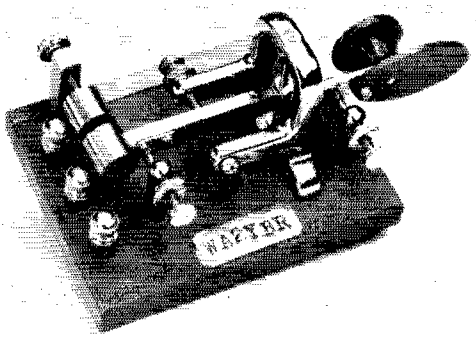
It was inevitable that I should try building a paddle from scratch. In my early attempts I had to machine a number of parts myself, but Photo C is a shot of a later scratch-built job that is much easier because many of the parts can be bought right out of a catalog. This is the PIC catalog — obtainable from PIC Design Corp, 477 Atlantic Ave., East Rockaway, N. Y. 11518.

There are PIC authorized re-sale agents practically in every state, major cities and in a number of foreign countries, so you might be able to pick up the parts yourself.

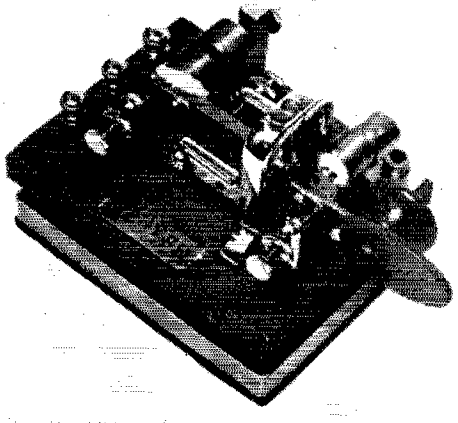
You can't buy a base, but most of the other metal parts I used came from stock. I made a base from a slab of steel, preferring that heavy metal because I have a very heavy hand. Aluminum would be easier to machine and will do the job, if it is screwed down to the operating desk to keep it from walking away.

Photos D and E show my latest attempt to build the paddle I've been looking for, and I think I have done a good job.

The design is different. It has separate dot-dash arms pivoted in ultra-precision ball bearings, double shielded and greased for life (PIC No. E4-6, $3.02 each). Four are needed. The magnets



(A)



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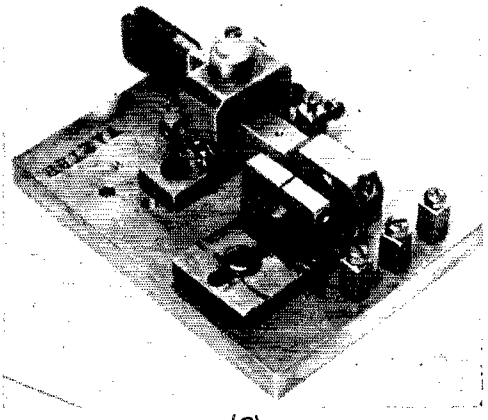
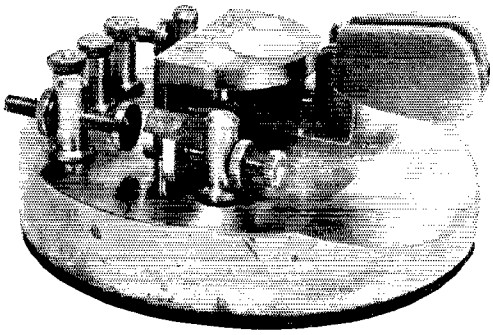
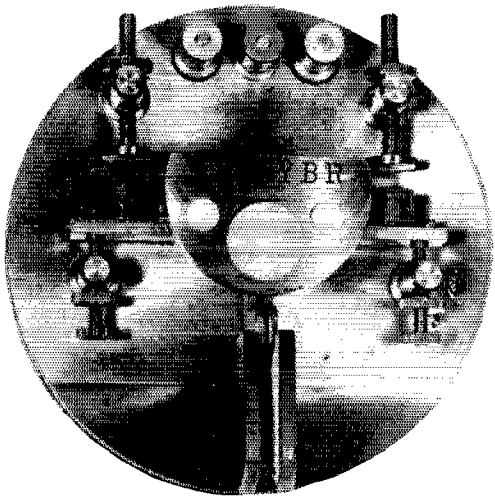


(C)

* 177 Landau Avenue, Floral Park, N. Y. 11001



(D)



(E)

used in the earliest models have been replaced by ones much smaller in size but equally strong (Lafayette Radio #14C3309, 39¢ each). They are predrilled, so epoxy isn't needed.

You will also notice that only two magnets are used in this model. Standard steel bolts with filed-down heads have been substituted for the other two. The magnetic field is strong enough to do the job.

There are many old bugs and keys around collecting dust and just asking to be put to use again, with a little effort and spare time. Why not make them magnetic?

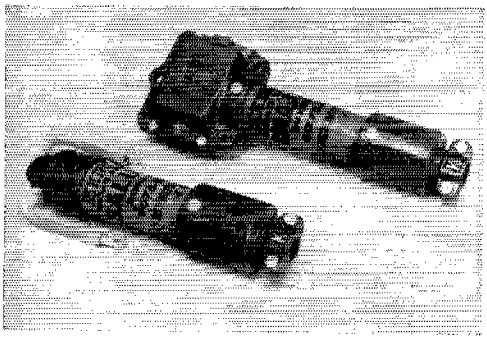
Many of my CW operators friends have tried my paddles, and without exception think they're fine. The lever action is extremely smooth, yet positive, and every trace of the side-play you find in commercial paddles has been eliminated. QST

• New Apparatus

Kirk Broad-Band Baluns

KIRK broad-band baluns are designed to handle the amateur legal power limit in the 3- to 30-Mc. range. Two impedance ratios are available as are two case styles. A 1:1 ratio balun is supplied for matching 50- or 75-ohm unbalanced line to 50- or 75-ohm balanced loads, and a 4:1 ratio balun is furnished for matching 50- or 75-ohm unbalanced line to 200- or 300-ohm balanced loads. Model 5075-D is designed for use with dipoles while model 5075-B is styled for use with beam antennas.

Model 5075-D (top half of the photograph) is constructed to replace the center insulator of a dipole. Although the installation instructions recommend that the coax cable and dipole connections to the balun be soldered, nuts, bolts and crimp lugs are provided so that only mechanical connections need be made if the user desires. A clamp at the bottom of the case helps to relieve the strain of heavy coax line on the balun's innards.



Model 5075-B has two lug-terminated 3-inch leads for connecting the balun to the driven element of a beam antenna. Included in the instructions are details of a hairpin matching system for raising the normally low driving-point resistance (5 to 30 ohms) of a beam to the characteristic impedance of the feedline. In addition, hardware is provided for attaching the balun to a boom.

The top and bottom section of each balun case is metal (looks like aluminum) and the center section is heavy-duty plastic. Inside the hollow center section are many turns of heavy wire on a ferrite core. Model 5075-D is 7 inches long and weighs 9 ounces, and model 5075-B is 6 inches long and weighs 6 ounces. The manufacturer is Kirk Electronics, 6151 Dayton-Liberty Road, Dayton, Ohio 45418, and the price class is $8. — *W1YDS*

Strays

Feedback

Footnote 3 on page 29 of *QST* for February 1968 failed to mentioned the publication. The reference should read: Lancaster, "Using New Low Cost Integrated Circuits," *Electronics World*, March 1966, p. 50.

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The wiring of the bridge gate circuit, BG_1, in Fig. 12, page 39, February *QST*, was incorrectly shown. The proper wiring (internal if the bridge is purchased as a unit) is given in Fig. 9, page 36.

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K6AW points out that "contact D" mentioned in the 2nd line of the 4th paragraph, page 61, "Semi-Automatic Key Adjustment" by Murphy in *QST* for February 1968 should read, "contact F."

Guidelines for Transistor Transmitters

BY D. W. NELSON,* WB2EGZ

Here are some "cookbook" recipes for hams who want to experiment with transistors in transmitters. Although pointed primarily at v.h.f., the principles are equally valid at lower frequencies.

Luck has very little to do with your success as a builder, particularly when the project is a transistorized transmitter. The primary limitations of a transistor in Class C — its low gain and its power restriction — present a new challenge to the amateur. Because the transistor is a low-impedance device, careful attention must be paid to the reactive component of the impedance, whereas this factor is of little concern with most vacuum tube circuits. Until recently, when several electronics manufacturers were able to apply computer-aided design techniques, the transistorized transmitter was the result of a series of experimental approaches, and (it was thought) the phase of the moon.

Empirical information gathered by the author in his work on 6- and 2-meter transmitters, as well as techniques used by others, will be discussed in this article. Certain do's and don't's will have less importance below 30 Mc.; however, the principles are still pertinent.

Let us use a block diagram of a transmitter (Fig. 1) for purposes of discussion. Typical circuits will then be shown for each block.

The Oscillator

In the oscillator circuit, power-rated transistors are preferred to give greater output. Low-power oscillator types which may be useful in receiver local oscillators are inappropriate in a transmitter. It is advisable to use an oscillator of the highest possible frequency; i.e., at or near the transmitter's final frequency. As will become evident, the harmonics that are generated in successive amplifiers may become troublesome.

Oscillator instability is a problem encountered which has dictated the use of crystal control in the author's experiments. Not all crystal oscillator circuits work satisfactorily, but Fig. 2 shows one that does. We find this circuit to be non-critical with respect to crystal activity. It will accept lower-activity crystals which fail to operate in a Pierce circuit which has been widely used. If the crystal is an overtone type, it will be necessary to assure that the loaded Q of the tank is sufficient to select the desired mode of the crystal. Probably this requirement will dictate the use of a buffer stage. Tapping down on the coil is also useful.

*9 Green Ridge Rd., Ashland, N. J. 08034.

Buffers, Multipliers and Drivers

A buffer, as here defined, is a Class A circuit requiring little or no drive power from the oscillator. By providing an isolating interface between the oscillator and the Class C stages, the buffer maintains the stability of the oscillator. Power is delivered by this stage to the succeeding stage. It may be practical to combine the multiplier with the buffer in spite of the use of Class A operation.

Even harmonics are dominant in the transistor multiplier shown in Fig. 4. Use of a series of doublers in preference to triplers may prove to be a very practical matter, and should be kept in mind when beginning your design. For the best purity of output, multiplication should be done at low power levels and high-Q tank circuits should be used.

Several driver stages, Fig. 5, may be necessary at the final frequency — particularly at v.h.f., where transistor gain is low. As the power capability of the transistor increases, so does its reactive component of impedance. While simple tanks, LC couplings, and link couplings are appropriate at low power levels, we now must become aware of the reactive component in our impedance matches. Matching networks in the form of πs, Ls and Ts are common in this application. These will generally not reject unwanted harmonics and subharmonics sufficiently, and we are therefore justified in our efforts toward single-frequency purity prior to the power stages.

Inexpensive transistors should be chosen at the lowest power levels, with high-power types only in the final stage(s). It is appropriate in all stages of a transmitter to use a transistor having the *lowest* rated frequency consistent with your needs. Higher-frequency units are not only more

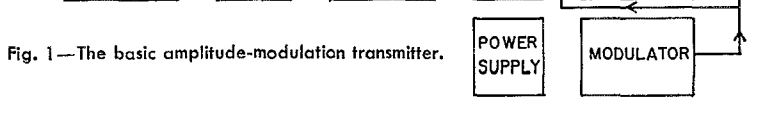

Fig. 1—The basic amplitude-modulation transmitter.

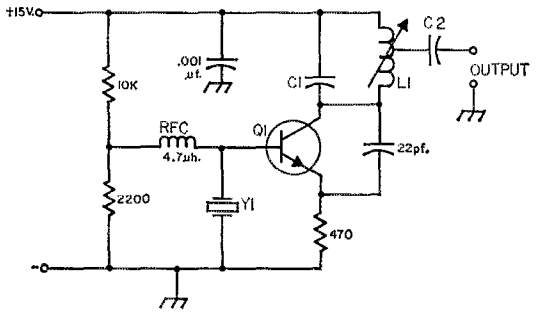

Fig. 2—Overtone crystal oscillator circuit for 50 Mc., also useful at lower frequencies with fundamental-type crystals. For 50 Mc. approximate tank values are C_1 33 pf.; L_1, 5 turns of No. 22 on a Miller type 4500 form, tapped ½ turn from supply end, when using a 2N3118 or RCA 40080. For other bands, C_1L_1 should be selected for resonance with the particular crystal frequency used; normal LC ratios are satisfactory. The tap on L_1 should be adjusted for sufficiently-high tank Q to permit crystal oscillation. C_2 is the coupling capacitor to the next stage; 20 pf. to 100 pf. ordinarily will be satisfactory, although a variable capacitor may be necessary for optimum output in some circuits.

expensive, but may also be unstable. Along these lines, some success has been attained by substituting cheaper transistors when a stage is initially tuned. The intent is to approach the correct tuning of the stage with a transistor which is more rugged. A transistor may be destroyed by incorrect tuning. In fact it may not survive the tuning procedure! More on this comes later.

Voltage and power ratings on Class C transistors may limit the available gain. For example, the semiconductor in question may have a breakdown (BV_{CER}) rating of 60 volts. Its gain is best using a 28-volt supply. This is an acceptable voltage for f.m. or linear service where the BV_{CER} need only be twice the supply voltage. On the other hand, amplitude modulation will have peaks of four times the supply voltage. Hence we are limited to a 15-volt supply and lower gain for the stage.

Keeping an r.f. power transistor cool is an extremely important consideration. Beyond the understanding of temperature vs. power charts are the unknown factors of impedance changes and effective change in breakdown ratings. The writer has seen transistors which when tuned hot became completely *untuned* after cooling; this was a rare case which also interested the manufacturer, but the detuning phenomenon may be expected to a lesser degree in all r.f. power transistors. The change in breakdown rating concerns the "second-breakdown" characteristic. Basically we may say that lower peak voltages are destructive at higher temperatures. Curves are not generally available, although a good bit of work has been done toward developing a new rating sometimes called the "locus of second breakdown."

Modulation

Modulating a transistor rig involves a few new concepts. F.m. is desirable from the standpoint of fewer audio parts and higher-gain r.f. stages. In f.m., there are no basic differences from the principles employed in tube designs. On the other hand, amplitude modulation offers a challenge! R.f. drive power is a significant part of the output power of the transistor; therefore, at power levels of a watt or more it will be necessary to modulate r.f. driver stages. The fewer driver stages you modulate, the easier will be the tuning.

A push-pull modulator for a.m. will spare the aggravation of burned-out finals. In a single-ended modulator where current is always flowing in one direction in the audio side of the modulation transformer, there will be a violent surge when power is removed. There is a good possibility of destroying some or all of the modulated r.f. stages. Granted that with proper phasing and judicious switching the danger is eliminated. But most of us can't afford the first mistake.

Tuning

While no single procedure will suffice for all transistorized transmitters, a few hints are listed below.

1) Dip tanks when possible. Network couplings may also show resonances at frequencies other than the one of interest, on the g.d.o.
2) Keep a receiver tuned near the transmitter frequency to monitor for oscillations.
3) When possible, disconnect succeeding stages until first stages are tuned.
4) Never insert or remove a transistor with voltages applied.
5) If an amplifier breaks into oscillation, remove power immediately. Check for excessive heating of the transistor.
6) Check transistors for heat during tuning. If too hot to touch, remove power until the transistor is cool.
7) Use a g.d.o. or absorption wave meter as a frequency indicator to be sure your tuning is correct. Other frequencies (usually harmonics

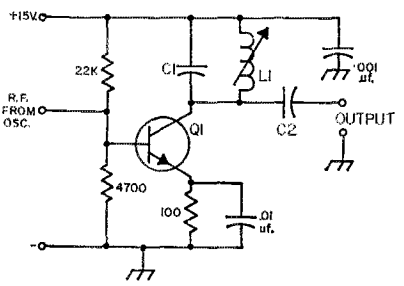

Fig. 3—Class A buffer amplifier. C_1L_1 is tuned to the operating frequency, usually, but frequency doubling also is possible at v.h.f. For 50 Mc. operation C_1 can be 22 pf. and L_1 7 turns of No. 22 on a Miller type 4500 form, using an RCA 40404. For other frequencies, remarks under Fig. 2 also apply to constants in this circuit.

of the basic oscillator) may accidentally be tuned in some stage.

8) A high v.s.w.r. may indicate the presence of strong harmonics rather than a mismatch at the desired frequency.

9) Tune for best amplitude modulation after the r.f. output is peaked, by starting at low modulation levels using a single tone. Increase modulation gradually, retuning at each level for lowest distortion. The process is more difficult at higher frequencies where a.m. may also f.m. slightly as the output reactance of the final transistor changes.

Aids to a Successful Transmitter

Emitter biasing is preferred to other techniques. Some manufacturers have shown optimized circuits where no emitter resistor is used, but don't you try it. Some current limiting is needed for tuning purposes and surge protection.

Bypassing of the emitter and supply voltage points may require two or more capacitors of unlike values. The second bypass should be 5 to 10 times the capacitance of the first. Good capacitors for this application are feedthrough, disk ceramic, and laminated-ceramic types. Incomplete bypassing may cause low-frequency parasitics in the stage due to its higher gain at lower frequencies. A second problem which is greatly reduced is incomplete bypassing due to lead inductance.

A typical base return on a power stage would be a low-Q choke. Not so easily found, you say. One suitable substitute is a low-resistance wirewound resistor. Two to ten ohms would be appropriate values. The Q of a regular choke may be reduced by shunting it with a low-value resistor or by placing ferrite beads on the choke leads. But why all the fuss about low Q? Simply that the motorboating mentioned earlier will be suppressed. Use of a coil of heavy wire in the collector circuit of the final amplifier, rather than a conventional choke, will also reduce the tendency to oscillate.

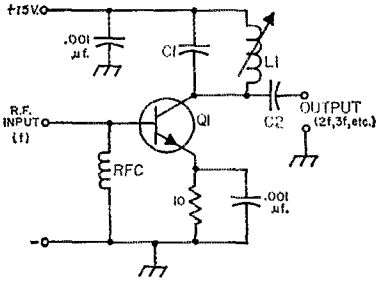

Fig. 4—The Class C frequency multiplier. The transistor is at or slightly beyond collector cutoff with no base-bias network. C_1L_1 is tuned to the desired multiple of the input frequency. Representative values for doubling from 72 to 144 Mc. using an RCA 40404 would be C_1, 5.6 pf., and L_1, 2½ turns of No. 22 on a Miller type 4500 form. The r.f. choke should be 6.8 µh. C_2, the coupling capacitor to the next stage may be a variable to match the next-stage input by proper tuning.

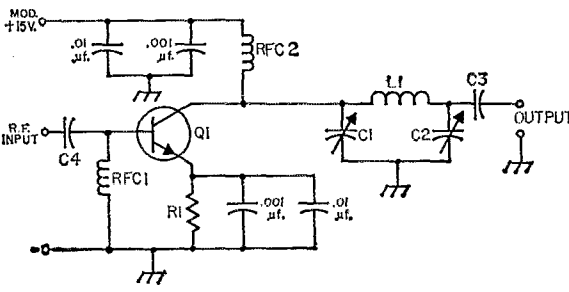

Fig. 5—Class C power amplifier circuit used for drivers and finals. If one of the circuits in Figs. 3 or 4 precedes this one, C_4 will not be needed since it performs the same function as C_2 in the other circuits. $C_1L_1C_2$ is a pi network with constants appropriate for the operating frequency; other types of network such as the T also are usable. See text for remarks on bypassing. Typical values for the transistor types indicated:

	4 Mc.	50 Mc.	144 Mc.
C_1	170-780 pf. mica	25-280 pf. mica.	0.9-7 pf. mica.
C_2	0.003-0.005 µf. mica.	50-480 pf. mica.	4-40 pf. mica.
L_1	1.3 µh.	0.1 µh.	3 turns No. 16, ¼-in. diam.
Q_1	RCA 40444	2N3375	2N3375
R_1	1 ohm; n.i.*	1-3 ohms, n.i.*	1-3 ohms, n.i.*
RFC_1	68 µh.	4-ohm, 3-watt wire-wound or 6.8 µh. low-Q.	2.4-ohm-3-watt wire-wound or 1.0 µh. low-Q.
RFC_2	App. 68 µh.	4 turns No. 16, ¼-in. diam.	1½ turns No. 16, ¼-in. diam.

* Noninductive

Chokes in the base return are preferred to resistors because of the enhancement of the collector-to-emitter breakdown. Reverse biasing of the base-emitter junction would be still better except that the transistor is more susceptible to second-breakdown in that type circuit.

A high-conductivity chassis is recommended for low losses. Copper or silver-plated chassis are best. An orderly layout on the chassis is also beneficial. Trying to compress the size of the transmitter may create losses and instability.

Power supplies with poor regulation are undesirable for use with a transistorized transmitter. The worst case would be a car's power system. Not only will the output power vary drastically, but detuning will occur. By using the highest available voltage (compatible with requirements already discussed) transients and line variations will have the least effect, but a good regulated supply is ideal.

(Continued on page 168)

A Milligallon For 15

BY WES HAYWARD,* W7ZOI

An amateur activity of increasing popularity is experimentation with low-power solid-state transmitters. The appeal of QRP work is derived largely from the simplicity and portability of the equipment used. However, most of the equipment described in the literature is designed for the 80- and 40-meter bands, where the circuitry is of minimal complexity. This is unfortunate in that current propagation conditions make the 10- and 15-meter bands very attractive to the low-power enthusiast.

The "milligallon" rig shown schematically in Fig. 1 was designed for the 15-meter band and uses two inexpensive (64 cents) epoxy-cased silicon transistors. The rig's simplicity is realized by operating the oscillator, Q_1, in its third-overtone mode. Garden-variety 7-Mc. crystals are used. The amplifier, Q_2, operates in the common-emitter configuration and has a power input of almost one watt. Hence the name "milligallon." With a 12-volt power supply, the measured power output was one-half watt into a 50-ohm resistive load. With the transistor shown, the supply potential should not exceed 12 volts and modulation should not be applied to the Q_2 collector. Diode CR_1 and its associated circuitry provides a convenient means for tuning the transmitter and may be used with a v.o.m. or v.t.v.m. A method for measuring power output is included in Fig. 2.

The transmitter is built on the 2 × 3-inch printed-circuit board shown in Figs. 3 and 4, and the finished circuit card is mounted inside a small aluminum box of suitable size. The crystal socket and p.c. board should be mounted so that the interconnecting lead length is small. The author included a ceramic wafer switch in his unit which serves as an antenna changeover switch. Extra terminals also remove the power supply from the transmitter during receive periods.

* 1801 11th Ave. N.W., Puyallup, Washington 98371

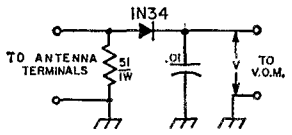

Fig. 2—Dummy load and peak rectifier for measuring power output. The fixed capacitor is ceramic.

Toroid coil forms [1] are used for both of the tuned circuits for reasons of compactness, shielding and economy. After the transmitter has been built, a 51-ohm resistor should be temporarily connected to the antenna terminals to serve as a dummy load. Adjust capacitor C_1 for good keying as monitored in a communications receiver, and tune the output tank capacitor, C_2, for maximum

[1] A kit of 2 small suitable toroid coil forms is available for $1.00 postpaid from Alcom Electronics, 2025 Middlefield Road, Mountain View, California, 94040. Fairchild transistors are available through any Fairchild distributor.

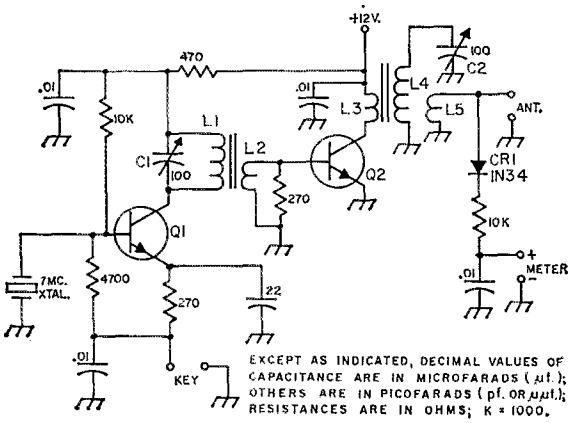

Fig. 1—Circuit diagram of the 21-Mc. "milligallon". Fixed resistors are composition, ½ watt or smaller. Fixed capacitors are ceramic.

C_1, C_2—7-100 pf. midget compression mica trimmer (Elmenco 423).
L_1—App. 2.5 μh.; 30 turns No. 28 on ferrite toroid form (Arnold type FE-0437-0501, 0.437 inch. o.d.; see also footnote 1).
L_2—5 turns No. 28 on same form as L_1.
L_3—5 turns No. 22 on same type form as L_1.
L_4—App. 0.8 μh.; 17 turns No. 28 on same form as L_3.
L_5—4 turns No. 22 on same form as L_3.
Q_1, Q_2—2N3641 (Fairchild) or equivalent.

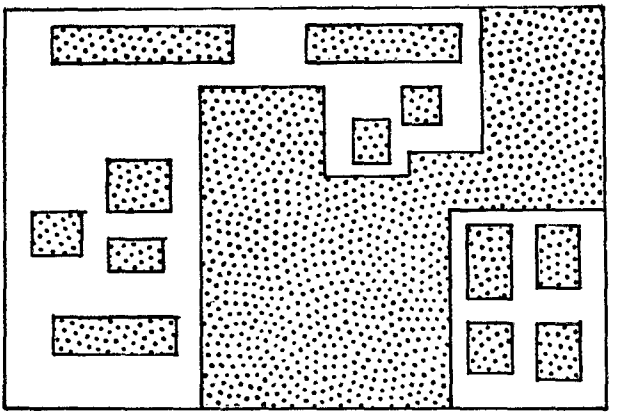

Fig. 3—Circuit board layout (bottom view), *full size. Shaded area is copper;* white area is etched out.

power output as indicated by a voltmeter connected to the meter terminals or the peak-reading r.f. voltmeter connected to the dummy load (Fig. 2). The transmitter should be used only with a well-matched 50- or 70-ohm antenna. If the s.w.r. is excessive the builder should consider an antenna tuner such as the T network described by Johnson [2]. Capacitor C_2 should be repeaked when the antenna system is connected.

Since the total current drawn by the transmitter is about 100 ma., power may be economically supplied by a 12-volt lantern battery. If a line-operated power supply is desired, the circuit used in the author's receiver [3] would be ideal.

The results obtainable with the milligallon will amaze all but the seasoned QRP-er. In the first month of operation, the author made contacts all over the U.S. and Canada and with several stations in Japan. The antenna was one of the popular trap verticals. When conditions are good, a 10-db. pad is inserted in the antenna line to add to the challenge. For five bucks worth of parts and a couple of evenings work, the rig is certainly hard to beat. QST

[2] Johnson, "Band-Switching Transmatches," *QST*, October, 1967.

[3] Daughters, Hayward, and Alexander, "Solid State Receiver Design using the MOS Transistor," Part II, *QST*, May, 1967, p. 25.

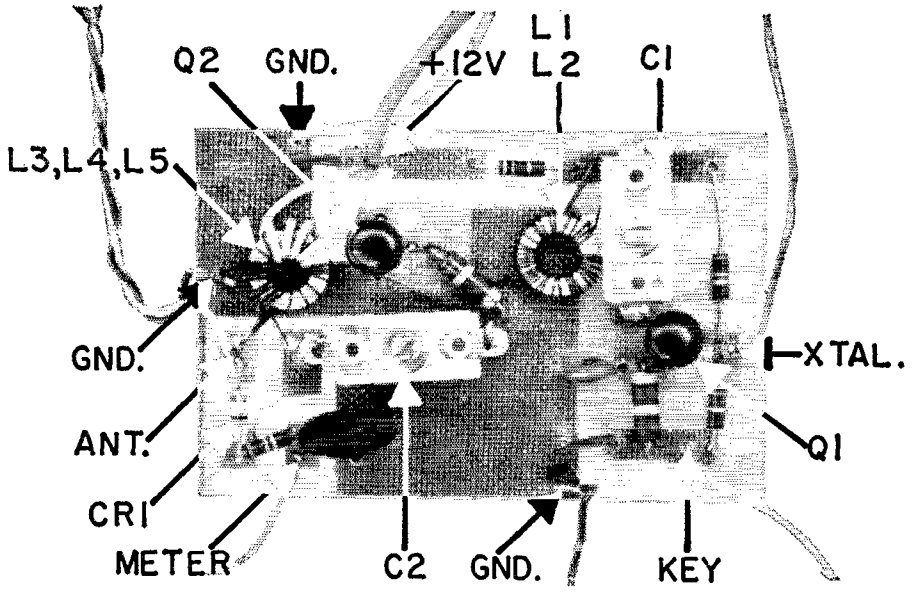

Fig. 4—Plan-view photograph, full size, of the Milligallon. Principal components are identified in this view as an aid to assembly; ones not labeled can easily be recognized by referring to Fig. 1. The dark areas are copper backing on the opposite side of the translucent circuit board and correspond (reversed left to right) to the layout shown in Fig. 3.

USING SUN NOISE

BY DON LUND,* WAØIQN

ONE may hear the question "How many db's of sun noise do you get?" asked among serious v.h.f.-men. Checking system performance of an advanced v.h.f. station by measuring the amount of noise received from the sun can be most useful, but there are some pitfalls that must be avoided. Our aim here is to set out the relationship between the power radiated by the sun, the antenna characteristics, and the receiver performance. If we know any two of these sets of parameters, we can measure the third. Finally, we'll explore some of the pitfalls inherent in talking about "db's of sun noise."

Solar Temperature, Antennas and Receivers

Twenty years or so ago, astrophysicists were arguing over whether the outer atmosphere of the sun was hotter than the visible surface. Radio astronomy provided some of the evidence that the outer atmosphere was much hotter than most astrophysicists had previously imagined. The result was that the "apparent temperature" of the sun increased with wavelength, at all wavelengths longer than a centimeter or so. (Apparent temperature comes in because the size of the sun is different at different wavelengths. So the sun is taken to be the same size as the optical sun, and apparent temperature is the temperature it would have, to radiate the measured power, at given wavelength, from this size of disc.)

What happens if we point an antenna at the sun? If the beamwidth of the antenna is just exactly the size of the sun, the antenna temperature will be the same as the temperature of the sun at this wavelength. Antenna temperature doesn't mean that we could burn a finger on the antenna; it means that the antenna is delivering the same amount of power to the transmission line that would be delivered by a resistor heated to the antenna temperature. This means that if we took a 50-ohm resistor, and heated it to 400,000°K, it would generate the same amount of noise at 432 Mc. as would be delivered to a 50-ohm resistor by an antenna with a ½-degree beamwidth pointed at the sun.

Antennas used by hams are not that sharp. If an antenna with a 10-degree beamwidth were pointed at the sun, its gain would be less, and it would deliver less power to the transmission line than a ½-degree antenna. Said differently, the antenna temperature would be lower for the broader antenna. In equation form

$$T_a = T_s \frac{\Omega_s}{\Omega_a}$$

where T_a is the antenna temperature, T_s the apparent temperature of the sun, Ω_s is the solid angle subtended by the visual sun (7×10^{-5} steradians), and Ω_a is the solid angle corresponding to the half-power beamwidths of the antenna[1]. If θ_H and θ_V are the half-angles to half-power beamwidths in the horizontal and vertical planes in degrees, then

$$\Omega_a = \frac{\pi}{4} \frac{\theta_H}{57.3} \frac{\theta_V}{57.3}, \text{ approximately.}$$

For illustration, an antenna which was 15° to the −3 db. points in the horizontal plane and 10° in the vertical plane would "see" a solid angle

$$\Omega_a = \frac{\pi}{4}\left(\frac{7.5}{57.3}\right)\left(\frac{5.0}{57.3}\right) = 8.99 \times 10^{-3} \text{ steradians}$$

The antenna is connected to a feed line which has some loss. If we call the feed line loss, when expressed as a ratio, A, we have

$$T_b = A\, T_s \frac{\Omega_s}{\Omega_a} + (1 - A)\, T_o$$

for T_b, the temperature at the receiver terminals due to the power received from the sun. T_o is the earth's temperature, usually taken as 290°K.

With no signal input, the receiver temperature is

$$T_R = (N - 1)\, T_o$$

where N is the noise factor of the receiver (noise factor is related to noise figure in the following way: if we express noise figure as a ratio, and add 1, we have the noise factor. A 6-db. noise figure corresponds to a noise factor of 5.).

If the sun noise at the output of the receiver is d decibels above the receiver noise, and if we converted to a ratio, call it D, then $d = 10 \log_{10} D$, and combining all the above, we have:

$$A\, T_s \frac{\Omega_s}{\Omega_a} + (1 - A)\, T_o = D\,(N - 1)\, T_o$$

The answer to "how many db.'s of sun noise" then is

$$D = \frac{1}{N - 1}\left[A \frac{T_s}{T_o} \frac{\Omega_s}{\Omega_a} + (1 - A)\right]$$

An equation much like this has appeared here before[2]; perhaps this presentation, which shows where such an equation comes from, will help in understanding what will be said later.

Let's work an example, showing how practical results may be predicted. If the receiver has a noise figure of 5 db., then $N = 4.16$. If the feed-line loss is 2 db., then $A = 0.631$, and if we are interested in 432 Mc. the apparent solar temperature is about 500,000°K for a condition when the sunspot number is 50 (see below). T_o is 290°K

* P.O. Box 1664, Boulder, Colorado 80301.

[1] For further discussion, see Pawsey and Bracewell, *Radio Astronomy*, Oxford University Press, Oxford, England, 1955, p. 21. Steradian: The solid angle subtended at the center of a sphere by a portion of the surface whose area is equal to the square of the radius of the sphere.

[2] See Bray and Kirchner, "Antenna Patterns from the Sun," *QST*, July 1960.

(about room temperature) and $\Omega_s = 7 \times 10^{-5}$. If the antenna beamwidth is 10° by 10° to the half-power points, its half-beamwidth to half-power points is 5° by 5°, and $\Omega_a = 6.0 \times 10^{-3}$. Then

$$D = \frac{1}{4.16 - 1}\left[0.631\,\frac{5 \times 10^5}{2.9 \times 10^2}\,\frac{7 \times 10^{-5}}{6.0 \times 10^{-3}} + (1 - 0.631)\right] = 4.14$$

Converting this back to decibels, the sun noise should be almost 6.2 db. above the receiver noise for this system. There is one problem with this calculation: The sun radiates noise of both vertical and horizontal polarization (usually equal amounts) while most antennas accept only one polarization. If this is the case, the antenna only accepts half the incident radiation, and we must subtract 3 db. for polarization loss. In such a case, the sun noise would be 3.2 db. above receiver noise.

Making Measurements

The radio astronomer would measure N, A, and the antenna parameters, and then knowing these would measure T_s daily by measuring daily values of D. As hams, we are probably more interested in measuring the antenna parameters, or in monitoring our receiving system to make sure everything is working the way it should. This way leads to some trouble, simply because we don't know enough about T_s. At frequencies below about 1000 Mc., the apparent solar temperature isn't very well known for several reasons. The first is that not too many solar observatories have measured solar temperatures daily over a long period of time in this frequency range. While Potsdam, Ottawa, and Toyokawa, among others, measure daily solar temperatures between 1,000 and 10,000 Mc., and have over most of a sunspot cycle by now, not very many protracted measurements are available for the frequencies we are talking about. The second reason is that the solar temperature varies from day to day. Radiation at these frequencies comes from high in the solar atmosphere, and there is still much to be learned about this region of the sun. Therefore, solar temperatures often show little correlation with sunspot number, which is really a measure of activity in the lower part of the sun's atmosphere. The best guess that can be made as to solar temperature as a function of frequency, and the amount it increases for a Wolf Sunspot Number of 100, is shown in Table 1.

TABLE 1

Frequency	*Temperature (Sunspot No. = 0)*	*Percentage Increase (Sunspot No. = 100)*
144 Mc.	1,100,000°K	10%
220	1,100,000	12%
432	400,000	50
1296	150,000	100

These values have been obtained by comparing the reported results of Allen[3] with the daily values reported by the Toyokawa Observatory of the Research Institute for Atmospherics of Nagoya University. The accuracy of these values is not very good.

With this caution in mind, some good information can be obtained from monitoring solar temperature. One thing that can be done is to find, experimentally, what the beamwidth of an antenna is. If D turns out to be more than 2 (that is, 3 db. above receiver noise), we can find the half-power beamwidth ($2\theta_H$ and $2\theta_V$) by pointing the antenna at a point in the sky that the sun will cross, and letting the sun slowly drift through the antenna pattern. When the sun is in the center of the antenna pattern, put a 3-db. attenuator *between the antenna and transmission line* (not between the converter and i.f. strip). Such an attenuator is easily made from coaxial cable (about 29 feet of RG-58/U for 432 Mc.). Clock the times at which the receiver output from sun alone is the same as with the sun at the center of beam and the 3-db. attenuator in line. Since the sun drifts one degree every four minutes, dividing the minutes (between calibrated −3 db. points) by 4 gives the half-power beamwidth in degrees (2θ). Turning the antenna on its side and repeating will measure the beamwidth in the other plane. If the antenna does not give more than 3 db. of sun noise, you will have to use a signal generator, and rotate the antenna to measure these beamwidths.

Knowing the beamwidth and the feed-line loss, one can measure the receiver noise figure (assuming a value for T_s). This can be compared with the noise figure measured by using a noise generator. If by measuring solar temperature, using the values you think are correct for your system, you come close to the values shown in Table 1, then you can be sure that your system is performing properly. By measuring these things daily, you can check the performance of your total system.

Summary

In the preceding sections, we have discussed how to measure receiving system parameters, and how to monitor system performance to guard against deterioration. Should you suddenly get 1 db. of solar noise, when you have been getting 3 db., you know that your system needs some checking. Finally, we discussed some of the reasons why this is not an exact measurement, but rather should be taken as an indicator of system performance. QST

[3] Allen, "The Variation of Decimetre-Wave Radiation with Solar Activity," *Monthly Notices of the Royal Astronomical Society*, p. 174 (1957).

Hints and Kinks For the Experimenter

IMPROVING THE VU2JN TRANSMITTER

In case some experimenting amateur has difficulty trying to build "A Transistor Transmitter From India" as described by VU2JN on page 16 of *QST* for November 1967, here is a possible remedy. The oscillator in my unit would not oscillate with any of my seventeen 40-meter crystals. As shown in Fig. 1, the problem was solved by adding a 330-pf. silver mica capacitor, C_1, between the base and the emitter of the OC171. Now the oscillator starts readily with any 40-meter crystal. — *Bob Richardson, W6WHM*

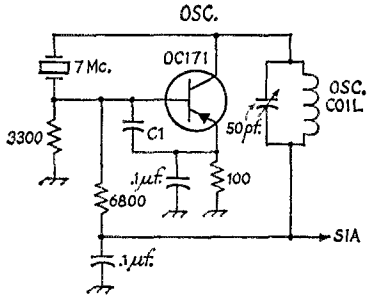

Fig. 1—Diagram showing W6WHM's modification to the VU2JN transmitter. The only added component is C_1, a 330-pf. silver mica. Resistances are in ohms.

CLEANING CRACKLE FINISHES

A Hint & Kink in *QST*, August, 1966, suggested that an art-gum eraser be used to clean crackle finishes. However, better results can be obtained by cleaning the finish with xylene and then applying a coat of Krylon clear lacquer. If xylene is hard to get, use gasoline. — *W1ANA*

—···—

The August 1966 Hint & Kink on cleaning crackle finishes is too slow. For quicker results, get a bottle of Soil-Off or Mr. Clean. Either one will lift the dirt off and put on a nice sheen. — *Carl E. Braun, W7HRV*

ALUMINUM FINISHES

In reference to W3KOC's article, "Aluminum Finishes," in *QST* for October 1967, there are two other convenient places, which the author neglected to mention, for cleaning, etching and dyeing aluminum: the bathtub and the toilet bowl. The toilet bowl has a flushing feature which, besides its obvious benefits, may be altered to facilitate dyeing with a hot solution. By reaching inside the toilet tank to close the flush valve when the water level in the bowl is low, you can substitute a pot of hot water for the bowl's contents. — *William J. Davenport, W12OZV*

IMPROVED METHODS FOR WIRING 83-1SP (PL-259) PLUGS

Wiring 83-1SP plugs can be annoyingly difficult. Many amateurs do not follow the manufacturers' instructions to tin the braid before inserting the coax into the plug, because they find it impossible to fit cable with tinned braid into the body of the 83-1SP. This is due to the fact that the diameter of the shield increases when the braid is trimmed, since it is impossible to cut the shielding without disturbing it. However, if the method to be described is used, the shielding is not upset, the tinned braid does not become overly large, and the plug can be screwed onto the cable without difficulty. Here is the procedure:

1) Referring to Fig. 2, remove 13/16 inch of the vinyl jacket.

2) Remove 13/16 inch of the braided copper shielding. This is easy to accomplish with a small fine-ridged file. First cut the braid with a corner of the file. Then remove all the stray ends of the wire shield, by rubbing the flat side of the file against the edge of the vinyl jacket.

3) Bare ¾ inch of the center conductor and tin the wire.

4) Remove 5/16 inch of the vinyl jacket and tin the exposed braid.

5) Screw the plug on the cable. At the four body holes, solder the braid to the connector, and solder the center conductor to the tip of the plug.

6) Screw the coupling ring on the assembly. — *Samuel Ansel, WB2MOI*

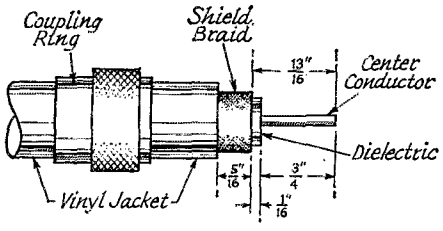

Fig. 2—Coaxial cable as prepared for insertion into an 83-1SP plug. See the text for details.

For about fifteen years I have been using the following method to install 83-1SP connectors on coaxial cable. Although over a kilowatt has been run through the connectors, there have never been any breakdowns. The prepared cables look professional, and the continuity of the outside conductor is about as good as it can be.

Remove about two inches of the vinyl cover. With a 100-watt soldering iron, tin the braid from about ⅜ inch from the vinyl to near the end. After the shield has cooled, cut the braid and polyethelene dielectric ⅝ inch from the vinyl. In order not to nick the center conductor, cut only part way through the dielectric. Flex the polyethelene at the cut and it will break free. Place the coupling shell on the cable and then attach the connector. Thread the end of the vinyl into the plug until the braid bottoms. Put a dab of solder in one hole of the body, being sure that the heat transfer is from iron to body to braid to solder. For good continuity between the braid and the connector, it is very important that the heat from the braid melts the solder. It is not necessary that the hole be filled with solder; the solder should run inside the body and help complete the connection. Finish the job by soldering the center conductor to the tip of the plug. — *Frank A. Eberhardt, W6VLR*

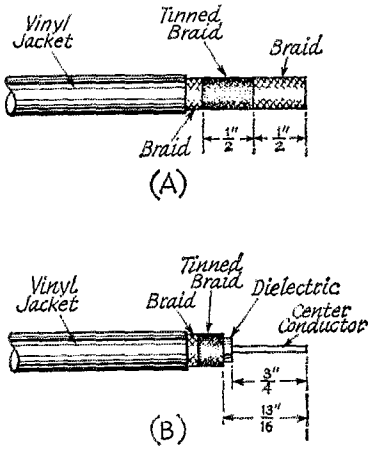

Fig. 3—Steps for preparing RG-8/U for installation in 83-1SP connectors.

Some hams do not tin the braid of RG-8/U when wiring 83-1SP (PL-259) plugs to the coax, because they find it hard to insert a tinned cable into the connector. The result can be poor shield-to-connector contact or a possible short circuit between the center conductor and stray wires of the braid. However, these problems don't need to occur, since there is a satisfactory way of preparing tinned braid. Referring to Fig. 3A, remove 1⅛ inches of the vinyl jacket, and tin the braid as shown. Then using a tube cutter, such as the type used to cut copper pipes, remove 13/16 inch of the braid (Fig. 3B). Next move the cutter toward the end of the coax and remove ¾ inch of the dielectric. With this method, you can cut as deeply as you wish, and the work can be inspected as you go along. To complete the installation, slide the coupling ring on the coax, insert the cable into the plug, solder the shield to the body, and solder the center conductor to the tip of the connector. — *Epps Griffin, W5HBD*

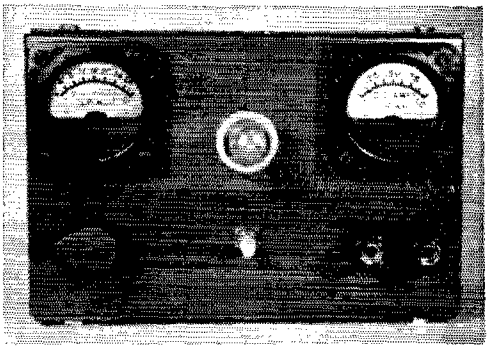

Fig. 4—The two meters shown on this d.c. supply have homemade faces. See the text for details.

NEW FACES FOR OLD METERS

Recently I built a regulated d.c. power supply using transistors. Not having a well-stocked junk box, the only devices I could find for monitoring the output voltage and current were two surplus VU meters. The meters were the right size and they worked well when properly shunted. However, the meter faces were horrible. They had uneven orange graduations on a black background.

The faces were too small to be redrawn by hand, since they measured only 1 by 1¼ inches. In addition, my fingers are not very small and my drafting capabilities are extremely limited. These factors caused me to use the photographic method to be described.

A Poloroid Land camera with a close-up lens attachment is used to photograph a hand-drawn template of the desired scale. At a focusing distance of 9¾ inches, any object on the finished print will be half its original size. By drawing the scale twice its original size — a rather simple undertaking — you can easily produce the exact meter face needed.

A compass, ruler and scissors are the only tools required to make the template. Draw the meter face on bright white drafting paper. A lettering set for the numbers will add to their appearance, but it isn't a must if a little patience is used.

Two 75-watt lamps near the template will provide sufficient light for the photograph. Once the picture is taken, cut a hole for the meter pointer and two mounting screws, and then trim the print as required.

Remember that since the finished picture from a Poloroid is 3¼ by 4¼ inches, any meter face below this size can be made. Each black and white photograph costs only 25 cents. As can be seen from Fig. 4, the results are professional looking. — *John Michael Shaw, K2LRE/KL7*

Raiding The Junk Box

Everyone has a junk box full of goodies. The following articles show two new ideas for utilizing old gear, and we hope will lead to other inspirations.

Crystal Stable Frequency Control With Your Old V.F.O.

BY J. WAYNE WALLER,* W4TZB

ANYONE who has tried operating s.s.b. with a v.f.o. not designed for less than 200 cycles drift per hour has found that this is a sure way to quickly become unpopular in a round table. The strict drift requirement has no doubt discouraged many would-be homebrew s.s.b. rigs, as the design and construction of a very stable v.f.o. is beyond the ability of the average amateur. By using two mixers, one taking the sum and the other the difference of the input frequencies, it is possible to cancel the effect of the v.f.o. frequency on the output frequency and make the output variations due only to the changes in frequency of a crystal oscillator. If a temperature-controlled oven-type crystal were to be used, a drift of only a few cycles per year could be obtained; but even with ordinary amateur-type crystals the drift is only a few cycles per day.

Description of the System

To see how the system functions, consider Fig. 1 which shows how a 9-Mc. output is obtained with a v.f.o. frequency of 3.98 Mc. Now suppose in the course of several hours the v.f.o. (assumed to be unstable) drifts 10 kc. to a frequency of 3.99 Mc. Fig. 2 shows the new conditions and how the output is still 9 Mc. Note the added feature that the output can be made almost any convenient frequency needed for a particular s.s.b. system simply by choosing the proper crystal frequency. Therefore older v.f.o.s having a 3.5 to 4.0 Mc. output can be used with 455 kc., 5 Mc., or 9 Mc. s.s.b. systems. Fig. 3 shows clearly how variations of the v.f.o. frequency are cancelled and any drift in the v.f.o. results in no change in the output frequency. Fig. 4 shows the sensitivity of the output frequency to the crystal frequency. It is therefore important to use a high quality crystal along with a well designed oscillator circuit.

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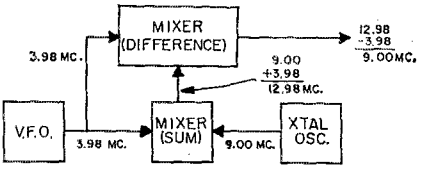

Fig. 1—System block diagram showing output for an input of 3.98 Mc.

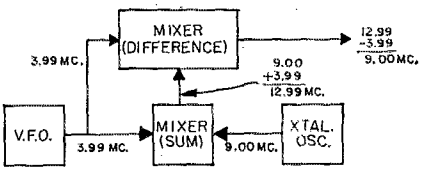

Fig. 2—System block diagram showing output for an input of 3.99 Mc.

The Circuit

A three-tube version of the system is shown in Fig. 5. It uses two 6CS6 pentagrid mixers

The system described here permits the use of an old v.f.o. for stable s.s.b. applications. Any variation of the v.f.o. frequency is cancelled by double mixing.

and a 6C4 crystal oscillator. V_3 operates in a modified triode circuit noted for its constant output voltage and excellent frequency stability. Its output feeds one of the 6CS6 tubes as a regular pentagrid mixer giving a sum output, while the second tube, V_1, is cathode driven (as in grounded-grid). A detailed explanation of these three circuits will be omitted as both are to be found in any recent *Handbook*. While construction is not critical, leads less than two inches should be avoided since the decreased reactance of the longer leads may cause the oscillator to quit.

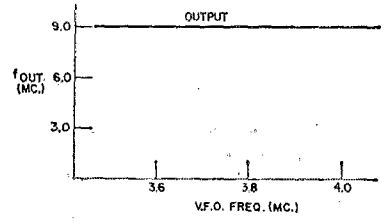

Fig. 3—Output frequency vs. v.f.o. frequency.

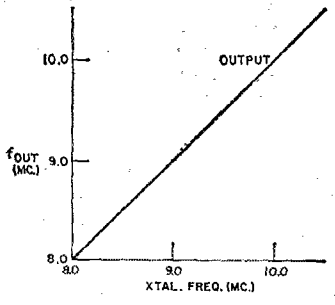

Fig. 4—Output frequency vs. crystal oscillator frequency.

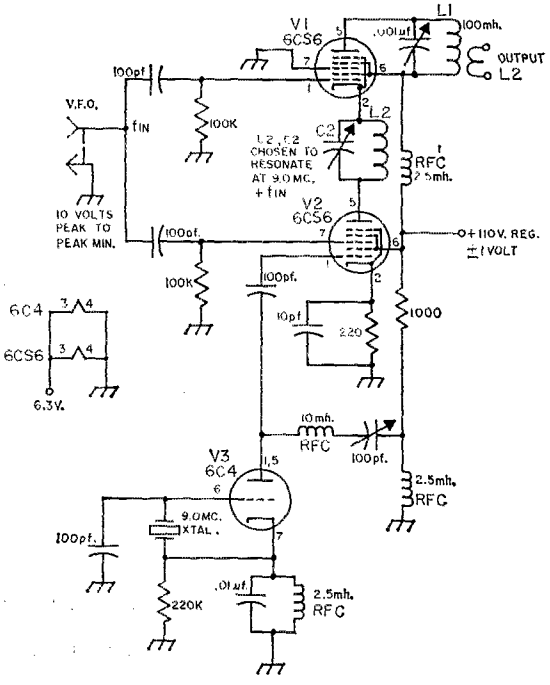

Fig. 5—Three-tube version of the double mixing system

Operation

The circuit described has been in use for several months with an old Heathkit VF-1 as the v.f.o. and no detectable change in the output frequency has occurred during that time. Don't throw away that old v.f.o. — give it a new chance with this special circuit. QST

Dummy Loads from the Junk Box

BY ERNST F. SCHROEDER,* DJ7HS

If you decide to build your own dummy load, you will discover a very fundamental problem to deal with: the input impedance of an antenna system represents a complex value that varies with frequency. For transmitter tune-up you therefore need a dummy load having exactly identical impedance (or you will have to retune the transmitter after switching over to the antenna).

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No high-power carbon resistor or similar device meets this requirement. That is indeed theoretically impossible and not due to technological difficulties. Some digging into the theory of transmission lines will show this.

Let us assume that we have got an antenna with a matched coaxial transmission line. This means that we will find an input impedance at the transmitter end of the cable equal to the Z of the cable. If we happen to know the distributed

line constants of that cable (R', G', L', C'), we can calculate the Z by Equation 1.

$$Z = \sqrt{\frac{R' + j\omega L'}{G' + j\omega C'}} \qquad (1)$$

Equations 2 and 3 give us j and ω.

$$j = \sqrt{-1} \qquad (2)$$

$$\omega = 2\pi f \qquad (3)$$

This leads us into the middle of the problem: Nobody can construct or adjust a resistor or network to a value given by a square root (with the exception of such values as $\sqrt{49}$, of course). Furthermore, Eq. 1 shows that Z varies significantly with frequency, f. This shows, that there can't be a network of lumped elements having the same impedance-characteristic as a transmission line.

The consequent use of the theory of transmission lines can show us the way out of the problem to a new and simple design:

If we terminate a length of coaxial cable with its Z (we know now that we cannot construct this Z, but let us assume we had a "black box" representing this Z at its terminals), we will measure this Z at the other end of the cable, regardless of the length of the cable. We now terminate the end of another length of the same cable with the input of the former. Now the input of the new length of cable shows the Z. By using only electrical measurements we can never tell the black box with cable from the black box alone (Fig. 1). At last we replace the black box with the remaining free end of the cable.

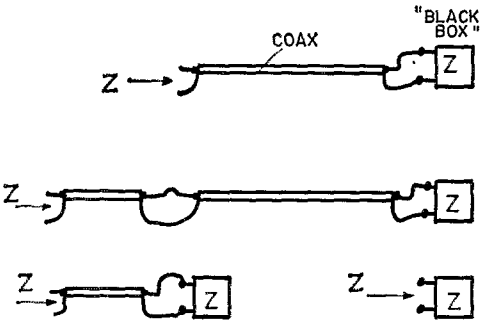

Fig. 1—If the black box represents the true impedance of the cable, it is not possible to tell the length of the cable by measuring the input impedance.

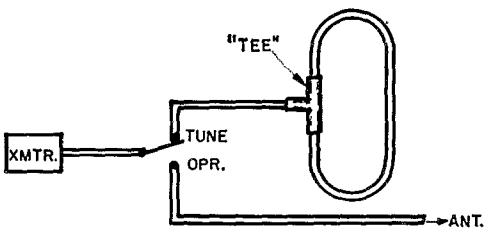

Fig. 2—Connection of the transmitter, antenna and the dummy load.

The resulting device is a ring of coax. If we make connections to the inner conductor and to the shielding braid, we can measure the Z of the cable at any point of the ring.

The rest is fairly simple: We take about 10 inches of RG 8/U, connect the ends by means of a u.h.f. "Tee" and connect the remaining receptacle to the transmitter (Fig. 2).

Measurements have shown the excellent quality of this dummy load. The frequency response of the v.s.w.r. is entirely flat over a frequency range from 160 to 2 meters. The v.s.w.r. is exactly 1:1 in this frequency range.

If the dummy load is made from the same cable as the antenna feed line and if the transmitter is tuned up on the dummy load and then switched to the antenna, there will be no mismatch at all.

Power capability is 1 kw. c.w. for periods up to one minute. As the r.f. power is not radiated but dissipated, the dummy load gets quite warm after that time. This can be tolerated, as the tune-up of most amateur linears does not last longer than half a minute. If more power capability is to be achieved, a longer piece of cable has to be used. This will reduce the v.h.f. capability of the dummy-load, as the length of the cable should not exceed 2/8 at the highest frequency to be used.

Simplicity and cost of this new design cannot be compared with any other dummy load. You can build this more-than-excellent dummy load from your junk box. If everyone used it for tuning purposes, there would be less QRM on our bands. QST

A Study of Hertz vs. Cycles Per Second

BY NOBLE HALE,* WØJIH

THE various ramifications of a new program usually are not fully apparent until some time has passed during which program implementation has survived the attacks of detractors and footdraggers. So it has been with the changeover from cycles per second to Hertz. The author has expended considerable investi-

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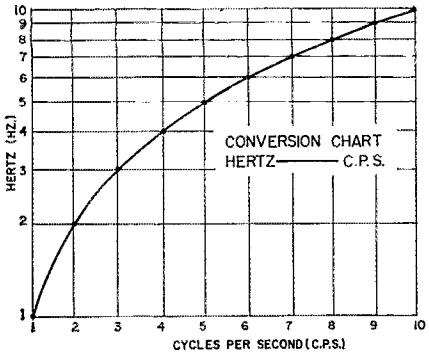

Fig. 1

gative effort in an attempt to simplify the application of Hertz, and herein presents the results of the study.

Shortly after the new terminology was announced, a preliminary study revealed a not unexpected relationship between the two fields of thought. The McDonnell Data Processing Division was brought into the picture and generously offered the use of its latest model computers. From the thousands of matrix points that poured from the machines, a sufficient number was selected to prepare the conversion chart shown on semi-log graph paper in Fig. 1.

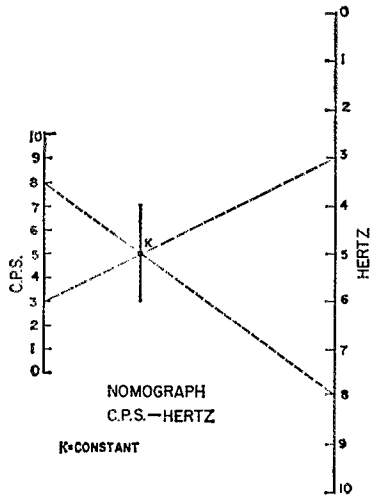

Fig. 2

Realizing that the emotional reaction to the Hertz program introduced obstacles to its immediate acceptance, it was decided to field test the impact of the curve of Fig. 1 before further effort would be scheduled. Accordingly, the completion date of the project was slipped to accommodate the necessary psychological interpolations.

Feedback from users quickly revealed an interrelated pattern of need for a more uniformly acceptable mode of presentation. A nomograph was suggested inasmuch as the engineer of today is accustomed to using shortcuts and approximations in his approach to prototype designs. Fortunately the relationship could be reduced to such a nomograph through the use of a constant, and Fig. 2 was released.

Fig. 2 was an instant success and untold quantitites of the nomograph, now in its 6th printing, were distributed at no cost, and application was made to NASA for approval.

Comments from Washington (paralleled by those from Cape Kennedy) were to the effect that although the project seemed to have demonstrated the ease of using the new system, i.e., the nomograph, a faster means of application was desirable.

At that point in time, all the available information was fed into Fortran computers in an English language program. In retrospect it really wasn't much of a gamble, but at the time we held our collective breath, while we waited for the printout.

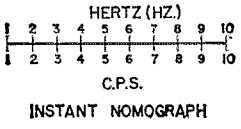

Fig. 3

That the effort paid off is quickly apparent from a study of Fig. 3. This is the Instant Nomograph that is now universally used. Its utter simplicity encourages memorizing it in its entirety. The nomograph itself can be filed for occasional reference.

The author invites correspondence from those who have difficulty in grasping the nature of the study. Permission is hereby granted for unlimited reproduction and distribution of the charts and nomographs. QST

Strays

Interested in a career in electronics? If so, Electronic Industries Association has a free booklet, "Planning a Career in Electronics." It's colorfully illustrated and gives an interesting history of electronics, some statistics on the industry, along with educational and career information. Get yours by writing L. M. Rundlett, W3ZA, Electronic Industries Association, 2001 Eye St., N.W., Washington, D. C. 20006.

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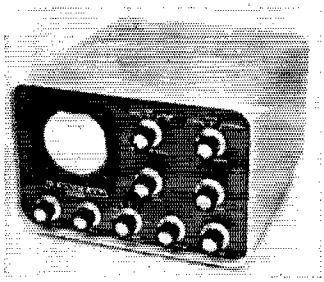
"A Complete Two-Band Station for the V.H.F. Beginner" — a reprint of four articles that appeared in July, August, September, and October, 1961 *QSTs* — is still available for 50¢ (no stamps, please) from the ARRL, 225 Main Street, Newington, Connecticut 06111.

Recent Equipment

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

Heathkit SB-620 "Scanalyzer"



IF the term "spectrum analyzer" rings no familiar bell for the average amateur, surely "panoramic adapter" does. The two have the same roots. The panadapter is the box camera of the family while the analyzer is the fancy job. Like the cameras, the panadapter and spectrum analyzer operate on the same principle.

To appreciate the difference, you need to understand how the panadapter works and must have some comprehension of its limitations. Stated briefly, the panadapter displays as vertical "pips" on a scope tube the signals that happen to be present in a selected portion of the r.f. spectrum. The horizontal spacing between the pips is approximately proportional to their frequency differences, and the pip heights are approximately proportional to the various signal amplitudes. The panadapter manufactures this display by rapidly and repetitively tuning over the same band of frequencies; it amounts to an automatically-tuned superhet receiver designed to work from i.f. signals in your regular communications receiver.

The spectrum analyzer does the same thing but, like the lens in a fine camera, is capable of showing considerably more detail — its "resolution" is better.

One important factor in panadapter or spectrum-analyzer resolution is the selectivity of the intermediate-frequency amplifier built into the adapter. A single frequency going through the amplifier is that and nothing more, but the *display* on the scope-tube face is a trace of the amplifier's output as the signal is swept through the i.f. passband. The selectivity of the i.f. amplifier in the garden-variety panadapter is not particularly high. Fig. 1A shows what might happen in a hypothetical case. A single continuous unmodulated signal is centered in a narrow spectrum, 10 kc., at the left. The panadapter display at the right is the result of sweeping the signal through an i.f. amplifier having a 6-db. bandwidth of 2 kc., the signal amplitude being on a linear scale. Although the signal actually occupies essentially no spectrum space, it *appears* to occupy nearly half the 10 kc. band.

Now if there are two signals 1 kc. apart, as in Fig. 1B at the left, there is a considerable portion of the sweep time during which there is i.f. output from *both* signals. A response of the i.f. system to such a combination might look something like the pattern at the right. (The pattern will vary from instant to instant, since the deflection amplitude depends on the relative phases of the signals at the instant a particular part of the i.f. band is swept — i.e., it depends on the sweep rate.)

If the panadapter's i.f. bandwidth is reduced to, say, 100 c.p.s. the scope pictures are quite different. Fig. 1C shows how, at the right, the same single unmodulated signal would look with the highly-selective i.f. system. Now when there are two signals, each produces a separate pattern as shown at the right in Fig. 1D. The increased resolution with the narrow i.f. justifies calling the device a spectrum analyzer instead of a plain panadapter.

However, bandwidth is not the only factor. The higher the selectivity the higher the effective Q of the i.f. amplifier. A high-Q circuit has a mechanical analog in a heavy flywheel; both have high inertia, electrical in the circuit case and mechanical in the flywheel. They tend to resist being started and stopped. This modifies the i.f. response to a signal that may be swept through the passband. If the sweep is slow enough, the actual selectivity curve will be traced with reasonable accuracy, as in Fig. 1E at the left. A fast sweep, however, will find the i.f. circuits lagging behind, and the amplitude never builds up to its real value. Neither does it decay as fast as it should. The pattern displayed by the scope might look like the right-hand drawing in Fig. 1E.

Thus high resolution comes only at a double price — high selectivity and slow sweep speed. In practical use, this means that the spectrum of a group of rapidly-varying frequencies, such as the frequency components of a voice-modulated signal, cannot be displayed with any

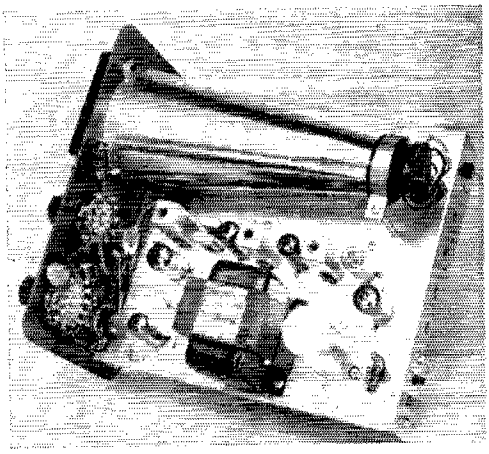
accuracy. The frequencies and amplitudes of such a composite signal vary far too rapidly for all of them to be "caught" by a sweep moving slowly enough to give good resolution. To be displayed properly, the components of a modulated signal must be unvarying in amplitude. Steady tone modulation (a two-tone signal if s.s.b.) is necessary.

One other feature usually distinguishes the spectrum analyzer from the panadapter. A choice between linear amplitude response (pip height directly proportional to relative amplitude) and logarithmic response generally is available. With the latter, decibel comparisons can be read off the scale directly.

Now that the background has been trod we can get down to the specific piece of equipment. The Heathkit SB-620 "Scanalyzer" is a panadapter with the extra features discussed above that make it useful for closer spectrum analysis.

Bear in mind that the Scanalyzer, like other panadapters, is basically a fixed-frequency amplifier working in what is usually called the intermediate-frequency range. Its output is detected by an ordinary rectifier, and the d.c. from this detector is used to deflect the beam of a cathode-ray tube vertically. The horizontal movement of the beam is controlled by a sweep circuit. In order to get the frequency display the amplifier must be preceded by a frequency converter having its oscillator tuning controlled by the same horizontal sweep voltage that moves the c.r. beam. Thus the spectrum to be displayed is tuned in synchronism with the horizontal movement of the bright spot on the tube face. Each signal in that spectrum shows up on the screen as it is automatically tuned through the selective amplifier.

The converter could shift signals from their "natural" frequencies directly into the adapter's



The input circuits (amplifier and mixer) are between the panel and the power transformer in this top-of-chassis view of the SB-620. The i.f. amplifier with its two-crystal filter runs from front to back alongside the shielded cathode-ray tube. The switches on the panel are the sweep-width (left) and amplitude-scale selectors.

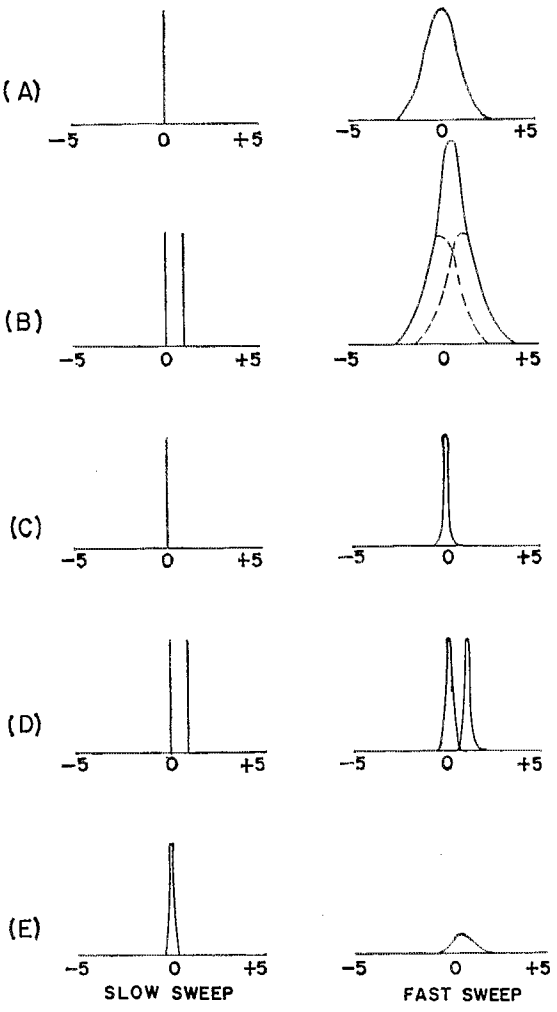


Fig. 1—Effect of selectivity and sweep rate on cathode-ray patterns. A, B: medium-selectivity with sweep rate appropriate for the selectivity; C, D: high-selectivity and appropriate sweep rate; E, high-selectivity with suitably-slow and too-fast sweep rates.

i.f. amplifier, but the conventional panadapter looks at them at some point in the i.f. chain of a communications receiver; the receiver supplies a first conversion. This is also the scheme built into the Scanalyzer. The converter in the SB-620 is designed to work from a receiver i.f., and suitable components are supplied so that you can set it up for whatever intermediate frequency may be used in the receiver you have. Any signal you wish to look at must first be converted to that i.f. You can look at any incoming signals your receiver can pick up, by this method, and you can also look at your own transmitter if your receiver can operate while you transmit. This lets out the transceiver because the receiver in such a set is out of commission whenever the transmitter is on.

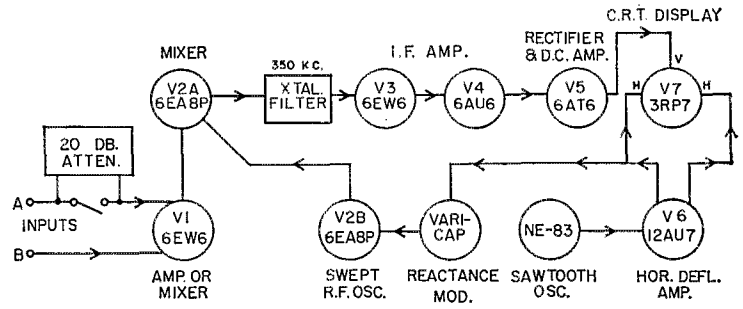


Fig. 2—Block diagram of the SB-620. Owners of the now-superseded HO-13 "Ham Scan" will recognize basic similarities in circuit to the earlier model, which was described in "Recent Equipment" in November 1964 QST.

To take care of this situation, among others, there is an input arrangement on the back of the Scanalyzer for introducing an outboard oscillator to convert the actual frequency of your transmitter to the Scanalyzer's input frequency. Thus transmitter checks can be made without the aid of a receiver.

This is all shown in the block diagram, Fig. 1. The input tube, V_1, operates as an amplifier at the communications receiver's intermediate frequency when the Scanalyzer is used for panoramic reception. Its plate is coupled to the mixer, V_{2A}, through a circuit that, in general, will have a bandpass (at least 100 kc.) depending on the receiver's intermediate frequency. Since the i.f.s in present receiver designs vary from about 6 Mc. to 455 kc., no one coupling circuit will serve for all receivers. The kit supplies parts for all of them, and you make your choice at the time of assembly. Once the choice is made, the input through "B" to V_1 must be at the chosen frequency if the SB-620 is to function as a panoramic adapter.

However, the signal input to V_1 through "A" can be at any frequency you like if a second r.f. voltage is introduced through "B" to beat with it and produce the selected intermediate frequency. In such a case V_1 becomes a mixer rather than a simple amplifier. A circuit change is made by a rear-mounted switch which disconnects the cathode bypass capacitor that is used when V_1 is a straight amplifier. In this mode of operation, the SB-620 is an independent piece of equipment (except that the external oscillator is required) and does not need to be used in conjunction with a receiver. An oscillator signal of at least 100 millivolts is required for good mixing. It can be supplied by a signal generator or test oscillator, or by a tunable oscillator you make up for the purpose. In the case of some conversion-type transmitters having provision for connection to the v.f.o., the v.f.o. output could be used for supplying the beat frequency to look at one's own signal; this depends on the conversion setup.

Whatever the i.f. chosen, it is converted to 350 kc. in V_{2A}. The beating oscillator, V_{2B}, for this mixer is regularly swept through an adjustable band of frequencies (which also depends on the i.f. chosen — the parts are furnished in the kit) in synchronism with the horizontal sweep voltage for the c.r. tube. A voltage-variable capacitor (Varicap) whose capacitance is varied by the sawtooth sweep voltage provides the recurrent tuning. As each signal goes past 350 kc. it causes a response in the narrow-band (approximately 200 c.p.s. passband) crystal filter which is then amplified in two 350-kc. stages, V_3 and V_4, and finally rectified in the diode section of V_5. The triode section of V_5 is used as a d.c. amplifier to provide adequate vertical deflection voltage for the 3RP7 cathode-ray tube. This is a flat-face 3-inch tube having a long-persistence phosphor so that the slow-sweep pattern will be visible long enough for inspection.

The sawtooth oscillator is a slow-charge *RC* circuit using a neon bulb for fast discharge. To get reasonably constant horizontal sweep speed across the tube face the bulb is driven through a high resistance from about 600 volts d.c., so that only the nearly-linear part of the charge characteristic is used. The sawtooth output voltage drives V_6, the horizontal deflection amplifier, which incorporates phase inversion to get a push-pull deflection voltage for the c.r. tube. One tube section of this stage also drives the Varicap frequency modulator.

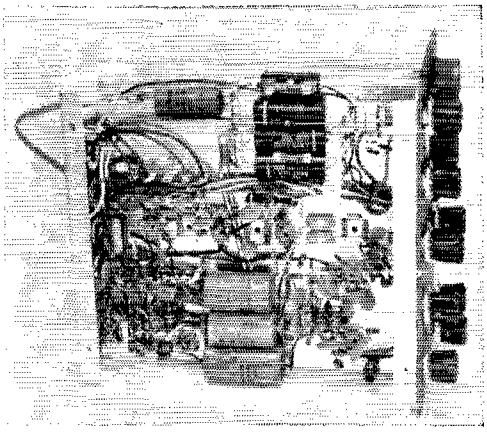
Switch-selected sweep widths (width of frequency band scanned) of 10 and 50 kc. are provided, and there is a third position on the switch for adjustable sweep width (a separate control is used for this). The sweep rate or speed at which the spot moves horizontally is tied in with the sweep-width switch. In the narrow-band position the spot takes nearly two seconds to move across the screen; it is faster in the 50-kc. position, and ranges from 5 to 15 per second in the variable position, depending on the setting of a separate sweep-rate control.

Among the nine front-panel controls there is an amplitude-scale switch having three positions: linear, in which the vertical deflection is directly proportional to signal amplitude; log, calibrated in decibels; and a 20-db. position which retains the log scale but inserts 20 db. of attenuation.

This last pushes the normal 40-db. log range up to 60 db., so a wide range of signal levels can be examined on a decibel basis.

Assembly of the kit is straightforward; a large part of the wiring is in a preassembled harness. The complete job, from opening the shipping carton to completion of alignment, took about 25 hours; about 19 hours of this was actual assembly and wiring. There is a certain fascination about the alignment process for anyone having an interest in measurements; the temptation is to spend hours at it in an attempt to get the last possible refinement in accuracy. The instruction manual details two methods of going about it, one using a calibrated signal generator, having an accurate attenuator, and a wide-range audio oscillator (which the builder may or may not have available), the other making use only of the receiver with which the instrument will be used as a panadapter. There is a built-in 20-db. attenuator in the r.f. input (spectrum analyzer) line that can be used for checking.

Some of the adjustments can be a bit tedious — for example, getting a fixed-frequency pip to stay put at the center of the screen when the sweep-width switch is moved through its three positions and the variable sweep-width control is turned through its range. Three interlocking adjustments are involved. Likewise, a lot of time can be spent on getting the log amplitude scale as right as possible. It is relatively easy, with a good signal generator, to get the 20-db. and 40-db. points to come out where they belong on the scale supplied for the c.r. tube face, but (in our case at least) the 10- and 30-db. deflections didn't want to match the scale marks exactly. By giving a little here and taking a little there it was possible to get the log scale deviation to be within a maximum of about 2 db. — estimated,



Bottom-of-chassis view. The i.f. amplifier runs horizontally at the center. Power-supply filter capacitors are at top center, with high-voltage circuits for the cathode-ray tube at the bottom. The row of variable resistors along the rear apron of the chassis (left) are non-operating controls used in initial setting up.

Heathkit SB-620

Height: 6⅝ inches.
Width: 10 inches.
Depth: 10½ inches.
Weight: 10 pounds.
Power Requirements: 120 or 240 volts a.c., 50–60 c.p.s., 40 watts.
Price Class: $120.
Manufacturer: Heath Company, Benton Harbor, Mich.

since the scale has only 10-db. calibration marks — the inaccuracy being greatest at the 30-db. point. This is adequate accuracy for most amateur purposes, of course, and is mentioned principally in the (probably vain) hope that users of the instrument will be a bit more realistic about their readings than most hams are about the s.w.r. that they "measure" with an ordinary bridge, or the decibels that they "measure" with an S meter.

The frequency sweep, which was set up for 455-kc. receiver i.f. in our kit, was reasonably linear; the frequency scale was compressed about 20 percent at the left-hand edge of the screen as compared with the right. There is no independent adjustment for this, and since it depends on how well the sweep voltage is matched to the oscillator tuning, which in turn is determined by the Varicap characteristics, it may possibly vary somewhat from kit to kit. It may also depend on the receiver i.f., since different components are used for different groups of intermediate frequencies.

Probably the major application of the Scanalyzer in the amateur station is as a panoramic adapter, and for this purpose it has much more to offer in both resolution and flexibility than its predecessors. Spectrum analysis of one's own transmitter is not the sort of thing to be indulged in constantly since it is a project in itself. For regular monitoring an ordinary scope is much better, as a practical matter, since a spectrum analyzer won't show much of quantitative value on normal signals. But for a detailed, if necessarily time-consuming, look at the things coming out of a transmitter, the SB-620 can show very much more than any panoramic adapter that we have met previously. With the necessary accessory equipment — a continuously-variable (and stable) signal generator or oscillator capable of covering as much of the r.f. spectrum as possible, a two-tone audio generator, a dummy antenna and, preferably, some good attenuators that are not frequency sensitive (so some of the r.f. at the dummy antenna can be applied safely to the Scanalyzer) — it is possible to get a pretty good picture of all the things, wanted or unwanted, that the transmitter is putting out. The experience can be a real education. The instruction manual tells how to go about making many of these tests, as well as giving a good deal of information on typical signal displays. — *W1DF*

Technical Correspondence

TRIANGULAR LOOP ANTENNA

Technical Editor, *QST*:

An easily-constructed rotatable antenna which may surprise you with its excellent performance is the triangular loop of one-wavelength periphery. This antenna is equivalent in gain to a one-wavelength circular or square loop; that is, it exhibits about 0.5-db. gain over a horizontal half-wave antenna at the same height above ground. Its horizontal pattern is a figure eight with two horizontal main lobes at right angles to the vertical plane of the loop, a pattern similar to that of the dipole antenna as shown in the *ARRL Handbook*. It has a better front-to-side ratio than the dipole, however.

This antenna is easy to construct with hand tools, is quite light in weight, has a low wind profile, low susceptibility to fading of DX signals, and is easily turned by a TV rotator.

Triangular loops for several bands may be strung concentrically on a single supporting structure consisting of three bamboo or fiberglass arms and may be fed from a single feed line. The radiation resistance of a one-wavelength periphery loop of this type is about 140 ohms. As it is a balanced-to-ground antenna, a balanced feed line is recommended for low-noise reception. When fed with a balanced feed line the loop antenna will respond only to the magnetic component of a nearby interfering radio-frequency field (noise). It will not respond to the electrostatic field of the noise. The recommended feed line is 125-ohm twin coax with the shield grounded and a balanced impedance-matching device used between line and receiver or transmitter. The length (L) in inches of the loop may be found from $L = 11{,}800/f$, where f = frequency of operation in megahertz.

One way of constructing the triangular loop is shown in Fig. 1. Other simple methods may be used. For example, a spider can be constructed using four pieces (one piece for the mast support) of $1 \times 1 \times \frac{1}{8}$-inch angle welded together. The method shown in Fig. 1 for joining the wire loop and feed line works quite well for any antenna. The piece of Plexiglas can be anchored to the mast for a single-element loop or allowed to hang free in multielement arrays.

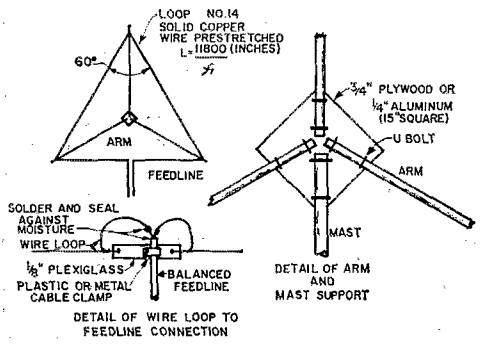


Fig. 1

Antennas covering four bands can be strung on one frame structure using closed loops for 10, 15 and 20 meters and an open-ended triangle for 40 meters. The 40-meter antenna is a half-wavelength wire folded triangularly on the support with the two upper ends insulated from each other where they meet at the vertical supporting arms. All the antenna wires are fed at the center of the bottom horizontal leg as shown in Fig. 1. The triangular loop can be oriented with its apex toward the ground and fed at this lower apex. Gain is the same with the apex down as with the apex up (apex up shown in Fig. 1); however, the author's conclusion is that the antenna is more susceptible to fading of DX signals with the apex of the triangle oriented toward the ground, as determined by listening tests over a six-months period with both orientations mounted on the tower.

Multiple element rotary beam antennas can be constructed using the one-wavelength triangular loop as a basic element. A beam using four elements on 10, 15 and 20 and two elements on 40 meters is in use by the writer. — *Norman B. Watson, W6DL, 5501 Via del Valle, Torrance, California 90505.*

BINARY-DECIMAL COUNTER READOUT

Technical Editor, *QST*:

Since publication of the article by William Skeen, K6YRQ, on a home-built frequency counter for measurement of audio frequencies (*QST*, January 1965), I have accumulated parts to build a similar unit. For a long time I have had wishful thoughts about building a counter, but the inclusion of all

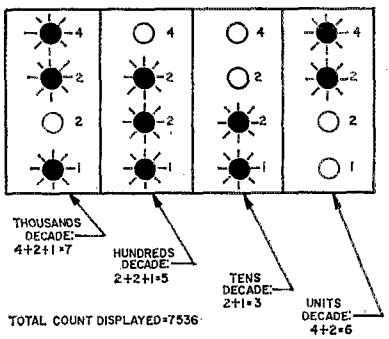


Fig. 2

the desired circuitry (totalizer, readout display, reset, timing gate, etc.), I felt, tended to put it out of the amateur class. After all, the least expensive commercial units cost a few hundred dollars. Mr. Skeen's article presents a simple and yet complete approach to a rather complex requirement.

Perhaps one deterrent for amateurs considering building his unit is its rather inconvenient binary display readout, and the resultant necessity to add a column of digits to realize the total count represented. With a quite simple circuit change, it is possible to have a combination binary-decimal readout. Each significant decimal digit is found by adding binary numbers, so one need never add to a figure higher than 9. The changes reduce the total count capability for a given number of flip-flop stages, but the readout system is more quickly interpreted.

The changes convert four consecutive FF stages into a decade divider section by adding two feedback loops. Feedback is used from Pin 1 of the

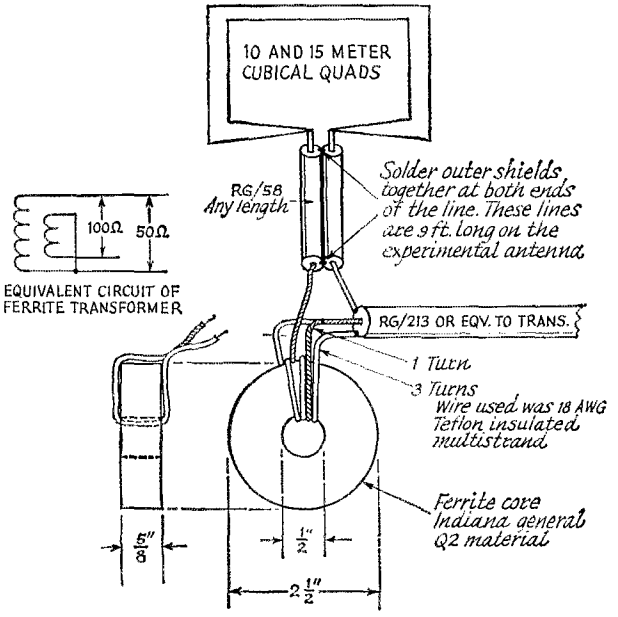


Fig. 3—Two-band quad Matching

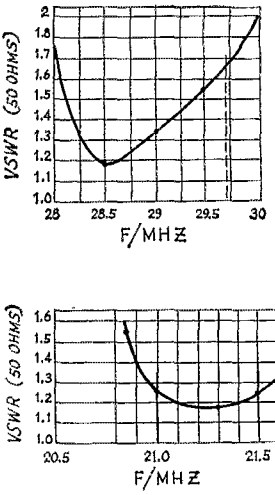


Fig. 4—Standing-wave ratio curves taken with a laboratory-type v.s.w.r. bridge. Measurements were made at the transmitter ends of the transmission line with the antenna array mounted on a steel tower 44 feet above ground.

third stage to Pin 7 of the second stage (see Fig. 2, page 33, January 1965 *QST*) and similarly from the fourth to the third stage of a decade section. The connections for feedback consist of a 120-pf. capacitor and a 470K resistor in series. This simulates six extra pulses in the chain of four stages, so that all four will reset to zero on the count of 10 instead of the normal 16. Thus, 12 FF stages will indicate to a count of 999. The numeric values assigned to the neon indicators of a decade section with this feedback system are 1-2-2-4 for the four FF stages, counting from the input stage. At the end of a counting period, the value of each decimal digit of the total count is obtained by adding values for four lamps from the appropriate decade section. Arranging the lamps vertically in sets of four would probably contribute to faster readout. Fig. 2 represents a total count of 7536, using 16 FF stages (4 decade sections).

As a matter of some interest in using a power-line controlled counter, I have made several long-term checks on the accuracy of the 60-cycle line frequency and find it to be quite good — a second or so a week error is common. However, the short-term stability is less. Checks made recently indicated errors at times of as much as 4 parts in 10^4 (although the average is about 2 parts in 10^4), in 5-minute periods during the week. The error appears to be higher on weekends than during the week. The error may be tolerable for audio work, but if a counter was built to count directly to 10 Mc., for example, a crystal-controlled time base would definitely be preferable. — *Jerry Hall, K1PLP, 15 Endleigh Ave., Pinehurst, Mass. 01866.*

TWO-BAND QUAD MATCHING

Technical Editor, *QST*:

While experimenting with a two-element two-band cubical quad antenna the problem of matching the antenna to a 50-ohm transmission line arose. The antenna is a "plain vanilla" quad built around information in W6SAI's book, *Quad Antennas*. My method of feeding the antenna *did not* produce fantastic front-to-back ratio or forward gain. It merely made the standing-wave ratio more acceptable to the 32S-3B used at the home QTH.

After building the two-band quad I checked it with a General Radio 1606 impedance bridge and found the 10-meter antenna to be about 118 ohms and the 15 meter antenna to be about 91 ohms at resonance. This is 2.36:1 and 1.82:1, or approximately 2:1 for a 50-ohm transmission line. The feed system I describe here made the v.s.w.r. much nearer the desired 1:1.

The heart of the system is a ferrite-core autotransformer. The measured impedance ratio is very close to 50:107 ohms. The insertion loss is less than 0.2 db. from 15 to 30 Mhz. when terminated in 107 ohms. When it is terminated in 50 or 200 ohms the insertion loss is less than 0.35 db. from 15 to 30 Mhz. Several transformers were built before these figures were obtained, and after a suitable design was achieved it was connected to the quad as shown in Fig. 3. You do not have to sacrifice F/B ratio for a more acceptable v.s.w.r. by detuning the reflector stubs; simply adjust the tuning stubs for maximum F/B ratio and then design the transformer for the proper impedance ratio. Also, lowering the v.s.w.r. places a larger portion of the desired band within an impedance range the average pi-section tuner will accept.

In answer to on-the-air inquiries: yes, performance of the antenna varies considerably from one end of the band to the other.

This antenna feed system is a broad-band device, so don't forget to use a low pass filter. — *Toney L. Magnino, W5MVK, Carrollton, Texas.*

An Index of *QST* Items on Commercial Gear

BY BILL WAGEMAN, WØBUR/K5MAT*, AND CAROL WAGEMAN, WØHQH*

THE radio amateur or SWL who is interested in purchasing used commercial gear is confronted with a bewildering choice of equipment in all price ranges. This index, an attempt to make it easier to find appropriate information, presents most of the interesting reviews, advertisements, and modification articles in *QST* on the great bulk of commercially-made transmitters, receivers, and transceivers that have appeared since World War II. An effort has been made to be as complete as possible, but undoubtedly there are a few omissions. Nothing has been skipped because of prejudice.

Unfortunately, because of space limitations, it has not been possible to include other pieces of gear that might be of interest (for example, power supplies, converters, VFOs, etc.), but in many cases this information may be found in conjunction with an associated item.

The list is alphabetically by manufacturer, with each model in alphabetical-numerical order. References for each piece of equipment are given in the order of their appearance, with the abbreviations *A* for advertisement, *R* for reviews, and *M* for articles dealing with modifications. Page numbers are given only when it is not obvious from the table of contents or index of advertisers as to where the information may be found.

Manufacturers listed here are not necessarily still in business nor are addresses still correct. Consult the "Index of Advertisers" in recent issues of *QST* for the names of current manufacturers engaged in the amateur radio business.

Thus, **CENTRAL ELECTRONICS, 100V** A Dec. 57, M Dec 62 p 63 refers to an ad in the December 1957 issue of *QST* and a modification described on page 63 of the December 1962 issue, both of which are concerned with the Model 100V. It would be necessary to look up the manufacturer in the index of advertisers to determine the location of the ad mentioned. In a few cases it may be necessary to look under one of the alternate manufacturers names to find the proper ad.

ADAM ELECTRONICS CORP. — **410**, A Apr. 55; **1010**, A Apr. 55

ALLIED RADIO (KNIGHT-KIT) — **Lincoln**, A Feb. 61; **R-55**, R Sept. 61; **R-100A**, A Nov. 62; **SX-255**, A Feb. 56; **T-60**, R Apr. 62; **T-150**, R Jan. 63; **T-100**, A Oct. 59; **TR-106**, R Oct. 66; **TR-108**, R Oct. 67; **Y-726**, R Oct. 58

AMERICAN ELECTRONICS CO. (AMECO) — **R-5**, A Aug. 67; **TX-62**, A Aug. 64; **TX-86**, A Nov. 60

AMERICAN GELOSO ELECTRONICS — **G209-R**, R July 59; **G222/TR**, A Nov. 59

AMPLEX RADIO PROD. — **KW-62**, R July 58

AMPLIDYNE LABS — **621**, A Dec. 64

AUDAR (TELVAR and MECK IND., JOHN) — **T60-1**, A Aug. 46; **T60-2**, A Sept. 48

AUTOMATION ELECTRONICS (PIERSON) — **KE-93**, R May 58

BABB ELECTRONICS — **TRA-6**, R Jan. 59; **TRA-10**, A Mar. 59

BABCOCK — **MT-5A**, A Apr. 53; **MT-5B**, A Mar. 54

BARKER & WILLIAMSON — **L-1000-A**, R Sept. 56; **L-1001-A**, A Jan. 58; **LPA-1**, A Nov. 60; **51SB**, R Mar. 55; **5100**, R Mar. 55; **5100-B**, A Dec. 55; **6100**, R Sept. 63

BRAD THOMPSON IND. (B. T. I.) — **LK-2000**, A Nov. 66

CARDWELL — **Fifty-Four**, A Aug. 46

CENTIMEG ELECTRONICS — **432**, R Feb. 60

CENTRAL ELECTRONICS — **10A**, A Nov. 52; **10B**, R Aug. 54; **20A**, R Jan. 54 p 47, M Dec. 63; **100V**, A Dec. 57, M Dec. 62 p 63; **200V**, R Aug. 61, M June 62 p 59; **600L**, A Mar. 55

CLEGG ASSOCIATES — **Cruiser**, A Dec. 67

CLEGG LABORATORIES (Also See SQUIRES-SANDERS) — **Apollo Six**, R Nov. 65; **Apollo 700**, A July 64; **Interceptor**, A Apr. 62; **Interceptor B**, A Dec. 63; **Thor VI**, R July 63; **Venus VI**, R Sept. 64; **Zeus**, R Sept. 61; **22'er**, R Apr. 65; **62TI0**, A June 56; **66'er**, R Apr. 67; **99'er**, A June 61; **250-6C**, A Feb. 58

COLLINS RADIO — **KW-1**, A Oct. 50; **KWM-1**, A Aug. 57, M May 59, M Nov. 59; **KWM-2**, A Nov. 59, M Apr. 62 p 38, M June 63, M Mar. 67; **KWS-1**, A Mar. 55, M Mar. 60 p 48, M Nov. 64 p 58; **30K**, A June 46; **30L-1**, R Nov. 61; **30S-1**, A Nov. 58; **32S-1**, A Nov. 58, M Nov. 59 p 54, M Apr. 62, M Dec. 63, M Nov. 64, M Dec. 64, M May 66, M Apr. 67; **32S-3**, R Feb. 63, M Dec. 63, M Nov. 64, M Dec. 64, M May 66, M Apr. 67; **32V-1**, A Dec. 47, M Apr. 54, M Oct. 65 p 95; **32V-2**, A Mar. 50, M Oct. 65 p 95; **32V-3**, A Sept. 51, M Oct 65 p 95; **32W-1**, A Mar. 55; **51J-1**, A Nov. 49; **51S-1**, A May 63; **62S-1**, R Nov. 63; **75A**, R Sept. 47 p 54, M Jan. 54, M Feb. 56 p 47; **75A-2**, A July 50, M Sept. 54 p 39, M July 55, M Feb. 56 p 47; **75A-3**, A Dec. 52, M Sept. 54 p 39, M July 55, M Feb. 56 p 47, M Apr. 58 p 62; **75A-4**, R Apr. 55, M Feb. 56 p 47, M May 58 p 76, M May 63, M July 64; **75S-1**, A Nov. 58, M Dec. 64; **75S-3**, R Feb. 62, M Apr. 67; **75S-3B**, A Mar. 64; **310-B**, A Mar. 49

COSMOS INDUSTRIES — **Cosmophone 35**, R June 58; **Cosmophone 1000**, A Sept. 59

*1114 North Luna Circle, Santa Fe, New Mexico 87501.

CRAFTRONICS—**CT-120,** A Jan. 62

CREATIVE ELECTRONICS (TRANSCON)—**Transcon,** R Dec. 57; **Transcon 6,** A June 60; **Transcon 10,** A June 60

DAVCO ELECTRONICS—**DR-30,** R Jan. 67

DeWALD—**6M Radio-Phone,** A Mar. 61

DOLLAR- ROBERT—**222,** A Feb. 53; **226,** A July 53

DRAKE, R. L.—**L-4,** A June 66; **R-4,** A Feb. 65; **R4A,** A Dec. 67; **T-4,** R May 66; **T-4X,** R May 66; **TR-13,** A Feb. 63, M June 66; **TR-4,** R Dec. 65; **1-A,** R Nov. 57; **2-A,** R July 60; **2-B,** A July 61; **2-C,** R Dec. 66; **2-NT,** R Dec. 66

EBY SALES CO.—**PCK-100,** A Feb. 55

EICO—**720,** R July 59; **723,** R Mar. 61; **753,** R Mar. 66

ELDICO—**MR-2,** A Sept. 52; **MT-2,** A Sept. 52; **SSB Jr.,** A Sept. 52; **SSB-100,** R Feb. 56; **SSB-100A,** A Mar. 56; **SSB-100F,** R Feb. 58; **SSB-100M,** A Mar. 58; **SSB-500,** A Mar. 56; **SSB-1000,** R Jan. 57; **SSB-1000F,** A Apr. 58; **TR-1TV,** R Oct. 54; **TR-75TV,** A Sept. 52

ELECTRO-COMM CO.—**ER-6,** A Apr. 56; **HT-2,** A Nov. 55

ELECTRO-MECHANICAL MFG. CO.—**EML 60-6,** R Aug. 62; **VX-101,** A Dec. 47; **VX-101 Jr.,** A July 47

ELECTRONIC ENGINEERING CO. (ELENCO)—**Commander,** A Nov. 58; **SS-75,** R Dec. 52 p 42; **X-4,** R Dec. 53 p 58; **77,** A Nov. 54; **400-T3,** A Jan. 54;

ELECTRO-VOICE (RME)—**RME-4300,** R Oct. 56; **RME-4350,** A Mar. 57; **RME-4350A,** R Sept. 58; **RME-6900,** R Feb. 61

ELENCO (See ELECTRONIC ENGINEERING CO.)

ELMAC (See MULTI-PRODUCTS CO.)

EL-TRONICS—**AE-30,** A Mar. 48

EMESCO (See MODERN SPACEMASTER PRODUCTS)

EQUIPMENT CRAFTERS, THE (TECRAFT)—**Hawk VI,** A Sept. 60; **Sidewinder,** A Sept. 60; **TR20,** R June 56; **220,** A Nov. 55

GALAXY ELECTRONICS (See WORLD RADIO LABS)

GELOSO (See AMERICAN GELOSO ELECTRONICS)

GLOBE ELECTRONICS (See WORLD RADIO LABS)

GONSET—**Commander,** A May 52; **Commander II,** A June 55; **Communicator,** A Aug. 54, M July 63 p 74, M Nov. 64 p 59; **Communicator III,** R Mar. 58, M Oct. 58 p 74, M Nov. 64 p 59; **Communicator IV,** R Apr. 61, M Nov. 64 p 59; **G-28,** A June 58; **G-33,** A Sept. 58; **G-43,** A Jan. 59; **G-50,** A Apr. 59; **G-63,** A Dec. 59; **G-66,** R June 56, M Mar. 58 p 59; **G-76,** R Mar. 61, M Feb. 62 p 33; **G-77,** R Apr. 57; **GC-102,** A Dec. 62; **GC-105,** R July 62; **GR-211,** A Oct. 61; **GR-212,** R Apr. 62; **GSB-100,** R Sept. 59, M May 60 p 83; **GSB-101,** R Aug. 60, M June 60 p 41; **GSB-201,** R Feb. 62; **MSB-1,** A Dec. 60; **Sidewinder (900A),** A Aug. 63; **Sidewinder (910A),** R Aug. 65; **2M Linear,** R Oct. 55; **6M Communicator,** R May 55, M Nov. 64 p 59; **6M Linear,** A Oct. 55; **500-W,** R Dec. 54; **903-A,** R Aug. 65; **913-A,** R Aug. 65

HALLICRAFTERS—**FPM-200,** A Aug. 57; **HA-2,** R Sept. 62; **HA-6,** R Sept. 62; **HT-1G,** A May 50; **HT-17,** A July 47; **HT-18,** A July 47; **HT-19,** A Jan. 49; **HT-20,** A Nov. 52; **HT-30,** A Oct. 55; **HT-31,** A June 55, R Jan. 56; **HT-32,** R May 57, M Feb. 60; **HT-32B,** A Jan. 63; **HT-33,** A Feb. 57; **HT-37,** R Mar. 60; **HT-40,** R Dec. 61; **HT-41,** R July 62; **HT-44,** A Nov. 63; **HT-45,** A May 64; **HT-46,** R Aug. 66; **S-38,** A June 46; **S-40A,** R July 46, M Apr. 54; **S-40B,** A Aug. 50; **S-53,** A Apr. 48; **S-76,** A June 53, M Nov. 54; **S-77,** A Dec. 50; **S-85,** A Oct. 54, M Dec. 58 p 69; **S-102,** A Apr. 56; **S-103,** A Apr. 56; **S-107,** A Nov. 59; **S-108,** A Nov. 59; **SR-34,** R June 59; **SR-42,** R July 65, M Feb. 66 p 70; **SR-46,** R July 65, M Feb. 66 p 70; **SR-75,** A Mar. 51; **SR-150,** R June 63; **SR-160,** A Dec. 63; **SR-500,** A June 65; **SR-2000,** R May 67; **SX-42,** A Dec. 46, R May 47 p 48, M June 50 p 56; **SX-43,** A Jan. 48, M May 51, p 136; **SX-71,** A Feb. 50; **SX-73,** A May 52; **SX-88,** R June 54; **SX-96,** R June 55; **SX-99,** A Jan. 55, M May 59 p 50; **SX-100,** R Dec. 55; **SX-101,** R Oct. 57; **SX-110,** A May 60; **SX-111,** R May 60; **SX-115,** R Mar. 62; **SX-117,** R May 63; **SX-122,** A Apr. 64; **SX-130,** A May 66; **SX-110,** R Dec. 61; **SX-116,** R Apr. 66

HAM CENTER (See HERBACH & RADEMAN)

HAMMARLUND—**Four-20,** A July 47; **HQ-88,** A Sept. 64; **HQ-100,** R Jan. 57; **HQ-100A,** R Dec. 61; **HQ-105TR,** R Dec. 61; **HQ-110,** R Aug. 58; **HQ-110A,** A May 62; **HQ-129-X,** R June 46, M Nov. 50 p 106, M Sept. 55 p 48; **HQ-140-X,** A Aug. 53; **HQ-140-XA,** A May 56; **HQ-145,** R June 59; **HQ-145A,** A May 64; **HQ-145X,** R Dec. 61; **HQ-150,** R Dec. 56; **HQ-160,** R Oct. 58; **HQ-170,** R Feb. 59; **HQ-170A,** A Nov. 62; **HQ-170A-VHF,** A June 64; **HQ-180,** R June 60; **HX-50,** R Mar. 63; **HX-50A,** A Jan. 65; **HX-500,** R Oct. 60; **HXL-1,** R June 64; **PRO-310,** R Apr. 56; **SP-600-JX,** A Aug. 52

HART INDUSTRIES—**Hart 75,** R Feb. 56

HARVEY RADIO LABS.—**100-T,** A July 46

HARVEY-WELLS—**Bandmaster,** A July 51; **R9,** A Jan. 55; **R9A,** A May 58; **T90,** R Sept. 55; **TBS-50,** A Dec. 47

HEATHKIT—**Apache,** R Mar. 59, M June 59 p 62, M Dec. 59 p 52, M Mar. 60 p 48, M Nov. 60 p 54; AR-1, M May 53; AR-2, A July 53; AR-3, A Mar. 56; AT-1, A July 53, M Oct. 55, M Dec. 55 p 96, M June 56 p 77, M Nov. 56, M May 57; **Cheyenne,** R Apr. 60, M Oct. 60 p 51; **Chippewa,** R July 60; **Comanche,** R Apr. 60; **DX-20,** A Dec. 56; **DX-35,** R Sept. 56, M June 58 p 71; **DX-40,** A Dec. 57; **DX-60,** R July 61; **DX-100,** R Dec. 55, M June 56 p 77, M Aug. 56, M Feb. 57 p 59, M Feb. 58 p 69, M Sept. 58, M Apr. 59, M June 59 p 62, M Aug. 59 p 53, M Nov. 59 p 55, M Feb. 60 p 50, M Aug. 62 p 56, M Sept. 62, M July 64 p 81; **DX-100B,** A Mar. 59; **HA-14,** R Nov. 65; **HA-20,** A Oct. 62; **HR-10,** R July 63; **HR-20,** R Mar. 64, M Oct. 67 p 47; **HW-12,** R Jan. 64, M Apr. 65; **HW-16,** A July 67; **HW-19,** A Apr. 60; **HW-22,** R Jan. 64, M Apr. 65; **HW-29,** A Apr. 60, M Oct. 60 p 50; **HW-29A,** A Nov. 60; **HW-30,** R Nov. 60; **HW-32,** R Jan. 64, M Apr. 65; **HX-11,** A Sept. 61, M Dec. 61 p. 62; **HX-20,** R Mar. 64, M Mar. 66 p 44; **HX-30,** R May 63; **Marauder,** R Oct. 62; **Mohawk,** R Dec. 58; **Mohican,** R Dec. 60, M July 62 p 53; **Pawnee,** R Jan. 62, M Aug. 64 p 64; **SB-100,** R Sept. 66, M May 67 p 49, M Nov. 67 p 50; **SB-101,** A Feb. 67; **SB-110,** R Feb. 66; **SB-200,** R May 65; **SB-300,** R July 64, M Dec. 66; **SB-301,** R Mar. 67; **SB-400,** R Jan. 65, M July 65 p 80, M Dec.66; **SB-401,** R Mar. 67; **Seneca VHF-1,** R Jan. 61; **Warrior,** R June 61

HENRY RADIO—**2-K,** R June 65; **2K-2,** R Nov. 67

HERBACH & RADEMAN (HAM CENTER)—**ECO-1,** A Oct. 46

HUNTER MFG. CO.—**Band-It 20B,** A Oct. 50; **Bandit** 2000A, A Feb. 63; **Bandit 2000B,** A June 64; **Bandit 2000C,** A Sept. 67; **Cyclemaster 20A,** A Oct. 48

INTERNATIONAL CRYSTAL — **AOR Series,** A Oct. 63; **AOT-50,** A Oct. 63; **KB-1,** A Nov. 59; **SBA-50,** R Sept. 67; **SBX-9,** R Sept. 67; **STP-50,** A Oct. 58; **T-12,** R Dec. 57

INTERSTAR — **SR-700E,** R Aug. 67; **ST-700E,** R Aug. 67

ITT MACKAY MARINE — **3010-B,** R Apr. 67

JOHNSON, E. F. — **Adventurer,** R Aug. 55, M Sept. 58; **Challenger,** R Dec. 59; **Courier,** R Aug. 58; **Invader,** R July 61; **Invader-2000,** A Sept. 60; **Messenger,** A May 60; **Navigator,** R May 58; **Pacemaker,** R Apr. 57; **Ranger,** R Sept. 54, M Nov. 57 p 89, M Jan. 59 p 61, M Feb. 59 p 49, M Apr. 59, M Feb. 60 p 51, M Jan. 61 p 59; **Ranger II,** A Sept. 61, M Sept. 66 p 85; **Thunderbolt,** R July 58; **Valiant,** R Sept. 57; **Valiant II,** A June 62; **Viking Kilowatt,** R Feb. 55; **Viking Mobile,** A Aug. 52, M May 58 p 78; **Viking I,** A Sept. 50, M June 52, M Dec. 52, M Oct. 53 p 47, M July 54 p 39; **Viking II,** A Jan. 53, M June 55; **6N2,** R Mar. 57; **6N2 Thunderbolt,** R Jan. 60; **500,** R July 57

JUSTIN — **Mobiltrans,** R Oct. 64

KNIGHT-KIT (See ALLIED RADIO)

LAFAYETTE — **HA-144,** R June 67; **HA-225,** A Jan. 65; **HA-230,** A Apr. 65; **HA-250,** R June 66; **HA-260,** A Oct. 67; **HA-350,** R Dec. 64; **HA-410,** A Sept. 66; **HA-460,** A Sept. 66; **HA-650,** R Mar. 66; **HA-750,** A Dec. 67; **HE-10,** See KT-200; **HE-25 Voyager,** A Feb. 61; **HE-30,** R Nov. 61; **HE-45,** A Dec. 61, M Feb. 67 p 49; **HE-50,** A Oct. 61; **HE-80,** A June 63; **KT-200,** A Sept. 59; **KT-390 Starflite,** A July 62

LAKESHORE INDUSTRIES — **P-400-GG,** A July 56; **P-500,** R Mar. 55; **Phasemaster Jr.,** A June 54; **Phasemaster II,** A Oct. 55; **Phasemaster II-A,** A Nov. 57; **Phasemaster II-B,** A Apr. 58

LETTINE RADIO — **240,** A July 50; **262,** A Aug. 60

LW ELECTRONIC LAB — **LW-50,** R May 54; **LW-51,** R Dec. 59; **LW-51 DeLuxe,** A Aug. 60; **LW-51 Double Deluxe,** A Feb. 62; **LW-90,** A July 57

LYSCO — **Transmasters (Mobile),** A Mar. 51; **600,** A Aug. 50; **600S,** A Dec. 51; **650,** A Feb. 52

MARS (See PAUSAN CO.)

MASTER MOBILE MOUNTS — **Mobile GO Power,** A Apr. 63

MECK IND., JOHN (See AUDAR)

MEISSNER (See THORDARSON-MEISSNER)

MICAMOLD — **XTR-1,** A Mar. 48

MILLEN — **90800,** A Feb. 46; **90801,** R July 54; **90810,** A Oct. 47; **90881,** A Feb. 47

MODERN SPACEMASTER PROD. (EMESCO) — **TR-6,** A May 62

MORROW — **Falcon,** A Feb. 57; **MB-6,** A Feb. 58; **MB-560,** A Sept. 55; **MB-560A,** R Nov. 56; **MB-565,** A Feb. 58; **MBR-5,** R May 56; **PW Series,** A June 60; **SBT,** A Oct. 58

MOSLEY ELECTRONICS — **CM-1,** A Sept 61

MULTI-PRODUCTS CO. (ELMAC) — **A-51,** A Dec. 51 p 108, M Feb. 53 p 59, M Mar. 53 p 62; **AF-67,** A Nov. 53, M Oct. 58 p 75, M Jan. 59 p 58, M May 59 p 48; **AF-68,** A Feb. 60; **PMR6-A,** A Feb. 53; **PMR-7,** R July 56

NATIONAL — **HFS,** A Apr. 48; **HRO-7,** A Jan. 49; **HRO-50,** A Mar. 50, M May 64; **HRO-50-1,** A May 51; **HRO-60,** A July 52, M Feb. 55 p. 38, M Apr. 66; **HRO-500,** A Oct. 64; **NC-33,** A Mar. 48; **NC-46,** A Mar. 46; **NC-57,** A Nov. 48; **NC-66,** A Dec. 57; **NC-88,** A July 53; **NC-98,** R Aug. 54; **NC-105,** R Apr. 62; **NC-109,** R Jan. 58, M June 59 p 61; **NC-125,** A Oct. 50; **NC-155,** R July 62; **NC-173,** R July 47 p 46; **NC-183,** A Jan. 48; **NC-183D,** A Apr. 52; **NC-188,** A Aug. 57; **NC-190,** R Oct. 61; **NC-270,** R Jan. 61; **NC-300,** A Nov. 55, R Jan. 56, M Oct. 57 p 90, M Mar. 58, M Apr. 58, M June 60 p 41; **NC-303,** R Apr. 59; **NC-400,** R Feb. 60; **NCL-2000,** R Feb. 65; **NCX-3,** A Oct. 62; **NCX-5,** A Sept. 64; **NCX-5 Mark II,** A Aug. 65; **SW-54,** A Jan. 51; **200,** R Dec. 67

NEIL CO. — **Alpha 6,** A Nov. 58; **Beta,** A Oct. 60; **Mobileer,** A Aug. 60

P & H ELECTRONICS — **L200M,** A Dec. 58; **L600M,** A Dec. 58; **LA-400,** A Feb. 56; **LA-400-B,** A June 57; **LA-400-C,** A Apr. 59; **LA500M Spitfire,** A Aug. 63; **2-150,** A Sept. 62; **6-150,** A Feb. 62

P & K ELECTRONICS — **501C,** A Aug. 56; **501DX,** A Apr. 57; **501R,** A Aug. 56

PALCO ENGINEERING — **Bantam 35,** A Apr. 55

PAUSAN CO. — **Mars Thunderbird,** R Mar. 60

PIERSON (Also see AUTOMATION ELECTRONICS) — **KP-81,** A Aug. 46

POLY-COMM (See POLYTRONICS LAB.)

POLYTRONICS LAB. (POLY-COMM) — **PC-2,** A Dec. 62; **PC-6,** R Apr. 63; **6-2,** A Aug. 60; **10,** A Aug. 60; **62B,** R Apr. 62

RACAL COMMUNICATIONS — **RA-17,** R Oct. 65

RADIO INDUSTRIES — **Loudenboomer Mark II,** R June 62

RADIO MANUFACTURERS ENGINEERS (RME, Also see ELECTRO-VOICE) — **RME-45,** R Oct. 46; **RME-84,** A Mar. 47

RADIO SHACK — **Realistic DX-150,** A June 67

RADIO TRANSCEIVER LABS — **HFM-25,** A May 46; **HT-144,** A Dec. 46

RADIOVISION — **Commander,** A June 50 p 81

REALISTIC (See RADIO SHACK)

REEVES INST. (RELIANT) — **L-103,** A Apr. 62

RELIANT (See REEVES INST.)

SERVO CORP. — **R5200,** A Apr. 56

SIDEBAND ENGINEERS — **SB1-LA,** R Sept. 64; **SB2-LA,** A Jan. 65; **SB-33,** R Apr. 64; **SB-34,** R July 66, M Feb. 67 p 48

SILVER, McMURDO — **700,** A July 46; **701,** A Nov. 47; **702,** A Nov. 47; **703,** A Nov. 47; **800,** A July 46; **801,** A Nov. 47; **802,** A Nov. 47

SOLAR ELECTRONICS — **Solar System VI,** A Sept. 60

SOMMERKAMP ELECTRONIC — **FL-200B,** A June 66; **FL-1000,** A June 66; **FR-100B,** A June 66

SONAR RADIO CORP. — **CD-2,** R May 55; **MB-26,** A Oct. 51; **MB611,** A Aug. 47; **Mono-Bander,** A July 62; **MR-3,** A Oct. 52; **MR-4,** A Mar. 53; **SR-9,** A Oct. 51; **SRT-120,** A Dec. 52; **VFX 680,** A Apr. 47

SPECIAL DESIGN PRODUCTS — **SDP-1000L,** A Dec. 57

SQUIRES-SANDERS — **SS-1R,** R May 64

STANCOR (See STANDARD TRANSFORMER CORP.)

STANDARD TRANSFORMER CORP. (STANCOR) — **ST-202-A**, A Oct. 47; **ST-203-A**, A June 48

SUBURBAN RADIO (SUBRACO) — **MT-15X**, A Aug. 48; **75T**, A Oct. 48

SUN RADIO — **PA-500**, A Dec. 47

SUPREME TRANSMITTER CORP. — **AF-100**, A Jan. 47

SWAN ENGINEERING CO. — **Mark I**, A July 65; **Mark II**, A Aug. 67; **SW-240**, A Feb. 63; **100 Series**, R Aug. 62; **250**, A May 66; **350**, R Sept. 65; **400**, A May 64; **500**, A Mar. 67

TAPETONE — **Sky Sweep**, A Dec. 58

TECHNICAL MATERIAL CORP. (TMC) — **GPR-90**, R Oct. 55; **GPR-90RX**, A Jan. 58; **GPT-750**, A Jan. 56; **GPT-750D**, A Apr. 58; **PAL-350**, A May 58; **SBE-1**, A Apr. 58

TECRAFT (See EQUIPMENT CRAFTERS, THE)

TELVAR (See AUDAR)

TEMCO (See TRANSMITTER EQUIPMENT MFG. CO.)

THORDARSON-MEISSNER — **Signal-Shifter**, A Aug. 48, M Oct. 53, M Apr. 54 p 49; **2-CW**, A Jan. 53

TMC (See TECHNICAL MATERIEL CORP.)

TRANSCON (See CREATIVE ELECTRONICS)

TRANSITRON — **500**, A Apr. 55

TRANSMITTER EQUIPMENT MFG. CO. (TEMCO) — **RA Series**, A July 47; **75GA**, A May 46; **500GA**, A Aug. 46

TRANSTECH — **432T**, R Aug. 59

UTICA COMMUNICATIONS CORP. — **650**, A Mar. 64

VOCALINE — **AT-30**, R Jan. 59

WHIPPANY LABS — **Lil Lulu (R)**, A Jan. 65; **Lil Lulu (T)**, R Aug. 63

WILCOX ELECTRIC — **99A**, A June 46

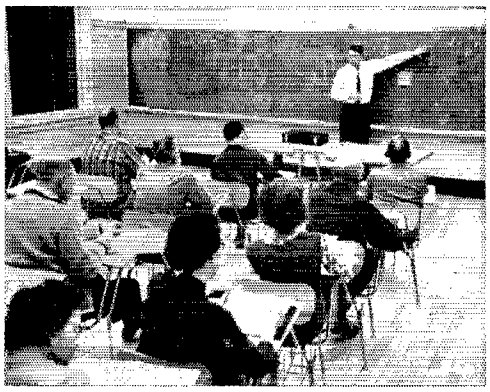
WORLD RADIO LABS (See also GALAXY ELECTRONICS, GLOBE ELECTRONICS, WRL ELECTRONICS) — **Atlas 2 KW**, A July 63; **DSB-100**, R Dec. 58; **DuoBander 81**, R Nov. 66; **Galaxy III**, R Oct. 64; **Galaxy V**, A Jun. 64; **Galaxy V Mark II**, A Feb. 67; **Galaxy 300**, R Oct. 63; **Galaxy 2000**, R. Jan. 66; **Globe Champion**, A Sept. 48; **Globe Champion**, R Feb. 58; **Globe Chief**, R Oct. 56 **Globe Chief Deluxe**, R June 60; **Globe HiBander**, A June 58; **Globe King**, A Oct. 47; **Globe King 400B**, A May 52; **Globe King 500**, A July 54; **Globe King 500B**, A Aug. 56; **Globe Scout**, A Oct. 52, M Oct. 55 p 44; **Globe Scout 66**, A May 57; **Globe Scout 680**, A May 57; **Globe Scout Deluxe**, R June 60; **Globe Trotter**, A June 46; **HG-303**, A May 62; **LA-1**, A Nov. 57; **Meteor SB-175**, R Dec. 62; **Mobiline Six**, A July 60; **TC6A**, A Nov. 64

YUBA-DALMOTOR — **DM-1000**, A July 60; **DM-4000**, A July 60 QST

Western Hams Get Into The Swing of Incentive Licensing

As soon as definite information on incentive licensing came out, a group of ham operators in the Portland, Oregon area holding general licenses organized a class and presented it to the Portland Community College, requesting that a theory class be taught. They found ready response from the directors and a teacher was secured who already has had years of experience in teaching radio theory. Hal Potter, W7MYG, the competent instructor, guided fifteen hams through an eleven week course of theory study aimed at improving their knowledge of their hobby and preparing for Advanced Class FCC examination and license. Classes were held at the Community College Monday and Wednesday nights from 7:30 to 10:00 P.M. and the attendance throughout the eleven weeks was 100 percent. Some of the members came from out of town to attend, which showed real effort on their part.

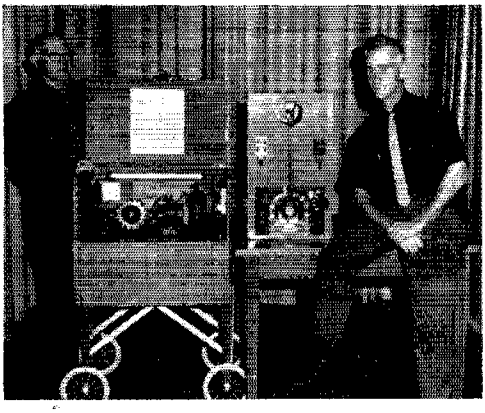
It was interesting to note the various occupations of these hams who were so vitally interested in their hobby of ham radio and signed up for the course: K7PQF, Veterinarian; K7KWA, Dentist; WA7AHW, Printer; K7HKW, Construction; K7QBA, Medical Technician; W7DXY, Accountant; K7KWM, Registered Nurse; K7ANC, Sales Engineer; K7BII, Personnel Assistant; W7ZLC, Warehouseman; K7ADI, Electronics Supply Clerk; K7HUT, Shoe Salesman; K7PHP, Garage Owner/Mechanic; WA7DRO, College Student; K7MSZ, Landlord, retired. The instructor, W7MYG, is an Avionic Technician, in private business, and also a certified electronics instructor for Portland Community College. K7KWA says "The course was a complete success and all of us felt that incentive licensing was a good thing for us. It got us off our operating stools and into the classroom. Instead of "beefing" on the air about the pros and cons of incentive licensing we got into the spirit of the thing. We got the message from FCC and we are having a real 'trip'."



K7KWA instructing the incentive licensing class at the Portland, Oregon Community College.

Strays

This station made quite a hit at the North East Ohio Boy Scout Jambo last October, showing amateur radio to the scouts. At the operating position are (l.) WA8SIL and WA8SJC, both Star Scouts of Chesterland, Ohio Troup 195



Spark rigs are not out of the picture yet. Here are two operated for demonstration purposes by Ralph Thetreau, W8FX and Harry Walsh, K8DX. K8DX gave a short lecture and demonstration with the able help of W8FX at the November meeting of the South Eastern Michigan ARA in Detroit. A QSO was carried on between the front and back stage before a very interested group of hams. W8FX was working mobile as can be seen! The two brass pounders still have their original calls having started with 8FX and 8DX.

The Braille Technical Press has printed sample questions and answers for the Advanced and Extra Class licenses in their January and February 1968 issues respectively. Braille editions (Grade II) are available at 60 cents each. Talking Book editions (16⅔ r.p.m.) are available at $1.00 each. The Braille Technical Press, Inc., 980 Waring Avenue, N. Y., N. Y. 10469

Here are three former League directors representing over 150 years of amateur radio activity. From left are W7ZC (West Gulf Division), W2ZI (Atlantic Division), and W6MLZ (Southwestern Division).

LeRoy Langhaar, W2FRK was awarded the First Army MARS trophy for outstanding public service. Shown (from left) are Lt. General Seaman, W2FRK, Commanding General 1st U.S. Army, Ed Liscombe, K4KNV, Chief Army MARS; and Bob Sheridan, W3REH, 1st U.S. Army MARS Director.

Is your XYL in favor of ham radio? W5CVW's is. This is the ham shack/den which she designed. Bill has been a League member since 1922 and was first licensed as 8BWK in Cleveland, Ohio.

Hamfest Calendar

Colorado — The Boulder ARC will hold its annual auction at the National Guard Armory, Boulder, Colo., April 28 at 1:00 P.M. Further information from Don Hanaford, WAØNFO, 303-443-2386.

Florida—The Orlando Radio Club will hold their Hamfest April 27 and 28 at the Statler-Hilton Inn, 3200 W. Colonial Drive, Orlando, Florida. There will be meetings for Army, Navy and Air Force MARS, RACES, ARRL, QCWA, and Floridoras; forums on v.h.f., sideband, ATV, and DX; transmitter hunts and c.w. contests and, of course, the displays of the many manufacturers of ham equipment.

Georgia — The Columbus ARC will hold their annual Hamfest on April 6 and 7 at the Fine Arts Bldg., located at the Fair Grounds in Columbus, Ga. Bingo for the XYLs and harmonics. Communications will be on 3985 kc. For reservations or information contact Harold DeVaughn, W4FIZ, 3804 Conbrad Dr., Columbus, Ga. 31904.

Illinois — The Chicago Suburban Radio Assn. will hold their annual auction on Wednesday, April 3, at National Hall, 3907 Prairie Ave., Brookfield, Ill. at 8:00 P.M. For more information contact WA9CCQ, Karl Weisshappel, 3122 Clinton Ave., Berwyn, Ill. 60402.

Illinois — The Moultrie ARC is having its 7th annual Hamfest at Sullivan, Illinois in the American Legion Pavilion, April 28.

Illinois — The Seventh Annual Dinner Dance of the 6-Meter Club of Chicago will be held at the Park Manor V.F.W., 1301 W. 87th St., Chicago, on Saturday, April 6 at 7:00 P.M. Tickets from members or by mail from Mike Corbett, K9RNZ, 5215 73rd Court, Summit, Ill. 60501.

Indiana — The honoring of old timers will be the theme of this year's annual Banquet of the North-Eastern Indiana RC to be held at the Library in Waterloo, Saturday, April 20. A place will be available at 2:00 P.M. for those who wish to come for eye-ball QSOs and to talk over old times. The evening meal will be at 6:45 with a program following. Reservations may be made with WA9GNA, Harold McEntarfer, Waterloo, Indiana 46793 before April 15. The price of the evening meal will be $3.00.

Kansas — The Coffeyville ARC Hamfest is April 21 at Pfister Park, Coffeyville. No advanced registration needed, bring covered dish. Talk-in on 3.920 and 145.1 Mc.

Maine — The PAWA will hold its Annual Banquet on April 20 at the Holiday Inn in Portland.

Maryland — The B&O/C&O Railroads ARC will hold its 9th Annual Banquet on April 20 at the Barn Restaurant, 750 Ritchie Highway, N.E., Glen Burnie, Md. Tickets are $5.00 each prior to April 10 and $6.00 after that date. Please make your reservations early to Joseph W. Zorzie, W3LBC, K "GO" Telegraph Office, B & O Central Bldg. 107, Baltimore, Md. 21201.

Ohio — The Dayton Hamvention April 27, Wampler Arena Center, Dayton, Ohio, sponsored by Dayton Amateur Radio Assn. QSO in person at the nations foremost radio event of the year. Technical Sessions, exhibits, hidden transmitter hunt. Bring the XYL for an outstanding Ladies Program. Join the satisfied participants who return year after year in celebrating Ohio Amateur Radio Week. For information write Dayton Hamvention, Box 44, Dayton, Ohio 45401.

New Jersey — All RTTY stations in the Delaware Valley are invited for the meeting to discuss plans for organizing an RTTY assn. for the area. The meeting will be held at National Park Boro Hall, Grove and Lakehurst Sts., National Park, N. J., April 15 at 8:00 P.M. For more info write RTTY Committee, 560 Barlow Ave. Woodbury, N. J. 08096.

New Jersey — The Second International V.h.f. Conference being held May 2-4, 1968 will feature top v.h.f.ers from everywhere! VK3ATN has already indicated he will attend. All three days will feature talks, symposiums and other events at the Garden State Plaza, Rts. 4 & 17, Paramus, N. J. in conjunction with the Ham Radio Expo (see March *QST*, pg. 69). Activities will culminate in the Banquet, Saturday, May 4, at 7:30 P.M. A program of first class entertainment headlined by star entertainer Jean Shepherd, K20RS, speaker of note, prizes, together with a superb top sirloin of beef dinner at the luxurious Champagne Towers, Rt. 17, Lodi, N. J. will interest OMs, XYLs and YLs alike! Banquet tickets at $7.95 — YLs and XYLs at $6.95 — are available from the East Coast VHF Society, WA2WEB, Box 1263, Paterson, N. J. 07509.

New York — The Rockaway ARC Spring Auction will take place Friday evening April 26 at 8:00 P.M. at the American Irish Hall at Beach Channel Drive (At Beach 81st St.), Rockaway Beach, N. Y. Doors will be open at 6:00 P.M. to accept items for sale. One dollar donation accepted at the door. For information write to Rockaway ARC, P.O. Box 205, Rockaway Park, N. Y. 11694.

Washington — The Skagit Club Hamfest has been set for April 20 at Arlington.

COMING A.R.R.L. CONVENTIONS

April 26-27 — Michigan State, Lansing.
June 1-2 — New England Division, Swampscott, Mass.
June 7-9 — NATIONAL, San Antonio, Tex.
June 29-July 1 — Saskatchewan Province, Saskatoon.
June 29-30 — Rocky Mountain Division, Cheyenne, Wyoming.
June 29-30 — West Virginia State, Jackson's Mills.
August 3-4 — Central Division, Springfield, Ill.
August 31-September 2 — Southwestern Division, Phoenix, Arizona.
September 28-29 Roanoke Division, Greenboro, N. C.
October 12-13 — Hudson Division, Tarrytown, N. Y.

ARRL MICHIGAN STATE CONVENTION

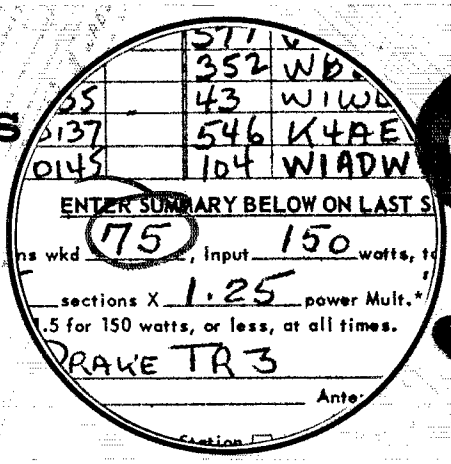
Lansing **April 27 & 28**

The ARRL Michigan State Convention will be held in Lansing on April 27 and 28, 1968 at the Jack Tar Hotel. Registration, manufacturer's displays and hospitality room activity will start at 2 P.M. on Friday. That evening there will be tours, a technical session, and initiation into the Royal Order of the Wouff Hong. The ladies will have a special program while the Wouff Hong session is in progress. Saturday morning the registration, swap and shop, and manufacturer's displays will open at 8 A.M. There will be net meetings, council of clubs meeting, ARRL Forum, DX Forum, an outstanding ladies program, and technical sessions throughout the day. The Saturday evening program will be a family type program with professional entertainers. Registration is $2.00 in advance (before April 25) or $2.50 at the door. For further information write convention chairman Currin Skutt, W9FSZ, 119 North Foster Avenue, Lansing, Michigan 48912.

Strays

Interested in 160 meters? Hams in the New England and Middle Atlantic states have formed the Northeastern States 160-meter Association to promote fellowship on the band. Membership inquiries may be directed to Association president, W1EUB.

Results — 34th ARRL NOVEMBER SWEEPSTAKES



REPORTED BY BOB HILL,* W1ARR

Jowls went unshaven, leaves went unraked, homework went undone: the Silly Season was here again. The OM muttered incoherent warnings to the rest of the family and disappeared into the shack, slamming the door behind him. It was the 34th ARRL November SS!

This year's wild doings (Nov. 11–13, 18–20) resulted in 842 phone and 1088 c.w. logs adding to the mailbag sag at Hqs., with some interesting trends to be noted. Phone activity edged ever closer to parity with c.w. as many participants found that QSOs went faster and were more numerous on sideband. Section-hunters flourished: 59 marksmen (21 voice, 38 code) found the range for all 75 multipliers — quite an increase from last year's total of 26. A third and somewhat peculiar phenomenon: of the 1947 logs submitted, 314 (almost one in six) represented either portable, multi-, or "guest" operation.

Logs, logs, logs. About half a dozen were computer printouts, while W4BVV went one better with a computerized dupe sheet. Some handwritten logs, like W7FCD's, were almost works of art in their neatness and precision: others — well, we were unable to award the Larson E. Rapp Memorial Booby Prize to the deserving entrant because we couldn't read his name or address, and he didn't put his call down anywhere anyway. Nearly everyone had something to say, so don't feel offended if your comments didn't make the writeup: we'd have to print a special issue of *QST* to include them all! But remember that *all* comments are read and *all* suggestions evaluated.

As usual, most comments fell into one of five categories: (1) "Had a ball," (2) "Where was [fill in a section]?" (3) "Murphy," (4) "Wait till next year," and (5) "Let's-drop-let's-add-let's-change." We had the customary quota of broken bones, defunct rigs, tilt-over towers that weren't supposed to, babies being born between NR 286 and NR 287 — make your own list! Suggestions for improving the SS included: drop the power multiplier, increase the power multiplier, change the criteria for a score multiplier, go back to two weekends, more hours, fewer hours, restore signal report to the CK — and a few strange characters even said they like the SS just the way it was. Several guys still stuck on a.m. commented sadly on the hopelessness of it all; several comments about that cloddish clique that runs a kilowatt (or more) and claims the low-power multiplier, implied that some entrants who signed the "I-have-observed-all-competition-rules" must have observed them from a considerable distance. And to you fellows intrigued by what effect the new FCC regs will have on the '68 Sweeps: you'll have to wait another year, since both weekends of the upcoming fracas will be over before November 22!

* Assistant Communications Manager, ARRL.

LED SECTION BOTH MODES

K1GAX	W4NQA	K7RAJ
K1LPL	W4USM	W9YT
W1BGD/2	K5RHZ	WA9ITB
W3BES	K2EIU/5	WA6CVS
W3GAU	W5WMU	VE1APP
K4BAI	KZ5FX	VE2BMS
K4PUZ	W6BIP	VE5US
K4WJT	WA6IVN	VE7EH
W4BVV	KH6IJ	3C8BB

"Long may that haunting DIDIDIT-DIDIDIT ring out across the airwaves." — K2KUA

For the third year, a thousand-point bonus was offered to each entrant attaching an SS message in proper form with proper handling data included. One-third (647) of the troops went forth to battle this MSG dragon; 70% succeeded in slaying the beast, but the others returned with nothing but singed sideburns to show for their efforts. If *you* were in the latter platoon, most likely you (1) omitted the precedence, (2) miscounted text word-count for the CK, or (3) put down inadequate handling data.

As long as we're on a military kick, let's look at the big guns for '67:

Phone. *Single operator:* K4WJT 193,918, W2RLM 189,550, K8DOC (WA8LEO, opr.) 178,707, K1LPL 176,904, WA6IVN 176,400, WA4PXP 174,886, K5RHZ 168,276, K4PUZ 167,610, W3GRF (K1ANV, opr.) 167,056, W5WMU 166,140. *Multioperator:* WAØCHH 172,563, KØVVY 167,112, WA9HEU 133,809, WAØCJU 129,717, W3ZKH 108,091.

C.W. *Single operator:* W9YT (K9ZMS, opr.) 139,563, K1LPL 138,883, W6RW (W6DQX, opr.) 135,563, W1BGD/2 134,313, K4GSU/3 131,123, K2EIU/5 130,281, WA9ITB 130,028, W3BES 128,813, K4PUZ 125,013, W9LKJ 124,921. *Multioperator:* K4VDL 128,438, K5LZO 125,550, WA3EPT 117,250, KØVVY 115,610, WAØDKA 103,410.

(Parenthetically, VE5US deserves honorable mention for topping Canada both modes: 151K with VE5DK behind the mike; 115K with VE5UF sending Morse. Extra-FB performances from VE-land!)

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Intra-sectional struggles are always a highlight of any SS. Most of the real Pier-Sixers were on c.w. this time. In EMass, W1MX (K3QDD, opr.) nosed out K1EUF by *nine points* (98,790 to 98,781); in WPa we had a thriller among WA3BLE (104,843), K3HKK (K3AHT, opr.) (104,483), and WA3IXN (103,660); Michigan was the scene of a spirited struggle among K8UDJ, W8UM, and W8SH, operated by K8MFO, W8CQN, and K1ZND, respectively. Other close races were in SNJ (WB2TEN and W2HDW), Miss. (K5AEU and K5IIN), NLI (W2GGE and W2AJR), NNJ (WB2RKK and W2NNL), Vt. (WA1HXU and W9BLQ/1), Alaska (KL7JDO and KL7MF), SJV (W6QMC and K6RTK), NC (W4NQA and K4MPE) and Alberta (VE6ATH and VE6VV). Only four sections had really intense battles on phone: MDC (W3GRF and W3AZD), Wis. (W9YT and K9LBQ), Nebr. (WAØHSX and KØCVA) and Va. (W4BVV and K4CG). It doesn't pay to let up even for a minute!

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Novice entrants were paced by Minnesota's WNØRAG with a score of 8,505; other WN certificate winners were WN1HGS WN1HHA WN1IUE WN2ANI WN2ARD WN2BND WN2CAL WN3HOM/3 WN4GTG WN6VXJ WN8WIA WN9ULI and WN9UOP.

Clubs

Forty-six ARRL-affiliated clubs submitted the necessary three individual entries and secretary's letter in order to vie for the handsome cocobolo gavel that goes to the highest-scoring club each year. For the fourth year in a row, the potent **Potomac Valley Radio Club** crew grabs that gavel! PVRC's active Activities Manager W3TMZ had what one car manufacturer calls "a better idea": rather than split the boys into just two large intra-club competing teams, Jack appointed *ten* team captains, each to have nine or ten members on his squad. The result was spectacularly successful, as 92 PVRCers turned out, blitzing the opposition by a margin of more than two million points! Special recognition goes to K1ANV, whose stout performances from W3GRF (on phone) and W4BVV (on c.w.) led the club on both phone and c.w. — no easy feat when you look at that roster of Potomackers.

Oddly enough, one man topped both modes for the second- and third-place clubs, too. W3BES stands at the head of runnerup **Frankford Radio Club's** 64 entries, and W8QXQ is champ of the fast-rising **Indian Hills Radio Club,** whose fine effort moved them from eighth in '66 to third in '67. **Central Michigan ARC** was the only other club to go over the million mark. **Connecticut Wireless,** with nearly the same

If the faces aren't familiar, the voices should be. At left is **KØCVA,** whose 834 phone contacts was fourth high nationally; at right is **WAØCHH,** chief op of the Missouri multiop effort that garnered a "multi-top" 172,563 points and a "75 sweep." Behind CHH is an unidentified stationary object.

FB total as last year, still slipped a bit from third to fifth. **Germantown RC's** talented teenyboppers moved up a notch, from 7th to 6th. The top ten is rounded out by the **University of Rhode Island RC, Miami Valley Amateur Radio Contest Society,** and **South Jersey RA.**

Here are the standings by mode:

Phone	*Rank*	C.W.
Potomac Valley RC	1	Potomac Valley RC
Frankford RC	2	Frankford RC
Indian Hills RC	3	Indian Hills RC
Germantown RC	4	Conn. Wireless Ass'n
Miami Valley ARCS	5	Central Mich. ARC
Central Mich. ARC	6	Minn. Wireless Ass'n
Univ. of Rhode Island RC	7	Nittany ARC
South Jersey Radio Ass'n	8	Massillon ARC
Conn. Wireless Ass'n	9	Univ. of Rhode Island RC
Synton ARC	10	South Jersey Radio Ass'n

We look forward to a very interesting future competitive situation in Minnesota, where two new and promising clubs have recently been formed: the **Minnesota Wireless Association,** whose membership is 100% ARRL and which, under the guidance of WØTKX, gathered over 586,000 points in its initial venture; and the **Viking Amateur Radio Society,** which, in the words of Secretary WØBMY, "has dedicated itself to becoming a real factor in amateur radio," and whose club station WAØCJU turned in a cool 130 kilopoints multiopping phone. So have at it, you two clubs, and Gopher that gavel next year!

Musings

. . . *on Doing Better.* "Didn't have much operating time, but did real crummy, even for 20 minutes. Will go all out next year and break the 25-point barrier." — *WB6YAX.* . . . Germantown RC's WA3DNV broke said barrier, going from 24 phone points in 1966 to 14,040 this year. A 5,850% score increase is not to be sneezed at. . . . "I think the SS is trying to tell me something about my c.w. By switching to phone this year my score is eight times as high. Now if only I could do the same next year." — *WAØOTE.* Now if you only could, Jim, you'd wind up with — um — 642,848 points, a very creditable showing indeed. . . .

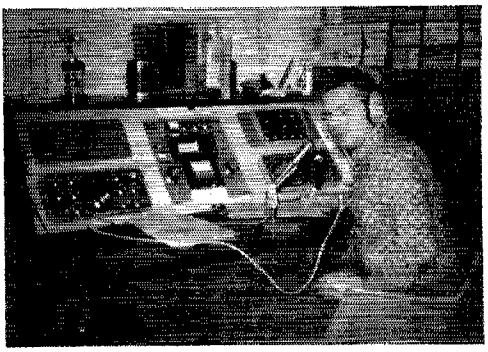
. . . *on Time, the Subtle Thief.* "Been in every SS since #1, the marathon affair which lasted nine days, like the Novice Roundup." — *W6BIP.* At least two other original SSers were still at it this year, W7EKE (ex-W9ERU) and the 1930 winner, W1ADW, who says the SS is better than ever. . . . "I nominate W2WE longest licensed in the contest (CK 13)." — *WA6JDT.* Waal, W6AM has him beat by a year. "It's good to meet old friends in the SS," Don says. . . . "It is a sobering thought to find that out of 343 stations worked, only 11 have licensing dates older than mine. Time QRQs." — *W2LEJ.* . . . "Nice contest — a lot like old times back in the 30's." — *W5WG.* . . . "A certain WB2 gave me CK 71 three times, until I told him what it was." — *WA8RUJ.* Best wishes to that WB2 for his *next* 96 years in ham radio, too. . . . "My CK 17 (first licensed as 1ABW Feb. 1917) really caused 'em to flip." — *W2IP.* "Enjoyed meeting again many of the oldtimers I used to work years ago as W6PBV from SCV Section." — *K7KOK.* . . .

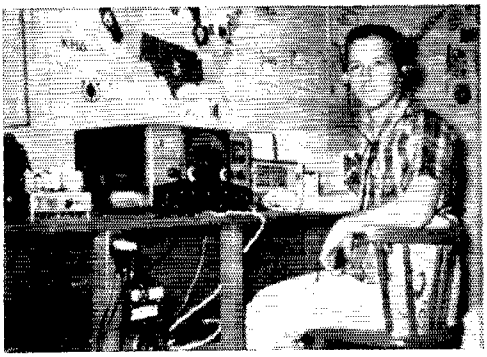
. . . *on Sweeping Clean.* "A funny thing happened on the way to a clean sweep: needed SF and couldn't find one, so called CQ SF. W6BIP answered and it shook me so, I almost lost him. VE8ML was an anticlimax." — *W4FRO.* "What a delight working VE8MP for my 75th section. The DX contests really teach you how to dig for the hard stuff." — *K8HZU.* "Didn't mean to be very active this year, but once I heard the normally-rare sections blast-

CLUB SCORES

Club	*Score*	*Valid Entries*	*Phone Winner*	*C. W. Winner*
Potomac Valley Radio Club	4,948,841	92	W3GRF (K1ANV, opr.)	W4BVV (K1ANV, opr.)
Frankford Radio Club	2,934,247	64	W3BES	W3BES
Indian Hills Radio Club (Ohio)	1,345,245	41	W8QXQ	W8QXQ
Central Michigan Amateur Radio Club	1,054,162	21	W8VPC	K8UDJ (K8MFO, opr.)
Connecticut Wireless Association	928,580	19	K1HTV	W1BGD/2
Germantown Radio Club (Pa.)	879,192	19	WA3CQW	WA3DCM
University of Rhode Island Radio Club	766,557	10	K1LPL	K1LPL
Miami Valley Amateur Radio Contest Society (Ohio)	739,159	18	WA8MCR	K8BPX
South Jersey Radio Association	723,174	33	W2ORA	K2AA (W2FYS, opr.)
Minnesota Wireless Association	586,383	11	.....	WØAA (WØTKX, opr.)
Nittany Amateur Radio Club (Pa.)	529,330	17	K3HKK (K3AHT, opr.)	K3HKK (K3AHT, opr.)
Massillon Amateur Radio Club (Ohio)	528,142	19	W8YHU	K8QHJ
Synton Amateur Radio Club (Ill.)	505,663	7	K9YNG	W9JCK
Order of Boiled Owls (Ohio)	390,865	7	WA8RWU	W8ETU
Wisconsin Valley Radio Association	384,309	12	W9RQM	W9RQM
West Park Radiops (Ohio)	374,273	17	W8IPA/8	W8AJW
Buckeye Shortwave Radio Association (Ohio)	326,835	11	W8VQI	W8OYI
Candlewood Amateur Radio Association (Conn.)	321,492	7	.....	W1CSM
Huntsville Amateur Radio Club (Ala.)	310,783	13	W4USM	W4USM
Suffolk County Radio Club (N. Y.)	302,013	16	WA2QEB	K2ZYR
West Valley Amateur Radio Club	301,080	8	WB6UHF	WB6KPN
Westside Amateur Radio Club (La.)	282,937	5	.....	W5BUK
1200 Radio Club (Mass.)	270,165	9	K1KNI	WA1HRG
Niagara Frontier DX Association (N. Y.)	269,247	7	WA2BEX	W2BSC
Rochester Amateur Radio Association (N. Y.)	252,817	16	WB2RCB	W2ADN
Viking Amateur Radio Society (Minn.)	249,395	5	WØIVZ	.....
Tri-County Radio Association, Inc. (N. J.)	222,211	11	W2WE	WA2ASM
Radio Club of Tacoma (Wash.)	217,073	10	W7BUN	K7VPF
Springfield Amateur Radio Club (Ohio)	212,091	9	W8HQX	WA8ZGC
Gallatin Amateur Radio Club (Mont.)	197,044	6	WA9ATY/7	K7KOK
Louisville's Active Radio Operators (Ky.)	189,088	8	W4CVI	W4CVI
Casper Amateur Radio Club (Wyo.)	173,555	4	.....	.....
West Allis Radio Amateur Club (Wis.)	172,164	5	.....	WA9NVY
Johnson City Radio Association (Tenn.)	149,192	5	.....	.....
Oak Park Amateur Radio Club (Mich.)	142,729	4	W8DQL	.....
Morton West High School Amateur Radio Club (Ill.)	122,016	6	WA9RJL	WA9RJL
Nortown Amateur Radio Club	111,925	6	VE3EVZ	.....
Cincinnati Buckeye Netters	83,754	5	.....	WA8TYF
Motor City Radio Club (Mich.)	81,924	5	.....	W8SS
North Penn Amateur Radio Club	54,089	3	.....	.....
Boeing Employees Amateur Radio Society (Wash.)	45,476	9	W7CJL	W7ERH
Chicago Radio Traffic Association	24,600	3	.....	W9REC
R. F. Hill Amateur Radio Club (Pa.)	20,836	10	W3BUR	WA3ABN
Louisiana Tech Amateur Radio Club	18,460	3	.....	WA5JWU
Lake Success Radio Club (N. Y.)	10,810	5	.....	K2HGR
Northern Chautauqua Amateur Radio Club (N. Y.)	4,833	4	.....	WB2VVW

Clean sweeps were numerous this year, and pictured right (top to bottom) are three reasons why. Neatness and portability are the characteristics of the setup at **WAØNTY** ("Nuts To You—it's *cold* in North Dakota"), a popular signal in the phone affair. The Heath-line equipment is mounted in a ¾-inch plywood console that can be readied for shipping in just half an hour, should Al ever feel the urge to silently steal away to a more temperate clime—like maybe *South* Dakota. . . . **KP4BJD** looks *muy contento* in his VP9 shorts, and no wonder: he had 500 A3 QSOs, with over 200 on 28 Mc. alone, to go along with the balmy weather in Santurce. *Bien hecho*, Gabriel. . . . If your c.w. operation didn't include 40 or 15 you probably didn't work Nevada, because you didn't work **WA7GCY** (below). Mark and helper WA7GUF sent out sparks from Sparks to 137 eager section-chasers.





ing through on 15 I decided to try for the clean sweep. KV4AM saved the day by providing the West Indies Section. I never even heard any of the KP4 gang." — *K8KFP*. Al got all 75 in 100 QSOs and only 14 hours of brasspounding. . . .

. . . *on Being Rare Game.* "The pileups for Maine were great fun and I hope I didn't miss too many that needed the multiplier." — *K1GAX*. "At some of the reactions some people gave when they learned my section, you'd think I was the only ham in Wyoming!" — *WA7EWC*. Local QRM is provided for Bruce by WA7DNZ, who lives across the street. And the same section's *W7TSM* unanxiously awaits the mess of QSLs that his SS activity is sure to stimulate. . . . Reliable *KZ5FX* offers a chilling thought: "Next year I'll be a W, and who from KZ5 will make clean sweeps possible?" Who indeed? Say it ain't so, Clem! . . . Here's why you missed W.I. on c.w.: "Relay went out in rig between phone and c.w. contests, so wasn't able to keep promise to be back for c.w." — *KP4DBJ*. "Ordinarily, being a California ham is not much of a treat. But during the Sweepstakes any station here in the Santa Barbara Section does cause a sensation!" — *W6RFU* (*WB6DPV, opr.*). Jim took the '64 SBar award with 30 watts of a.m. and 80 QSOs. . . . "Enjoyed working SS from Nevada; it's almost like being a DX station. First SS in about 10 or 12 years for me. Last one was using my other call, K6BWD. Ran into several longtime friends." — *W7EJU*. "I must have been the only VE2 in the contest. Now I know what the DX feels like, and they can keep it! Even had a K2 on c.w. pick me up in the Canadian 75-meter phone band and entice me above 3800. We must have been really rare." — *VE2BMS*. "Had fair propagation the first day [of the phone weekend], was all set for a big second day, but condx were the worst I ever saw during SS; also had power interruptions on Sunday for approximately 3½ hours. Glad to give some stations a NWT multiplier." — *3C8BB*. Marsh even managed to work his own call-area on c.w. by nabbing VE8YM. . . .

. . . *on Cheating.* "I cannot but feel that misuse of the QRP multiplier must result in a hollow victory, if you win and God-only-knows-what if you do not." — *W4BRB*. . . . "After hearing a couple of guys on the air *bragging* about their always cheating in the SS by running high power and claiming low power, I decided I would get my linear out of the house for the weekend so no one could accuse me of cheating. So I dropped it off at W5UKK's house for safe keeping. I am going to do this every year, because I have no desire to have anyone include me in with such a bunch of slobs." — *W5JAW*. . . . "*KILL* SS cheaters!" — *WA8FHB*.

Vox Pop

"There were some contacts given same number due to error in my logkeeping. Next year I'll use ARRL logs." — *W6JVA*. And what about you other nonconformists? . . . "My first SS, and I should not even have attempted it without a direct-readout numerical clock." — *WB4HFJ*. "We gave up a weekend leave to operate the SS, and we're glad we did," enthuses Navy's *W3ADO*. "Losing to Navy doesn't make us too happy but it did provide a lot of good experience for our new ops," counters West Point's *W2KGY*. . . . "Worked KH6IJ through a W6 pileup!" — *WA4UAZ*. "Special thanks to Dick, KV4AA, who is *always* there on 14081 when you need W.I." — *W8UM* (*W8CQN, opr.*). "Many sections rare in CD Party easy here, but many easy in CD rare here." — *WA8MCQ*. "Ever try to send with a cast on your thumb?" — *WA8UPU*. . . . *K9ZMS* and *W4USM*, among others, mentioned the conflict with pro football on TV. Wish Pete Rozelle would get smart and reschedule the games — after all, we were here first. . . . "Using last year's check-sheet, after having crossed out the old call letters, I was surprised to see most of the same stations back in the contest this year, on the same bands." — *W2QFQ*. "An outstanding factor was the discrepancy in the times of contacts. My clock was checked against WWV, but I noticed variations of 2 to 4 minutes in reports received. Lack of transceive capability was very detrimental to speed of zeroing in." — *W4ZNI*. "Ten-meter phone was excellent. Like we say here in San Juan, "*Estaba de pelicula.*" — *KP4BJD*. "To future Novices: learn to listen more and send less — it helps in picking up section multipliers." — *WN7HPK*. "Drank 2.76 gallons of coffee and 6 quarts of beer. Hic!" — *WB6BBC*. "Sending CK 54 SV was 'tongue-twister' on c.w.; either that, or I have a lousy fist." — *WA6JDT*. "My stupendous score is directly a result of Murphy's Law. After 13 years in amateur radio, this was to be my first attempt at the SS. And how I planned it! Alas, come Saturday at 5 P.M. my wife presented me with the winner: my #1 son, who scored 8 lbs., 8 oz., a good one in that league, hi." — *K2KGE*. "Nearly

went permanently QRT when lightning hit 100 feet away from my antenna." — *WB2ZSG*. "They sure do send fast, don't they!" — *WB2UZU*. "I wouldn't wish having 73 multipliers on my worst enemy. You could have a nervous breakdown looking for the other two. I wonder what it must be like winding up with 74." — *K2BMI*. "To pad out my low score a bit I drafted my first message and set about trying to get it into a net. Broke into the Grey-Bruce Net with my twenty-five 80-meter watts and found the NCS, VE3FGV, was most cooperative and even took the trouble to make some kind comments at the end of the session. If I'm not careful I'll find myself hooked on traffic handling — have to find some use for the rest of my pad of message-blanks." — *VE3FXZ*. "My 2nd op never called, never showed, and I haven't heard from him since." — *WB2MJD*. "My first big c.w. venture since Novice Round-up in 1953!" — *WØPAN*. "Bumped into 3C8BB right at the start of the SS again — honest, no sked! Surprised to see N.H. among the hard-to-work this year for the first time in ages." — *W4KFC*. "One fascinating aspect of the Sweepstakes is looking at the statistics after the contest. I tested the high-power vs. low-power argument this year, and a complicated analysis of my statistics convinces me that high power produced no more than 10% more QSOs than low power would have (and I threw away that 1.25 score multiplier to do it). To heck with high power!" — *W4DVT*. "What an exercise in the gentle art of zero-beating. (Too bad some of us flunked the course.)" — *W4ZM*. "One could feel the tension on 15 metres a few minutes before Z hour as everyone watched their clocks count down. Thereafter it was sheer bedlam, but the contest was a rag, nevertheless." — *VE7BHN/WØ*. "This was my first contest. Hope to do better next year with more operating time." — *K9YNG*, who led Ill. on A3 with 114K. "Passed out after my 527th QSO, and that ended it." — *WA9LVJ*. . . . We salute: *WØIYH*, who operated 20 s.s.b. only and still got all 75 mults; Technician *WB2VVZ*, who worked six stations on 6 meters with 5 watts to a 40-meter dipole; and 15-year-old *WA7CSK*, who ran 100 watts on c.w. for 14 hours with an indoor dipole in a house at the bottom of a deep gulley — and made the clean sweep in just 170 exchanges. . . . "My sincerest thanks to WA3IID, who missed his first chance to operate an SS and probably the last chance for the next five years, for loaning me his receiver so I might operate." — *WA3GKI*. "As usual, managed to get the hard sections and miss the easy ones." — *W3CSZ*. "QRM was heavy on the Novice bands." — *WN3HYJ*. (Yeah, and about those *other* bands . . .) . . . "First SS for me since '63; been QRL as DL4LA." — *W5QGZ*. "Three cheers and a tiger for all those guys like 3C8BB and KL7AIZ who took a spin up into the Novice band to give us peons (hi) a chance at the goodies," praises *WNØRAG*, who deserves some cheers himself for piling up the highest Novice score in the affair. Tim adds, "My biggest kick was working F3VN/W2 in NNJ. Made the afternoon more enjoyable for me and I hope he liked our American-style contest." Okay, let's find out: "Really enjoyed my first SS. I was impressed by the courtesy of the operators, in spite of the high level of activity and QRM — but where were the old-timers? I felt like a grandfather passing out CK 50!" — *F3VN/W2*. The Gallic touch was evident in the second call area, as F2YS also was on helping out at K2RDM. *Vive les Suipstecques!* . . . "I worked California on 80 meters!" — *WN8YYV*. . . . K1KDP used the phonetics "Kosher Dill Pickle" and found they attracted more attention than his section, WMass. . . . Not every member of the Potomac Valley Radio Club is an enthusiastic SSer. *K3NPV* did his duty and participated both weekends, but John's comment is merely "Bah, humbug." . . . *WA8TKW*, at the tender age of 12, ran up

"WHAT A ROARING AND NOISY CHALLENGE!" — VE1AKA

almost 50K in the A3 portion and may have his Advanced ticket by this time. . . . "Who sez you can't work anyone on 6 meters — K8MMM gave me NR 286 after only 3 hours contest time!" — *WA8NVW*. Hmmm . . . "Forty meters never closed. I was constantly surprised by the Sixes that called me in the wee hours; couldn't even get a cat-nap. Biggest thrill was 3C8BB coming back to my CQ." — *K2UAR/2*. . . . "I thought some Novice operators were better than some General Operators. Had to go hunting through the Novice band to get the last of 75: Oklahoma!" — *WAØKXJ*. . . . This year's Edsel Murphy Award goes to the crew at *WØGHZ*, who report, "We heard on ten meters Sunday morning that the hamburger drive-in across the street was robbed. We had a clear view of it all night but nobody was watching." . . . What a pleasant jolt to get 49 c.w. logs from Connecticut and five multi-operator phone entries from — of all places — Montana. . . . "First evening of phone SS 75 meters was skipping to East Coast as if it were 10 meters." — *W6VUZ*. "The East and West Coasts have one thing in common: the Midwest stations with big signals." — *K3DVS/6*. "Had so much trouble finding an SJV station last year that I decided to pack my gear and portable quad and go there myself. But near the end of the contest I heard another SJV station giving numbers well above 500." — *K6YNB/6*. "Borrowed about 20 crystals — almost as good as a v.f.o." — *WN1HHA*. "Would have put in more time, but the USA skip up this way real good for only about 9 or 10 hours a day. The rest of the time you might as well spare the iron, for they just don't hear you." — *KL7JDO*. "I've had it! After nine years of Sweepstakes, I've decided that to go all out one more time would be sheer suicide. You can only go so far, and after a while operating skill becomes irrelevant, with physical endurance taking over as the deciding factor." — *K7CTI*. Want to bet that Mac won't be in there dispensing 600-or-so Montana QSOs again next year? . . . "Enjoyed contest very much. Hardest part was recopying the score sheet into my station log. Didn't find one lid in the entire contest. Everyone was very patient and considerate in the heavy QRM. My congratulations to everyone connected with Sweepstakes." — *WA9LED*. "Missed San Diego — thought I'd worked it early!" — *W3GAU*. "What a roaring and noisy challenge," marvels 15-year-old *VE1AKA*. "It was a weekend of constant distraction, with out-of-town visitors galore and domestic chores aplenty, but I did manage to have a ball and meet a new friend: K5IIN dropped in a week after the SS to shake hands and visit awhile. Next year we will both 'come out fightin' again, but until then we are the best of friends, hi." — *K5AEU*. Attention W4KFC: K5IIN lives on Signal

The loudest noise from Potomac-land was generated by K1ANV, who led PVRC on both phone (from **W3GRF**) and c.w. (from **W4BVV**). Gene was a *big* reason for that whopping club total!

QST for

Hill Drive. . . . "One of the biggest advantages of using VOX is that you don't get the mike-stand dirty while you're eating." — *WB6KPN*. "Wasted many minutes trying to get my section across. One W3 even argues that there was no such section as Orange!" — *K0GJD/6*. "Suggest an expedition to Maine in 1968." — *W3AXW*. "Murphy struck about two o'clock: my mother." — *WA3AMH*. . . . One Central Division entrant was very emphatic in his avowal that he had operated alone, by himself, with absolutely no outside help, aid, or assistance. His score: 3. . . . "With *everybody* calling CQ SS, who's left to come back to 'em?" — *WA9RPD*. "Screech-owl perched on dipole all night long — added two S-units to my signal." — *WN2CAL*. Calling H9OT, no doubt. . . . "If this year's SS can be used as an indication, WPa may one day be as competitive as EPa and MDC!" — *K3KMO*. "Ever try to find a drugstore that has a 6CL6 at 12:15 Saturday night?" — *VE2BMS*. "I wish that the only VO1 was answering calls instead of choosing who to call, and that the KP4 had given me an exchange, but that's life on 7 Mc.! This was the best-mannered, most professional-sounding SS I have ever heard. It was as if *everyone* cared enough to send his very best." — *W5WQN*. "Forty meters was really great until the BBC came on." — *WN8IJR*. "Worked a KL7 for 50th state. Also worked other 'easy' sections like NWT, Wyo., KZ5, etc., but never even heard a San Diego or SF." — WA9IXF. "My apologies to those who had to QRX while I replaced the fuse in my keyer. Luckily I discovered the problem before running out of fuses!" — *WA3DCM*. "Used a small heater to ward off frostbite in my uninsulated 5′ × 8′ shack up on Kickapoo Mountain." — *WA3ATX/3*. "My cold made my ears ring so bad I couldn't tell the dits from the dahs." — *W3QMZ*. "Next year, back to the old VE3 prefix instead of 3C3, which I'm sure confused a lot of people. Missed Idaho for 70, because a W7 there refused to work anybody in the Test." — *3C3EEW*. . . . After being dormant for 15 years, *VE2PJ* rejoined the SS madness and says, "My impression is that today there are more good c.w. operators than ever before.' . . . "Happy to hear 19 open on Sunday. KH6IJ and KH6GGU/mobile running S9 with the beam the other way. Heard many rare sections: KL7, KP4, VE8, Wyoming, Nevada." — *K9UCR*. "First phone entry in several years and I overestimated my antenna and underestimated the QRM." — *K9HCK*. "After 4500 revolutions in 24 hours my 'CQ Sweepstakes' voice tape-loop *and* me were worn pretty thin. The tape-loop seemed to pull them in better than I could do live. Hmmm . . ." — *K9LBQ*. . . . In a thrilling intra-family c.w. contest, W2ZVW nosed out sibling rival W1NJM, 4756 to 3760. . . . "Murphy, you dirty rat. Got in only 13 hours operating because of having to work both Saturday night and Sunday afternoon, thus few contacts — lotta tears. Going back to 2 meters, where I *know* I won't work anybody." — *K5ATT*. . . . W9SZR and *W3DVO*, at the latter's QTH, racked up 611 two-ways in 73 sections on 40 c.w. Ray reminisces: "I was on the key and SZR was presumably asleep in the next room. He ran in and yelled, 'Get that NWT CQ' when I was fishing around and did not hear him and SZR zeroed the receiver for me. The guy apparently sleeps with one ear open for DX when there is a speaker blasting in the vicinity." W9SZR enjoyed no small measure of fame as HI8XAL. . . . "I feel left out, didn't work W4KFC!" — *K3VXV/3*. Never mind, there were *several* people that didn't. One, two, three . . . "Sending with a straight key for 15 hours sure gets the arm tired." — *WB2ZEU*. "Herewith my ARRL Sweepstakes log for 1967. I have several excuses for it, like this: (a) Since I do not expect to be around for the next Canadian Centennial in 2067, I decided to use my Centennial 3C prefix. This is definitely a handicap in bauds! (b) Could not work the contest full time due to lack of sleep, as I was brutally forced to attend a wild party the night before the contest. (c) I need a new receiver. (d) Everybody else needs a new receiver. (e) A temperature inversion over Alliston during the contest. I couldn't get out! (f) A diabolical plot on the part of sections such as Vermont, Nevada, VE8, Oregon and others not to work me. (g) There must be others, but either I can't think of them or prefer not to mention them! It was a most interesting contest, though, and I hope to overcome all the aforementioned obstacles for the one next year!" — *3C30N*.

THIRTY-FOURTH SWEEPSTAKES CONTEST

Scores are grouped by Divisions and Sections. . . . The operator of the station first-listed in each Section is award winner for that Section unless otherwise indicated. . . . Likewise the "power factor" used in computing points in each score is indicated by the letter A or B. . . . A indicates d.c. power up to and including 150 watts (multiplier of 1.25 c.w., 1.5 phones), B over 150 watts (multiplier of 1). . . . The total operating time to the nearest hour, when given for each station, is the last figure following the score. . . . Example of listings: W3GAU 112, 333-508-74-A-19 or final score 112, 333, number of stations 508, number of multipliers 74, power factor of 1.5, total operating time 19 hours. . . . An asterisk denotes Headquarters Staff members, ineligible for awards. Superscript one denotes Novice certificate winners. Multi-operator stations are grouped in order of score following single-operator station listings in each section tabulation.

Phone Scores

ATLANTIC DIVISION

Delaware

W3GAU 112,333-508-74-A-19
W3CKH 28,886-201-49-A-11
K3NMY 26,391-233-57-B-12
W3DRD 21,798-173-63-B-12
WA3DUM 15,112-147-32-A-15
W3IYE 14,766-107-46-A- 9
W3NNK 1350- 25-18-A- 2

Eastern Pennsylvania

W3BES 153,144-714-72-A-24
K3MNJ 120,993-553-73-A-21
WA3CQW 113,033-567-67-A-24
W3GHM 106,155-507-70-A-20
K3QDV 94,500-500-63-A-19
K3CGQ/3 93,668-453-69-A-24
K3TUF 90,576-448-68-A-17
WA3DUM 86,784-452-64-A-24
WA3CEJ 71,082-361-68-A-19
K3DPQ 62,985-324-65-A-21
K3BNS 60,705-429-71-B-22
K3HTZ 56,200-403-69-B-16
K3PSW 52,866-369-66-A-18
W3QMZ 42,545-320-67-B-15
WA3MWC 42,252-253-56-A-12
WA3FUE 12,210-340-63-B-21
W3KT 31,659-173-61-A-13
W3EAN 30,210-266-57-B-12
WA3DSZ 30,040-220-44-A-10
WA3EVU 29,232-174-56-A-14
W3GRS 23,187-131-59-A- 9
W3BGN 20,664-164-42-A- 4
K3MCO 16,920-118-48-A- 9
W3CGB 16,014-157-51-B-10
WA3DNV 14,040-121-39-A-14
W3BUR 5640- 80-29-B- 4
K3GYS 4805- 80-31-B- 8
WA3BSC 3864- 56-23-A- 3
W3CXO 1998- 37-18-A- 8
W3KDF 1581- 31-17-A- 2
K3LBG 1075- 5- 5-A- 1
W3EQA 616- 22-14-B- 1
WA3GFZ 369- 41- 3-A- 5
W3PNL 75- 5- 5-A- 1
WA3CMD 75- 5- 5-A- 1
WA3EMQ 60- 10- 2-A- 6
WA3EGD (4 oprs.)
38,211-272-47-A-24
W3YP (5 oprs.)
36,040-265-68-B-21
WA3AAN (WA3s AAN HGX)
29,253-199-49-A-22

Maryland-D. C.

W3GRF (K1ANV, opr.)
167,056-749-74-A-23
W3AZD 162,241-757-71-A-24
W3DPJ 102,115-485-70-A-24
W3EIS 95,059-475-66-A-24
WA3AMH 76,356-404-63-A-24
K3JYZ 72,355-335-71-A-18
WA3FHB 68,891-366-63-A-18
WA3AUS 60,298-436-68-B-16
WA3DSD 59,400-330-60-A-20
W3JPT 44,920-240-61-A-23
K3NPV 37,642-319-59-B-10
W3CSZ 36,423-214-57-A-14
W3KMV 29,559-169-59-A-19
W3FYS 29,104-214-68-B-14
W3EFZ 26,650-150-57-A- 8
W3HVM 21,840-182-60-B-13
W3AXW 21,294-169-63-B- 9
W3HRE 16,986-149-38-A-17
K3CYA 15,469- 91-53-A-10
W3OTC 14,445-110-45-A-17
W3MSR 11,700-100-39-A-10
W3KDP 7245- 69-35-A- 6
W3MCG 2887- 38-17-A- 4
W3TMZ 1520- 20-13-B- 1
W3DVA 1351- 13- 9-A- 2
WA3DNH 600- 20-15-B- 6
K3OAE/3 495- 15-11-A- 1
WA3EOP 3- 1- 1-A- 1
W3ZKH (K3EST, W3s TMZ ZKH) 108,091-735-73-B-24
W3MVB (W3MVB, W9SZR)
85,000-600-70-B-23
WA3EPT (7 oprs.)
62,136-432-72-B-24
W3ADO (4 oprs.)
58,100-415-70-B-24
K3IVO (6 oprs.)
34,510-301-58-B-23
K3AHB (K3AHB, KØECG)
31,995-197-54-A-19

Southern New Jersey

WA2BLV 101,008-463-72-A-20
W2ORA 80,640-385-70-A-24
WB2RVX 67,980-515-66-B- -
K2PZF 54,549-277-66-A-21
WB2BYF 45,837-233-66-A-17
WB2CGW 29,250-150-65-A-16
K2AGU 25,610-197-65-B-16
W2QDY 23,010-195-59-B-15
K2CPR 22,750-125-58-A-10
WA2DVU 21,240-177-60-B-10
WB2TEN/2
19,836-174-38-A-23
WB2UVB 19,026-151-42-A-20
W2OWA 16,254-194-42-B-19
WB2FOC 15,904-108-46-A-12
W2QKJ 15,616-128-61-B-15
W2DAJ 13,800-138-50-B- 5
W2PFQ 11,316- 92-41-A-13
W2ZUL 10,488- 92-38-A-14
WA2BZV 9720- 90-36-A-13
WA2EMB 6743- 73-31-A- 5
W2UGL 5880- 70-28-A-15
W2EWN 1300- 15-10-B- 2
W2ITG 520- 20-13-B- 2
K2IEO 510- 17-10-A- 2
W2EWO 300- 15-10-B- 1
WB2SCK 260- 13-10-B- 2
W2PAU (W2s ESX PAU)
72,820-346-70-A-23
WB2ZJR (WB2s WRP ZJR)
16,014-158-34-A- 9
WB2CPS (K2YBN, WB2CPS)
14,352-151-48-B-17

Western New York

WB2YNU 65,565-355-62-A-17
WB2RCB 47,025-275-57-A-13
W2ADN 44,982-296-51-A-19
W2VDX 43,216-296-73-B-18
W2DIZ 37,372-217-56-A-15
WA2BEX 35,400-200-59-A- 9
WB2YQH 34,200-200-57-A-11
WB2UQJ 31,747-304-53-B-22
WB2SMD 26,116-161-52-A-12
K2CEI 22,133-114-65-A-13
W1BUS/2 20,898-131-54-A-19
WA2GCX 19,298-134-48-A-10
W2SSC 13,230-105-42-A- 4
K2KIR 10,179- 88-39-A- 4
K2SWT 9306- 99-48-B- 9
W2SNI 8960-112-40-B-10
W2QY 6600-100-22-A-13
K2EQB 3540- 88-20-B- 2
W2ZCZ 3300- 50-22-A- 4
WA2WHA 3219- 37-29-A- 8
WB2YYP 2772- 44-21-A- 5
WA2SWW 1800- 45-20-B- 4
WA2KMI 1452- 33-22-B- 2
W2PDS 1350- 45-15-B- 1
WB2YQO 360- 15- 8-A- 2
WB2VVZ 18- 6- 1-A- 1
W2HNE 3- 1- 1-A- 1
WB2YUT (WB2s OYE YUT)
37,779-259-49-A-24
WB2VZV (multipor.)
28,077-191-49-A-20
K2CC (WA2SJC, WB2AFS)
3976- 72-28-B-4

Western Pennsylvania

K3HKK (K3AHT, opr.)
85,252-413-68-A-21
K3KMO 54,969-272-67-A-21
WA3GGV 47,125-364-65-B-18

K3FCK 45,000-250-60-A-20
WA3ENR 41,013-217-63-A-20
W3KQD 31,494-181-58-A-16
K3SJS 25,828-247-44-B-16
K3SIQ 24,336-169-72-B-12
WA3EJG 20,115-149-45-A-18
WA3BRE 14,580-110-45-A-12
WA3BPY 13,209-119-37-A-20
W3NEM 8743- 89-29-A- 5
W3NLU 5400- 75-36-B- 5
K3UGM 5025- 67-25-A-16
W3WLF 2961- 47-21-A- 4
WA3GJU (4 oprs.)
67,200-350-64-A-24
WA3HAE (WA3s AYC HAE HAV) 23,484-212-57-B-24
WA3DET (WA3s BHM DET) 22,523-194-39-A-17

CENTRAL DIVISION

Illinois

K9YNG 114,161-560-69-A-18
WA9LVJ 104,319-520-67-A-20
W9JCK 101,014-445-75-A-24
K9AIFD 87,156-406-72-A-24
WA9EOD 76,981-386-67-A-16
K9HDZ 75,762-366-69-A-21
W9GEG 71,640-300-72-B-24
K9CZU 65,124-324-67-A-21
WA9AVB 63,685-300-70-A-23
W9YRU 59,074-412-67-B-21
WA9RJL 51,918-255-68-A-22
WA9OTD 49,195-315-51-A-21
W9RHV 48,750-250-65-A-20
K9IDQ 48,198-277-58-A-10
WA9UCE/9 45,540-220-69-A-19
WA9NWK 42,390-239-60-A-23
WA9LED 36,300-221-55-A-18
WA9TCW 33,264-200-56-A-15
WA9RAQ 32,718-299-57-B-17
W9JJT 27,888-166-56-A-16
WA9EBC 22,688-139-55-A-12
WA9NJB 20,140-116-55-A-11
W9YDX 19,140-116-55-A- 8
K9VGT 17,955-143-63-B-12
K9MDO 17,200-120-45-A-13
WA9FXH 16,380-105-52-A-12
WA9QCH 15,035-133-39-A-11
W9OUS 12,120-101-40-A-13
K9UCR 11,468-122-47-B- 6
W9JMY 8400- 81-35-A-10
W9VBV 6510- 70-31-A- 4
W9NLF 4800- 50-32-A- 5
K9BQL 4320- 60-36-B- 6
WA9EKJ 2700- 45-20-A- 5
WA9KLU 45- 5- 3-A- 1
WA9HEU (multiopr.)
133,309-611-73-A-23
WA9NDK (WA9s NDK QBAI) 62,580-298-70-A-21
W9EUN (7 oprs.)
51,054-387-67-B-22
W9BXU (WA9s KLU UOS) 42,168-251-56-A-23
WA9NPS/9 (K9UKF, WA9NPS) 32,712-282-58-B-19
WA9TQW (WA9s RPD TQW, WN9UDX) 31,590-206-52-A-24
WA9KVA (WA9s KVA RXX) 23,036-222-52-B-24

Indiana

WA9ITB (WA9NFS, opr.)
155,925-694-75-A-24
W9ZRX 111,888-505-74-A-18
K9DVZ 100,013-447-75-A-24
K9CUY 70,409-323-73-A-23
WA9AUM 60,858-322-63-A-13
WA4W1N/9 59,904-312-64-A-20
W9CUC 46,400-250-63-A-14
WA9AQZ 35,452-262-44-A-20
WA9SMN 28,379-242-59-B-13
K9UBF 22,594-222-34-A-17
W9RDJ 18,144-168-54-B-13
WA9TJK 9045-101-30-A-13
W9JVF 6820-110-31-B- 4
K9HCK 3100- 50-31-B- 9
W9VDB 3038- 49-31-B- 6
W9DGA 1180- 15- 6-B- 2
K9UKM/9 816- 21-17-B- 1
W9UEM/9 756- 21-12-A- 1
WA9NPM (WA9s NPM TKH TJL) 58,216-299-64-A-23

Wisconsin

W9YT (K9KGA, opr.)
147,298-664-74-A-24
K9LBQ 142,759-676-70-A-24
W9RQM 135,576-616-73-A-24
WA9JDT 60,480-320-63-A-16
WA9NVY 55,168-296-61-A-18
W9GMV 44,680-312-70-B-20
WA9ETL 44,239-250-58-A-20
W9RXJ 40,658-218-65-A-18
WA9SQN 30,735-188-53-A-18
WA9HCZ 30,447-199-51-A-24
W9ZHB 28,600-221-65-B- 9
K9HER 18,136-119-48-A-12
WA9NSR 13,168-104-39-A- 8
K9VUJ 10,388-106-49-B-10
W9UMQ 9984- 64-52-A-18
WA9IRK 7446- 73-34-A- 6
W9NYJ 6990-117-20-A- 7
WA9EDU 3591- 60-21-A- 8
WA9TZU 3270- 55-20-A- 6
K9KSA 2830- 31-20-A- 3
W9NUW (WA9RAK, opr.)
1238- 28-15-A- 2
W9VHA 720- 20-12-A- 2
WA9NDV 210- 16- 5-A- 1
K9GDF/9 189- 9- 7-A- 1
W9HHX (4 oprs.)
91,944-640-72-B-24

DELTA DIVISION

Arkansas

WA5RTG 45,143-233-65-A-16
WA5QPI 37,962-225-57-A-15
WA5KQU 7110- 80-30-A-10

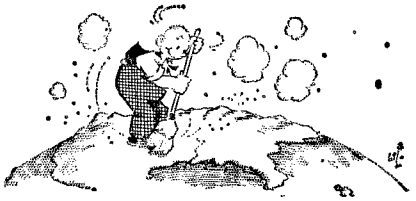
Louisiana

W5WMU 166,140-789-71-A-24
WA5LGO 103,275-459-75-A-21

"CLEAN SWEEP" HONOR ROLL

Worked All 75 Multipliers

Phone: W2RLM WA2BVU W4KFC K5AEU K5IIN WA5CBE WA5LGO W6TZN WA6IVN WB6WEG W7BUN WA7FFU K8HZU WA8MCR K9DVZ W9JCK WA9ITB W0IYH WØSOZ WAØCHH* WAØSDC



C. W.: K1EUF W1BIH W1EOB W1TS WA1DJG W1BGD/2 W2SZ* K3HTZ W3BES W3DPJ W3GHM WA3EPT* K4AEV K4BAI K4CG K4VDL* W4DVT W4FRO W4KFC W4MCM W4NQA W4PTR WA4UBH/4 K2EIU/5 K5LZO* K6AEH W6RW K7CTI K7RAJ K7UKC WA7CSK K8KFP K8UDJ W8SH W8UM W9YT WAØKXJ WAØSDC

* multioperator

DAKOTA DIVISION

Minnesota

WAØKDS 99,671-484-69-A-22
KØIUZ 86,184-400-72-A-24
WAØKEQ 79,853-413-65-A-22
WØRYM 65,637-334-66-A-24
WAØJKT 49,093-349-69-B-22
WØIVZ 24,771-150-53-A- 9
WAØQAK 7410- 65-38-A- 7
KØBFT 4368- 52-28-A- 8
WAØFWC/Ø 4176- 87-16-A- 9
WØAA (WØTKX, opr.)
1539- 27-19-A- 6
WØYDX 1162- 14- 6-B- 2
WØISJ 1001- 1- 1-A- 1
WAØCJU (8 oprs.)
129,717-619-71-A-24
WØYC (5 oprs.)
50,652-382-67-B-24

North Dakota

WØHSC (WAØHYI, opr.)
154,505-719-73-A-23
WAØNTY 75,275-376-67-A-24
WAØPTK 48,564-284-57-A-16
WAØLJM 28,305-185-51-A-17
KØFRP 12,168-105-39-A-12
WAØLJN 5856- 61-32-A- 8
KØRSA/Ø 1716- 33-26-B- 4

South Dakota

WAØCPX 110,947-551-67-A-21
KØZTV 19,458-138-47-A- 8
WAØOML 4617- 62-27-A-16
WAØQMV 624- 16-13-A- 3
KØVVY (W8GKB, WAØQCC) 167,112-775-73-A-24
WØBXO (WA0s ARZ DNG MWN) 67,600-373-60-A-22
K5AGI 94,002-641-73-B-22
W5ERR 56,175-275-67-A-20
WA5MMD 34,733-211-55-A-23
W5QPS 31,920-190-56-A-16
WA5KAJ 25,480-165-51-A- 6
W5JFB 19,188-123-52-A- 9

Mississippi

K5IIN 102,075-681-75-B-24
K5AEU 85,575-575-75-B-18
K5SVC 76,212-438-58-A-14

Tennessee

K4PUZ 167,610-758-74-A-24
K4UWH 58,560-395-64-A-13
W4SQE 54,600-280-70-A-21
W4OGG 25,926-149-58-A-12
WB4DAM 7152- 78-32-A- 6
WB4CXM 5082- 77-33-B-14
WA4COU 2754- 51-18-A- 4
WA4YNE 1917- 36-24-B- 6
WA4ZUI 300- 10-10-A-15
W4ODR (WA1EVN, WB6EIU, WAØMKF) 58,145-329-59-A-19
WA4UCE (5 oprs.) 48,620-374-65-B-24
WB4EHK (WB4s EHK FNN) 2550- 51-25-B-16

GREAT LAKES DIVISION

Kentucky

K4RZK 59,760-415-72-B-24
WA4UAZ 55,460-392-70-B-14
W4CVI 50,932-229-73-A-15
W4NWT 49,720-232-70-A-23
W4KZF 10,881- 93-39-A-11
WB4HTQ 9291- 82-38-A- –
K4LIA/4 2795- 42-23-A- 4
WB4AXQ 792- 44-18-A- 2
WA4SMS 756- 19-14-A- 3
WA4ZIR 663- 17-13-A- 1
W4LDL 600- 25-12-B- 1

Michigan

K8HZU 149,163-660-75-A-23
W8UGW (WA8USD, opr.)
110,547-520-71-A-24
K8LJD 71,273-366-65-A- –
W8VPC 69,340-340-67-A-20
W8OWG 62,125-451-71-B-23
K8BGZ 58,378-262-73-A-24
WA8RUJ 54,036-316-67-A-24
W3TBF/8 49,572-365-68-B-20
K8UDJ 47,286-222-71-A-18
W8QQL 46,092-336-69-B-21
WA8GGN 35,472-172-67-A-17
W8ELE/8 33,256-169-64-A-14
W8DQL 25,465-234-55-B- 8
WA8USQ 21,528-244-42-B-11
W8DJS 20,930-153-58-B- 7
W8TWA/8 15,872-124-64-B- 8
WA8VVU 14,670-163-30-A-19
W8MFU 11,400-114-50-B-13
K8MFO/8 6090- 70-29-A- 2
WA8SOP 5175- 70-25-A- 5
WA8KME 3760- 40-23-A- 5
W8DMI 3212- 73-22-B- 5
W8NBN 2862- 53-27-B- 8
WA8MCG 1733- 28-21-A- 4
WA8MAM 1486- 20- 9-A- 7
W8FSZ 1125- 25-15-A- 3
W8VWY 616- 22-14-B- –
WA8VGQ 300- 10-10-A- 1
WA8SKG 60- 5- 4-A- 1
WA8LAY (W8CRP, WA8s LAY QCW)
60,480-280-72-A-21
K8HKM (K8HKM, W8TJQ) 53,362-262-67-A- –
WA8LBH/8 (multiopr.)
42,840-240-60-A-19
WA8FVD (K8ZZV, WA8FVD) 35,410-185-62-A-16
WA8OPC (WA8s OPC UNS, VE3DOA)
24,656-184-67-B-17

Ohio

K8DOC (WA8LEO, opr.)
178,707-841-71-A-24
W8ILC 147,742-661-74-A-24
WA8MCR 146,913-651-75-A-21
W8MEL 135,420-610-74-A-21
W8WFC 128,677-583-73-A-22
W8QXQ 93,907-419-74-A-22
WA8RWU 81,342-368-73-A-20
WA8PZA 81,282-437-62-A-20
K8BPX 77,800-400-64-A-10
W8IPA/8 74,880-419-69-A-24
K8EHU 70,720-352-70-A-23
W8HSK 69,930-341-60-A-19
WA8TKW 49,647-247-67-A-18
W8SUS 49,446-246-67-A-19
W8ALXO 48,606-225-71-A-15
K8BSM 47,860-330-71-B- –
WA8UQH 47,637-237-67-A-18
W8YHU 46,647-219-71-A-21
W8WDU 44,313-264-55-A-22
WA8SLW 43,875-225-65-A-20
WA8VGK 43,578-269-54-A-24
K8RMK 42,102-260-53-A-13
W8ZJM 40,187-185-73-A-13
W8CEA 39,544-176-73-A-13
W8VQI 37,400-275-68-B-22
WA8BZE 36,326-194-61-A-17
W8TAI 36,126-223-54-A-22
W8UPH 33,390-315-53-B-19
W8DWP 32,722-156-68-A-15
W8HQX 30,456-252-39-A-22
K8GVK 29,990-223-65-B-14
WA8USP 28,984-212-66-B-11
W8VZE 28,360-190-48-A-15
W8LHV 27,984-212-66-B-16
WA8TKM 27,750-185-50-A-20
W8AJW 27,361-153-58-A-10
W8USP 27,196-148-59-A-10
WA8FBZ 26,469-173-51-A-16
W8FFK 26,134-142-59-A-12
WA8CXV 25,740-130-66-A-20
W8OYI 25,080-220-57-B-15
WA8CWU 24,888-136-61-A- –
W8ICS 24,868-204-39-A-16
W8HYV 24,255-193-63-B-19
WA8MQP 23,142-133-58-A- 8
WA8SHP 21,475-175-39-A- 5
WA8CLR 21,370-196-35-A-20
WA8ZGC 21,079-146-46-A- –
W8ETU 21,000-125-56-A-11
K8EKG 20,433-189-36-A- 8
WA8UHN 19,950-133-50-A-13
WA8JUY 19,225-135-45-A-14
W8DZG 16,390-114-45-A-10
W8OYL 15,795-117-45-A- 9
W8NHO 15,744-164-48-B-18
W8IDM 15,513-108-45-A- 9
WA8LVT 15,400-120-40-A-13
WA8EYA 15,150-152-50-B-12
K8ISS 14,664-104-47-A-13
WA8ZDK 13,852-102-42-A-11
W8VYU 13,789-147-29-A- 9
WA8PQL 12,817-101-39-A- 7
W8IJZ 12,816- 89-48-A-20
K8NEB 12,700-100-39-A- 9
WB8IM 12,300-100-41-A- 8
WA8FZS 12,150-135-30-A-15

W8YCF 12,088- 77-72-B- 7
K8STP 11,920-104-35-A-15
W8GSD 10,750-130-25-A-12
K8SWE 8708- 64-44-A- 6
WA8TYF 7830- 87-30-A- 4
W8ENH 6630- 65-34-A- 6
W8EXI 6615- 64-35-A- 6
K8HED 6612- 87-38-B- –
W8GMK 6200- 65-40-A- 7
WA8NYS 5304- 62-29-A- 5
W8AEB 4150- 42-25-A- 4
K8CQA 3564- 50-24-A- 6
W8TWJ 3264- 68-24-B- 3
WA8RCN 2220- 37-20-A- 3
W8POR 1924- 22-14-A- 5
WA8IGD 1824- 38-24-B- 4
K8SEV 1750- 25-10-A- –
WA8SCZ 1408- 32-22-B- 2
WA8RMZ 1405- 46- 3-A-16
WA8NVW 1077- 26- 1-A- 3
WA8SGV 986- 29-17-B- 6
WA8LWH 675- 25- 9-A- 3
W8MOH 405- 15- 9-A- 3
WA8WSP 111- 37- 1-A-10
W8TNF 81- 9- 3-A- 3
K8IIS 12- 6- 1-B- 1
WA8VBV 3- 1- 1-A- 1
K8WBL (4 oprs.) 69,510-499-70-B-23
W8EDU (6 oprs.) 56,100-415-68-B-24
WA8LXI/8 (8 oprs.) 49,680-280-60-A-24
W8GYG (K4JYN, WA8WRO) 11,610-130-45-B- 7

HUDSON DIVISION

Eastern New York

W1BGD/2 72,820-380-63-A-11
K2UAR/2 50,268-285-59-A-24
W2HES 38,564-311-62-B-16
WB2UUD 29,484-182-54-A-14
WB2EXZ 27,202-235-58-B-24
WB2ROU 23,220-180-43-A-13
WB2YIL 7161- 77-31-A- 9
W2IP 1425- 25-19- 4
WB2FXB 360- 15-12-B- 2
W2SZ (7 oprs.) 64,860-473-69-B-24
K2RDM (F2YS, K2RDM) 56,680-447-65-B-24
W2KGY (7 oprs.) 49,665-382-65-B-24
W2AEE (WA2s BNK LEN) 15,545-121-43-A-14

New York City — Long Island

W2RLM 189,550-849-75-A-24
WA2BVU 154,238-690-75-A-24
WA2FTS 89,970-637-70-B-24
WB2ZTQ 84,904-443-64-A-24
WA2QEB 62,370-330-63-A-20
W2AJR (WA2UWA opr.) 56,800-310-60-A-19
W2LEJ 41,846-343-61-B-23
WB2YJZ 38,115-231-55-A-24
WB2UZU 32,712-188-58-A-15
WB2YKL 26,100-150-58-A-18
WB2ZBM 23,100-210-55-B-13
W2ZV 21,160-120-56-A-16
W2GKZ 19,476-149-62-B-10
WB2ZXJ 18,840-158-40-A-18
K2RAR 17,192-154-56-B- 8
WB2VIA 9324-126-37-B- 9
WB2MJD 7020- 78-30-A- 6
WB2SZZ 6816- 77-32-A- 6
WA2AFC 4526- 74-31-B-15
WB2ROV 2160- 45-16-A- 8
WN2DBA 1434- 64- 7-A-17
WB2HTW 1380- 19-10-B- 3
W2TUK 1050- 25-14-A- 1
WB2QLL 1023- 3- 3-A- 2
WB2VFF 240- 10- 8-A- 4
W2UNS 120- 10- 4-A- 2
K2HGR 36- 5- 4-B- 1
WB2OLD 10- 3- 2-B- 1
WB2VYM (WB2s MVA VYM VZC) 101,760-530-64-A-24
WB2UIY (WB2s UIY ZGG) 88,255-418-70-A-24
WB2ZAB (WB2s ZAB ZQE) 61,620-316-65-A-22
WA2PXB (4 oprs.) 54,660-458-60-B-24
W2DSC (WA2s APT UNC) 31,784-274-58-B-17
WB2UNT (WB2s MGB PUX UNT) 29,040-177-55-A-18
WB2UOA (WB2s UOA UPB) 16,667-139-41-A-12

Northern New Jersey

WB2SSZ 116,513-605-65-A-20
W2JKH 87,296-646-67-B-24
W2NNL 76,500-375-68-A-20
W2DMJ 72,252-336-72-A-19
WB2WIX 43,660-371-59-B-18
W2WE 25,984-205-64-B-16
WB2UAQ 25,521-181-47-A-22
WB2KNN 21,204-186-38-A-24
WB2RKK 17,760-148-40-A-17
WA2ASM 17,066-161-53-B-11
F3VN/W2 16,060-146-55-B-13
WB2ZGI 15,445-155-31-A-13
W2QFQ 12,960-135-48-B-14
W2ECO 12,900-100-43-A-11
WB2VLC 11,530-135-26-A-13
WB2ZCJ 11,125-125-27-A-13
WB2TSY 10,120-110-46-B- –
WB2JYM 5346- 66-27-A- 4
WB2LDV 5100- 75-34-B- 5
WB2QGB 4050- 50-27-A- 3
W2CIV 2205- 35-21-A- 3
WB2YBE (WB2RKK, opr.) 1428- 34-14-A- 1
W2GLQ/2 (4 oprs.) 85,630-434-65-A-24
WB2HLH (WB2s HLH HMS) 56,476-276-67-A-18

MIDWEST DIVISION

Iowa

WAØLEW 136,728-636-72-A-24
WAØSDC 121,750-805-75-B-22
WAØQTE 80,356-389-68-A-20
KØYVU 78,385-369-70-A-24
WAØPUJ 76,296-354-71-A-23
WAØKXJ 41,654-355-59-B-23
WØIYH 34,200-228-75-B-19
WAØPTV 17,595-129-46-A-21
WAØJSD 2442- 37-22-A- 3

Kansas

KØRNZ 104,932-736-74-B-24
W9ECV/Ø 67,065-460-73-B-23
WAØLGS 44,510-236-63-A-18
WAØKDJ 38,044-196-65-A-19
WAØPGI 24,845-155-53-A-13
WØSPF 12,852-103-42-A-11
WØLXA 11,880-110-54-B- 6
WAØJRZ 6384- 84-38-B- 9

Missouri

WAØEMS 147,621-673-73-A-23
WØQWS 103,356-481-72-A-20
K8KJN/Ø 77,952-406-64-A-16
KØDEQ 58,942-394-74-B-19
WØPEM 50,266-238-69-A-22
KØVVH/Ø 46,072-315-72-B-23
KØREV 45,549-362-63-B-17
KØFCW 35,400-200-59-A-16
KØJPL 25,472-200-64-B-11
WØSOZ 24,600-164-75-B-16
WAØPFU 18,156-165-51-B-12
WØULJ/Ø 16,660-116-45-A-15
KØETY 10,260-114-45-B- 6
WØDSW 3700- 50-18-A- 4
WAØPUL 1242- 25-18-A-12
WAØCHH (4 oprs.) 172,563-764-75-A-24
WAØJBY (5 oprs.) 61,030-437-69-B-24
WØZLN 46,684-371-63-B-24

Nebraska

WAØHSX 125,542-611-68-A-23
KØGVA 121,764-834-73-B-22
KØLFA 60,522-459-66-B-19
KØVVO 45,504-320-72-B-19
WAØGVJ 30,600-170-60-A- 8
WAØOPQ 26,280-219-60-B-19
WAØKAQ/Ø 12,160- 94-40-A-11
KØODF 11,886- 89-41-A- 8
WØWLO 9491- 87-37-A- 9

NEW ENGLAND DIVISION

Connecticut

K1HTV 108,676-501-72-A-24
W1CSM 87,265-405-71-A-24
W1CNY* 84,214-414-67-A-23
W1BIH 72,388-331-72-A-13
W1ARR/1* 52,020-437-60-B-13
K1DPB 40,455-220-62-A-18
WA1FIR 34,047-291-39-A-24
WA1FGN 32,256-224-48-A-12
WA1FJU 22,545-167-45-A-12
K1LWC 22,313-214-53-B-18
WA1IED 14,184- 99-48-A- 9
K1MOT 10,824-123-44-B-10
WA1DJG 6045- 65-31-A- 4
W1EEN* 1045- 5- 3-A- 1
K1WIM/1 (K1s WIM YXK) 61,132-451-68-B-21
WA1CJE (WA1s CJE CYT) 15,210-130-39-A-14

Eastern Massachusetts

K1KNI 91,825-435-70-A-24
WA1EOT 73,216-351-68-A-24
WA1FZK 42,770-333-65-B-16
WA1HRG 31,266-195-54-A-17
K1KZL 30,739-266-59-B-23
K1YRG 25,821-151-57-A-13
W1FTJ 7181- 84-43-B- 9
W1EIQ 5560- 60-38-B-10
W1RPF 5280- 55-32-A- 8
WA2ZEW/1 4704- 50-32-A-10
K2AJA/1 627- 19-11-A- 1
W1KBN (4 oprs.) 95,777-483-67-A-23
W1FW (5 oprs.) 44,764-364-62-B-21
WA1FMM (WA1s FMM HES) 29,253-200-49-A-16

Maine

K1GAX 55,948-395-71-B-16
K1VXU 21,228-174-61-B-12
W1GKJ 9400-100-47-B- 8
W1DIS 2704- 52-26-B- 6

New Hampshire

W1BUT 47,410-432-55-B-19
WA1HXH 11,736-163-24-A-12

Rhode Island

K1LPL 176,904-819-72-A-24
W1KMV (K1JYN, opr.) 127,980-598-72-A-20
W1YNP 100,232-755-67-B-20
WA1FNK 49,860-277-60-A-19
K1KYI 45,933-251-61-A-23
K1HMO 39,564-314-63-B-24
WA1EEJ 11,488-152-23-A-10
K1YDA 9900-132-25-A-11
WA1GND 3692- 71-26-B-10

Vermont

W9BLQ/1 1- 1- 1-B- 1

Western Massachusetts

K1KNQ 98,601-476-69-A-23
K1KDP 87,536-436-67-A-24
K1DGQ 48,393-283-57-A-21
WA1GIH 21,242-145-49-A-12
W1EOB 17,464- 98-56-A- 8
W1YK (K1s THQ TKS, WB2FPG) 48,591-259-63-A-19

NORTHWESTERN DIVISION

Alaska

KL7MF 33,800-260-65-B-14
KL7AIZ (4 oprs.) 71,001-567-63-B-23

Idaho

W7IY 12,000-100-40-A-21
WA7EWV 10,600- 81-40-A- 9

Montana

W7TYN 88,332-433-68-A-20
WA9AFY/7 33,488-264-62-B-21
WA7BQS 28,236-181-52-A-13
K7LTV/7 21,840-130-56-A-13
K7PGL 10,800- 90-40-A- –
W7CBY 5106- 69-37-B- 5
WA7BKW (WA7s BKW CWF DCF) 108,000-525-72-A-24
WA7IQY (K7TZZ, W7NML, WA7IQY) 78,390-391-67-A-23
W7ED (WA7s GHW HOD IAL) 60,300-336-60-A-24
K7CTI (K7CTI, WA7DMA) 55,800-300-62-A-13
W7FO/7 (7 oprs.) 39,323-255-59-B-23

Oregon

K7WWR 66,030-310-71-A-18
K7STK 38,336-301-64-B-11
KØYSW/7 10,578- 86-41-A-12
W7ZUL (K7HBN, W7ZUL) 73,485-355-69-A-21
WA7EFP (WA7s EFP HYM) 72,009-384-63-A-22

Washington

W7BUN 122,500-540-75-A-20
K7UKC 114,318-786-73-B-24
WA7FFU 75,300-502-75-B-24
K7ONF 65,856-347-64-A-21
WA7BHH 58,272-304-64-A-18
W7LEU 15,835-115-43-A-12
WA7CXD 8920- 80-33-A- 5
K7INE 8600-100-43-B- 4
W7CJL 8325- 75-37-A-12
K7CZM 5699- 70-41-B- 9
K7RSB 4950- 15-11-A- 2
K7IND 4284- 51-28-A- 9
WA7ACQ 2772- 42-22-A- 4
K7KYG 2188- 22-18-A- 6
K7EKX 2016- 42-16-A- 7
WA7IQ1 1260- 30-21-B- –
K7VPF 450- 15-10-A- 3
W7OS 12- 2- 2-A- 1
WA7FID (4 oprs.) 14,382-141-51-B-13

PACIFIC DIVISION

East Bay

WA6IVN 176,400-793-75-A-24
W6VNH 69,877-480-73-B-18
WB6BID 13,974-137-51-B- 8

Hawaii

KH6IJ 75,744-526-72-B-20

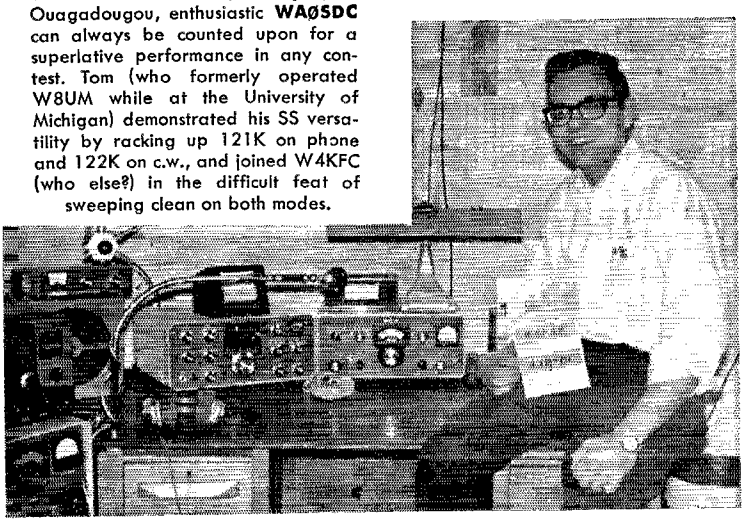
Nevada

W7EJU 44,744-332-68-B-20
WA7DIA/7 10,047-100-34-A- 8

Sacramento Valley

WB6UNP 79,074-357-73-A-24
WB6MZX 70,380-340-69-A-19
WB6WZL 38,513-198-65-A-13
WA6JDT 8820- 70-42-A- 7
W6VUZ 3096- 43-24-A- 4

Whether he's in Iowa, Michigan, or Ouagadougou, enthusiastic **WAØSDC** can always be counted upon for a superlative performance in any contest. Tom (who formerly operated W8UM while at the University of Michigan) demonstrated his SS versatility by racking up 121K on phone and 122K on c.w., and joined W4KFC (who else?) in the difficult feat of sweeping clean on both modes.



San Francisco

W6BIP 45,360-216-70-A-18
K3DVS/6 1173- 23-17-A- 3

San Joaquin Valley

K6YNB/6 118,104-534-74-A-21
W6TZN 77,550-517-75-B-24
W6HYK 1612- 31-26-B- 3

Santa Clara Valley

WB6ZGJ 59,228-442-67-B-19
WB6MOE 22,272-193-58-B-17
W6ISQ 5310- 59-45-B- –
WA6TZN 429- 13-11-A- 2
K6LY (5 oprs.) 81,622-565-74-B-24

ROANOKE DIVISION

North Carolina

W4NQA 95,973-652-73-B-22
WA4FFW 56,780-427-68-B-21
WA4IWE 31,584-189-58-A-19
K4EOF 20,448- 96-71-A-14

South Carolina

K4WJT 193,918-870-74-A-24
W4YDD 108,524-517-71-A-19
WA4VZK 87,437-412-71-A-13

Virginia

W4BVV 112,887-512-74-A-19
K4CG (K3WUW, opr.) 111,528-776-72-B-24
W4KFC 106,900-706-75-B-20
W4PTR 93,820-442-70-A-19
K4CGC 92,556-429-72-A-23
W4DKU 77,479-346-74-A-22
W4ZM 61,588-306-66-A-15
K4VDL 53,064-270-66-A-19
W4YGY 48,250-226-70-A-17
K4ORQ 42,315-228-62-A-18
W4JVN 39,060-211-62-A-12
K4ZA 26,380-141-60-A-15
W3IZL/4 24,825-166-50-A-11
W4WBC 23,230-142-52-A-14
K4AEV 21,532-160-45-A- 6
K4ASU 20,400-150-68-B- 6
W4MOJ 20,224-180-54-B-17
W4PHL 12,218- 92-45-A-10
K4JQO 10,280-129-40-B-12
K4CFB 9936-138-36-B-16
WB4HIP* 9309-107-29-A- –
W4GF 9062-100-46-B- 6
WA4KYR 8876- 90-44-B- 6
W4YZC 7095- 22-11-A- 3
WB4BLJ 2254- 49-23-B- 6
W4OP 1160- 29-20-B- 4
WA2UFI/4 1018- 3- 3-B- 1

West Virginia

WA8VQT 60,940-558-55-B-24
WA8TWR/8 1134- 27-14-A- 3
WA8IUY 48- 10- 2-A-10
K8QYG 8- 2- 2-B- 1

ROCKY MOUNTAIN DIVISION

Colorado

WA0CVS 148,355-702-71-A-23
KØJGF 88,775-669-67-B-16
WØKYI 54,992-302-61-A-17
WØBWJ 15,616- 87-56-A- 8
W5NML/Ø 8992- 74-36-A- 5
KØGVA 4154- 67-31-B- 6
WØHEF/Ø 2565- 45-19-A- 6
WØATA 311- 12- 9-A- 2

New Mexico

WA5QJQ 84,533-440-65-A-15
W5MYM 48,328-247-64-A-21
WA5POK 38,661-265-49-A-16
K5STL 12,087-119-34-A- 5

Utah

K7RAJ 138,196-622-74-A-23
W7CYH 88,780-667-66-B-22
W7GXC 66,990-391-58-A-22
WA7AUW 31,713-163-63-A- 7
WA7HQU/7 (K7QEZ, WA7HQU) 65,205-311-70-A-24
WA7EVI (WA7s EVI GQD) 25,300-176-50-B-22

Wyoming

WA7EWC 99,087-463-71-A-24
W7TSM 44,856-405-56-B-16
WA7DNZ 8991- 81-37-A- 3

SOUTHEASTERN DIVISION

Alabama

W4USM 39,367-203-63-A- 9
W4AKS 28,275-192-50-A-13
W4HFU 23,272-128-58-A-11
W4DS 18,492-134-69-B-13
W4ZNI 16,146-104-52-A-12
WA4QVQ 15,824-100-53-A- 6
K4IKR 15,444- 99-52-A- 6
W4NLI 15,180-110-46-A- 4
WA4RBH 3864- 43-23-A- 4
WB4EOW 84- 7- 4-A- 6
WB4BNO (WB4s BNO RNP) 60,882-280-73-A-24

Canal Zone

KZ5FX 47,817-255-63-A- –

East Florida

WA4PXP 174,886-798-73-A-24
W4PZV (WA4SVO, opr.) 123,516-570-73-A-24
WA4VLQ 76,582-371-68-A-23
WA4LFP 65,789-363-61-A-20
WA4VBN 58,080-305-64-A-15
WA4UFW 55,068-354-52-A-18
W4PKD 4864- 64-38-B-16
W4ILE 297- 11- 9-A- 1

K4IXG 171- 10- 9-B- 1
WA4RDA (4 oprs.) 19,580-181-55-B-12
W4SVX (K4GIE, W4SVX, WA4COD) 16,072-165-49-B-21

Georgia

K4BAI 137,944-635-72-A-24
WB4DWD 120,855-589-70-A-15
K4RIN 56,004-359-52-A-15
WA4YEJ 52,740-293-60-A-17
WB4AJR/4 16,952-164-52-B- 9
K4PIA 4959- 57-29-A- 5
K4EZ 3712- 58-32-B- 3
WB4HSG 3- 1- 1-A-10
K4YSG (K4s NVN YSB, WB4FWK) 77,724-383-68-A-24
WB4EMF (WB4s EMF GDQ) 26,776-180-48-A-12
WB4FAM/4 (W4WKP, WB4FAM) 1156- 34-17-B- 3

Western Florida

WA4VIY 57,960-415-70-B-24
WA4EPH 2000- 40-25-B- 4
WA4ECY (4 oprs.) 83,785-644-65-B-24

West Indies

KP4BJD 67,728-505-68-B-20
KP4DBJ (KP4DBJ, WAØGQH) 22,275-165-45-A-13

SOUTHWESTERN DIVISION

Arizona

K7PXI 114,099-521-73-A-22
W7FCD 33,174-194-57-A-10
WØHNF/7 9177- 81-38-A- 6
WA7ERH 2040- 34-20-A- 1

Los Angeles

WB6HGU 107,139-507-71-A-24
WB6YKM 94,424-642-74-B-24
WB6UHF 72,863-364-67-A-24
WB6KPN 67,001-356-63-A-22
K6YFZ 62,928-305-69-A-17
K6BEP 44,640-242-62-A-22
WB6TSN (K6OIZ, opr.) 22,792-206-56-B-14
W6SBB 21,216-136-52-A-14
WB6TVH 20,727-141-49-A-24
WB6JOI 16,832-116-49-A-13
W6EIG 13,745- 94-49-A- 9
WB6ROR 12,771- 99-43-A-13
W6QYR 9204-119-39-B- 5
WB6ZEP 7440- 80-31-A- 9
WA6STJ 7161- 77-31-A- 9
K6QFG 4752- 73-33-B-11
WB6ARH 3456- 49-24-A- 5
WA6RQQ 2553 - 37-23-A- –

Orange

KØGJD/6 151,416-701-72-A-24
WB6UDC 99,960-490-68-A-22
WB6WEQ 89,213-399-75-A-20
WB6FCR 63,054-339-62-A-23
WA6WFW 16,335-149-55-B-18
WB6YPX (W6DLE, WB6s WRX ZID) 78,660-380-69-A-12

San Diego

K6JLJ 21,709-117-59-A-12

Santa Barbara

W6RFU (WB6DPV, opr.) 38,380-270-68-B-14
W6GEB 17,316-111-52-A- 9
W6BHZ (WA7CWM, opr.) 11,880- 90-45-A-12

WEST GULF DIVISION

Northern Texas

K5RHZ 168,276-758-74-A-22
WA5CBE 144,788-644-75-A-24
WA5LUM 99,070-470-70-A-23
W5TMZ 94,973-509-63-A-20
WA5QXD 86,940-621-70-B-21
K5BWK 66,980-502-68-B-24
WA5QER 63,440-522-61-B-24
WA5NGH 62,937-335-63-A-22
W5QGZ 58,500-300-65-A-21
W1ZGH/5 33,432-199-56-A- –
K5WIQ/5 1431- 27-18-A- 6
WA5QQQ (WA5s QQQ QQR) 60,885-369-55-A-24
WA5QEZ (WA5s PPQ QEZ) 38,830-353-55-B-23

Oklahoma

K5JIT 55,965-288-65-A-19
K5HWO/5 1275- 38-17-B- 5
WA5RMF (WA5s QTQ RMF) 37,497-221-58-A-24

Southern Texas

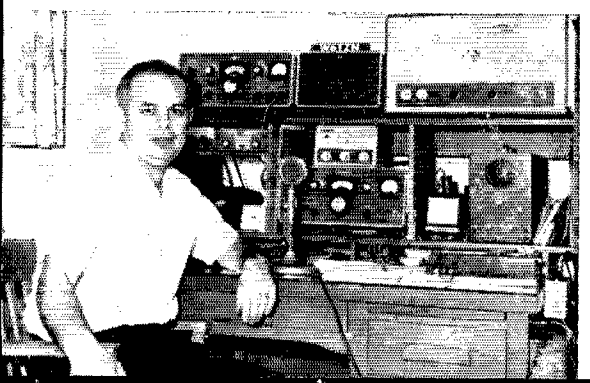
K2EIU/5 132,202-591-74-A-24
K5ATT 57,888-304-64-A-13
WA5SFO 31,311-215-49-A-18
K5JCC 24,675-239-35-A- 5
WA5AOI 22,278-159-47-A- 6
WA5LVJ 19,030-175-55-B- –
WA4YPM/5 18,750-188-50-B-16
WB2LZF/5 9916- 74-67-B-13
WA5GZX (WA5s GZX QVE RLZ) 70,174-384-61-A- 23

CANADIAN DIVISION

Maritime

VE1APP 4726- 46-27-A- 9
VE1AKA 1092- 27-14-A- 7

Here's a talented trio of Californian SSers. Air Force Capt **KØGJD/6** (upper left) piloted his Swan 400, TA-33 and V-4-6 vertical to a supersonic victory in the A3 mission John soared over the opposition with 700 two-ways 151K, and highest altitude in both Orange and the Southwestern Division. (Yes, W3——, there *is* an Orange Section.) . . . Contest QSOs from San Joaquin Valley are seldom plentiful, but this year K6YNB/6 and Fresno's **W6TZN** (bottom left) handed out a total of more than 1050 exchanges during the voice weekend. One of 21 mikesmen to cross off all 75 on the multiplier list, Art became a firm believer in transceive operation as a result of his Sweepstakes doings. . . . **WA6IVN** totaled 1456 contacts and 300,000 points for two weekends' work—which, may we say, is making hay in a big way in East Bay. Steve, who pleads for an end to unnecessary repetition of preamble info on c.w., utilized a Gonset GSB-100 transmitter to pump r.f. into a TH6-DX at 78 feet, 40-meter rotary dipole up 65 feet, and an 80-meter wire vertical.



VE1NV (VE1s AKW NV)
52,650-411-65-B-23

Quebec

VE2BMS 75,028-398-62-A-21
VE2WA 558- 16-12-A- 1

Ontario

VE3EVZ 46,045-231-65-A-16
3C3ES 29,382-166-59-A- 8
3C3CKW 13,630-145-47-B-10
VE3GLZ 7980- 86-35-A- 6
VE3DPG 7752- 69-38-A- 6
VE3DMU 3872- 88-22-B- -
VE3EZM 3- 1- 1-A- 1

Manitoba

VE4SD 57,392-434-68-B-20
3C4ST 20,706-179-58-B-15
VE4UM (8 oprs.)
39,690-313-66-B-24

Saskatchewan

VE5US (VE5DK, opr.)
151,626-686-74-A-24
3C5TO 21,988-132-53-A-21

Alberta

VE6AGV 34,580-266-65-B-16
VE6MA 29,621-403-49-A-13

British Columbia

VE7EH 63,280-452-70-B-18
VE7BAV 7278- 79-27-A-22

Yukon - Northwest Territories

3C8BB 19,968-192-52-B-17

C.W. Scores

ATLANTIC DIVISION

Delaware

W3GAU 94,980-509-74-A-21
W3IYE 43,120-308-70-B-16
K3COO 33,940-219-61-A-12
W3DRD 27,048-176-62-A-19
W3NNK 19,575-135-58-A-13
WA3GKI 10,335-106-39-A-17

Eastern Pennsylvania

W3BES 128,813-687-75-A-24
W3YUW 114,608-623-74-A-23
W3GHM 109,313-535-75-A-22
W3NOH 98,273-533-73-A-21
K3MNJ 85,680-476-72-A-16
W3BGN 83,640-492-68-A-15
WA3DSZ 81,000-450-72-A-18
W3CPS 78,030-477-68-A-24
WA3DOCM 77,655-501-62-A-24
K3HTZ 76,525-506-75-B-22
W3KDF 66,869-413-65-A-16
W3AEQ (WA8BJD, opr.)
61,360-416-59-A-17
K3JGJ 58,800-280-70-A-15
W3ISE 58,752-408-72-B-17
W3BLP 58,575-330-71-A-17
WA3ATX/3
51,836-301-69-A-23
W3MWC 50,881-350-73-B-12
W3KT 43,690-257-68-A-17
K3LWR/3 37,950-253-60-A-11
W3EER 27,985-193-58-A-14
WA3CEJ 27,500-251-55-B-15
K3MCO 27,480-229-48-A-11
W3EAN 26,510-244-55-B-10
W3JET 20,100-260-67-A-16
WA3GAT 19,875-151-50-A-15
WA3ENY 18,963-207-37-A-15
W3GHS 18,240-114-64-A- 7
W3CGB 16,807-172-49-B-11
W3QMZ 16,400-164-50-B- 8
W3MPX 14,500-100-54-A- 7
K3RFB 13,160-140-47-B-15
W3INH 13,000-100-52-A- 4
K3FSV 12,275-110-41-A- 7
WA3GLX 10,140-108-39-A-14
W3EQA 9504-104-44-B- 5
W3DVC 9405-100-38-A- 8
WA3IPR 7750- 90-30-A-14
WN3HOM/3[1]
6145- 74-28-A-19
WA3EMO 6130- 77-27-A- 8
W3QOR 5475- 73-30-A- 4
K3EUR 5325- 71-30-A- 5
W3ADE 4756- 82-29-B- 6
WA3ABN 4165- 60-28-A-19
W3BUR 4125- 50-25-A- 2
WN3HMU 3760- 51-24-A-24
WA3CTW 3476- 52-27-A- 7
K3HNP 3378- 52-26-B- -
K3SXR 2828- 39-29-A- 9
K3JLI 2375- 50-19-A- 5
WA3GMS 2168- 51-17-A- 4
WN3IPE 2125- 48-20-A-24
K3LBG 2102- 29-19-B- 3
K3ZOL 1550- 31-20-A- 2
WN3HYJ 1238- 31-18-A- 9
W3STA 1200- 30-20-B- 3
W3CEI 1080- 27-16-A- 5
W3CXO 1080- 30-18-B- 5
K3DPQ/3 650- 20-13-A- 4
WA3CMD 601- 19-13-A- 4
WN3IQU 385- 16-11-A-19
WA3DNV 315- 15- 9-A- 2
W3PNL 150- 10- 6-A- 1
K3PSW 23- 3- 3-A- 1
K3BNS (K3BNS, WA3JCA)
41,876-366-58-B-21

W3YP (4 oprs.)
34,524-274-63-B-24
WN3IMG (WN3s HST IMG)
1876- 44-19-A-12

Maryland-D. C.

K4GSU/3 131,123-720-73-A-24
W3EIS 112,325-611-73-A-24
W3MSR 95,900-651-73-B-24
W3AZD (K3OAE, opr.)
93,592-643-72-B-24
W3GRF 90,946-616-74-B-18
W3DPJ 88,375-587-75-B-24
W3CRE 81,738-503-65-A-23
W3AEL 69,458-441-62-A-16
W3JXS 69,010-412-67-A-23
W3MFJ/3 67,200-381-66-A-20
W3CSZ 62,808-372-67-A-17
W3AXW 57,816-397-73-B-21
W3TMZ 55,714-415-66-B-12
K3JYZ 49,128-279-69-A-15
K3TVF 47,260-257-72-A-23
W3AFM 41,316-313-66-B-16
W3FYS 37,668-258-73-B-14
WA3GZM 37,465-256-59-A-24
WA3DYW 35,075-231-61-A-24
W3MCG 34,720-281-48-A-16
W3RNY 34,719-253-55-A-14
W3EFZ 34,433-253-67-B-11
K3NPV 33,390-265-63-B- -
WA3AMH 28,256-211-55-A-22
K3CYA 27,815-173-62-A- -
W3MNE 23,936-187-64-B-24
WA3GMC 20,680-190-44-A-18
WA3GUI 15,625-164-36-A-13
W3KDP 14,250-114-50-A- 9
W1QMM/3 12,573-107-47-A-13
W3TN 11,830-114-38-A-14
W3KMV 9640- 98-36-A-17
WA3GAU 7588- 85-31-A-10
WA3HAN 5092- 67-38-B- 6
W3QCB 4719- 77-25-A- 9
WN3IJR 4219- 53-25-A-22
WA3HKF 3300- 66-20-A-13

Southern New Jersey

WB2TEN 92,440-508-72-A-24
W2HDW 90,165-525-68-A-21
WB2MOQ 75,140-442-68-A-21
WA2BLV 70,125-425-66-A- -
K2AA (W2FYS, opr.)
61,425-351-70-A-23
K2CPR 41,425-231-70-A-14
WB2BGH 38,025-236-65-A-15
K2AGU 27,720-199-70-B-12
W2EBW 24,650-213-58-B-22
W2PU (K8JLF, opr.)
22,538-191-59-B-13
W2QDY 21,800-200-52-B-17
WB2UVB 18,498-151-49-A-17
K2FRC 16,125-150-43-A-15
WB2VHU 16,100-134-35-A-18
WB2SCK 16,048-131-49-A-13
K2BG 13,950-140-50-B- 9
WB2UEY 10,413-119-35-A-21
WB2ZEU 7020-108-26-A-15
WB2ZPB 5135- 79-26-A-14
W2ZVW 4756- 82-29-B- 2
K2IEO 4740- 79-24-A- 6
WN2CXL 3705- 57-26-A-17
W2DAJ 3024- 54-28-B- 3
K2PI 1155- 33-14-A- 4
W2PAZ 420- 14-12-A- 3
W2PAU (W2s ESX PAU)
82,271-465-71-A-23
WB2ZGR (WB2s YCZ ZGR)
38,563-312-50-A-22
W2REB (K2PWV, W2REB)
28,560-340-42-B-20

Western New York

K2KIR 116,523-638-73-A-24
W2AITA 92,889-505-73-A-24
W2SSC 74,621-449-67-A-12

W3DYA 2540- 28-22-A- 5
WA3DNH 1178- 31-19-B-10
WA3CFN 476- 17-14-B- 4
WA3EPT (8 oprs.)
117,250-621-75-A-24
W3DVO (W3DVO, W9SZR)
89,206-611-73-B-24
W3MVB (W3MVB, WA3AUS)
70,414-503-69-B-24

WB2OYE/2
60,559-385-63-A-23
WB2YQH 56,875-350-65-A-20
WA2PCW 36,653-273-54-A-22
WA2BEX 36,225-230-63-A-10
W2ALDN 35,126-247-57-A-13
WA2BPH 33,930-261-52-A-21
WB2FWG 32,940-216-61-A-20
W2TFL 31,123-211-59-A-19
WB2SMD 27,859-221-51-A-18
W2SEI 27,530-190-70-B-11
WA2UXZ 21,945-154-57-A-10
K2KKH 21,315-203-42-A-15
K2DJD 18,696-165-57-B- 9
WA2SWW 14,040-160-45-B-13
W2GB 13,500-120-45-A-14
WB2ZVQ 11,270- 98-46-A-18
W2DIZ 7995- 82-39-A- 8
W2QY 6000-100-24-A- 9
WA2AIV 4880- 61-32-A-20
WB2VVW 4030- 62-26-A-13
WB2YQO 3300- 60-22-A- 8
W2PDS 3250- 50-26-A- 3
K2DNN 2596- 42-19-B- 6
WB2ZCC 2550- 52-25-B-20
WN2CAL[1] 2058- 26-18-A-24
W2ZCZ 1440- 32-18-A- 4
W2UJS 1375- 15-10-A- 5
WN2ZOW 1170- 26-18-A-14
WN2APH 1040- 29-16-A-16
WN2AWX 618- 19-13-A- 9
W1BUS/2 399- 15-11-A- 4
K2UAN 230- 12- 8-A- 3
WN2BSG 175- 14- 5-A-15
WB2ZYW 28- 4- 4-B- 2
WA2CZQ 10- 4- 1-A- 1
K2CC (4 oprs.)
25,200-210-60-B-21
W2TOP (W2TOP, WA2CUZ)
24,115-182-53-A-21
WA2BCI (WA2BCI, WB2WII)
8815- 86-41-A- 7

Western Pennsylvania

WA3BLE 104,843-571-73-A-24
K3HKK (K3AHT, opr.)
104,483-583-71-A-23
WA3IXN 103,660-585-71-A-24
K3KMO 76,060-418-72-A-22
W2KAT/3 52,785-306-69-A-19
K3EXE 45,958-300-62-A-24
W3LMM 45,500-260-70-A-15
W3NEM 44,740-324-54-A-18
W3KQD 29,925-190-63-A- -
WA3GJU 26,438-225-47-A-13
WA3ENR 23,002-186-62-B-15
K3FUK 19,448-187-52-B-23
K3RZE 10,160-127-32-A- 9
WA3GPK 8960-113-32-A-13
K3VXV/3 5873- 81-29-A- 8
K3UGM 2550- 31-20-A- 8
WA3GZQ 1200- 30-16-A- 5
K3RXK 1080- 36-12-A- 4
WA3CQG/3 935- 22-17-A- 5
K3CFA 455- 14-13-A- 7
WA3HMV (4 oprs.)
23,954-204-59-B-24
WA3HAL (WA3s GTE HAL)
5670-108-21-A-19

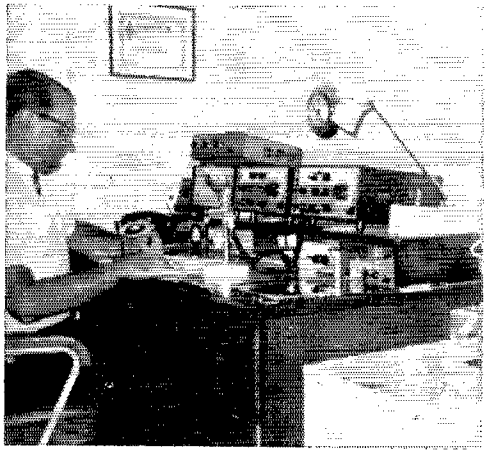
CENTRAL DIVISION

Illinois

W9LKJ 124,921-687-73-A-23
W9JCK 114,333-623-73-A-24
WA9HEU 106,215-582-73-A-23
W9NPC 92,288-535-69-A-24
W9YYG 84,952-574-74-B-23
K9TKT (K9UIY, opr.)
68,580-383-72-A-22
WA9HVQ 63,896-378-67-A-23
WA9OTD 59,438-425-55-A-22
WA9IXF 56,605-337-66-A-23

DIVISION LEADERS

Phone			C.W.	
Single Operator	*Multioperator*		*Single Operator*	*Multioperator*
W3GRF	W3ZKH	Atlantic	K4GSU/3	WA3EPT
WA9ITB	WA9HEU	Central	W9YT	W9JDJ
WØHSC	KØVVY	Dakota	WAØHYI	KØVVY
K4PUZ	W4ODR	Delta	K4PUZ	WA4UCE
K8DOC	K8WBL	Great Lakes	K8UDJ	K8BFT
W2RLM	WB2VYM	Hudson	W1BGD/2	W2SZ
WAØEMS	WAØCHH	Midwest	WAØSDC	KØGXR
K1LPL	W1KBN	New England	K1LPL	K1DFC
W7BUN	WA7BKW	Northwestern	K7CTI	W7TRE
WA6IVN	K6LY	Pacific	WA6IVN	WB6QIT
K4WJT	.....	Roanoke	W4BVV	K4VDL
WAØCVS	WA7HQU/7	Rocky Mountain	WAØCVS	.....
WA4PXP	WA4ECY	Southeastern	K4BAI	WA4UBH/4
KØGJD/6	WB6YPX	Southwestern	W6RW	WB6NWK
K5RHZ	WA5GZX	West Gulf	K2EIU/5	K5LZO
VE5US	VE1NV	Canadian	VE5US	VE3EZM



Louisiana is represented on the clean-sweep honor roll by **WA5LGO,** who turned up a Vermont station only an hour before the voice contest ended. Larry radiated with a 20-15-10 beam, 40-10 vertical and 80-40 dipole.

K9DWG 56,088-321-70-A-19
WA9NWK 53,257-300-71-A-24
WA9FBC 51,841-311-67-A-20
WA9EKJ 46,140-297-61-A-15
W9KOI 45,200-261-68-A-19
W9GFF 38,699-231-67-A-11
WA9AMT 35,508-269-66-B-16
W9RCJ 34,618-227-61-A- 8
WA9QBM 28,805-166-67-A-18
K9DMW 21,739-212-41-A-21
WA9RJL 15,696-153-51-B-19
WA9SLM 14,980-139-44-A-12
W9REC 14,170-109-52-A-17
WA9UOS 12,249-120-41-A-16
WA9UAQ 12,240-149-34-A-18
W9ZSQ 11,993-123-39-A-12
W9UDK 11,825-112-44-A- 7
WA9QQB 9435-102-37-A- 9
K9EFC 7401- 96-31-A-11
W9HPG 7000- 70-46-A- 7
WA9JIS 6480- 73-36-A- 4
W9AGM 5760- 80-36-B- 5
WA9RFF 5696- 75-31-A- 7
W9QWM 5001- 49-33-A- 4
WA9QMB 3510- 59-24-A- 8
W9WR 3430- 49-35-B-13
K9TDB/9 3375- 55-25-A- 7
WA9SVR 1805- 38-19-A- 9
WA9VPP 1620- 36-18-A- 4
WA9RPD 1238- 28-18-A- –
W9JJN 1216- 32-19-B- 2
WN9ULR 1200- 37-15-A- 9
W9YAC 1020- 31-12-A-10
W9VBV 945- 27-14-A- 2
WN9UUQ 363- 15-10-A- 3
WN9VQF 70- 7- 4-A-17
WA9KLU 30- 8- 3-A- 1
W9JDJ (WA9s EOD HSS LGT) 58,338-363-65-A-22
WA9RXX (WA9s KVA RXX) 23,934-234-41-A-24
W9EUN (4 oprs.) 2772- 55-28-B- 4

Indiana

WA9ITB 130,028-707-73-A-24
WA9AUM 100,800-560-72-A-24
W9RGB 92,629-509-72-A-22
K9CUY 88,228-474-71-A-24
K9MMH 53,985-363-61-A-19
W9JOO 38,404-273-57-A-20
WA9EBR/9 30,875-197-65-A-22
W9CUC 29,238-226-66-B-20
W9DGA 28,976-270-52-B-10
WA9NXY 16,526-172-39-A-12
K9HCK 14,630-133-55-B-16
K9UKM/9 5280- 80-33-B- 3
W9RDJ 4000- 80-25-B-11
W3FNO/9 2420- 46-22-A- –
WN9UJB (WN9s UAR UJB) 4604- 73-29-A-18

Wisconsin

W9YT (K9ZMS, opr.) 139,563-743-75-A-24
W9RQM 122,915-680-74-A-24
W9NYJ 86,235-487-71-A-24
WA9NVY 64,645-382-68-A-21
WA9JGO 57,603-329-72-A-19
W9UJT 55,626-382-73-B-22
WA9HRS 46,935-301-63-A- –
W9NUW (WA9RAK, opr.) 31,920-225-57-A-16
WA9HCZ 29,891-2155-por-64
W9GOC (WA9LBN, opr.) 28,489-179-64-A-12
WA9TIA 22,975-170-52-A-21
WA9NSR 16,239-115-53-A- 6
WA9MCC 13,638-185-51-B-22
W9TXF 12,600- 90-56-A-13
K9GDF 11,324-159-38-B- 4
WA9SQN 10,090-100-36-A-10
W9GMV 7972- 83-42-B- 5
WN9UOP 7146- 79-33-A-16
WA9RTU 4520- 59-32-A-17
WA9TPQ 4063- 64-26-A-15
W9WYL 3375- 50-27-A-12
WN9USA 3105- 46-27-A-22
WN9VNJ 2688- 40-19-A-14
W9OVZ 2313- 37-25-A- 4
WA9NDV 640- 32- 8-A- 3
WA9RUD 3- 1- 1-A- 1
W9KMM (4 oprs.) 19,392-203-48-B-17

DAKOTA DIVISION

Minnesota

WØAA (WØTKX, opr.) 92,525-526-70-A-20
KØZXE 82,449-465-71-A-24
WAØLKL 76,631-463-67-A-23
KØUJL 76,418-445-69-A-21
WØYC (WAØFMF, opr.) 74,520-418-72-A-24
WAØKDS 64,571-392-67-A-20
WØLYP 63,054-439-71-B-24
KØCNC 15,975-142-45-A- 7
WAØPRT 13,600-160-34-A-21
WØLAJ 11,340-108-42-A- 8
WØFAN 8800-100-44-B- 7
WNØRAG 8505- 82-38-A-16
WNØSEN 4750- 52-30-A-20
KØBFT 405- 14-12-A- 3
WØKUI 50- 5- 5-B- 1
WNØRWH 10- 2- 2-A- 1
WAØDKA (WAØs DKA PRL) 103,410-578-72-A-24
WAØCJU (6 oprs.) 92,744-527-71-A-24
WNØRVN (5 oprs.) 4909- 73-33-A-23

North Dakota

WAØHYI 112,950-637-72-A-24
WAØQVW 25,043-189-53-A- 9
WAØJEO 11,856-118-46-B-10
WAØPPK 9500- 95-40-A-12
KØRSA/Ø 4760- 68-35-B- 6

South Dakota

WØSMV 87,407-617-71-B-24
WAØOML 1475- 31-20-A-14
KØZTV 630- 21-12-A- 1
KØVVY (W8GKB, WAØQCC) 115,610-637-73-A-24

DELTA DIVISION

Arkansas

K5TYW 59,838-405-73-B-14
WA5KUD 49,806-309-65-A-20

Louisiana

W5WMU 100,731-574-71-A-22
W5BUK 84,135-474-71-A-24
W5OZR 73,425-445-66-A-21
W5OKF 69,440-435-64-A- –
WA5WWX 39,589-329-61-B-14
W5ERR 33,598-221-59-A-20
WA5GVB 33,375-270-50-A-15
W5WG 14,678-153-57-A-18
WA5JWU 13,599-127-43-A- 7
WA5NRZ 4858- 67-29-A- 9
WA5ADT 3- 1- 1-A- 1

Mississippi

K5AEU 81,570-577-70-B-22
K5IIN 78,313-553-71-B-24
WA5OYU 8360-105-32-A-21

Tennessee

K4PUZ 125,013-689-73-A-24
W4SQE 83,880-466-72-A-24
K4UWH 79,100-440-71-A-18
WA4VYL 51,000-300-68-A- –
W4DRT 37,193-259-58-A-23
W4OGG 6600- 66-40-A- 5
WA4ZUI 5895- 67-36-A-16
WB4DAM 4050- 70-30-B- 8
WB4FNN 3900- 60-26-A- 8
WN4GSS 650- 23-13-A- 7
WA4UCE (4 oprs.) 32,450-275-59-B-24

GREAT LAKES DIVISION

Kentucky

W4CVI 83,603-447-74-A-22
WB4AIN/4 73,420-510-71-B-23
WA4TWB 56,430-342-66-A-20
WA4UAZ 24,920-184-65-B-12
K4LIA/4 20,625-167-50-A-19
W4DHE 18,976-163-47-A-13
W4YDL 16,932-173-51-B-16
WA4UIH 10,605-115-34-A-11
WB4BBO 7313- 75-39-A-10
WA4SMS 5845- 57-34-A- 5
W4NWT 2350- 27-20-A- 4
K4YZU 1950- 39-25-B- –
WB4FOT 1750- 35-20-A- 5
W4LDL 960- 30-16-B- 2
WA4ZIR 210- 12- 7-A- 1

Michigan

K8UDJ (K8MFO, opr.) 124,313-663-75-A-24
W8UM (W8CQN, opr.) 120,900-806-75-B-24
W8SH (KIZND, opr.) 120,188-644-75-A-24
W8DQL 99,330-609-66-A-23
W8CRD 89,638-505-71-A-24
W8VPC 89,113-501-70-A-23
W8PGW (WA8RSD, opr.) 73,365-444-67-A-22
WA8LWK 72,719-455-65-A-23
WA8DNZ 64,040-399-64-A-15
WA8MAM 63,528-402-63-A-24
WA8KME 62,305-366-67-A-24
WA8TQN 53,544-338-65-A-24
W8HFM (WA8QAF, opr.) 52,640-335-64-A-22
K8HKM 51,120-286-72-A-23
K8HZU 49,655-301-66-A-15
WA8FVD (K8ZZV, opr.) 39,528-328-61-B-20
W8PVI 39,088-266-59-A-20
W8KLE/8 38,837-275-71-B-20
W8YVH 27,443-215-61-A-11
WA8QFW 27,075-239-57-B-22
WA8MCQ 27,000-200-52-A-13
W8DOI 22,756-166-55-A-15
W8DM 16,600-166-51-A-12
W8TJQ 13,910-107-52-A- 9
W8MSK 11,050- 85-52-A- 8
WA8USU 11,019-108-41-A-13
W8EGI 10,000- 90-40-A- 6
WA8UML 8080-101-32-A-20
WA8VRB 7440- 98-31-A-16
W8JUP 5425- 70-31-A-10
WN8VJT 5425- 73-31-A-15
K8ETU 5256- 73-36-B-14
W8SS 5250- 60-35-A- 5
W8MPD 4750- 75-20-A- 5
WA8UPU 3640- 53-28-A- 7
K8BGZ 2523- 29-21-A- 5
WA8VGQ 595- 17-14-A- 2
WN8WOQ 50- 8- 4-A- 6
W8VWY 35- 7- 2-A- –
W8REN (WA8s NKA RVE) 52,345-361-58-A-24
WN8ZDR (WN8s VMS WCZ ZDR) 5950- 70-34-A-19
WA8RWL (multiopr.) 4788- 57-42-B-10

Ohio

W8QXQ 110,774-603-73-A-24
W8QDH 101,835-558-73-A-24
W8AEB 97,360-529-73-A-22
W8AZGC 96,305-567-68-A-24
W8OYI 92,300-520-71-A-19
W8ETU 87,688-475-73-A-22
K8QHJ 86,250-502-69-A-24
K8RMK 85,085-505-67-A-23
K8NEB 84,353-489-69-A-23
K8EKG 71,560-452-63-A-19
WA8LVT 70,713-429-65-A-21
W8LQA 65,880-433-61-A-16
W8VYU 64,970-418-62-A-18
WA8SHL 4,268-451-57-A-22
W8HSK 63,280-346-72-A-23
WA8PZA 63,135-414-61-A-24
K8EHU 62,583-357-69-A-23
WA8OCG 62,360-385-64-A-19
W8AJW 60,463-357-67-A-17
WA8TWC 58,720-367-64-A-24
K8BPX 54,750-300-73-A-14
W8UPH 51,040-417-60-B-21
WA8CWU 48,914-333-74-B-21
W8YCP 46,632-350-67-B-14
WA8TYF 43,240-321-66-B-18
WA8RCN 43,200-270-64-A-20
WA8UHN 42,713-255-67-A-16
W8LHV 42,529-300-71-B-20
WA8RWU 41,063-225-73-A-17
K8DDG 40,455-308-65-B-15
W8DWP 40,100-230-68-A-17
W8SZU 39,570-266-58-A-17
K8CQA 39,125-250-61-A-20
K8GVK 36,225-231-61-A-21
W8VQI 33,500-250-67-B-20
W8MXO 29,869-205-59-A-13
W8WDU 28,981-204-55-A-18
W8NHO 28,557-252-57-B-23
K8VAK 28,288-185-59-A-16
W8GOE 25,764-227-57-B-14
W8FFK 25,750-165-60-A-12
K8SWE 24,795-171-58-A-15
K8VCW 24,375-150-65-A- 9
W8YPT 23,165-171-52-A- –
W8ZJM 22,863-161-55-A- 7
WA8REN 22,815-169-54-A-19
W8IDM 21,188-162-50-A-12
W8CHT 20,140-132-58-A- –
K8IKO 19,895-174-46-A-19
WA8NXS 19,759-175-43-A-13
WA8JUY 19,360-136-54-A-20
K8KFP 18,750-100-75-A-14
K8BSM 17,850-150-56-B- –
W8EXI 17,415-129-54-A-10
WA8LWH 16,675-145-46-A-13
W8VZE 16,665-122-52-A-14
W8NWR 15,578-201-31-A-14
WA8MGD 14,850-111-54-A-12
WA8VNU 14,846-164-43-B-10
WA8VBV 14,345-151-38-A-15
K8KRN 12,524-134-43-B-13
W8DZG 12,440-104-44-A-15
WA8UYZ 12,255-114-43-A-18
W8EDU (WA3BGE, opr.) 11,844-141-42-B- 5
WA8MCR 11,670- 98-44-A- 7
W8GMK 10,690- 85-57-B- 9
W8YEU 10,630-107-36-A-11
W8KNF 9690- 95-51-B- –
WA8KKN 9688-125-31-A- 8
W8GFH 9678- 79-49-A- 7
WA8GRR 8600- 80-40-A-14
WA8PLR 7800-104-30-A-10
W8ICS 7780-113-24-A-12
WA8PJA 6250- 50-30-A- 4
K8MLO 6050- 61-40-A-17
WA8GYT 5775- 77-30-A- 3
W8ENH 5557- 74-31-B- 9
W8HQX 5270- 62-34-A- 9
WA8RZD 5175- 69-30-A- 5
WA8CFJ 3944- 64-23-B- –
WN8WIA 3375- 56-25-A-16
WA8OPH 3263- 46-29-A- 4
WA8OPD 3010- 43-28-A-13
K8KEG 2990- 52-23-A-15
K8SEV 2733- 33-21-A- 9
WA8SCZ 2728- 45-31-B- 3
WA8RXM 2400- 40-24-A- 4
WN8WGX 1829- 45-19-A-14
W8WPC 1568- 34-19-A- 3
K8BFZ 1386- 33-21-B- 5
WN8WYW 1260- 34-16-A-22
W8VDF 1026- 27-19-B- 6
WN8YYV 900- 24-15-A-10
WA8SLW 768- 32-12-B- 2
WA8VBS 624- 20-16-B- 2
WA8EYA 574- 23-14-B- 6
WA8ZDK 553- 17-13-A- 5
WN8YSV 230- 12- 8-A- 5
WN8YJG 163- 17- 5-A-10
WN8YHN 113- 8- 6-A- 3
WN1HNQ/8 106- 12- 5-A- 8
WA8NVW 3- 1- 1-A- 1
K8BFT (K8s BQY DHT NPH) 60,638-388-63-A-24
W8CEA (W8s CEA UEX) 45,800-374-60-B-13

HUDSON DIVISION

Eastern New York

W1BGD/2 134,313-711-75-A-24
WB2CSY 49,280-311-64-A-23
W2MEL 43,633-283-62-A-11
WB2YPM 38,940-265-59-A-21
WB2ALX 37,043-225-66-A-21
W2TER 36,815-247-58-A-20
W2HES 36,225-288-63-B-17
K2KUA 25,020-210-48-A-13
WB2NDS 24,720-210-60-B-15
WB2ROU 12,510-139-36-A- 8
WA2WGS 12,488-111-45-A-10
WB2YBX 8250-100-33-A-15
W2AEE (WA2BNK, opr.) 7562-101-38-B- 8

WB2YBQ 7000- 75-32-A- 9
WA2BHN 3410- 44-21-A- 4
WN2BND[1] 3185- 51-26-A-10
WN2BRI 1475- 20-10-A-12
W2FSL 975- 26-15-A- 5
WN2BHK 735- 22-14-A-10
WB2UHZ 494- 19-13-B- 1
WN2CRW 45- 6- 3-A- –
K2KGE 10- 2- 2-A- 1
WB2UTD 10- 2- 2-A- 1
W2SZ (5 oprs.) 70,500-477-75-B-24

New York City-Long Island

W2GGE 98,272-666-74-B-23
W2AJR (WA2UWA, opr.) 97,738-545-71-A-24
K2ZYR 78,899-445-71-A-23
WB2FAJ 64,000-400-64-A-19
WB2VTM 53,760-420-64-A-17
WA2KSD 45,795-323-71-B-17
W2GKZ 39,836-266-73-B-12
WB2SZZ 34,223-256-54-A-20
WB2YKL 27,280-176-62-A-20
W2ZV 27,070-158-66-A-20
WB2SEQ 23,530-181-52-A-12
WA2VDA 20,273-159-51-A-16
W2HG 17,425-206-34-A-19
W2DUS 16,875-150-45-A- 8
WB2BCI 12,095-118-41-A-17
W2HAE 11,869-106-45-A- 8
WB2UJS 10,051- 95-43-A-14
WB2ROV 8625-115-30-A-14
W2UAL 8269-123-27-A-11
K2HGR 8118-100-41-B- 7
WB2QIL 7000-100-24-A-16
WA2URD 6107-100-31-B- 6
WB2VFF 5600- 80-28-A-12
W2LPA 5040- 84-24-A-10
WB2WXR 4900- 70-28-A-17
WB2WXP 4089- 71-29-B- 6
WN2ARD[1] 4088- 67-30-A-16
K2OHK 3800- 51-28-B- 6
WB2ZSG 3444- 48-29-A- 7
WB2HIR 3063- 49-25-A-14
WN2AXL 2205- 42-21-A-11
WN2ZWT 1775- 40-20-A-16
WB2ZXR 1275- 35-15-A-11
WB2VIA 1152- 32-18-B- 3
W2TUK 1063- 25-17-A- 1
W2UNS 825- 30-11-A- –
W2TNI 553- 17-13-A- 7
WB2UZU 390- 13-12-A- 3
WB2BFP 375- 15-10-A- 4
WB2UZX 193- 11- 7-A- 2
WB2OLD 176- 11- 8-B- 2
WN2AVX 83- 6- 4-A- 1
WB2AXH 15- 3- 2-A- 1
WB2HMS (WB2s HLH HMS) 54,640-373-72-B-22
WB2YCC (WB2s YCC YKU) 35,630-255-56-A-24

Northern New Jersey

WB2RKK 96,030-534-72-A-23
W2NNL 91,263-522-70-A-24
WB2NZU 89,750-500-71-A-23
K2COR 76,466-493-63-A-23
K2BMI 75,464-417-73-A-22
WB2TFK 72,000-400-72-A-24
WB2SSZ 64,790-430-62-A-15
WA2ASM 61,450-391-62-A-21
WB2JYM 55,913-355-63-A-17
WB2RJJ 55,438-335-65-A-17
WB2UEK 37,890-264-56-A-16
WB2YEW 37,500-300-50-A-19
WAØNOH/2 32,463-245-53-A-19
W2DMJ 30,800-193-64-A- 9
WB2ZCI 27,355-251-42-A-15
W2GBY 24,380-184-53-A-16
WB2ZSH 21,130-245-33-A-17
W2WE 15,813-128-50-A-16
W2ECO 15,210-117-52-A-15
WB2QQU 14,125-150-35-A-22
WB2GGO 13,750-110-50-A-13
W2IBZ 13,090-154-34-A- 9
W2NEP 12,250- 70-70-A-11
W2EWZ 10,125-150-27-A-11
W2OPE 8400-150-28-B- 6
WB2NSV 6000-100-24-A-17
K2SBW 5400- 90-30-B- 7
W2ZEP 5400- 90-24-A- 6
WB2OHK 4608- 82-22-B- 3
W2VJN 4464- 93-24-B- 2
W2ABL 4332- 57-38-B- 4
WN2ANI[1] 4185- 62-27-A-19
W2CIY 3300- 55-30-B- 7
WN2AXY 2588- 46-25-A-16
W2JKH 2375- 63-19-B- 3
WN2AMM 2370- 40-24-A- 7
WN2CHJ 1995- 38-21-A- –
W2LRO 1710- 36-19-A- 2
K3PLJ/2 1705- 31-22-A- 3
W2MPP 633- 23-11-A- 2
W2JDH 595- 17-14-A- 3
WN2BRW 140- 8- 7-A-10

QSO LEADERS

(Single-operator)

Phone		*C.W.*	
K4WJT	870	W8UM	806
W2RLM	849	K1LPL	761
K8DOC	841	W9YT	743
KØCVA	834	W6RW	724
K1LPL	819	K4GSU/3	720
WAØSDC	805	W1BGD/2	711
WA4PXP	798	WA9ITB	707
WA6IVN	793	W1MX	699
W5WMU	789	K2EIU/5	690
K7UKC	786	K4PUZ	689

F3VN/W2 72- 6- 6-B- 3
W2HDT 3- 1- 1-A- 1
WB2BZO (5 oprs.) 65,975-377-70-A-24
W2GLQ/2 (5 oprs.) 41,480-305-68-B-24
W2BSC (WA2HLH, WB2CRX) 29,848-288-52-B- –

MIDWEST DIVISION

Iowa

WAØSDC 122,875-652-75-A-23
KØAZJ 83,600-473-70-A-18
WAØKXJ 67,825-447-75-B-24
WAØJSD 27,825-210-53-A-16
WØQVA 18,800-200-47-B- 9
WAØQYS 14,331-119-45-A-20
WØYSE 8009- 75-43-A-11
WØJTC 5694- 73-39-B- 9
WØTLH 3270- 55-24-A-10
WNØQND 2363- 47-21-A-16
WØQZR/Ø 1838- 35-21-A-13
WAØRJY 220- 11- 8-A-10
KØGXR (KØGXR, W5LZG) 85,733-488-71-A-24
WØGHZ (4 oprs.) 3273- 62-22-A-24

Kansas

KØBWI 38,280-240-66-A-16
KØPFV 18,800-161-47-A-18
KØKED 16,680-162-49-B-11
WØYRN 9225- 90-41-A-13
WAØKDJ 6600- 66-35-A- 7
WØCV/Ø 6408- 52-52-B- 4
WAØLWC (K3ZMI, opr.) 3094- 50-25-A- 4
WØQQQ (5 oprs.) 28,072-246-58-B-15

Missouri

KØJPL 113,055-628-73-A-23
K8KJN/Ø 86,395-467-74-A-24
WØQWS 71,730-403-72-A-23
KØJEQ 55,924-398-69-B-19
WAØELM 46,699-297-63-A-11
WØKCG 38,413-220-70-A-17
KØJPL 27,720-176-63-A-10
WAØPUL 13,210-111-44-A-16
WAØLJV 10,106-116-35-A-17
WNØRVR 5950- 70-34-A-16
KØYGR 2100- 41-21-A- 8
WNØQXN 275- 11-10-A-10
WAØPFU 3- 1- 1-A- 1
WØQEV (5 oprs.) 66,409-391-67-A-24
WØEEE (WAØs CXI IKT OXO) 56,736-394-72-B-23

Nebraska

WØWLO 71,820-402-72-A-21
WAØGVJ 41,950-260-63-A- 9
KØOAL 3565- 46-31-A- 4
KØODF 2283- 27-19-A- 3
WNØRSK 75- 10- 4-A- 4

NEW ENGLAND DIVISION

Connecticut

W1ECH 117,180-632-74-A-24
W1CSM 94,670-565-68-A-23
K1JHX 88,048-605-72-B-24
WA1FCB 67,184-494-68-B-18
WA1FJU 64,000-400-63-A-20
K1MOT 63,750-426-60-A-21
W1BIH 61,050-410-75-B-15
W1DDJ 60,895-365-66-A-23
WA1DJG 57,850-380-75-B-23
WA1FGN 55,663-365-61-A-19
W1ACR 54,743-406-54-A-22
W1WCG 52,188-325-63-A-19
K1THQ 46,208-304-61-A-16
K1HTV 43,230-263-66-A-10
W1RJJ 42,788-246-70-A-19
WA1CJE 40,463-250-65-A-22
W1EEN* 34,278-261-51-A-10
WA1IUL 32,118-222-58-A-22
W1BDI 31,500-200-61-A-17
W1ILV 30,562-261-59-B-16
W1RZG 29,242-266-54-B-19
K1LWC 27,648-260-54-A-23
W1CNY* 26,260-202-52-A-12
W1AW (W1ARR, opr.)* 25,164-233-54-B- 7
K1PQS 25,000-201-50-A-16
W1TS* 22,500-150-75-B-14
W1DIT 21,731-143-61-A-16
W1AFM 13,965-147-38-A-10
W1ZJJ 9956-146-27-A-16
W1ADW 9350-110-34-A- 8
W1TCJ/1 6562-103-27-B- 4
WN1IUE[1] 5800- 64-30-A-22
WA1GIX 5256- 73-29-A- 7
WN1HVL 4900- 62-26-A-12
W1BFW 3940- 70-21-B- 4
WN1JM* 3762- 57-33-B- 2
W1FTX 3760- 47-32-A- 3
WA1GGN 3600- 52-20-A- 5
W1TX 2968- 41-24-B- 2
WN1IQJ 2678- 52-21-A-20
K1DPB 2580- 43-24-A- 6
WA1FZE 2550- 51-20-A- 5
WA1GFW 2254- 50-23-B- 3
W1YNC 1360- 32-17-A- 3
WA1IED 385- 15-11-A- 3
WA1CYT/1 3- 1- 1-A- 1
WA1IXB (WA1CQW, opr.) 1- 1- 1-A- 1
W1YU (4 oprs.) 52,680-391-68-B-24
K1WIM/1 (K1s FNU WIM YXK) 45,440-286-64-A-23
K1QKR (WA1s CQW CYT) 570- 19-12-A- 1

Eastern Massachusetts

W1MX (K3QDD, opr.) 98,790-699-70-B-24
K1EUF 98,781-522-75-A-24
W1DAL 76,420-420-72-A-23
K1PRB 58,709-353-67-A-24
WA1FHU 56,508-416-68-B-21
K4LAY/1 55,770-338-66-A-20
K1CUD 52,699-306-69-A-20
WA1HRG 30,994-220-57-A-24
W1AQE 27,555-167-66-A- –
K1VUT 23,273-161-58-A-14
W2AZO/1 19,500-156-50-A-20
WA1EOT 13,110-114-46-A- 8
W1EIQ 12,600-116-50-B-16
K1KNI 10,250-100-41-A-12
K1QFC 8568-119-36-B- 4
W1PLJ 7884-110-36-B-11
WA1FCD 2785- 55-26-B-15
WA1DYU 3778- 51-22-A-12
WN1HGS[1] 2365- 46-22-A-20
W1WLZ 2100- 50-21-B- 2
WN1HRT 2035- 37-22-A- 8
W1RSR 1344- 32-21-B- 6
WN1ISH 90- 7- 6-A-13
W1BET 83- 8- 6-A- 2
W1KBN (K1FVS, WBZs NGI WFJ) 57,443-333-69-A-20

Maine

K1GAX 29,915-193-62-A- 9
W1GKJ 13,440-140-48-B- 7
W1PDN/1 32- 4- 4-B- 1

New Hampshire

W1DXB 58,823-357-66-A-22
W1EEF 53,520-451-60-B-23
W1BUT 12,052-131-46-B- 8
WA1FCN 8305- 76-44-A-14
K1PQV 3063- 50-25-A- 8
K1AC 1725- 30-23-A- 4

Rhode Island

K1LPL 138,883-761-73-A-24
W1KMV (K1JYN, opr.) 102,240-568-72-A-20
WA1BLC 44,400-279-64-A-18
WA1FNK 42,700-280-61-A-24
W1EIR 31,920-230-56-A-19
K1TAV 9188-105-35-A-12
K1YDA 8671-102-34-A-13
WA1HBG 1800- 40-18-A- 9
WA1GND 1240- 31-20-B- 9

Vermont

WA1HXU 34,716-289-66-B-18
W9BLQ/1 32,988-207-65-A-14
K1UZG 17,663-157-45-A-12
W1PEG 13,566-166-42-B-21

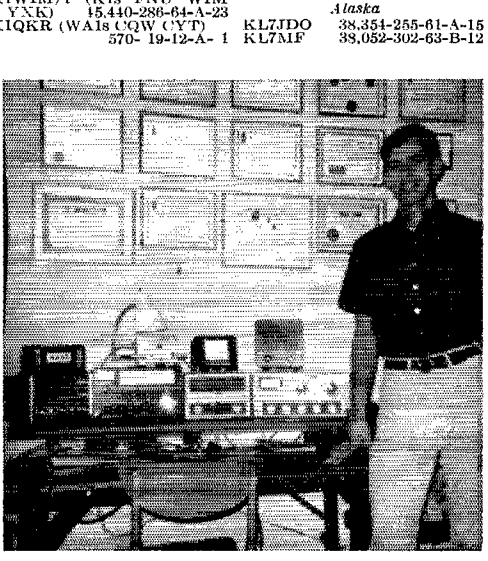
Western Massachusetts

W1EOB 101,875-538-75-A-22
K1KDP 60,210-335-72-A-24
W1EZD 47,232-369-64-B-15
W1WF 18,590-150-52-A-11
WN1HHA[1] 2500- 40-16-A-14
K1DGQ 1838- 35-21-A- 3
WN6WKN/1 1823- 24-14-A- 7
WN1HFF 304- 16- 9-A- 4
K1DFC (K1DFC, WA1FEH) 78,192-543-72-B-24
WA1HEC (4 oprs.) 22,968-200-58-B-23

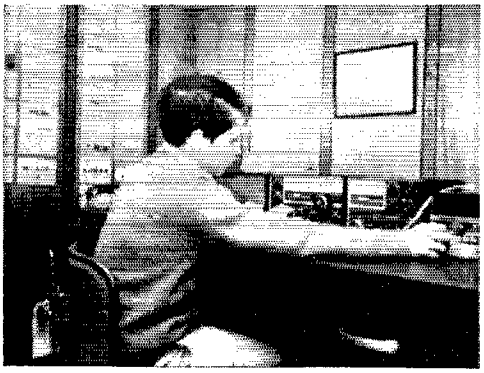
NORTHWESTERN DIVISION

Alaska

KL7JDO 38,354-255-61-A-15
KL7MF 38,052-302-63-B-12



That proud smile belongs to Larry, **WA3BLE,** c.w. winner for WPa after a furious struggle with K3HKK and WA3IXN —would you believe *three* 100K-plus scores from that section? BLE did the trick with a DX-60, Drake 2B, TH6-DX, inverted vee, and a dipole. You'll be hearing him from Lehigh University next year.



Missouri's 13-year-old **WNØRVR** breezing along on a TO keyer en route to 5,950 Sweepstakes points. Tom's FB setup also includes a Drake 2NT transmitter, 2C receiver and a 14AVQ vertical.

KL7FRZ 15,520-134-55-B-20
KL7EWA 11,988-115-54-B-15
KL7AIZ (5 oprs.) 50,317-378-67-B-24

Idaho

W7IUO 50,490-312-66-A-24
K7CPC 13,536-111-49-A- 6

Montana

K7CTI 114,750-614-75-A-20
K7KOK 51,350-320-65-A-22
W7FLB 25,436-181-57-A- 6
WAØATY/7 23,220-203-55-B-21
K7LTV/7 22,545-167-54-A-13
WA7BQS 450- 15-12-A- 2

Oregon

K7BPR 94,276-530-71-A-24
K7WWR 7080- 76-32-A- –
WA7ETL 2300- 58-16-A-24
WA7DGF 1460- 37-20-B- 8
WA7HGD 488- 17-13-A- 8
W7TRE (K7DSS, W7TRE) 58,658-362-66-A-23

Washington

K7UKC 93,656-504-75-A-24
W7ETZ 61,132-453-68-B-19
K7ONF 46,970-312-61-A-15
K7EXT 45,900-270-68-A-15
W7GYF 38,665-243-62-A-10
WA7CSK 31,875-170-75-A-15
WA7FOE 24,125-195-50-A-17
W7IEU 23,200-148-60-A-19
WA7CXD 21,250-150-54-A- 8
W7ZOI 19,305-143-54-A-13
W7ERH 17,500-143-50-A-22
K7VPF 15,180-132-46-A-14
K7KYG 5125- 50-33-A-11
K7BFL 2243- 44-23-A- 3

WN7HPK 2073- 33-13-A-17
WA7EYN 1657- 39-17-A-16
W7DRA 1496- 29-21-A- 5
WA7GLC 1403- 26-22-A- 7
K7RSB 1350- 27-20-A- 6
W7EVT 1250- 25-20-A- 3
W7BUN 3- 1- 1-A- 1

PACIFIC DIVISION

East Bay

WA6IVN 121,268-663-74-A-24
K6AUD 46,900-280-67-A-17
K6BXI 45,608-371-64-B-22
WB6FTY 40,975-248-65-A-24
WB6BBC 34,650-220-63-A-24
K6LRN 203- 9- 9-A- 2
W6FAR 3- 1- 1-A- 1
WN6WFN (WN6s WFN YMB) 1418- 35-18-A- 9

Hawaii

KH6IJ 80,240-590-68-B-18

Nevada

WA7GCY (WA7s GCY GUF) 14,548-137-46-A-23

Sacramento Valley

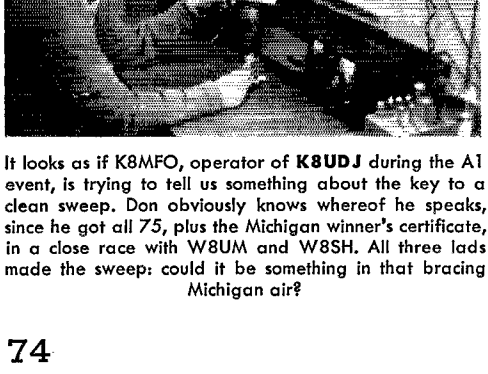
W6NKR 65,213-353-74-A-21
W6EGX 51,405-298-69-A-20
WA6JDT 19,415-127-58-A-12
W6VUZ 8075- 85-38-A- 9

San Francisco

W6BIP 47,508-321-74-B-20
W6WLV 35,720-218-64-A-19
W6IZR 240- 12- 8-A- 6

San Joaquin Valley

W6QMC 43,428-329-66-B-18
K6RTK 39,260-209-64-A-13



It looks as if K8MFO, operator of **K8UDJ** during the A1 event, is trying to tell us something about the key to a clean sweep. Don obviously knows whereof he speaks, since he got all 75, plus the Michigan winner's certificate, in a close race with W8UM and W8SH. All three lads made the sweep: could it be something in that bracing Michigan air?

WB6RSS 14,025-128-44-A-15
W6BYH 10,238- 91-45-A- 7
WB6MCA 6480- 81-32-A-19

Santa Clara Valley

K6FBB 110,960-608-73-A-24
K6QEZ (WA6AMW, opr.) 96,915-549-71-A-24
WA6LFA 32,815-253-63-B-24
WA6TZN 25,296-172-59-A-13
W6GJV 23,375-170-55-A-15
WN6YNK 5868- 62-33-A-21
WB6AIG 5376- 84-32-B- 9
WB6QIT (4 oprs.) 80,808-546-74-B-24
K6LY (4 oprs.) 64,440-449-72-B-24

ROANOKE DIVISION

North Carolina

W4NQA 98,875-653-75-B-23
K4MPE 97,108-520-74-A-24
WA4FFW 64,940-387-68-A-21
K4KOF 59,625-350-67-A-19
W4VON 16,898-155-52-B-18
KH6FON/4 14,606-143-44-A-19
WA4WSU 9975- 95-42-A-22
WB4BGL 4750- 60-25-A- 2
W4BNU 4000- 50-30-B- 7
WB4EQW 336- 14-12-B- 2

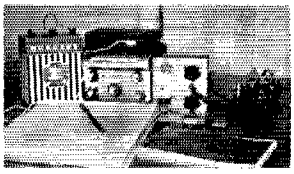
South Carolina

K4WJT 118,475-635-74-A-24
WA4VZK 64,255-362-71-A- –
WB4CPE 2498- 37-27-A- 6
K4YTZ (WB4DFW, opr.) 1015- 30-14-A- 4

Virginia

W4BVV (K1ANV, opr.) 124,765-670-74-A-22
W4KFC 108,100-716-75-B-19
W4PTR 106,750-584-75-A-24
K4AEV 102,000-550-75-A-18

WØQZR/Ø had 35 contacts, 21 sections and 13 hours of fun with this mini-power rig. The transmitter consists of a 2N918 oscillator, 2N918 doubler and 2N3866 final; the receiver is a Regency transistor converter working from a pocket radio; the antenna was a dipole taped to the ceiling. Joe's signal may not have been a rock-crusher, but it was at least a stone-grinder (No? How about a pebble-pusher?)



W4YGY 99,050-530-74-A-18
K4CG (K3WUW, opr.) 96,300-642-75-B-24
W4DVT 81,475-537-75-B-22
W4NH 77,620-450-69-A-21
W4ZMI 73,900-405-72-A-18
W4SNU 72,968-423-69-A-20
W4DKU 71,910-400-72-A-22
W4YGO 69,036-524-66-B-24
K4PQL 68,424-410-67-A-23
W3IZI/4 62,240-393-64-A-24
W4TKR 61,149-345-71-A-20
W4YZC 53,155-373-56-A-18
W4GF 49,725-307-65-A-15
W2IWP/4 48,060-267-72-A-19
W4NHX 45,900-306-60-A-21
K4CFB 45,135-306-59-A-18
W3ZKH/4 44,730-252-71-A-23
K4ORQ 41,391-332-63-B-21
W4KXV 34,615-249-54-A-12
W4RAE 32,419-200-65-A-18
W4WBC 31,744-248-64-B-16
W4MOJ 30,550-240-65-B-23
K4MXF 27,500-200-53-A-19
WB4DRD 27,280-250-44-A-23
W4NWJJ 20,313-125-65-A-15
WA4YOX (WB4DVD, opr.) 20,055-191-42-A-19
W4IA (W4TFX, opr.) 13,035-162-33-A-10
W4PNK 9430- 93-41-A- 4
K4ASU 8520- 94-40-B- 6
W4GHW 7363- 98-31-A-22
WN4GTG[1] 7200- 91-32-A-18
W4FZG 4590- 51-36-A- 4
W4JAT 3625- 50-29-A- 5
K4UYY 3408- 47-29-A- 4
WB4HOU 3048- 54-23-A-13
K4VDL (K4VDL, WB2ZFX) 128,438-686-75-A-24

West Virginia

W8HRQ 46,630-338-54-A-21
WA8IOS 25,440-260-47-B- 9
WA8TWR/8 13,860-154-36-A-13
WA8RDW 12,100-122-40-A-16
W8JWX 11,660-106-44-A-13
WN8VLM 4030- 55-31-A-16
WA8OIS (WA3IAQ, opr.) 2200- 44-25-B-11

WN8YCD (WN8s YCD YCE) 123- 7- 7-A- 8

ROCKY MOUNTAIN DIVISION

Colorado

WA0CVS 120,345-680-71-A-24
WØWAIE 71,663-417-70-A-22
W5NML/Ø 62,600-390-64-A-24
VE7BHN/WØ 41,974-270-63-A-21
KØEDG 36,280-224-63-A-23
WØLBI 20,956-202-52-B- 6
WØKAU 16,184-146-52-B- 6
WØUAT 12,760- 98-48-A- 9
WØATA 3000- 50-24-A- 3
WA0AIBL 1860- 31-24-A-11
WØHEP 96- 8- 6-B- 1

New Mexico

W5QJH 107,500-601-71-A-24
K5STL 51,228-331-62-A-14
WA5MHR 44,715-271-66-A-23
WA5NEB 16,233-153-43-A- 9
WA5ROU 1623- 32-22-A-18

Utah

K7RAJ 117,438-625-75-A-24
W7QDM 110,760-626-71-A-24
K7VGW 20,719-169-51-A-15
WA7BSG 1829- 20-17-A- 1

Wyoming

WA7EWC 63,813-377-67-A-23
W7TSM 49,265-430-59-B-21
WA7CLF 37,320-227-64-A-14
W7HRM 4514- 61-37-B- 6
K6UVJ/7 3299- 47-29-A- 7
WA7DNZ 1664- 32-26-B- 2

SOUTHEASTERN DIVISION

Alabama

W4USM 104,323-559-74-A-23

WØGKY/4 22,875-150-61-A-16
WB4EOW 9158-111-33-A-22
W4YFN 3063- 33-25-A- 4
W4HFU 75- 6- 5-A- 1
WB4BNO (WA4RNP, WB4BNO) 20,250-180-45-A-16

Canal Zone

KZ5FX 72,870-529-70-B-13

Eastern Florida

K4TIG/4 108,719-615-71-A-24
W4BRB 78,366-444-71-A-22
W4KET 74,004-407-73-A-20
W4UQZ 66,130-390-68-A-24
W4FRO 62,156-333-75-A-22
WA4UFW 43,291-295-59-A-23
W4LCP 33,600-210-64-A- 8
W4RPV 22,005-163-54-A-11
W4HOS 14,690-113-52-A- 9
WB4HFJ 11,500-115-50-B-14
W4ZOK 10,005- 69-58-A-17
W4IAZ 7500- 75-40-A- 6
W4LLE 5938- 63-38-A- 4
K4IXG 4234- 53-32-A- 3
W4LEP 812- 29-14-B- 3
WA4YNP 481- 19-11-A-12
WN4FQK 88- 9- 5-A- 2
WN4FLW 3- 1- 1-A-10
WA4OAB (WA4OAB, WB4s AMY CTC) 27,746-235-49-A-24
WA4RIJ (WA4RIJ, WA5ETA) 18,900-171-45-A-18
WA4RDA (WA4RDA, WB4s CPP FHA) 15,708-155-51-B-13

Georgia

K4BAI 118,188-625-75-A-24
K4RIN 101,561-558-73-A-24
W4MCM 99,600-604-75-B-24
K4PIA 36,974-272-54-A-15
K4PZ 21,230-194-55-B-10
WN4HLC 114- 8- 7-A- 7
WA4UBH/4 (WA4UBH, WB4AJR) 60,100-394-75-B-23
WB4EMF (WB4s EMF GDQ) 15,625-150-39-A-22

WA4QPL (WA4VOA, WN4FJG) 2438- 53-23-B-11

Western Florida

WB4DHZ 23,595-226-55-B-20
WB4GYX 14,365-122-44-A-13
WA4ECY (WA2VIV, WB4HKM, WA9JWI) 48,256-416-58-B-24

West Indies

KV4AM 3312- 72-23-B- 4

SOUTHWESTERN DIVISION

Arizona

W7EKE 118,165-639-73-A-23
W7FCD 28,215-199-57-A-12
W7KRW 3878- 50-33-A- 4
WA7FCV (WA7s DAZ FCV) 47,250-300-63-A-24

Los Angeles

W6RW (W6DQX, opr.) 135,563-724-75-A-22
K6AEH 123,156-661-75-A-24
WB6HGU 85,470-581-74-B-24
W6EJJ 75,790-416-72-A-24
WB6KPN 70,015-420-67-A-24
WB6UHF 58,123-347-67-A-24
W6SBB 54,513-313-70-A-15
W6OEO 32,915-247-52-A-14
W6RCV 26,164-211-62-B-17
W6UME 23,798-171-57-A-19
W6LS (W6DDB, opr.) 23,585-178-53-A- -
K6BEP 16,740-141-48-A-13
WB6TMC 7220- 77-38-A- 7
WB6KVA 6273- 57-37-A- 5
WN6VXJ1 5525- 65-34-A- 7
WB6IQT 5456- 59-31-A- 7
WB6ZEP 4888- 58-34-A- 7
K6CDW 4263- 55-31-A- 6
WB6VVS 1575- 35-18-A-15
K6YEZ 813- 25-13-A- 3
WN6VUS 648- 22-14-A-10
K5MHG/6 360- 16- 9-A- 6
W6AM 288- 12-12-B- 1
WA6RQQ 270- 12- 9-A- 4
WN6YWM 208- 16- 6-A- 3
WB6ROR 138- 11- 5-A- 1
WN6ZEC 98- 7- 6-A- 3
WB6TVH 23- 3- 3-A- 1
WB6YAX 23- 3- 3-A- 1
WB6VBM 10- 2- 2-A- 2
WB6NWK (WB6s NWK OLD) 88,995-525-68-A-23
WB6RZH (WB6s RZH VFJ) 65,325-402-65-A-24
WA6WZD (WA6s WOY WZD) 53,680-448-61-B-24
WB6WMT (WB6s PXA RGO WMT) 22,880-208-55-B-16
WN6VOF (4 oprs.) 6545- 77-34-A-21
WN6WCS (WN6s WCS WQA) 2075- 44-20-A-24
WN6YUQ (WN6s YUP YUQ) 1024- 37-13-A-24

Orange

WB6NRK 86,400-480-72-A-20
WB6WEG 74,988-432-70-A-21
K6OIZ 58,788-426-69-B-22
WB6TYZ 15,100-120-47-A-14
K6OVJ 13,380-113-48-A-13
K6YNB 5185- 61-34-A- 5

San Diego

W6JVA 60,528-342-71-A-15
K6CAG 14,445-107-54-A- 7

Santa Barbara

W6GEB 75,004-407-73-A-23
W6BHZ (WA7CWM, opr.) 36,450-261-60-A- -

WEST GULF DIVISION

Northern Texas

K5RHZ 109,865-602-73-A-21
WA5CBE 85-008-460-74-A-20
W5DWT 73,695-439-68-A-13
W5QGZ 60,235-359-66-A-23
WA5PQI 45,850-345-52-A-17
W5ONL 41,600-261-64-A-16
K5YED 40,194-319-63-B-22
WA5RAI 2473- 43-23-A-16
WA5NHI 1710- 36-19-A- 5
WN5SXS 450- 20-10-A-12
WA5QEZ (WA5s PPG QEZ) 37,480-304-60-B-23

Oklahoma

K5OCX 120,970-675-72-A-24

Southern Texas

K2EIU/5 130,281-690-75-A-24
W5JAW 112,850-613-74-A-24
W5WQN 23,068-158-73-B-24
K8IAE/5 21,195-159-54-A-21
W5FIT 3675- 56-28-A-10
W5AR 2750- 58-25-B-13
K5LZO (K5LZO, WA5LES) 125,550-848-75-B-21

CANADIAN DIVISION

Maritime

VE1APP 27,198-237-46-A-13
VE1AE 13,065-134-39-A-17
VE1AKA 6040- 78-32-A-12
VO1GF (4 oprs.) 19,500-196-40-A-24

Quebec

VE2BMS 91,125-515-70-A-24
VE2WA 38,588-221-70-A-13
VE2PJ 23,525-170-53-A-13
3C2AWR 3625- 74-25-B- 4

Ontario

3C3EEW 61,583-357-69-A-21
VE3GCE 43,555-282-62-A-18
3C3ON 35,840-225-64-A-16
VE3DGB 27,056-241-45-A-14
VE3BC 24,650-171-58-A-15
VE3FXZ 22,600-136-64-A-15
VE3BMR 16,425-146-45-A-13
VE3DH 14,688-129-47-A- 8
3C3CKW 11,025-123-45-B- 9
VE3BQL 10,890-122-36-A-13
VE3AED 8559- 85-41-A-11
VE3CWN 3900- 58-20-A- 8
VE3DPG 1488- 35-17-A- 4
VE3BLK 1093- 23-19-A- 9
VE3ABN 200- 10- 8-A- 2
VE3EZM (VE3s EVE EVZ EZM) 56,610-338-68-A-24

Manitoba

VE4EO 16,445-158-44-A-16
VE4YZ 646- 19-17-B- 1
VE4AR 12- 3- 2-B- 2
VE4UM (VE4s EI J1 LG) 42,903-352-63-B-20

Saskatchewan

VE5US (VE5UF, opr.) 115,300-641-72-A-24

Alberta

VE6ATH 36,359-225-63-A-15
VE6VV 35,604-258-69-B-15
VE6FN 23,779-189-51-A-11
VE6MA 17,684-151-47-A-12
VE6AUH 3031- 55-25-A-15

British Columbia

VE7EH 78,225-449-70-A-20
VE7AXM 68,000-400-68-A-24
VE7AC 22,948-186-59-B-12
VE7BAV 22,560-155-56-A-22
VE7AGN 1760- 32-22-A- 9
VE7RZ 1105- 34-17-B- 2

Yukon-Northwest Territories

3C8BB 57,915-353-66-A-23

Check logs: (*Phone*) W1AW (multiopr.), WB2YBA, W3AYS, WA9JFU/8; (*c.w.*) W2DMG, W2BLL, WB2VZV, W3AYS, W4JBM, WB6MZX, KTEFB, K7GLD, WA9JFU/8, WA9SYD, WØKYI, VE3AWE, VE7OM.

A contest without **W9YT** would be like a BPL listing without W3CUL. Operators K9KGA (left) and K9ZMS (right) wound up at the top of the Wisconsin heap on both phone and c.w., respectively, with the A1 entry also high score among Central-Division competitors. The boys enjoyed the luxury of a photoelectric CQ-wheel and a voice tape-loop.

Strays

QST congratulates . . .

W. Walter Watts, W4VI, on his promotion to senior executive vice-president of RCA.

Paul Kinas, WN9VKF, on his appointment to the Merchant Marine Academy.

Frank A. Gunther, W2ALS, named President of the Armstrong Memorial Research Foundation.

Cho Yo-Sung, HM1AA, on receiving his doctorate in engineering from Yale University.

Mary Stockstill, WB6SSZ, the first deaf-blind Novice, on receiving her Conditional Class license.

Wayne E. Overbeck, K6YNB, appointed editor-in-chief of the Daily Record-Gazette (Banning, Calif.).

Stuart D. Cowan, W1RST, on publication of his book (co-authored with Dr. W. R. Guild) *Vigor for Men Over 30.*

Arthur K. Meen, VE3RX, ARRL Associate Counsel, on his election to the Ontario Provincial Parliament.

Dr. Harold Rosen, W5JKW, named "Edison of space" for his design of the Early Bird satellite.

Kenneth M. Gleszer, W1KAY, presented Connecticut's special achievement award for service to the handicapped by Governor Dempsey.

AMATEUR RADIO PUBLIC SERVICE CORPS

CONDCTED BY GEORGE HART,* W1NJM

Which Approach?

LAST month our lead dealt with the question of which mode to use in performing our public service communications. This month we deal with a subject much more basic, touching as it does on the very concept of public service and actually bringing up the possibility that our approach is basically wrong and *has* been all these years.

It started with a letter from WØLIQ responding to our bit on "Whither Public Service?" which appeared in Oct., 1967, *QST*. The League, said WØLIQ, seems to be in a dilemma regarding arguments for "justifying" ham radio, having pushed the concept of public service for so long. The argument that public service is paramount, he contends, is losing ground rapidly.

"Most hams," he goes on, "conceive 'hamming' as a pastime game that does not include public service activity. This means that the game hamming and the game public service are in conflict if these are to occupy the same frequencies at the same time. It seems more reasonable for us to shift our justification for ham radio to a more substantial and enduring base, and do a selling job that is easier to defend. Is not amateur radio a tremendous demonstration of civil and international freedom of speech? Do we not find the minds of our youth excited about their scientific futures by this fostering of their creativity? It seems to me that the public service responsibilities of ham radio are becoming a weak argument."

In connection with this same ARPSC lead we received a number of other letters, some of them agreeing heartily with the thought that in an emergency we shall always have to improvise, so why all the emphasis on preparedness? Now OM WØLIQ comes along with the suggestion that our basic approach is wrong, that if public service isn't popular, then we should push what amateurs *are* interested in doing, and create justification for doing it so that we may continue to occupy frequencies.

Admittedly, Roy's thought is somewhat revolutionary. It proposes, in effect, that the League devote its energies exclusively to what amateurs *want*, without any regard for what is really in the best interests of amateur radio as a whole, now and in the future. The latter, after all, *could* be a matter of opinion.

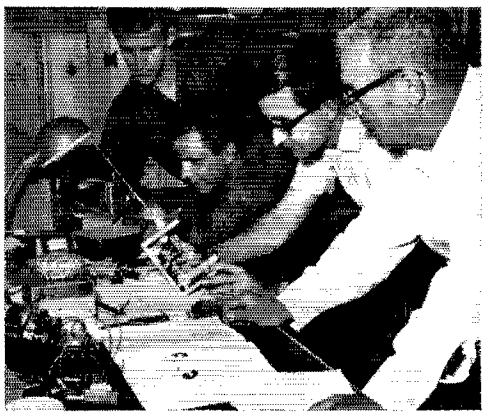
We suppose that from one standpoint it could be argued that democracy is based on popularity, either of an individual or an idea. But there is more to it than that — quite a bit more, because enlightened people sometimes have a funny habit of voting for what they believe to be most beneficial for the whole, regardless of personal conveniences, and elected officials very often exercise their judgment based on what they think is best, not solely on what they think their constituents would like most. If our founding fathers had taken the path of least resistance, we wouldn't be here today. True, they sometimes get the axe as a result, but you'd be surprised how many beneficial measures are put into effect this way.

So it seems to be a question of two different approaches. Either we amateurs base our efforts on what appears to be most beneficial, or we start with what is most popular and work to justify *it* as beneficial. Which approach should be used? A little of each, maybe? — *W1NJM*.

Preparedness Its Own End

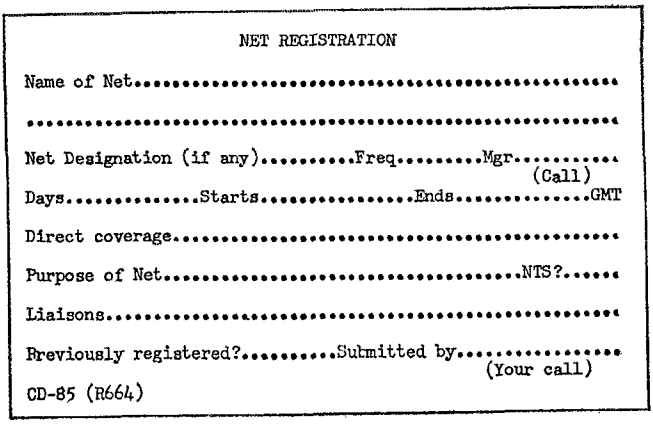
In our ARPSC source material file we came across a memo from KØOAL, SEC Nebraska, with which he enclosed a note from a Nebraska amateur who volunteered to undertake an EC assignment. "At present," the note said, "I am not a member of ARRL. I also do not know of any amateur here that is. But I will be glad to join . . . and help you get this under way."

We consider this a most admirable attitude, one which we wish more of our dedicated amateurs could adopt. This particular amateur didn't *say* he, or his local colleagues, were anti-ARRL in general, but it is implicit in his note. What is



Gettysburg, Pa., members of Adams County Amateur Radio Society are shown working on two 432-Mc. transceivers that will be used for emergency communications. Left to right are K3ONW, WA3ECI, K3EUG and W3DMV. *Photo by W3KGN.*

*Communications Manager



NET REGISTRATION

Name of Net.....

.....

Net Designation (if any).....Freq.....Mgr.....
(Call)

Days.....Starts.....Ends.....GMT

Direct coverage.....

Purpose of Net.....NTS?.....

Liaisons.....

Previously registered?.....Submitted by.....
(Your call)

CD-85 (R664)

CD-85 is the form to use when registering your net for the net directory. Don't have one? They're available from ARRL Headquarters. A facsimile can be used, just follow the form and refer to instructions elsewhere in this column.

admirable is that despite this, he (and we hope at least *some* of his townspeople) wants to join the League so he can become EC and do a public service job which the League sponsors. Whatever it is that has turned him away from the League, it is not the public service program, which he considers necessary and beneficial and worthy of his support.

There are probably thousands of amateurs who stay out of the League because of one thing, for one reason, one incident. What is it? Incentive licensing? DXCC policy? QRM from League-sponsored contests? A sharp letter received from headquarters? Dislike for the current SCM or director? One such item (or even two) is hardly sufficient cause to withdraw or withhold support of all the other things the League does, many of which you *must* approve. Are you against public service? Don't you want the amateurs to be represented before FCC, at international allocations conferences? Are you opposed to the program of international good relations we are working so hard on?

No matter how hurt you have been at something the League has done, if you stop to think of it you will find the balance strongly in favor of support of the majority of its programs. It's axiomatic that we can't please everyone, that the League's policies and programs can't be 100% popular, but there are so many of them and they cover so many facets of the hobby that it's just as impossible to *displease* everyone, or even to displease *any*one 100%, if he stops to think about it.

The Nebraska EC candidate stopped to think about it, and joined the League so he could take a job that is a lot of work and pays no money. We know he'll be a good EC because he will be critical and keep everyone on his toes, including his SEC, SCM and headquarters. We wish we had 1500 more like him. — *W1NJM*.

Trans Canada Net

In operation for the past five years, the Trans Canada Net, although not a part of the National Traffic System, is a part of the ARPSC family. It meets Sundays at 1800 GMT on 14,140 kc. There are three net control stations: VE3FLG is Eastern NCS; VE4XN is Central NCS and net manager; VE6ADX is Western NCS. The net is called at the appointed time by each NCS, a preamble read and a 15-second pause for emergency traffic observed. Both formal and informal traffic are handled.

The net is called by VE call areas, in an order determined by the NCSs prior to net call-up time. In each call area, NCS will call for stations with traffic only. After all stations with traffic are in, these stations will be directed to call the station wanted. Stations thus put in contact will move to another frequency. When their traffic is cleared, they return to net frequency. Only after all stations with traffic are cleared will the NCS call for check-in by other stations.

When checking in, stations state their calls, locations, and traffic, if any. They are then expected to remain in the net until excused by the NCS. No casual QSOing on the net frequency is permitted. At the close of the net, all NCS will make a closing statement.

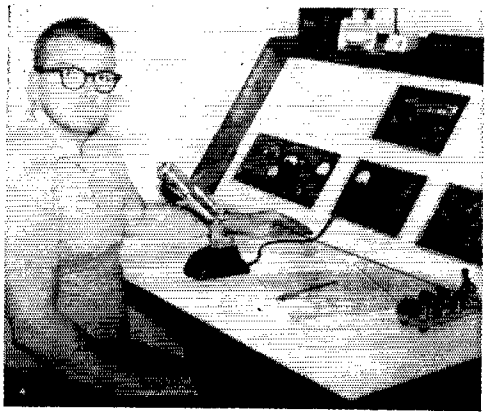
That's the Trans Canada Net, gang. It's all-Canadian from coast to coast, a modern version of old Trunk Line I.

Is Your Net Registered?

We expect that the 1968 edition of the Net Directory will be particularly valuable because of many net frequency changes as a result of the amateur regulations effective Nov. 22. There is also another change that is very significant and that is the widespread observance of the practice known as Daylight Savings Time.

Take a look at your 1967 Net Directory (only edition that has appeared on 8½ × 11 sheets) and look up the date of last registration. If your net is properly listed and the date shown is Jul7 or as a squeaker Aug7, you need not make a new registration. Also, if you have sent in a registration after July 1967 and no changes have been made in time, frequency, etc., *please do not* send a new registration at this time. Otherwise, *now* is the time to register in order to assure your net's appearance in the 1968 edition of the Net Directory.

There are five items required for a registration: (1) Name of net; (2) Frequency; (3) Day or days of the week per GMT; (4) Meeting time in GMT (followed by * if net meets one hour earlier during periods of daylight saving time); (5) Statement of the *Public Service* performed. Note that only nets operating in the amateur bands and rendering a public service are eligible for listing in the Net



Jim Benson, W8OUU, Ohio SEC, seated at his operating position. Note the control unit Jim built which contains antenna switch, rotator, timer and clock. The plywood cabinet is finished in maple to match living-room furniture; the inside panel and drop lid are covered in formica.

Directory. Please use the CD-85 Net Registration card (available from ARRL) or a reasonable facsimile for each net being registered. Incorrect or sloppy registrations, or those showing local time instead of GMT may result in your net appearing incorrectly or not at all. Please observe the following instructions when making your net registration.

1. *Name of Net.* Write or type the name of your net exactly as you wish it to appear in the directory. We have found that some of the best nets are those with short, concise names. Please use abbreviations such as AREC, SSB, CD, FM, ARC, PON, etc.

2. *Net Designation.* Many nets have designations used in the call-up, or brief combination of letters, or numbers and letters, by which the net is generally known. If you have one, let us know. Examples are EAN for Eastern Area Net, M6TN for Michigan 6-Meter Traffic Net, etc.

3. *Frequency* or frequencies in kc. If your net operates on more than one frequency be sure to correlate them with the day and time. Frequency bands or segments are not sufficient.

4. *Call of Net Manager.* Just his call letters: if no official net manager, give the call of the amateur who can supply further information about the net. This is usually the call of the person who registers the net, or who should be making the registration.

5. *Days.* Tell us which day of the week the net meets per GMT (Zulu) time. If the net meets daily, this is 365 days per year; if it meets Mon. thru Fri., put M-F, etc. Be extra careful that the day is in GMT as well as the time (e.g., if your net meets Sunday by local time at 2000 EST, enter Monday 0100Z).

6. *Net Starting time*(s) and ending time or duration. All nets are registered in GMT only. If the net meeting time shifts an hour during periods of daylight savings time show this by an asterisk (*). If the time is shown in other than GMT, the net may not be listed. Instead of ending time, put the length of a typical directed net session in minutes, or the usual time the net is free for informals.

7. *Direct Coverage.* The coverage area assigned the net (if part of a system) or the coverage provided by regular participants. Do not include coverage provided by liaison with other nets. Use abbreviations where possible and if the net covers a county, city or ARRL Section, show this. If your net name includes the town name or county, simply show the ARRL Section or State, because this is usually more meaningful than a footnote. National Traffic System nets have definite boundaries which are well known so do not jeopardize listing as NTS by showing coverage that is contrary to NTS principles.

8. *Purpose of Net.* Just a word or two showing the public service performed. Does it fall in the category of an emergency net (E), a traffic net (T), a weather net (W) etc.? If it is some special purpose, describe the public service performed.

9. *National Traffic System?* Indicate if your net is part of the National Traffic System. Note that Local nets meet weekly or more often, and maintain liaison with the Section NTS net; Section nets meet at least five times a week, usually 7 or 14, and maintain liaison with the Region NTS net.

10. *Liaisons.* NTS nets show their proper liaison net. Other nets may show nets with which they maintain regular liaison. Please do not show liaison with non-amateur services such as CB, MARS or CAP.

11. *Previously registered?* Give us the year in which the net last appeared in a Net Directory. If it is a new net or the name has changed, show either No or old net name.

12. *Submitted by.* Give us your call letters. If you have more than one call, use the one by which you are best known. This makes you responsible for all the information in the registration. Unauthenticated or unsigned registrations will not be entered.

Don't forget that we start compiling the information in July and if your registration comes in after *July 15*, your net may not appear until the 1969 Net Directory.

Diary of the AREC & RACES

On Sept. 28, W3DWG/VR6 on Pitcairn Island made an urgent appeal for medical assistance K9TRW in Chicago, operated by W9JFT, answered the plea. There was no doctor on the island but only a resident nurse with limited medical facilities. In cases of serious illness, patients had to make a 3400-mile voyage to New Zealand. After obtaining some details, W9JFT called a doctor and briefly described the situation. The doctor then came to station K9TRW and talked with the island nurse via amateur radio. The doctor took notes and prescribed treatment considering the limited facilities available, and promised to consult again the next day. On Sept. 29, the nurse reported that the patient was feeling better and responding to treatment. On Oct. 3, the island nurse requested assistance regarding another person and by mid October, both patients were doing well and the nurse felt that no further assistance was needed. — *W9JFT.*

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On Oct. 30, seven tornadoes hit the Miss. Gulf Coast area. K5TYP, operated by 24 different amateurs, handled 289 messages in a multi-station setup with transmitters on 80, 40, and 20 meters. There was also some activity on 6 and 2 meters. Most of the traffic was handled the first night although the station was manned for one 38-hour continuous stretch. The Miss. Sideband Net on 3888 kc. was in operation for 7½ hours with W5EBF and K5SYG doing an outstanding job in the affected area. WA5KEY operated almost continuously with WA5PTE and W5ODY relieving at times. Because all stations on or near the net frequency were cooperative and sincere, the net could not

have had better coordination. — *W5EMM, SCM Miss.*

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On Dec. 13 at about 0015Z, VE2AJS of Quebec West broke into the Reseau De Telephone Du Quebec Net on 3780 kc. and asked for some important information from the operators of dams in Rapide Blanc Beaumont, La Touque and La Tranche. VE2ASK of La Touque was able to deliver some messages to the operator of the Quebec Hydro at La Touque, and send back replies. There was a period of nearly three hours during which La Touque had no communications with Shawinigan or Trois Rivieres. At 0325Z VE2EB of Shawinigan announced that normal communications had been restored between Trois Rivieres and La Touque. VE2AQC, who had been net control for the period, checked and found that normal communications had been restored. He then thanked all those who relayed and obtained information and closed the net. — *VE2AJD EC Trois Rivieres, Quebec.*

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From Dec. 24 to Jan. 28, thirty different amateurs utilized the facilities of the West Coast Amateur Radio Service on 7255 kc. to report eleven different accidents and two vehicle fires to authorities. There were also a number of cases of stalled vehicles and obstructions reported to the Highway patrol. On Jan. 23, WB6CGA called in on 7255 kc. to locate a station in San Francisco in order to relay emergency medical information to a doctor in San Francisco. WB6CBW and WB6BSD moved to 20 meters and made direct contact with HR1WM and passed the information. — *WB6IZF*

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On Jan. 26, VE2BAI relayed two messages between VE2BUC of Iles de la Madeleine and VE2LG of Quebec City because of difficult band conditions on 3781 kc. The messages relayed involved inter-urban communication system failure and probable time of restoration of service. — *VE2BAI, EC Jonquiriers, Quebec.*

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On Jan. 26 at about 0500Z, K5DGS reported an explosion and fire at a chemical plant in Deer Park, Texas, via the 2-meter f.m. repeater WA5QLA. Pasadena Radio Officer WA5OYS and the c.d director placed the local emergency plan into effect. Fortunately there were only 4 injuries. The operation was completed about 0645Z, but while several of the amateurs were drinking coffee, there was another blast and they saw a ball of fire shoot up into the sky. WA5BUV, EC/RO Montgomery County, reported a ship-barge collision near the Baytown-LaPorte Tunnel, about 7 miles south of the plant explosion. W5CWL and K5HXR headed to the location and again the local emergency plan was activated. W5RZM, K5SCR and K5GNK went to the north side while W5CWL and K5HXR went to the south side of the channel. K5GNK used his marine mobile equipment to talk direct to the vessels involved. Requests for the Sheriff's Dept., Coast Guard and Immigration officials were then relayed via amateur frequencies. No casualties resulted, but property damage was heavy. Amateur operation was completed by 0745Z. As a matter of coincidence, WA5OYS had planned his Simulated Emergency Test exercise around such an emergency to be carried out Jan. 28. WA5OPK and K5HXR had also completed plans parallel to the actual disaster. — *K5HXR, EC/RO Harris County, Texas.*

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On Dec. 14, operation Santa Claus was held in Des Moines, Iowa, under the sponsorship of the Des Moines Radio Amateur Association and the Central Iowa VHF Club. A local radio station put out requests for items which might brighten the Christmas of others. Over 1100 calls were made in a 6½ hour period. Amateur Radio operators dispatched the calls from the studio via remotely controlled equipment on three amateur bands. Thirty mobile units and eight cars without radios were driven over 1800 miles throughout the afternoon and evening. This 18th annual operation made Christmas a little brighter for 700 Des Moines area families.

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On Dec. 18 and 24, Alabama Emergency Net R on 6 meters was called into session for weather alerts. W4WGI asked WA4DBQ to use the mobile unit to check several areas of Huntsville, Ala., for flooding. It was soon realized that more than flooding conditions prevailed and actually a small tornado had been through the area. The information was radioed back to the control station and the c.d office. Police were directing traffic in a heavily damaged area but information had not been given to other organizations. This alert emphasized the need for inter-agency communications. — *WA4DBQ, OVS, Huntsville, Ala.*

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Forty-three SEC reports were received for December activities, representing 16,105 AREC members, a drop of 1109 members from the Dec. 1966 report. The following sections reported: Ala, Alta, Ark, BC, Colo, Del, EFla, EMass, Ill, Ind, Kans, Ky, La, Me, Mar, Mich, Mo, Mont, Nebr, Nev, NH, NLI, NC, NNJ, Ohio, Okla, Org. Que, SF, SCV, Sask, SDak, SNJ, STex, Tenn, Utah, Va, Wash, WVa, WFla, WNY, WPa.

We received 496 SEC reports from 57 different sections in 1967, a drop of 63 reports from 1966. We are very pleased to report that twenty-seven sections reported every month in 1967. This is one more 100% section than for 1966. In accordance with usual custom, we list herewith the 100% sections, with number of consecutive 100% years in parenthesis: EFla (16), NLI (14), Mich (9), SDak (8), Alta (6), Ala (5), NC (5), NNJ (5), Mo (4), Sask (3), Colo (2), Del (2), EMass (2), Mont (2), Okla (2), Org (2), WPa (2), Ark, Conn, Ill, Mar, Nebr, Que, SNJ, Utah, Va, WNY. Missing only one report for 1967 were: Ga, Ind, Kans, Ky, Nev, Ohio, SCV, STex, Wash. The following sections submitted *no* SEC reports for 1967: Alaska, Ariz, C.Z., EBay, ENY, Ida, Iowa, Man, Minn, NDak, NMex, RI, SC, SJV, Vt, W.I., WMass. Wyo.

National Traffic System

April is the month that "daylight saving" time goes into effect. We have previously expressed our opinion of this institution, but have been told that the columns of *QST* are not the place to air our personal opinions. So we'll refrain, this time — if we can.

But as you all know, DST is the practice of advancing the clock an hour so we can all kid ourselves into thinking we're following the same old daily routine, when actually we're doing it an hour earlier. Thus we get up an hour earlier, eat lunch an hour earlier, quit work an hour earlier (this gives us more daylight before bedtime, hence the name), usually dine an hour earlier, and finally

WA7AEL and WB6CBW are shown operating the official station of Sahara Amateur Radio Operators Convention at the Hotel Sahara, Las Vegas, Nev., on January 4 through 7. This station was set up and manned by members of the West Coast Amateur Radio Service.

retire an hour earlier. It works, too. It doesn't work with animals, only humans, because animals don't have our high order of intelligence. They can't fool themselves.

There we go again!

Anyway, since just about every state (maybe *all* of them this year, we haven't heard) is officially changing, it becomes necessary for NTS to change too. So, effective April 29 at 0000 GMT, NTS will commence operating *one hour earlier* in all its operations. That is, not *actually* one hour earlier, because the clock will — er, no, it *is* actually one hour earlier, but the clock will stay the same. What we mean is, it *will* be but it *won't* be. See? Golly, we're a little confused ourselves.

But don't panic, we'll get it straightened out. What you have to do is go right on keeping all your skeds the same as you have always kept them, at the same times by your clocks. That is, unless you keep your clocks on GMT, which everybody is supposed to do but hardly anybody does. If you do (use GMT, that is), then all your skeds are an hour earlier than you usually keep them. OK? Phew! Of course if you're one of these guys who has two clocks, one on local time and one on GMT, and you advance your local clock an hour on April 28, then there'll be one less hour between your local time and GMT than there was before. Then, because you'll be keeping your skeds an hour earlier, you'll keep them by the normal time on your local clock, but an hour earlier on your GMT clock. Get it?

Perhaps an example will help. Let's say you're an east coast amateur. Better make that a west coast amateur, or we'll be accused of being regional again. You're a west coast amateur, sitting in your shack on Sunday, April 28. Your clock (local) says it's 1830. Your GMT clock says it's 0130 (April 29). Your net usually meets at 1900 by your local clock, 0300 GMT. But now, since it's after the time your local clocks are changed, your net will meet at 1900 (no change here, because the nets meet an hour earlier local) and at 0200 GMT, an hour earlier than before.

Got that straight, now? See you on the net, April 29 at — ahhh — 1900, or 0200 GMT, or is it 0300 GMT? See you *some* time around then! — *W1NJM*.

January reports:

Net	Sessions	Traffic	Rate	Average	Representation (%)
EAN	45	3080	1.445	68.4	91.8
CAN	42	2220	1.142	52.8	100
PAN	41	1978	.960	48.2	100
1RN	72	965	.398	13.4	94.0
2RN[1]	58	586	.612	10.1	95.2
3RN	70	782	.453	11.1	100
4RN	74	1218	.455	16.5	83.4
RN6	86	1686	.643	19.6	100
RN7	63	741	.323	11.9	52.5
8RN[1]	58	609	.426	10.5	97.7
9RN[1]	54	670	.609	12.4	91.0
TEN[1]	62	764	.560	12.4	90.4
ECN	82	343	.223	4.2	75.2
TWN	50	352	.248	7.0	52.8
Sections[2]	2808	18866		6.7	
TCC Eastern	168[3]	1425			
TCC Central	124[3]	1082			
TCC Pacific	165[3]	1171			
Summary	3665	38538	EAN	18.6	—
Record	2981	28192	1.158	12.5	—

[1] SET information not included.

[2] Section and Local nets reporting (88): AENB, D, H, M, O, P, R, T, AM (Ala.); OZK (Ark.); HNN (Colo.); CPN (Conn.); FAST, FATT, FMTN, FPTN, FSBEN, GN, QFN, SATN, TPTN, WFPN (Fla.); GSN (Ga.); QIN (Ind.); ILN (Ill.); Iowa 75; KPN, KSBN, OKN, OKS, PI (Kans.); KRN, KTN, KYN (Ky.); LAN (La.); PTN (Me.); MEPN, MDDS, Termite (Md.-Del.); EMN, WMN (Mass.); M6TN, QMN (Mich.); MJN, MSN MSPN (Minn.); MNN, MTTN (Mo.); NEB (Nebr.); NJN, AREC, NJPN, PVTEN (N.J.); Roadrunner (N.Mex.); NLI, NYS (N.Y.); NCN, NCSB (N.C.); OSSB (Ohio); OLZ, SSZ (Okla.); EPA, EPEN, PFN, PTTN, VHFTN (Pa.); RISPN (R.I.); SDN (S.Dak.); ETPN, TN, TPN, TSSB, TTN (Tenn.); NTTN, TEX (Texas); BUN (Utah); VTNHN (Vt.-N.H.); VN, VSBN, VSN (Va.); WSN (Wash.); WVPN (W.Va.); BEN, SWRN, WSBN (Wisc.); APSN (Alta.); GBN, RPQ (Ont.-Que.).

[3] TCC functions performed not counted as net sessions.

January SET reports were included where possible; however, the number of net sessions during SET is an estimate.

January TCC reports:

Area	Functions	% Successful	Traffic	Out-of-Net Traffic
Eastern	168	91.1	3769	1425
Central	124	88.8	2328	1082
Pacific	165	89.1	2044	1171
Summary	457	89.8	8141	3678

TCC roster: Eastern Area (W3EML, Dir.) *W1s* BJG EFW EMG NJM, *W2s* GKZ MTA SEI, *K2s* KTK RYH, *WA2s* BLV UWA WBA, *WB2s* OYE RKK UHZ, *W3s* AIZ EML NEM, K3MVO, WA3BLE, *W4s* DVT NLC ZM, K4KNP, *W8s* CHT RYP UM, K8KMQ, *WA8s* OCG POS ZGC. Central Area (WØLCX, Dir.) W4OGG, *K4s* BSS DZM, WA4WWT, WB4AIN, W5KRX, *W9s* CXY DYG JUK VAY, *WØs* INH LCX TDR, *KØs* AEM YBD, *WAØs* DOU MLE. Pacific Area (W7DZX, Dir.) *W6s* BGF EOT HC IPW TYM VNQ, *K6s* DYX LRN IBI, *WA6s* BRG LFA ROF, *WB6s* HVA RJX, *W7s* AAF HMA ZB ZIW, WA7CLF.

Other Net Reports:

Net	Sessions	Check-ins	Traffic
7290	44	2174	1063
Mike Farad	57	507	378
Coast Guard	22	656	33
QTC	22	333	258
New England Teenage	31	354	325
East Coast Traffic	24	105	52
HBN	31	469	496
75 Interstate	31	1152	538
20 Interstate	22	481	3207
EATN	25	326	318
North American	27	616	392
Kans PON	—	792	126

QST

Portable and Mobile Regulations

A Summary of the Regulations for Operations Away from Home

At last, it's Spring. Now we can start contemplating those trips away from home. It's time to brush up on the rules for ham operating from a portable location, from a car or boat. Some changes were made last Winter, too — so you should read this even if you think you're with it.

Anytime you are going to operate away from home for more than 48 hours without a return to the address shown on your license, whether portable or mobile, you need to be covered by a notice to FCC. Formerly, such notices were valid for 30 days; under present rules they are valid for periods up to a year provided there is no change in the facts contained in your notice. For example, if you *always* go up to your country place the last week end of the month and operate from there, you can now send one notice for the whole year, giving the expected dates and the other information mentioned in this discussion. If you're a traveling salesman who *always* follows the same route, again you may submit one notice a year, giving the approximate dates and places for all your trips. If, after sending in a notice for either type of activity, you decide to *change* the routine in any respect, then an additional notice is required; otherwise, you need send a notice only once a year.

There are 24 FCC districts scattered around the country and its possessions, each headed by an Engineer-in-Charge and encompassing a certain amount of real estate. The approximate district boundaries are shown on the map; a list by counties can be found in the ARRL *License Manual*. You mail notices to the Engineer-in-Charge of each district in which you plan to operate. The point is that FCC wants to be able to reach its licensees within a reasonable time, and if you're not home it wants to know just where you can be reached. You may mail a postcard, carbon copy or even mimeographed notice early enough for the notification to reach each engineer before the operation begins. It's wise to make a notation in your log as well.

The following rules tell you exactly what information is required when sending notification of portable or mobile operation.

Section 97.97 *Notice of operation.* . . .
The notice required by this section shall contain the following specific information:
(a) Name of licensee.
(b) Station call sign.
(c) Authorized fixed transmitter location.
(d) Portable location(s), or mobile itinerary as specifically as possible, or temporary fixed transmitter location, or new permanent fixed transmitter location.
(e) The dates of the beginning and end of each period of operation away from the location specified in the station license.
(f) The address at which, or through which, the licensee can be readily reached.
(g) In the case of mobile operation, the official name, registry number or license number (including the name of the issuing state or territory, if any) of the aircraft, vessel, or land vehicle in which the mobile station is installed and operated.

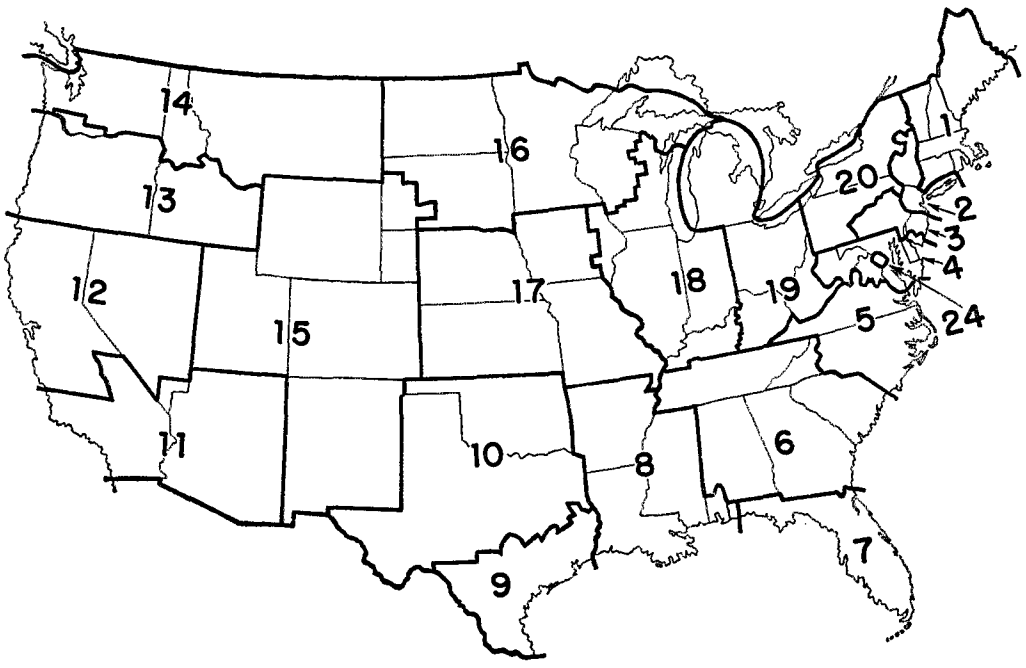
Canada: American hams whose vacation travel will take them into Canada can get permission from the Department of Transport, Ottawa, Ontario (or its Regional Offices) to operate under their U. S. calls in Canada. (Since there is no Canadian equivalent of the U. S. Novice and Technician Classes, holders of these classes are not eligible.) You should request the necessary forms from the Department of Transport a few weeks before your planned departure through Ottawa or the nearest of these: 739 West Hastings Street, Vancouver 1, B. C.; Federal Building, 9820-107th Street, Edmonton, Alta.; Winnipeg Gen'l. Post Office Bldg., 266 Graham Avenue, Winnipeg 1, Manitoba; 25 St. Clair Avenue East, Toronto 7, Ont.; Regional Administration Bldg., Montreal International Airport, Dorval, P. Q.; Federal Bldg., P.O. Box 42, 1081 Main Street, Moncton, N. B. A reminder: when a U. S. licensee operates outside the country, he is required to notify the FCC Engineer of his home district in advance.

Canadians coming south can get application blanks from the Secretary, Federal Communications Commission, Washington, D. C. 20554. The VEs also notify FCC Engineers for the districts in which travel is contemplated, in the same manner as W/K licensees.

Mexico: As a unilateral courtesy, without a formal agreement of any kind, Mexico has from time to time permitted U. S. amateurs to secure mobile licenses. For current information, write the *Liga Mexicana de Radio Experimentadores A. C.*, Apartado 907, Mexico 6, D.F., Mexico.

New Identification Rule: When you are operating mobile you need no longer show your approximate geographical location. Under rules adopted in 1967, the word "portable" or "mobile" is followed by the number of the call sign area in which you are located, for phone operation: ". . . W1XXX mobile three." When you operate c.w. away from home, it's just ". . . W3XYZ/6" whether you're portable or mobile.

On the high seas, you now indicate the region of the International Telecommunications Union in which you're operating. Region 1 is roughly Europe, Africa, the Near East and all of the U.S.S.R. Region 2 is the Western Hemisphere, including Hawaii. Region 3 is the remainder of the world, most of Asia and most of Oceania. For phone operation from a ship or airplane two hundred miles from Australia, you'd say ". . . W7QRK mobile Region 3"; on c.w.



United States Radio Districts

Address the District FCC Engineer-in-Charge

1. India and State Streets, Boston, Mass. 02109
2. 641 Washington Street, New York, N. Y. 10014
3. 2nd and Chestnut Streets, Philadelphia, Pa. 19106
4. Gay & Water Streets, Baltimore, Md. 21202
5. Granby & York Streets, Norfolk, Va. 23510
6. 240 Peachtree Street N.E., Atlanta, Ga. 30303
7. 51 S.W. First Avenue, Miami, Fla. 33130
8. 600 South Street, New Orleans, La. 70130
9. 515 Rusk Avenue, Houston, Tex. 77002
10. 1314 Wood Street, Dallas, Tex. 75202
11. 312 No. Spring, Los Angeles, Calif. 90014
12. 555 Battery Street, San Francisco, Calif. 94111
13. 620 S.W. Main Street, Portland, Ore. 97205
14. 909 First Avenue, Seattle, Wash. 98104
15. 19th Street at California, Denver, Colo. 80202
16. 6th & Market Streets, St. Paul, Minn. 55102
17. 601 E. 12th Street, Kansas City, Mo. 64106
18. 219 South Dearborn Street, Chicago, Ill. 60604
19. Washington Blvd at Lafayette, Detroit, Mich. 48226
20. Ellicott & Swan Streets, Buffalo, N. Y. 14203
21. 502 Federal Building, Honolulu, Hawaii 96808
22. 322 U.S. Post Office, San Juan, P. R. 00903
23. 4th Avenue at F Street, Anchorage, Alaska 99501
24. 1919 M Street, N.W., Washington, D. C. 20554

W7QRK/R3." The words "aeronautical mobile" and "maritime mobile" and the c.w. equivalents "AM" and "MM" are no longer a part of the identification. Nor is it necessary now to send your complete latitude and longitude under such circumstances.

Examples of Notices: First, a two-week vacation involving portable operations:

Engineer-in-Charge
Federal Communications Commission
India and State Streets
Boston, Massachusetts 02109
Dear Sir:

This is notice that amateur station W4ABC will be operated in portable status at Johnson's Camp, Algonquin, Maine, between April 25 and May 10, 1968.

John A. Smith, W4ABC
1357 W. Evergreen Ave.
Springville, Ala. 35146

Another for an extended mobile trip, with multiple copies in separate envelopes addressed to each district involved.

Engineers-in-Charge
Federal Communications Commission
Districts 18, 17, 15, 11
Gentlemen:

This is notice that amateur station W9XYZ will be operated in mobile status along the itinerary and for the dates shown below. Installation is in a 1968 Ford sedan, Illinois license plates 327-918.

May 4–6, 1968 U.S. Routes 30 and 6, Chicago to Omaha
May 7–9, 1968 Routes 6 and 30, Omaha to Denver
May 10–12, 1968 Routes 40 and 189, Denver to Provo, Utah
May 13/16, 1968 Route 91, Provo to Los Angeles, (% Mayfair Motel, Ocean View Ave., Los Angeles, Calif.)

Yours truly,
John A. Smith, W9XYZ
327 Brandon Avenue
Glen Ellyn, Illinois 60137

Or, to make things simpler, send a self-addressed stamped envelope to ARRL Hq., with your request for Forms S-43 (a) which the League has made up to help you file your Notice of Operation Away from Home.

Mobile Laws

In several states and municipalities, there are laws which deal in one way or another with mobile radio communications. While they affect normal amateur operation but little, it is well at least to know about their existence. We present herewith a summary of such laws on which we have been able to obtain information, with no guarantee of its completeness:

California: Los Angeles has a city ordinance prohibiting the installation in a motor vehicle of receiving equipment which can tune to municipal (fire and police) frequencies.

Connecticut: The law prohibits the operator of a motor vehicle from using two-way radio while such vehicle is in motion, but is intended primarily to cover subscribers to the telephone company's mobile service, and specifically exempts amateurs, RACES, and most other mobile services.

Florida: The law prohibits the use in a motor vehicle of equipment capable of receiving on police frequencies; however, amateurs are specifically exempted.

Indiana: Prohibits use in motor vehicles of equipment capable of receiving on public frequencies.

New Jersey: Prohibits use in motor vehicles of equipment capable of receiving on police frequencies, unless user has a permit from local chief of police.

New York: Same as New Jersey.

North Dakota: Prohibits installation and use of mobile short-wave receivers without a permit. (Like many others of this nature, the law was originally passed to give authorities a means to control "ambulance-chasers." To our knowledge it has never been applied to amateurs, though technically it could be.)

South Dakota: Same as North Dakota.

As a matter of interest, the states of Connecticut and Vermont prohibit the installation of a television set in a motor vehicle in a location where it can be seen by the driver!

It goes without saying that any amateur operating mobile should double-check to make certain he has his motor vehicle operator license, registration, and amateur license always in his possession.

Keeping an Amateur Station Log

The FCC requires every amateur to keep a complete station operating record. It may also contain records of experimental tests and adjustment data. A stenographer's notebook can be ruled with vertical lines in any form to suit the user. The Federal Communications Commission requirements are that a log be maintained that shows (1) the date and time of *each* transmission, (2) *all calls* and transmissions made (whether two-way contacts resulted or not), (3) the input power to the last stage of the transmitter, (4) the frequency band used, (5) the time of *ending* each QSO and the operator's identifying signature for responsibility for each session of operating. During a period of continuous mobile operation, the time of each transmission may be omitted, provided that the dates and times of commencing and terminating such mobile operation are entered in the log. Messages may be written in the log or separate records kept — but record must be retained for one year as required by the FCC. For the convenience of amateur station operators ARRL stocks both logbooks and message blanks, and if one uses the official log he is sure to comply fully with the Government requirements if the precautions and suggestions included in the log are followed.

Complete FCC Rules

Complete FCC amateur rules and explanatory comment are contained in the *Radio Amateur's License Manual*, available from ARRL, Newington, Conn. 06111, for 50¢ postpaid. QST

NEW BOOKS

Amateur Radio Incentive Licensing Study Guide, by Robert M. Brown, K2ZSQ/W9HBF, and Tom Kneitel, K2AES, published by Editors and Engineers, Ltd., New Augusta, Ind. 160 pages, 5½ *X* 8½, $2.75.

"Something new is being created: 'exclusive reserved bands,' something the United States has never known in its . . . Amateur Radio Service." When a knowledgeable reader finds such a statement in the opening paragraph of this new publication, he might wonder whether the remainder of the text could contain similarly-inaccurate information. And with good reason.

One would think that two hams earning a living in the writing field would at least have done a little research and not have committed such additional inexcusable goofs as reproducing and recommending use of a renewal form for amateur licenses which was discontinued in 1961!

Yet some of the material can be useful; the circuit diagrams are certainly reliable, since nearly all are identical to those in the ARRL *License Manual*. Unfortunately for the reader, the similarities are to an outdated manual and many of the sample test questions are based on the older FCC exams, not the current ones. On regulatory questions, their answers are often in error. E.g., one question refers to the 1947 Atlantic City documents, which have not been in effect for nearly 10 years; others give years-old suballocations for high-seas mobile, and for f.s.k. operation.[1] Several references in the text and promotional material indicate we hams total 200,000 — a figure applicable to 1960.

All of which belies the claim that "all material is fresh and up-to-date," and points to the conclusion that for someone who wanted to upgrade his license five or ten years ago, this might have been a very useful book. — *W1LVQ*

[1] Interestingly enough, the same (and then correct) answers given in the 1959 *CQ License Guide*, a flagrant plagiarism of the ARRL *Manual*, including wholesale copying of the schematics. — EDITOR.

Happenings of the Month

ADVANCED AND EXTRA FOR SHUT-INS

Plugging a gap in the present incentive license structure, the Federal Communications Commission has proposed new rules to allow volunteers to conduct examinations for Extra and Advanced Class. The suggested text would apply to applicants for the higher classes who are unable to appear at an FCC exam point because of protracted disability. The applicant would have to furnish a physician's certificate as is now done under the disability rule for Conditional Class. The examiner chosen by the applicant would have to hold a license equal to or higher than the class of license for which the applicant is being examined. Otherwise, the rules already in effect for tests supervised by volunteers would govern.

The proposal is known as Docket 17989. Any interested party may file comments with FCC on or before April 1. Replies to the comments of others may be filed until April 15. Formal participation calls for an original and fourteen copies, but the Commission customarily takes into consideration informal comments in letter form submitted by individuals. It is also possible that these deadlines will be extended if FCC is requested to do so.

The ARRL Executive Committee will be meeting as this issue goes to press to consider this docket and handle routine business.

LICENSE SUSPENSION

The First Class Commercial and Advanced Class Amateur licenses of Arthur H. Jones, Jr., W3IRL of 4017 Cold Spring Lane, Baltimore, Maryland, were ordered suspended for a period of three months in an Initial Decision issued by Hearing Examiner Chester F. Naumowicz. Mr. Jones was found to have fraudulently assisted an applicant to obtain an operator's license.

The hearing examiner stated that Mr. Jones, acting as a volunteer examiner, certified to the Commission on September 11, 1962, that William A. Azmon had passed the prescribed five word a minute Morse Code test which is part of the examination for the Technician Class Amateur license. On November 4, 1966, when Mr. Azmon was interviewed in the FCC Baltimore field office, he was able to identify only five Morse Code characters correctly. Under questioning he revealed that Mr. Jones, who had been his

The QST article, "Transceive with Transistors (Almost)," won the December Cover Plaque for author Varoujan Karentz, W1YLB. Making the award are Middlesex ARC prexy W1ILP, ARRL Director W1QV and Vice Director W1EAE. (Photo by WA1CDW)

WHO THE DEVIL IS WHO?

A Two-Letter Call Conversion Chart

One of the non-controversial features of the incentive licensing program was a change in the rules governing issuance of two-letter calls (e.g., W6XX) making these calls available on request to Extra Class licensees whose first license was obtained at least twenty-five years earlier.

After some delay, FCC's computer started turning out these choice monikers in February; here are some early results:

Now	*Was*	*Now*	*Was*
W1AM	W1CNB	W4MC	W4FFH
W1AU	W1KHW	W4MW	W4VCS
W1AX	W1JYH	**W5**AK	K5PNI
W1CE	W1JBI	W5CX	K5SYL
W1CW	W1WPO	**W6**CP	W6CPU
W2AH	W2KIT	W6DC	W6FJH
W2BJ	W2PEO	W6DL	WB6RTC
W2CJ	W2VRU	W6DM	W6YTA
W2CY	W2PZI	W6DQ	K6BPR
W2DF	W2NRV	W6DZ	K6RWO
W2FR	W2SEI	W6EJ	K6HOR
W2GA	WA2WEE	W6EL	K6CYG
W2GS	W2BBP	W6EM	W6MTO/FDY
W2HI	W2KIR	W6FJ	W6EZL
W2IN	W2TQZ	W6FN	W6GKK
W2IW	W2GFX	W6FU	W6VEB
W2IZ	W2MKT	W6GP	W6YMD
W3AC	W3JNM	W6JH	W6SFG
W3BI	W3MQY	W6MI	W6YZD
W3BQ	K3COR	W6RR	W6ITA
W3CZ	W3TXQ	**W7**BE	W7POU
W3EB	K3OKX	W7BK	W7JYZ
W3FU	K3CYA	W7BP	K7TJN
W3GO	K3BEK	W7BT	K7KGG
W3GN	W3MSR	W7BQ	K7JHA
W3GZ	W3FMC	**W8**AN	W8TZO
W3HK	W3ELI	W8AO	W8RGL/TPW
W4BW	W4CXA	W8BJ	WA8QYK
W4DD	W4LJE	W8BQ	W8DJD
W4DM	W4PTR	W8CC	W8IQS
W4DN	W4NFR	**W9**AE	W9EOV
W4EU	W4YHW	W9AN	W9JFA
W4EY	K4DGL	W9BQ	W9KQL
W4FF	W4QDF	W9CB	W9VUD
W4FY	W4EIE	**WØ**AW	WØVBR
W4HM	W4YGY	WØAY	WØNCK
W4HO	WA2MMW	WØBB	KØWPZ
W4IC	W4HUE	WØBV	KØYGR
		W9CC	WØGBD

Ham radio was represented at the Mid-America Boat Show at Cleveland's Public Auditorium. Chairman WA8OFT, K8ONA and K8IMF surround "Miss North America" (Lynda Hydock) as she poses at the exhibit's rig.

business partner in 1962, had certified him as proficient in code to enable him to get the license he required for the business. Mr. Jones did not testify in his own behalf.

In setting the three month suspension the hearing examiner stated that the offense threatens the integrity of the volunteer examiner system. While there are mitigating circumstances, in that except for the single incident Mr. Jones has earned a reputation for professional competence and integrity in his community, Hearing Examiner Naumowicz concluded that "the offense is too severe to be entirely without consequence."

The initial decision became final on December 20, 1967.

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A number of revocations, fines and suspensions of amateur licenses are in various stages along the legal road, and will be reported in *QST* from time to time as the penalties become final.

NEW JERSEY LICENSE PLATES

Speaker of the Assembly Albert Smith of New Jersey has introduced a bill, A-265, providing for call letter license plates for amateurs in the state. It is co-sponsored by Assemblyman Louis R. Aikins, W2VJH and has been sent to the transportation committee. Governor Richard J. Hughes is known to be opposed to the measure and can be expected to veto it. Supporters feel, however, that if the majority of amateurs and radio clubs support the bill, a veto can be overturned.

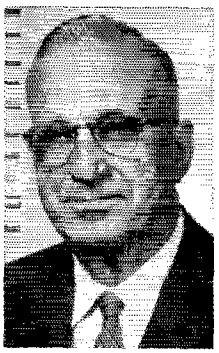
—···—

In Georgia, a bill has been introduced to allow "vanity plates" for an extra $10, but amateurs on the scene have taken steps to see that the amateur plates, which cost only a dollar, are not affected by the bill.

Behind The Diamond

Number 3 of a Series

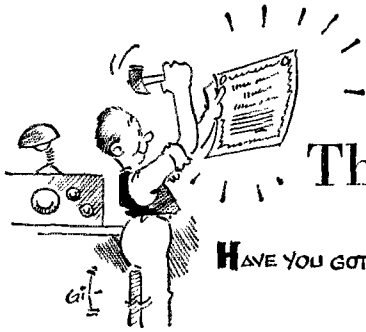
About thirty-five years ago a young college instructor had to take keys to the hamshack away from his best brass-pounder who was in imminent danger of flunking out. The two are still in close contact today: the student was George Hart, W3AMR/W1NJM, now communications manager of ARRL; his sympathetic but strict mentor was **Gilbert L. Crossley, W3YA,** ARRL director from the Atlantic Division, member of the Executive Committee and since 1966 a vice president of the League.



Gil not only represents the largest ARRL division, but one which is always hyperactive in League elections. Gil has been on the ballot eight times since 1953, has always had at least one opponent and 15 in all, and has tallied a total of 18,652 votes to 14,208 for the other candidates combined.

Two factors stand out: tenacity and travel. Director Crossley has stuck with good ideas, introducing them repeatedly at Board meetings until adoption. As for travel, Gil's current report shows 42 hamfests, dinners or club meetings visited and 9552 miles logged during 1967 alone.

Gil was first licensed in 1915, and has held the Extra Class since 1954. A League member since 1923 (and now a Charter Life Member), he was elected as first section communications manager for Western Pennsylvania in 1928. For eight years he held appointment under former director Brad Martin, W3QV, as assistant director. He has been an official relay, official phone and official bulletin station. Gil has been radio officer for Centre County and deputy radio officer for the State of Pennsylvania civil defense. He was also public relations officer for the U.S. Civil Defense Amateur Radio Alliance. He's presently assistant state director for Army MARS. Gil taught electrical engineering at Pennsylvania State University for 44 years, retiring with the title Emeritus Professor. He and his wife Navonne have twin sons and a daughter. One of the boys is Ed, W3SMF, also a Life Member. QST



Those Higher-Class License Examinations

In Six Parts — Part II

In our rearrangement of the FCC sample questions for the Advanced and Extra Class examinations, described last month, the second broad grouping included those that could be classified as dealing generally with circuits and their operation. This is the subject of the present installment. As there is no way to draw a really sharp line between "general" questions and those dealing with specific problems of transmitting and receiving, the selection of material is of necessity somewhat arbitrary. The studying you do for this section probably will be more comprehensive than actually is necessary, yet it will not be time wasted—later groups of questions will cover the extra ground you now explore.

Examination of the FCC samples below shows that they range through applications and characteristics of components (for the most part included in the study suggestions in Part I of this series), basic methods of operating amplifiers and oscillators, cathode ray tubes and displays, and some measurement procedures. As before, the study material is to be found in the *Handbook*. We recommend the following:

Components and applications: *Handbook* pages 52-55 in the 1967 and 1968 editions.

Rectifiers and associated filter data: Pages 326-335 (1967) or 304-313 (1968).

Amplifier circuit types and operating classes: Pages 59-75 in both editions; pages 81-86 (1967) or 80-87 (1968); pages 154-158 (1967) or 150-154 (1968).

Oscillators: Pages 73-75 in both editions; page 86 (1967) or 87 (1968); page 101 (1967) or 103 (1968); pages 149-154 (1967) or 145-150 (1968).

Measurements—basic, frequency, and the c.r. tube: Pages 518-529 (1967) or 528-539 (1968); pages 550-553 (1967) or 561-563 (1968).

It is necessary, too, to reiterate that you *may* get actual questions similar to those on related subjects in the General Class exam.

The FCC sample questions below are marked (A) and (E) to indicate, as before, that they come from the Advanced and Extra Class examinations, respectively. They are followed by a short quiz of our own in multiple-choice form. There aren't any formulas to be memorized for this group of questions, although actual questions may call for the use of some of those listed in last month's installment.

FCC Sample Questions

(A) How are bypass capacitors used? How should their impedance compare to the element they shunt?

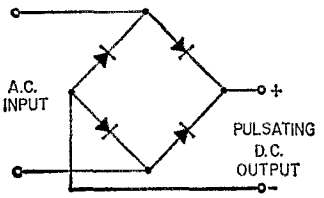
Bypass capacitors are used for providing a direct route for signal-frequency current through a part of a circuit where there is a possibility that it might take an undesired path. (As an example, the signal current should not be permitted to flow through the power-supply circuits of an amplifier stage.) The impedance of the bypass capacitor must be low compared with the impedance of the circuit to be bypassed. As an approximation, the impedance of the capacitor should not exceed 10 percent of the impedance of the circuit into which the signal current is to be discouraged from flowing.

(A) Why does a type 6146 tube have 3 prongs connected to the cathode?

The 6146 (and other types of tubes intended for v.h.f.) have multiple cathode leads to reduce the lead inductance between the actual cathode inside the tube and the ground point external to the tube. At v.h.f. the small inductance of the cathode lead can cause undesirable feedback from the plate circuit to the grid circuit. Connecting several leads in parallel reduces the total inductance as compared with the inductance of a single lead.

(A) How does a full-wave bridge rectifier operate? What is the schematic diagram of this rectifier circuit?

A full-wave bridge rectifier consists of four rectifying components, two operating in series on each half of the cycle; one rectifier is in the lead to the load, the other is in the return lead. The current flows through two rectifiers during one half of the cycle and through the other two rectifiers during the other half of the cycle. The basic schematic is shown on the next page.



Full-wave bridge rectifier

(A) Compare the pentode, tetrode, and triode for use in an r.f. amplifier stage. Give advantages and disadvantages of each.

Tetrode and pentode r.f. amplifier tubes designed for use in receivers have very low plate-to-control-grid capacitance, so feedback is generally insufficient to cause self-oscillation. Hence the stage can be operated without neutralization. The plate resistance of such tubes is very high; thus the tube does not load down the output tuned circuit to lower its Q and impair selectivity.

Transmitting pentodes and tetrodes also have low grid-plate capacitance, but its value is larger in power tubes than in small receiving tubes and feedback, although small, frequently is the cause of self-oscillation. In such cases neutralization is necessary. These tubes, particularly the tetrodes, have very high power sensitivity (ratio of r.f. output power to grid driving power), and many are capable of operating at full output without grid current (no driving power except that needed for supplying circuit losses) in Class AB_1. A disadvantage is the necessity for a screen-grid power supply, and the fact that with plate modulation the screen grid must be modulated along with the plate to obtain linear modulation.

A triode always requires high driving power for full output, and because of its relatively large grid-plate capacitance must be neutralized to prevent self-oscillation in conventional grid-driven circuits. In cathode-driven circuits neutralization may not be necessary with triodes designed for this type of operation.

(E) Why is there a practical limit to the number of stages that can be cascaded to amplify a signal?

Although there is no theoretical limit to the number of amplifying stages that can be cascaded, it becomes difficult to maintain stability in a practical amplifier when the overall gain is very high. With very high gain an extremely small fraction of the output power, when inadvertently introduced into the amplifier's input circuit, can cause self-oscillation. Such feedback is difficult to prevent in practical construction. It is particularly difficult in amplifiers operating at radio frequencies. Also, there is a practical limit to *usable* gain because signals weaker than the noise (thermal noise and shot noise) generated in the amplifier's front end remain masked by the noise no matter how great the amplification, since both signal and noise are amplified equally.

(E) How are grounded-grid amplifiers used in electronic circuits? List some advantages and disadvantages of their use.

The grounded-grid or cathode-driven amplifier has found little or no application at audio frequencies, but is used extensively for r.f. amplification, both receiving and transmitting. The grid is maintained at ground potential and the signal or driving voltage is applied to the cathode, the output being taken between plate and ground. The feedback capacitance from the output to the input circuit of a triode tube operated in this way is considerably less than the feedback capacitance when the cathode is grounded and the grid is driven; as a result, triodes of suitable internal construction can often be used without neutralization at h.f. and even v.h.f.

In grounded-grid operation the cathode circuit and plate circuit are, in effect, in series. The driving stage therefore contributes to the total output power, in addition to supplying the normal driving power (if any is needed) for the amplifier tube. Since the driver is supplying its share of the output power at low voltage, the impedance it "sees" in the cathode-driven circuit is relatively low. Because of this extra "fed-through" power taken from the driver the power gain of a grounded-grid stage is comparatively low, but the output is high and the plate efficiency is otherwise comparable with grounded-cathode operation. As a linear amplifier for s.s.b., the grounded-grid amplifier provides a better load for the driving stage than a grounded-cathode amplifier operating Class AB_2 or Class B_2. This is because the relatively high ratio of fed-through power to power actually consumed in the grid-cathode circuit of the amplifier tube makes the load on the driver fairly constant; thus no "swamping" is needed as would be the case with a grid-driven amplifier in which grid current flows over part of the modulation cycle.

The grounded-grid amplifier is useful as an r.f. amplifier in v.h.f. receivers because a triode, which has lower noise than a pentode, can be used with very simple neutralizing circuits or none at all, while neutralization of a grounded-cathode amplifier that must be tuned over a considerable frequency range would be difficult at these frequencies. The low input impedance readily can be matched to the antenna system for maximum signal-power transfer.

As compared with a grounded-cathode amplifier in transmitting applications, the principal disadvantage of the grounded-grid amplifier when used as a Class-C amplifier for c.w., f.m. or f.s.k. is that more driving power is required. Also, for amplitude modulation it is generally necessary to modulate the driver along with the amplifier if 100-percent modulation is to be secured. In s.s.b., the grounded-grid amplifier's extra driving power requirements are a disadvantage only when compared with Class AB_1 operation with grounded cathode; in Class AB_2 or Class B_2 the power required from the driver for low distortion is roughly the same because of the necessity for swamping.

(A) When is an amplifier operating Class A? Class B? Class C?

A Class A amplifier is one operated in such a way that the waveform of the signal output voltage is identical with the waveform of the signal input voltage. With vacuum-tube amplifiers this is achieved by using a value of grid bias that places the operating point in the center of the linear portion of the grid-voltage/plate-current characteristic and confining the signal amplitude to the linear part of the characteristic. Usually, the grid is not driven positive with respect to the cathode in Class A operation. In transistor amplifiers the base bias is chosen so that the relationship between base current and collector current is linear over the entire signal cycle.

A Class B amplifier is one in which the signal output power is proportional to the square of the signal input voltage. (This relationship also is true of power and voltage in a simple resistance, a "linear" device, so the Class B amplifier is a "linear" amplifier.) Class B operation is achieved by choosing an operating point such that the amplifier takes little or no d.c. power in the absence of signal, and then driving the amplifier into conduction over the linear portion of its grid-voltage/plate-current curve, in the case of a vacuum-tube amplifier, and over the linear portion of its base-current/collector-current characteristic in the case of a transistor amplifier. Since the amplifier is operated near its "cut-off" point (for plate current or collector current) it is beyond cutoff during most of one half-cycle of the signal input, so the output is delivered in approximately half-cycle pulses. In a Class B radio-frequency amplifier the pulsating output is made sinusoidal by the use of a tuned output tank circuit, which filters out the r.f. harmonics generated in the amplification process.

The Class B amplifier can be used for audio amplification if two such amplifiers are connected in push-pull. The amplifiers then conduct on alternate half cycles and the combined output reproduces the complete waveform.

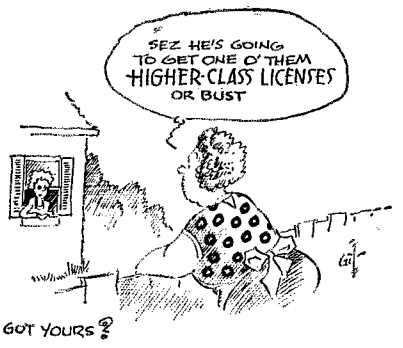
The Class C amplifier is primarily one in which the signal power output varies as the square of the instantaneous value of the plate voltage — that is, it is an amplifier that is capable of being modulated linearly by an audio source. With vacuum tubes, Class C operation is achieved by making the plate current flow in short pulses, the amplitude of which depends on the instantaneous plate voltage. As the plate-current pulses must have a duration of less than one half cycle of the signal input, the grid bias must be well beyond the value that gives plate-current cutoff. Similar considerations apply to the collector current and base bias of transistor Class C amplifiers. The Class C amplifier is used at r.f., where the tuned output tank circuit filters out the harmonics generated in amplification and makes the r.f. output essentially sinusoidal.

(E) List several advantages and disadvantages each for Class A, Class B, and Class C amplifier operation.

The principal advantage of the Class A amplifier is that its output is a reproduction of the entire waveform of the input signal, usually with little or negligible distortion. As commonly used, the vacuum-tube Class A amplifier also takes no power from the signal source (this, however, is not true of Class A amplifiers using the conventional type of transistor). The fact that the actual signal waveform is reproduced without distortion makes the Class A amplifier useful in broad-band applications, because resonant circuits are not required for suppressing harmonics. The disadvantage of Class A operation, in power amplification, is that the amplifier efficiency (ratio of useful output power to power-supply input power) is low — of the order of 15 to 25 percent in most cases. Also, the maximum power dissipation occurs when there is no input signal, since in a Class A amplifier the input power remains constant with or without signal. Thus an amplifying device having relatively large power dissipation capability is required if appreciable power output is to be secured.

The principal advantage of the Class B amplifier is that its efficiency is relatively high — of the order of 75 percent at maximum signal input, with modern vacuum-tube tetrodes and with transistors. With proper adjustment, the alternating output voltage across a load resistance is proportional to the signal voltage applied to the input of the amplifier — that is, the relationship between input and output is linear. However, since the plate or collector current flows over only a little more than one half cycle of the input waveform the simple Class B amplifier is not suitable for audio amplification; the distortion in the output signal would be intolerable. The amplifier may be used at radio frequencies if an output circuit having sufficiently high Q to suppress the r.f. harmonics created by Class B amplification is used. In such case, the linear relationship is used to advantage in the amplification of modulated signals, since the modulation envelope will be reproduced in the output with relatively little distortion. In general, Class B amplifiers require power from the driving-signal source over part or all of an input half cycle. This may cause distortion unless proper precautions are taken to maintain good voltage regulation in the driving source under the varying load represented by the Class B amplifier's input circuit. Class B operation can be used at audio frequencies if two tubes or transistors are used in push-pull (or its equivalent), in which case one amplifier supplies one half of the output waveform and the second supplies the other, thus reproducing the entire signal input waveform. The push-pull circuit also can be used at radio frequencies, although it is not necessary for linear operation since a single amplifier can reproduce the modulation envelope of a modulated signal as explained above.

The Class C amplifier operates at the highest efficiency of any type and therefore is capable of developing more output power, for a given dissipation rating in the tube or transistor, than Class A or B amplifiers. However, the operating condi-



tions (plate or collector current flowing during less than half the signal input cycle, and peak driving voltage such that the amplifier is driven into plate-current or collector-current saturation) cause the output waveform to be highly distorted, and the relationship between driving voltage and output voltage is not linear. The Class C amplifier therefore is not suitable for the amplification of modulated signals, or for any applications — as at audio — where low distortion of the input signal is required. In Class C r.f. amplifiers the waveform distortion is substantially eliminated in the output by the use of tuned circuits having sufficiently high Q to suppress the harmonics generated in the amplifier, but the nonlinear relationship between input and output voltage remains. Class C operating conditions are favorable for direct modulation of an r.f. amplifier, and this type of amplifier is almost invariably used in the modulated stage of an amplitude-modulated transmitter. In practice, Class C amplification requires considerable driving power from the input signal source, so the power amplification ratio of a Class C stage is considerably lower than in Class B or Class A amplifiers.

(E) What improper operating conditions are indicated by the upward or downward fluctuations of a Class A amplifier's plate current when a signal voltage is applied to the grid? How can this be corrected?

Upward fluctuation of Class A amplifier plate current with excitation indicates excessive negative grid bias: hence, the grid bias should be decreased. Downward fluctuation of plate current with excitation indicates insufficient negative grid bias; hence, the bias voltage should be increased. (Either condition also may be caused by overdriving, for which the remedy is obvious.) The correct bias is the value which allows the plate current to remain unchanged when a signal is applied to the grid circuit. (Because of unavoidable nonlinearities in practical amplifying devices, Class A power amplifiers operating at maximum drive and output will show a *small* upward shift in plate current in normal operation, although there would be no such shift in an ideal amplifier.)

(E) What improper operating conditions are indicated by grid current flow in a Class A amplifier?

This indicates that the tube is being overdriven — that is, the driving-signal voltage is too large. (Note: In Class-A operation as normally used, the grid is never driven positive. However, this is not a *necessary* condition for Class A; the basic definition is that a Class A amplifier is one in which plate current flows throughout the signal cycle. The grid can be driven positive, and thus result in grid-current flow, provided the driving stage can deliver power into the variable grid load without distortion.)

(A) What are some common types of oscillators employed in amateur equipment? How can each be identified in circuit diagrams? What part does feedback play in these oscillators? What points in the circuits should be coupled to provide good feedback?

(See earlier *Handbook* references for circuits and identification.)

Feedback is a method of introducing a small amount of the output power into the input circuit, in phase with the input signal, to sustain oscillation. In a vacuum-tube oscillator, the plate and grid circuits should be so coupled.

(E) What factors determine the frequency at which a quartz crystal will oscillate?

The factors determining the frequency at which a quartz crystal will oscillate are its physical dimensions (in high-frequency crystals, principally the thickness) and mode of vibration, the angle at which it was cut with respect to the optical axis and the manner in which it is mounted. The exact frequency is also a function of the crystal temperature and the electrical characteristics of the circuit in which it is used, particularly the circuit capacitance that may be in shunt with the crystal.

(E) What frequency should a crystal oscillator circuit be tuned to for maximum stability?

Minimum power dissipation in the crystal and consequently less heating and frequency change will occur when the feedback in the oscillator is such that the least r.f. voltage, consistent with the required output amplitude, is applied to the crystal. If the oscillator circuit is one having an adjustable tuned circuit, the tuning should be set as far as possible from the resonant frequency of the crystal while maintaining satisfactory operation.

(E) What determines the fundamental operating range of a multivibrator?

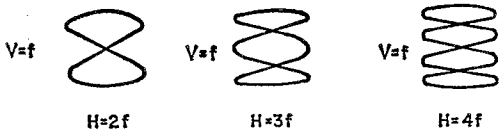
The fundamental operating range of a multivibrator is determined primarily by the time constants of the RC feedback circuits. It is also affected by the characteristics and operating voltage of the tubes or transistors used in the circuit.

(E) How does a cathode-ray-tube operate? How should the plates of a cathode-ray tube be biased?

In the cathode-ray tube, a narrow beam of electrons, formed in an electron "gun," is directed toward a fluorescent coating on the front transparent face of the tube. On striking the coating, the beam causes the fluorescent material to emit a spot of light. The position of the spot can be changed by deflecting the beam, after it leaves the gun, by applying voltage to pairs of "deflecting plates" set at right angles. Alternating voltages cause characteristic patterns to be formed on the tube face. The plates should be biased so that the spot, when at rest, is at a desired position (usually the center) on the tube face.

(A) What are Lissajous figures in oscilloscope operation? What scope patterns would be produced if the signal applied to the horizontal input has a frequency equal to two, three and four times the frequency of the signal applied to the vertical input?

Lissajous figures are oscilloscope tracings showing the amplitude, frequency and phase relationships of two a.c. signals, one applied to the vertical deflection plates and the other to the horizontal plates. A signal applied to the horizontal input with twice the frequency of that applied to the vertical input would produce a figure-8 pattern. This and the other examples are illustrated for the case where the signals are in phase.



(E) Should a voltmeter have high or low internal circuit resistance? Explain.

A voltmeter should have high internal circuit resistance. A low-resistance meter would draw a relatively large current from the circuit under test, and if the circuit itself has high resistance, the reading will be low as compared with the true conditions existing without the meter in the circuit.

(E) What means may be employed to measure low frequencies? High frequencies? V.h.f. and u.h.f.?

In principle, the same basic methods can be used for all frequencies. All methods use, ultimately, some well-established standard as a reference.

Measurement at amateur frequencies for example, is generally based on standard-frequency transmissions from WWV. For radio frequencies one widely used system employs a 100-kc. crystal oscillator and its harmonics, which are useful up to 30–50 Mc. as a rule. A 1000-kc. crystal oscillator also is frequently used, the harmonics being detectable to 150 Mc. and higher. In either case, some means for adjusting the oscillator frequency is always provided so a harmonic can be set to exact zero beat with one of the several standard radio frequencies transmitted by WWV. Although such oscillators provide only "check points" at 100-kc. or 1000-kc. intervals, they establish with high accuracy the limits of many amateur bands and sub-bands. For smaller intervals frequency dividers generating signals at subharmonics of the oscillator frequency — e.g., 50 kc., 10 kc., etc. — can be used for equal percentage accuracy at intermediate points.

Measurement is accomplished by using a receiver to determine the pair of adjacent check points between which the unknown signal lies. A more exact measurement of the frequency can be made by using the receiver dial for interpolation between the check points, after calibration (the dial can be calibrated from a series of check points) or by comparing the audio-frequency beat note between the signal and a check point with a calibrated audio oscillator set to the same tone.

An alternative method is to use a heterodyne frequency meter, a tunable oscillator covering some fairly-low-frequency range, such as 1750–2000 kc. or 3500–4000 kc. and thus limited to amateur-band coverage, and carefully calibrated against known check points such as those from a 100-kc. crystal oscillator. The signal (and its harmonics) from the heterodyne frequency meter can be adjusted to zero beat with the unknown, using the receiver, and the frequency read from the calibrated dial of the meter. For checking the station transmitter, a simple detector can be built into the frequency meter as a detector for zero beat, the receiver sensitivity not being necessary in this case because the transmitter signal is strong. The disadvantage of the heterodyne frequency meter is that its accuracy is not comparable with that of the standard against which it is calibrated, in the absence of a continuous check against the standard, because of frequency drift and other factors that affect the frequency of self-controlled oscillators.

Frequency measurement in the audio range is usually by means of a variable audio frequency oscillator. An accurate calibration can be made by using the standard audio frequencies transmitted by WWV as modulation on its r.f. carrier. An assortment of calibration points can be obtained with Lissajous figures on an oscilloscope pattern, using the standard audio frequency signal on one set of plates and connecting the oscillator output to the other set.

For rough frequency measurements around a transmitter where r.f. power is available, an absorption wavemeter may be used. The wavemeter is a simple tuned circuit, usually provided with some type of indicator which either shows the relative r.f. current in the circuit or the relative r.f. voltage developed by the circuit; either will be maximum when the wavemeter

circuit is tuned to resonance with the unknown frequency. In some cases an indicator may not be necessary, since the circuit being checked may itself be capable of indicating the resonance setting of the wavemeter; a sharp change in the plate current of an amplifier is an example.

In the u.h.f. range there may be practical difficulties in applying the standard check-point method described above. In such cases a linear variation of the absorption wavemeter — Lecher wires, for example — will serve for measurement of the wavelength, which can then be converted into frequency. Measurement accuracy is not as high as might be desired, however.

Examination-Form Questions

Q1. What principal advantage does a grounded-grid amplifier have over a grounded-cathode amplifier for linear amplification of single-sideband signals?

A — It doesn't need a grid choke.
B — It gives more power output than a grounded-cathode amplifier.
C — It never needs to be neutralized.
D — It inherently provides a constant load for the driver.
E — It can be coupled more easily to the exciter.

Q2. If the frequency of a vacuum-tube crystal oscillator drifts noticeably in a short period after a cold start, which of the following are the most probable causes?

A — The plate power input is too high.
B — Tube heater voltage is low.
C — Feedback is excessive.
D — Grid-leak resistance is too low.
E — There is not enough feedback.

Q3. If the plate voltage on a Class C amplifier is reduced to one-half, what should happen in its output circuit?

A — The power output should be one-half its former value.
B — There should be no change in power output.
C — The plate current should not change.
D — The plate current should decrease to one-half its former value.
E — Both the plate current and power output should decrease to one-fourth the former values.

Q4. What is the purpose of a multivibrator in frequency-measuring equipment?

A — It stabilizes the oscillator in a heterodyne frequency meter.
B — It can be used as a substitute for a crystal in a secondary standard.
C — It acts as a frequency divider and harmonic generator.
D — It is an efficient frequency multiplier.
E — It controls the feedback in a crystal oscillator to improve the waveform.

Q5. Name a distinguishing feature of Class A operation with a transistor amplifier.

A — The d.c. collector current does not change when a signal is applied to the base-emitter circuit.
B — The amplifier always has a bias resistor in the emitter return circuit.
C — The base and emitter are at the same d.c. potential.
D — Transformer coupling has to be used.
E — Class A operation is usable only at audio frequencies.

Q6. Which of the following statements is true?

A — A Class C amplifier is useful in radiotelephony only when it is plate-modulated.
B — The plate efficiency of a Class C amplifier is essentially constant at all levels of plate voltage.
C — A Class A amplifier makes a good frequency multiplier.
D — Class A, B and C amplifiers require different basic circuits in r.f. amplification.
E — A Class B amplifier is usable only for linear r.f. amplification.

Q7. What is the purpose of plate decoupling circuits in multistage transmitters?

A — To prevent intrastage parasitic oscillations.
B — To avoid overdriving the final amplifier.
C — To regulate the coupling to the antenna circuit.
D — To prevent generating harmonics in the TV bands.
E — To reduce the possibility of feedback between stages.

(*Answers on page 166.*)

(*Please note:* In the answers to questions in Part I, page 148, March QST, the captions for the drawings should be transposed.)

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I.A.R.U. News

INTERNATIONAL AMATEUR RADIO UNION

GB2LO AT CITY OF LONDON FESTIVAL

An unusual feature of the 1968 City of London Festival, July 8th to 20th, will be the amateur radio station installed and operated by the *Radio Society of Great Britain.*

Equipment will be operated by volunteers on the amateur frequencies in the 10, 15, 20, 40 and 80 meter bands under the call of GB2LO. The Society's Public Relations personnel will be on hand to explain the station and its function to visitors.

INTERNATIONAL MEETING WILL SIGN VK1EC

This month, the Economic Commission of Asia and the Far East (ECAFE) will hold their 24th Session in Canberra, Australia. This is a very important international conference and many top government officials will be present.

Because of the importance of the occasion, the call VK1EC (Economic Commission) has been issued for the three weeks of the Conference. Operation will center on 20-meters s.s.b. and conventional a.m., and possibly some 40- and 80-meter activity. All stations contacted will receive a special QSL for the event.

EA6ITU

During the CCIR sessions (broadcasting study groups of the International Telecommunications Union) at Palma, Majorca, April 27–May 10, it is expected that EA6ITU will be in operation.

QSL BUREAU CHANGES

The following are new QSL bureau addresses; a complete bureau list will appear in the June issue. Norway: *Norsk Radio Relae Liga*, P.O. Box 21 Refstad, Oslo 5, Norway. Canada: (VE2 Bureau) J. Ravenscroft, VE2NV, 353 Thorncrest Ave., Dorval, P.Q., Canada. Australia: (VK3 — Victoria) E. Trebilcock, 340 Gillies Street, Thornbury, Vic. 3071. (VK4 — Queensland) Inwards QSL Officer, Box 638J, GPO, Brisbane, Qld. 4001. (VK5, VK8 — South Australia) G. W. Luxon, VK5RX, 27 Belair Rd. Torrens Park, S.A. 5062.

At the October, 1967 meeting of the VK6 Branch of the Wireless Institute of Australia, VK6RU received an award for his 21 years of service as VK6 QSL Manager. (Photo by VK6KK.)

DJ6QT is shown receiving an ARRL DX Competition award for top European phone score from Deutscher Amateur Radio Club president DL1QK.

Here are some of the gang you may have worked in the Bermuda contest sponsored by the *Radio Society of Bermuda:* From left are (seated) VP9FW (Bermuda's only YL), VP9DL, VE1PL (last year's contest winner), VP9CP, VP9BY, VP9AX, (standing) VP9FK, VP9FU, VP9AK, VP9FO, VP9BN, VP9FW, VP9L, VP9FX, VP9BO, and VP9FJ.

FAREWELL RSGB BULLETIN

Starting with the January, 1968 issue, the name of the official publication of the Radio Society of Great Britain has changed from RSGB Bulletin to *Radio Communication*. RSGB points out that the name change was made not to imply a change in direction, but to better indicate to the uninitiated the area of interest covered by the journal.

SPANISH CONVENTION

The *Union de Radioaficionados Espanoles* will hold their II Convention Internacional de Radioaficionados en Espana in Zaragoza, May 22–26, 1968. The program will include meetings, tours, luncheons and dinners. Detailed information and registration cards may be obtained from: Delegacion URE, Apartado 86, Zaragoza. Registration deadline is April 15.

MEXICAN CONVENTION

Liga Mexicana de Radio Experimentadores announces that their National Convention will be held in the city of Monterrey from May 30, to June 1, 1968 (the weekend before the ARRL National Convention in San Antonio). Visiting U.S. amateurs will be able to obtain temporary licenses to operate from Mexico. For further details write *LMRE*, % Antonio Pita M,. XE1CCP, Paseo Echegaray 106, Echegaray, Mexico.

Above are Floro Spinelli, LU7CK, President of the Radio Club Argentino, and (right) Secretary Justino Gimenez, LU9AW.

April 1943

. . . Editorially, K. B. Warner comments on WERS, not only as an emergency network applicable to situations directly caused by acts of the enemy, but also as a highly useful and necessary facility to be used in the case of natural disasters, such as floods, hurricanes and the like. Some inland communities seem to believe that they are immune to enemy action and have been slow to take up and implement WERS and it is hoped that the realization of their potential usefulness in the case of natural disasters affecting the public safety will stir some of the lazy communities to action.

. . . We have previously paid visits to the Army, Coast Guard, Air Force and Navy. This month Clinton B. DeSoto, W1CBD, takes us on a tour of Camp Lejeune, N. C. where the Marines are busy transforming ordinary young fellows into tough, highly-trained fighting men. Radio operators here are also fighting men, as is every Marine. Copiously illustrated with photographs supplied by the Marine Corps, you get a real good look at what goes on at this and other camps.

. . . Want to build a siphon tape recorder so that you can see what kind of fist that high speed artist has? This recorder, described by J. P. Gilliam, W9SVH, won't record music or speech but produces a wavy line resulting from c.w. signals. These have been in use commercially for quite some time and some operators can copy code from the tape at a speed fifty percent faster than by ear. This writer knew a couple of fellows who read the tape at 65 to 70 w.p.m. for two hours at a stretch. The device looks a little complicated to build, but might well be done as a club project. Samples of the tape are shown.

. . . George Hart, W1NJM, Acting Communications Manager, points out that a seeming conflict in rules governing WERS is easily resolved if one remembers that normally FCC is in control of WERS operations, but in case of enemy action the army takes over. Under the former, call signs must be given at the beginning and end of each transmission of whatever length. During an attack, say, no call signs are to be used and transmissions must be limited to 30 seconds duration and then no oftener than once every two minutes.

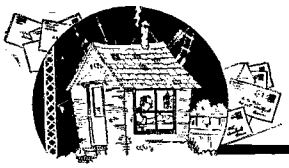
. . . George Grammer, W1DF, continues this course in elementary a.c. mathematics, this time discussing such things as average and effective values. You should read this one, if your old issues are handy.

. . . Having previously referred in this column to various WERS rigs employing self-excited oscillators and sometimes m.o.p.a., we now have a crystal-controlled transmitter for WERS purposes. This is described nicely by F. E. Brooks, Jr., W5JLZ.

— *W1ANA*

Strays

Bulletins of local weather conditions, astronomical events, and other scientific data of interest to radio amateurs are transmitted daily from WA1IOX at the Talcott Mountain Science Center (see June, 1967 *QST*, p. 56). Bulletins begin at 1630 GMT on 145.54 Mc. and are followed by a period of listening for other stations.



Correspondence From Members-

TECHNICAL ABILITY

¶ Your salute to Rod Newkirk caused me to go back 26 years with some nostalgia and the thought that perhaps there is a hidden message of sorts here for the young amateur of today and the proponents of limited licensing and limited technical ability etc.

In 1942 there developed a critical need for high speed radio operators and the plea went out accordingly. A group of very young amateur radio operators volunteered for such work with radio station WAR.

It was certainly no small tribute to amateur radio to see these 20-year-old boys within a few weeks take their seats alongside the finest radio operators in the world and become respected by their superiors and fellow operators.

It was my pleasure to have been one of those boys along with Rod Newkirk. I also recall a skinny individual named Len Chertok, W3GRF, and very clearly remember a handsome devil coming in one day for his first day's work and paying more attention to all the good-looking girls in the station than the business at hand: Bob Denniston, WØNWX.

In later years as a Marine Corps communicator I saw a transition from the usual stroke of good luck to have a radio amateur assigned to your unit to recent years where having an amateur radio background means little or nothing on the record.

Whose fault is it that the state of the art has become so simplified that so many radio amateurs are just not interested in going behind the on-off switch? I think amateur radio has lost something along the line but I am also thankful that something like this comes up to remind us of the days that were a bit different to say the least. — *Norman Gertz, Providence, Rhode Island.*

¶ Quite a few people maintain that amateur radio doesn't lead anyone to a career, as it did in the past. I don't know if one case means anything. However, for what is is worth, my case seems to refute the critics.

Like many who choose astronomy as a career, my decision was made at a very early age (about 12!). All of my education beyond high school has been devoted to preparation for the Ph.D. in Astronomy. In my particular case, I had envisioned myself as an optical astronomer. You know the type — long hours at the eyepiece of a large telescope in any kind of clear weather, even longer hours interpreting the resulting data.

In 1965, I was introduced to amateur radio by my younger brother, Andy, WB2RZU who had just become a Novice. Anopheles Marconi bit and I got my Novice, and Tech., and then General, principally due to the code practice from W1AW. I did then and do now get considerable enjoyment from amateur radio. The kind of enthusiasm that amateur radio creates is bound to spill over into other areas.

My advisor must have noticed the shift in my interests because when I successfully passed the Ph.D. qualifying exam in the beginning of December, he surprised me with the suggestion that I might like to do a thesis in radio astronomy. This is highly unusual because this institution has never had anyone do a thesis in radio astronomy! It was doubly a surprise since the work was to be done at the National Radio Astronomy Observatory, the finest institution of its kind in the world.

As a result, it would appear that I am going to become a radio astronomer. It is clear to me that amateur radio will be responsible for my career. Now I can spend those long hours monitoring radio noise. Anyway, the control room is heated. Hi! — *William J. Webster, Jr., WB2TNC, National Radio Astronomy Observatory, Charlottesville, Virginia.*

FREE AIR?

¶ I am aroused to the point of concerned anger by continual assertions that we owe our use of the radio spectrum to the fact that the government feels amateur radio to be in the public interest. This may very well be true but if so it is a shameful state of affairs unless the "public" in whose interest amateur radio operates, consists of the quarter of a million or more radio amateurs.

Every citizen in this country and especially those who are directly involved in its government had better realize that the *government* (including the FCC) exists because *it* is in the public interest and not vice versa. Otherwise we will soon see the completion of the metamorphosis of our "free" country into a socialistic totalitarian state which will eventually be dissolved into anarchy by the rebellion of those who have had a taste of freedom. It isn't difficult to see these very trends in our society today.

Two facts seem clear: (1) A large proportion (probably a majority) of those interested in personal use of the radio spectrum for the purpose of transmission as well as reception are radio amateurs. (2) The air is free, no one has more nor less of an *a priori* right to it than anyone else. Therefore, the only point of view that will keep our country free demands that we take the position illustrated by the following summary: We who are interested in amateur radio have organized into various amateur radio societies in order to increase our enjoyment of the hobby. We insist on a proportional share of the spectrum and we *invite* the Government, in the form of the FCC, to regulate our activities in order to establish sound operating procedures and put the force of law behind them. We do this because it is in *our* best interest to do so, because we enjoy our hobby most when it is so regulated. But the regulations which are in force must, for that reason, be so because we request them and not at the whim of some government agency.

As I see it, your editorial of February 1968 reflects a lamentable state of affairs. When are we going to wake up and return to the ideal of government of the people, by the people, and for the people? — *Richard B. Davidson, WB6VSP, Los Angeles, California.*

[EDITOR'S NOTE: If OM Davidson's premises were followed, then a million CBers — who have as much "right" to "insist" as we — could properly claim five times as much spectrum as amateurs have. Thank goodness access to the spectrum *is* determined mostly on the basis of contribution to the public interest and not on sheer numbers or other political bases.]

ADVANCEMENT

¶ After going into amateur radio only a year ago and receiving my General as my first license, I was a little unhappy when the new licensing procedure was announced.

But I bought a new copy of the *License Manual* and began studying all over again. This morning I passed my Advanced Class on the first try.

I now think the licensing procedure is better in many ways. As soon as my two years of holding a license expire in May of 1969, I will try for the Extra Class. — *T. L. Caldwell, W4BHTS, Audobon, Pennsylvania.*

¶ You may be interested to know that I started my study in amateur radio in July 1967.

I passed my Novice in November, 1967.

I passed the Technician December, 1967.

I passed the General January, 1968.

I passed the Advanced February, 1968.

When my two years waiting period is up I will take the Extra Class. Thanks for your helpful publications. I am 50 years of age — enjoying amateur radio very much. — *F. Theodore Wilder, WB4ICZ, Griffin, Georgia.*

¶ At first I was very skeptical about the whole idea of "incentive licensing." In fact, it sounded terrible. Like many other hams I didn't really learn the theory — just kind of. Now I'm ready to improve myself. I don't care to be a run-of-the-mill ham operator. — *James H. Larsen, WA0LPK, Ames, Iowa.*

¶ Thanks for helping me to get my Extra ticket today.

The code practice sure comes in handy. *QST* also helps a lot with theory not to mention the *Handbook* or the *License Manual.*

Let me say I was in favor of the new system of licensing; had it not been for the extra incentive I would have been later in getting the Extra Class license. All of us are a little lazy to say the least and this was just the kick in the pants I needed to get going or be left behind. — *Peter C. Johnson, K1VCH, Somerset, Massachusetts.*

¶ I recently took the new Advanced Class examination which, as I had expected, was a formality — somewhat easier, in my opinion, than the General Class test I took eleven years ago. Probably this was unavoidable, as there simply is not enough difference between the General and Extra Class technical requirements to permit any real gradation of difficulty in an intermediate test. What I do not see, is why anybody from now on is going to bother with the General Class license. Any man who has passed the 13 w.p.m. code test is a fool if he does not go for the Advanced directly; there is so little difference between the two tests that if he can pass one he can pass the other.

The predictable result will be the transformation of the General Class into a very large static group of holdovers, most of whom, being relatively inactive, will never bother trying to go higher. And to save these gentlemen the trouble of showing up at an FCC field office, the rest of us are about to be afflicted with an insanely complicated system of reserved sub-bands, with all the makings of a citizens-band type of enforcement mess.

The League's original proposal, in RM-499, would have avoided some of this by phasing the General Class out entirely in the major high-frequency 'phone bands. I supported this proposal, even though the League apparently thought better of it. Before very long, they may have reason to revive it. — *Jonathan T. Morey, W2HXF, Princeton, New Jersey.*

¶ A few days ago I received several back issues of *QST* and was surprised to find that incentive licensing had been approved. Having expected this I successfully qualified for the Extra Class license in March 1967.

My amazement was not with the passage of the regulation, but with the comments some of my fellow hams have made. You don't know how sorry I am for them. It must be absolutely terrible to require a person to know what goes on behind the shiny emblazoned panels of their "guaranteed for 90 days" equipment. No, I'm not an advocate of home-brew gear, but I do know how my signal is produced, how to control it, and how to fix it when it ails.

Why do I say all of this? Simple! I was able to find enough time and interest to further my knowledge of electronic principles and circuitry when employed as an intern in a very busy hospital. Besides working daily and every third night, I wanted to know the idiosyncrasies of advanced techniques in electronics.

I did it because I love amateur radio and what it stands for. I take personal pride in successful accomplishments. All I can say to anyone who claims he doesn't want to know any of the advanced technology required by modern day communications is, "shape up or ship out." There is no room for stagnation. Anyone who sincerely appreciates achievement and is willing to put forth honest effort to do so will succeed. I have wearied from the sad laments of those who would condemn a little bit of proficiency. We don't need you, and had we the power, we may not want you.

To the ARRL, continued success for the program of advancing the state of amateur radio. — *Stephen A. Kriso, M.D., K2OMP, FPO, New York 09501.*

¶ I am 63 years old and it is with great pity I read the pros and cons regarding the changes which are a part of life. I for one at 63 can clearly see most of our troubles are the failure to accept change and to conform with the times and if the young could see this there would be less of the nonsense written in complaining about changes.

I'm glad I'm an ARRL member! I'm glad the use of the choice sections of the bands must be earned! I have no fight with anyone. The a.m. boy can clobber me with carrier, the s.s.b. boy can run his gallon on top of me, the c.w. man can turn his electronic key up to 55 w.p.m. and I'll take him on with joy. I listen with patience to the griper and the know-it-all. The stumbling Novice is my friend; I even like CBers — they may someday be converted. I like *QST, CQ, 73* and even *Popular Electronics* — they all offer me tidbits I like. If at 63 one hasn't learned that none is perfect but all have some beautiful sides to them he's a lost case. I guess its great to be an idiot, Hi! — *Bill Nagata, W2EGI, Syosset, Long Island, New York.*

OP MANUAL

¶ In the twenty one years that I have had an amateur license I have never been more impressed with an ARRL non-technical publication than *The Radio Amateur's Operating Manual.* I think it is terrific and wish I had purchased one when you first advertised it. — *D. S. Webber, W1PCD, Bangor, Maine.*

INFORMATION PLEASE

¶ Recently I have had surgery in the form of a thoracotomy whereby myorcardial electrodes were inserted in the heart, and the pulse generator was implanted subcutaneously below the diaphragm near the abdominal wall. The pacemaker (pulse generator) is a mercury cell-powered transistorized blocking oscillator working into a saturable core transformer followed by a transistorized amplifier which discharges a tantalum electrolytic capacitor and thus provides a pulse that is basically rectangular in shape, has a duration (pulse width) of 1.5 to 2.0 milliseconds, and is biphasic (current of opposite polarity is delivered during the interval between pacing pulses). The rate (pulse/min.) and current (amplitude) are adjustable.

Quite naturally, I am concerned about the influence of external fields on an implanted pacemaker inasmuch as I expose myself to many different types of electromagnetic fields of varying intensity. In response to my query about the effect of r.f. currents generated by my transmitter (1 kw.) at frequencies ranging from 3.5 to 30 megacycles, the manufacturer reported they would conduct such tests at one of their employees homes who also has a kw. rig. They reported that they were unable to detect any adverse effects upon the pacemaker's performance. On the strength of their report, I have since then confirmed this by operating my station and noting no change in my pulse rate. Of course, I have no means at my disposal to measure the amplitude (output) to see if it is constant.

There are many unanswered questions, however, such as what would be the effect of r.f. fields in the multi-kw. range as is usually the case with commercial induction heating and welding units? What is the effect of strong d.c. fields?

Although my interest is inherently a selfish one, inasmuch as I am directly affected, it follows that my queries may elicit information from your readers which would benefit others who also are living with implantable pacemakers (either endocardial or myorcardial).

I shall deeply appreciate hearing from anyone who has had first hand experience with such problems or who may have access to clinical data concerning these questions, which I believe to be valid and in need of investigation. — *V. L. Spoley, W2ASF, Bronxville, New York.*

¶ A year or so ago I thought my hearing might be deteriorating faster than the normal frequency response due to age. I had my hearing checked and was advised that at about 4000 cycles there was a dip in the normal curve which would indicate damage due to noise injury. We need a frank and informative article on how to treat ears, describing what is excessive noise, how to know when you have reached the danger point, and how to avoid it. Is there an expert who could undertake the writing of such an article? I am sure the fraternity would be ever grateful.

I have enjoyed ham radio since before my first QSO in about 1920, and I have always thought it was something to retire to in my old age. I do not want to limit my accomplishing this by damaging my hearing! — (Name withheld by request).

EDSEL MURPHY'S LAW

¶ Congratulations on Edsel Murphy's laws (February 1968). I have been an amateur only a short time, but I find these laws holding quite true. I had a piece of coax cut off so short that it had to be spliced; by a shovel falling down along a wall; to mention just one of many. Hi. Thanks for the great rag, keep it up. — *Ronald K. Rundberg, WN7IFA, Redmond, Washington.*

¶ Notwithstanding the frustrations, I guess that "Old Murph" hit on the magic ingredient that keeps us old timers "rolling our own" ham gear. If it worked the first time we would soon tire of the whole affair and give up for lack of interest. I wonder if that is not why so many of our fraternity who consider themselves "commercial" hams lose interest in their hobby and fall by the wayside. Edsel Murphy wasn't so bad after all! — *James P. Gillespie, W4LQC/W8BKK, Nashville, Tennessee.*

I believe the author overlooked one very important law in the "trouble shooting" category. This law will be found to hold in most shacks.

"After climbing the 100-foot tower to adjust the yagi's matching device it will be observed that the high s.w.r. was caused by loading into the transistorized receiver instead of the beam." Variations of this anyway. — *Gary Straub, W8RXQ, Marion, Ohio.*

[EDITOR'S NOTE: See "League Lines," page 10.]

FET, EME, PDQ, ETC.

¶ Saw an interesting looking article in the January number entitled "A Layman's look at E.m.e., part II." Recognized that I did not know what e.m.e. is, so looked it over. Could not find anything but the initials, so hunted up the first part. Looked it over carefully also, but still nothing but initials. I'm frustrated, for I just cannot concentrate on the article until I know exactly what it stands for! Can guess Moon Echo, but what's the first one? Electronic? Please explain. Would it not be a good idea to assume that there is some reader who has forgotten or never knew, and print it out somewhere near the first of the article? — *Greg M. Evans, WØCAS, Custer, South Dakota.*

[EDITOR'S NOTE: Sorry, we get into the habit of using abbreviations and sometimes forget that they can be cryptic to the reader seeing them for the first time. Anyway, e.m.e. is an accepted term for moonbounce, coming from the German equivalents of the words "earth-moon-earth" — fortunately the initials are the same.]

DISTRESS

¶ The data contained in "Amateur Radio and Distress Information" (*QST*, Jan. '68) should be kept handy in the shack of every active ham. Chief Dean, a top operator in every sense of the phrase, has done a fine job of compiling this info. Distress and emergency calls *do* originate daily, and not just on emergency frequencies. So, don't say, "I'll never hear anything like that." *You* might be the one who intercepts a call today, tomorrow or maybe next week. Be ready! — *Paul F. Folmsbee, RMI, U.S. Coast Guard, WA4BRS/MM, FPO, San Francisco, California.*

QST EXTRA

¶ When I want to read a *QST* "Extra" article, I have to grit my teeth, wrinkle my nose, and pull my eyes out an extra ten diopters to read the print underneath that red ink splashed across the page. Why make it so hard to read? Don't any of you guys sit down and read *QST* after it gets printed? It would serve you right! — Red-eyed but cordially. — *Larry Triggs, W2YBK, Fairport, New York.*

[EDITOR'S NOTE: Sorry, OM! We're using a lighter overprint this month which should make the text easier to read.]

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

How:

The DX Century Club Award is one of the most popular and sought-after awards in all of amateur radio, and among the most difficult to acquire. Its issuance is carefully supervised at ARRL headquarters. . . .

— *The Radio Amateur's Handbook*

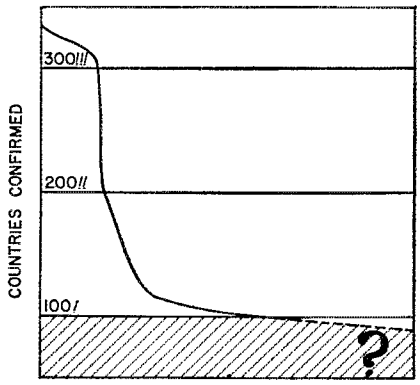


Fig. 1—Bob White's Tricky Toboggan Run.

In the fourth decade of ARRL's DX Century Club, hamdom's most widely coveted circle, we find almost three hundred long-haul experts qualified for *QST*'s DXCC Honor Roll listing. There are 300-country men in abundance. Most deservingly, the DX limelight tends to focus on them. They've brought the state of the art of DX pursuit to a highly polished summit in what amounts to the greatest DX contest of them all.

The excitement of this high-level chase tends to obscure the importance of DXCC's threshold, the 100-country goal. If now there are thousands of DX enthusiasts pressing toward their 300th country, how many more are in the lower QRM layers nearing No. 100?

Fig. 1, derived from statistics supplied by W1s CW and YYM of ARRL's Communications Department, gives a vague but impressive idea. The graph's shaded area, like the submerged portion of a huge iceberg, holds a vast number of 70-, 80- and 90-country folk! Were it to shrink, so would the future eminence of DXCC.

Thus we should appreciate one of the most important complexities of the job done at ARRL's DXCC Desk. While still satisfying exuberant demands of the endorsement-hunting triple-DXCC gang, W1CW & Co. must see to it that the award's basic values aren't whittled in the process.

New DXCC members of today and tomorrow deserve an award as worthy as that earned by yesterday's applicants. This stability is even more important to the DX talent toiling far higher on the DXCC ladder. Who wants to be king of the hill without a hill?

—•••—

Better late than never, here's a newsclip from last year's "How's" miscellany file of probable import to those battling toward DX big-gun rating:

F.A.A. BANS TOWERS HIGHER THAN 2000 FT.

Washington, July 11 (UPI) — The Federal Aviation Agency today banned the construction of television antenna towers and other similar structures higher than 2000 feet.

The new regulation labels any structure higher than 2000 feet "inherently a hazard to air navigation and an inefficient utilization of the air space.

FAA said anyone proposing to build a tower higher than 2000 feet will have the burden of convincing the agency that it will not endanger air traffic. A "no hazard" finding, the FAA added, will be issued "only in exceptional cases."

Hmm — would still needing Albania be an exceptional case?

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That doggoned Novice Round-up — pile-ups near 7160 kc. get wilder every year. It suddenly dawned on us, after sweating out a Nebraska WNØ in mid-February, that this is a potentially

— Reprinted from March, 1958, *QST*

*7862-B West Lawrence Ave., Chicago, Ill. 60656.

HS4AK, on the International Telecommunications Union ban list at time of writing, has hopes of early authorization for W/K/VE/VO contacts. Meanwhile we can only listen to Arno's FB signal near 14,105 kc. around 1700 GMT. (Photo via W1JMY)

explosive situation. More and more higher-class types rush the beginners in each NR while the supply of Novices holds fairly steady. Which reminds us that we gotta hit the book, Jeeves. As W9GFF points out, FCC is sponsoring its big Extra Round-up come November.

—···—

What:

Sure we want your log for the 1968 ARRL DX Contest. Whether you made just one QSO or one hundred, it's your contest and you ought to vote. April 20th is postmark deadline, OM — mail away! ._._._ We haven't documented DX doings on 14-Mc. voice since December, so let's hitch old Pegasus to the "How's" Bandwagon and hit the road. As usual, "UJ8KAA (110) 15" means that UJ8KAA is reported near 14,110 kc. around 1500 GMT. . . .

20 phone, described by **Ws** 2DY 2VOZ 3DWG/VR6 3HNK 4YOK 5QGZ 8YGR 9LNQ, **Ks** 4HQD 4TWJ 9UCR, **WAs** 1DJG 1GXE 6JDT 7AUW 8MCQ 8WSI 9THB, **WBs** 2RJJ 4EWU, **KP4**DBJ, P. Kilroy and J. Stevens, offers the audio of **AP2s** AD (184) 3, MR (205), SG (212) 18, **CEs** 1FC 1HU 3AEO 2, 3BD 3CN 4AJ (100) 20, 4DT 6EQ 8AA 8CP 9AT (100) 16–18, **0A**E (225) 2–9, **CNs** 2AR (202) 8, 8BC 8BV 20, 8FV (220) 5, **CO8**MN (218) 23–4, **CPs** 1EE (157) 0, 1GF 5AO 5BH 23, 6GC (145) 20, 8BB, **CRs** 4AE O, 4AJ (255) 0, 4AK (119) 19, 4BC (180) 0–8, 4BL 0–3, 4BO (204) 21, 5SP (185) 21–22, 6AI 23, 6BX (195) 7, 6DO (197) 21, 6HI 20, 6IK 6IS (175) 4, 6IV (155) 22, 6JW 6KR 7BV 15, 7CD 23, 7CI 5, 7CO (193) 4, 7DS (331) 0, 7GF (198) 15, 7IZ (140) 17, **CTs** 1LN 1PK (175) 6, 2AO (200) 18, **CXs** 5BR 5CS 7BY (178) 0, 8BM, **DM4**WPL, **DUs** 1FH (205) 22, 1BSP 2AF 9FB (190) 17, **EAs** 6BC (110) 19, 8CP 9AQ (224) 17, 9EJ (200) 17, **EIs** 4J 7AF 9Q, **ELs** 2AC 3, 2AJ 3C 8B (205) 22, 8H (210) 5, 8I 8J 18–21, **EPs** 2BQ (194) 16, 2DA (194) 16, 2DW 15, 3AM (196) 6, **ET3s** REL (130) 17, USA (124) 15, F9RY/**FC**, **FB8ZZ** 8, **FC**2CD (155) 19, **FG7s** TH XL (332) 20, XT (175) 10, **FK8s** BK (105) 8, BL, **FM7s** WD 23, WQ (250) 22, **FO8s** AB (122) 17, AG 4, AN 23, BQ BS (221) 8, BV 4, **FP8**CY (175) 20, **FR7s** ZD (196) 3–4, ZG (145) 19, ZN (145) 20, **FW8**RC (240) 4, **FY7s** YG (190) 20, YL 0, YM 4, **GCs** 2LU (215) 8, 8HT, **HB0**AG (210) 17, **HCs** 2LX 4, 5MP 8RS (190) 19–0, **HH**9DL (338) 23, **HI8**XDA 23, **HL9s** AA (223) 13, KP (217) 12, KR (213) 2, KY TT TY (210) 4, US 1, **HKs** 6AAY 6AZQ **0A**I 5, **0B**IS (180) 6, **0B**KW (185) 2, **HP1**XYZ 3, **HRs** 1MD (330) 13–14, 1KS 21, 2VFB (315) 3, 6EB (205) 4, taboo **HSs** 1AZ 1RZ/3 (120) 16, 4AK (105) 17, **HV3SJ** (154) 19, **IS1s** PPB (160) 17, TDW (296) 23, **IT1s** CDN 17, LTF (107) 16, **JAs** 1AEA 1ANG 1BU 1CC 1DAN 1DFQ 1GTS 1IB 1ZZ 3KHB 6AD 6BXA 6DCE 7MA 7NZ 8ADQ 8GY 8HK 8KH 8LL 9AG 0AXV, **JT1**KAA (112) 13, **JW5**YG (205) 19–20, **JXs** 3XK 6RL (170) 0, K8NHW/**XV5** (132) 9, **KAs** 2KA (180) 1–2, 2NY (140) 8, 9MF, **KCs** 4USB (160) 10–23, 4USC (292) 4, 4USF 4, **4USL** 4USM 4USN 8, 4USQ 16–0, 4USV 1–3, 4USX (262) 4, 6BY (250) 8, 6CL (320) 11, 6CM 6JC, **KGs** 4AM 4CX (300) 2, 6ALY (220) 7, 6AQG 6AQS 6FAE 6IG (240) 16, 6IF 6SA, **KJ6**BZ (220) 6, **KM6**DE (202) 6, **KR6s** BD GF (202) 12, KN MH MU WH, **KS6**CL 10, **KV4s** AB 4, AD BW (207) 4, FA, **KW6EJ** (200) 8, **KX6s** DQ (232) 8, DB FA (297) 5, FN IN, **LJ2X** (328), **LX1s** DB WR (127) 19, **M1B** (225) 6–7, **MP4s** BBW (185) 4, BCC (129) 14, BGE MBC (190) 19, **OAs** 3T 4AG 0, 4CV 4TX 3, 5AY 6BU (300), 8D/3 9L (185) 21, **OD5s** BZ (210) 4, EJ 19, FC (210) 4, **OEs** 7UD (205) 16, 9ZBJ (155) 2, **OH0s** AA (160) 23–0, NI, **OXs** B3S 20, 3DJ 22, 3DM (239) 4, 4AA (224) 2, 4AC, 4AD 5AB 5AC I, 5AG 5AK (262) 15, **OYs** 1AB 2YL (252), 3B 2, 4OV 9IM (215) 17, **PJs** 2CE (223) 15, 2CT 2MI (200) 18, 2MJ 3CC 3, 3CL 3, 3CR, **PYs** 4OD (197) 19, 4VT 23, 6MC 3, 8SV 1, **PZ1s** BF BW (226) 4, BX (210) 4, CI (130) 20, **SL2**ZI, **SM2**COP, **SPs** 8CA 9ANH 18, **SVs** 1BN 0WL 0WEE, **TAs** 1AX (202), 1LY (130) 18, 2BK (332), **TFs** 2WKD 21, 2WKP (175) 13, 2WKR (191) 1, 3EA, **TG9s** DF (310) 17, RN (233) RU (295) 2, **TIs** 1EVA (105) 22, 2AB (225) 1, 5CMR (210) 3, **TJ1s** AG (182) 21, QQ (197), **TN8s** AA (190) 15, BK, **TR8**AG (101) 20, **TU2s** AF (195) 22, AY (117) 22, BA (175) 0–4, BL 6, CA (260) 0, CC, **U5**ARTEK of the Crimea, **UAs** 2AO 2KAW 2KBD (105) 18, 9KDL (230) 12, 9TE **0I**E **0N**M 7, **UB5s** KAW (150) 7, KMX 14, OT (195) 4, WF, **UC2s** BF (202) 3, CK 15–16, **UF6s** BG (211) 18, CW (175) 19, KPA (203) 14, KTM, **UG6s** AW (211) 18, KAA (120) 16, SG (143) 10, **UH8**BO (255) 6, **UI8s** AG 3, LC (130) 14, **UJ8**KAA (110) 15, **UL7s** FA (113) 21, JA 3, LA, **UM8s** FZ (200) 9–13, KAB, **UO5**PK (112) 17, **UR2s** AR 14, KAW, **UWs** 9XZ 0IH (215) 2, **VE8s** CS RCS RX, **VKs** 1GD (250) 13, 9AN 9DR 9KS 9OM 9ON 9XI (116) 13–16, **0I**A (160) 17, **0J**P 12, 0TO, **VPs** 1CP 1DL 1FR (320) 17, 1LL (332) 23–2, 1PV 2AA 3, 2AC 2AZ (195) 17, 2AW 2GAE (190) 23, 2GBC (202) 4, 2GN (190) 23–0, 2KM (230) 11–12, 2LA (213) 1, 2MH (162) 17, 2MJ (168) 23, 2MO 2SM 2, 2SY (219) 11–13, 5AA (202), 5AB 2, 7NF (180) 7–8, 7NS 8FL (172) 1, 8HZ (202) 1, 8IE (188) 23, 8IG 8IU 4, 8JC 8JD (325) 19, 8JF 8JI 16, 8JN 8JR 2, 9BN (138) 14, 9DC (138) 15, 9FK 9FT 9FX 23, 9VV, **VQs** 8BI (193) 16, 8BZ (202) 14, 8CA 13, 8CC (195) 17, 8CDC (239), 8CG 8CI 13, 9JF 9V (203) 18, **VRs** 1L (220) 5–6, 2CC (185) 20, 2DI (220) 19, 2DK (137) 9, 6TC (205) 8, **VSs** 6CO 6DO 9MB (170) 20, **VU2s** BK 12, CQ (209) 13, DKZ (203) 15–16, FN 13, GM KV 17, LE RM, WA2CWG/**OA6** 2, **XE1s** CB DDP KB WS XQ, **XP1**AA (258) 2, **XW8s** AZ 5, BQ (194) 1, BS (200) 13, BV BX (205) 13, **YAs** 1DAN (216) 3, 2KAT, **YJ8**BW (195) 8, **YK1**AA (160) 14, **YN3**KM (330) 13, YSs 1CPE (326) 4, 1MAX 1WPE (247) 5, 1XEE (320) 20, 2CEN 17, 2RAR 2RTS 2RU 23, **YU3**TXT (195) 17, YVs 2GU O, 4AU 23, **ZB2s** A AP (250) 18, AY, **ZC4s** AK 15, BI (175) 5, CN (180) 4, **ZDs** 3D 7FF (238) 23–0, 7KH (332) 22–1, 8AB 8DX 3, 8HAL (173) 1, 8JES 8RH 8WK 9BE (260) 18, **ZEs** 1CX (332) 23, 5JU (325) 8KY, **ZF1**GC (186) 23, **ZP5s** CF (140) 20, JB (212) 1, JU, **ZSs** 3JJ (158) 18–19, 3LU (180) 4, 9H 9L (207) 20, **3A2s CL** MJC (120) 8, **4S7s** BR (140) 16, PB 17, **4U1**ITU (218) 16, **4W1s** H 18, M (135) 15, **4X4s** BL (195) 4, DK FQ (202) 15, MQ RW, **4Z4**AO, **5A4**AB (210) 6, **5H3s** JL (240) 19, JO KJ (155) 18, **5N2s** AAF AAX (160) 18, ABK (188) 21, ABW, **5R8s** AS (199) 16, AU (145) 17, AZ (162) 17, BC BP (135) 17, **5U7s** AK AL (210) 22, AN (221) 0, **5Vs** ZAB (106) 8, ZRQ (150) 18, 4EG (148) 17, **5W1**AT (210) 5–6, **5Z4s** AA (155) 18, AN IR 16, JL (198) 21, JW 18, KO (202) 15, LG (176) 19, **6O1**GB (103) 21, **6W8s** BE BM (218) 8, CM DK (201) 23, **6Y5s** AM (224) 15, CB (185) 20, EM GB (200) 0–3, LA (225) 15, RA (225) 15–16, **7P8**AR 16, **7Q7s** AM (140) 17, EC 6, LZ PBD, **7Xs** 2AR 0AH (175) 17, **8P6s** AH (207) 13, AM AZ (192) 21, BX 1, CC 7, CE, **8R1s** C (240) 5, G 3, J P S, **9F3**USA 22, **9G1s** BB DY GA (340) 0, GM 0, KT 16, YJ YK, **9H1**M (332) 14–17, **9J2s** AP (120) 18, BC BK 16, IE (255) 4–5, JC LK, **9K2s** AM BY, **9L1s** DW 9, GQ JJ 23–3, TW (174) 23, **9M2s** DX 23–0, NF 17, PO (183) 10–13, **9N1**MM (190) 10–11, **9Q5s** BY (125) 6–7, EB 19, PI (195) 17, PT, **9U5s** BB (165) 19–20, HI (235) 19, **9V1s** MS (184) 13, OM, **9X5s** AA (220) 20, CE LB PB SA (197) 16, SM 22, WE (103) 17, **9Y4s** AR (153) 21, LP (180) 14–15 and VT (200) 23, all but a few using monosideband. And this is only a sampling!

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Next month we hope to spot-check 20 c.w. with the aid of **Ws** 1AYK 2ADP 3HNK 4YOK 7POU 8IBX 9LCG 9LNQ, **Ks** 2BMI 4TWJ 5MHG/6 5YUR 6OZL 0SAJ, **WAs** 1CYT 1DJG 1FHU 1GXE 2PZD 3HRV 5PUQ 8MCQ 8PVN 9THB, **WB2s** 8SK ZQE, 1IER, followed by further treatments: (15 c.w.) **Ws** 3HNK 4YOK 7POU 9LNQ, **K5s** MHG/6 YUR, **WAs** 1CYT 1DJG 1FHU 3DSD 5MIN 8PVN, **WB2s** FPG SSK, 1IER, **WNs** 1ION 4GSS 4GTI 4IIF; (15 phone) **Ws** 2DY 3DWG/VR6 4JVN 9LNQ, K4TWJ, **WAs** 1DJG 3DSD 5PIF 7AUW; (10 c.w.) **Ws** 4YOK 5QGZ, **WAs** 1CYT 1DJG 5PIF 8MCQ 9QBM; (10 phone) **Ws** 4YOK 5QGZ 8YGR 9LNQ, K4TWJ, **WA1s** CYT DJG, **KG6**IC, **KH6**BZF, P. Kilroy; (40 c.w.) **Ws** 3HNK 4YOK 8YGR, K5MHG/6, **WAs** 1CYT 1DJG 1FHU 3DSD 5MBC 5PUQ 8MCQ 8PVN, **WB2**FPG, **WNs** 3INI 4IIF; (40 phone) **Ws** 3DWG/VR6 8YGR, Mr. Kilroy; (80 c.w.) **Ws** 1SWX 4YOK, **WAs** CYT 1FHU 1GXE 8MCQ, **WN1**ION; (160 c.w.) W1BB, **WA1s** FHU and GXE with more reporters to file. Got your 10-meter double-DXCC yet?

Where:

HEREABOUTS — Plenty of "QSLers of the Month" this month — CN8BV, CR5CA, DL4EO, EL2s AK D, EP3MK, FP8DJ, G6YL, GD3AIM, GM5s AFF AIF, HAs 3MB 4KYB 6KVB 8CK ØLL, HB9AG, HP1IE, JA1KSO, JH1BBU, KH6EDY, KL7FPM, KX6DB, OF2PB, OH0AA, OY9IM, PA0FF, PJ3CC, SV0WL, TG0AA, TJ1QQ, TU2CA, UF6AM, VE8MLE, VKs 4OP 9GN, VR1L, VP7EB, VS9ARS, WB2PXZ/VP9, XW8BX, YN3KM, YOs 3RF 8GP, YS1WKE, YU1VR, YV5s CIZ/1 CKR/1, ZB2BE, ZDs 7GS 8HAL 8J, ZP5KA, ZS1ACD, 4X4CJ, 5H3KJ, 5R8CQ, 6W8BF, 8P6BU, 9J2s W WR and 9Y4TW, plus QSL managers Ws 1JYH 2CTN 4DQS 4YWX 6CUF 6RGG 7VRO, Ks 4KJN 4RCS 6MHD and WB2UKP, all commended for snappy QSL comebacks by "How's" contributors Ws 1SWX 8IBX 8YGR, Ks 2MFY 5YUR, WAs 1FHU 2HIU 3ATX 3DMH 3DSD 3FRL 5MIN, WB2ZQE, KG6AQI and s.w.l. Kilroy. Any prompt pasteboarders *you'd* like to applaud? . _ . _ . *Halp!* These italicized colleagues seek assistance toward glomming QSLs from holdouts mentioned: *W4OGG*, KS6BV, HK0AI, HG2KLD, KR6UL; *W7BA*, ZS2MI; *K2MFY*, EA8EN '66, 5R8BA; *K5YUR*, 4M4A; *WA3DMH*, KH6GEL; *WA9UVP*, CT2BO, EL2D, FG7TH, PJ2ME, TF3AB, VP1MW, YS1W, ZE1S, ZP5CF, 4M4A, 5U7AK and 9Y4LJ. Any 'alp? In this connection W8IBX observes, "In your 'help!' section I see calls of stations from whom I've gotten cards after months and, in some cases, years of waiting. In many instances I guess the key word is 'patience.'" Ah, impatience is characteristic of all new generations, especially fledgling DX generations who have yet to discover that a two-way QSL exchange via bureau is not unusually a matter of months and months. W9NN recently received an African QSL fifteen years after QSO. What's the rush, OMs? . _ . _ . _ WA0PUQ volunteers for QSL managerial duties should any overseas types be needful . _ . _ . _ WA5OCG's tour as YN1FR QSL tender starts with QSOs of February 8, 1968 . _ . _ . _ "Ex-ZD8HL has been active as VP2AC," records W2GHK, "His QSLs are handled by 'DXpedition of the Month.'" . _ . _ . _ ARRL Assistant Secretary W1UED indicates that KZ5GS is arranging to assume charge of the Canal Zone bureau . _ . _ . _ K6KDS, noting evidence of spurious ZF1DX activity, points out that he used the call only from 2050 GMT, October 23, 1967, to 1830 the 28th of that month . _ . _ . _ "All cards received are answered 100 per cent via bureaus," declares OA8V' "except those with s.a.e. (self addressed envelopes) and IRCs (International Reply Coupons) which I send back direct. My *Callbook* address is undependable since mule train over the Andes is rather slow." Paul's best mail route appears in the listings to follow . _ . _ . _ *DX News-Sheet* adds to last month's Barbados call correlationships: 8P6s AE (VP6AK), AI (VP6AP, AU (VP6FD), BN (VP6LX) and CA (VP6UN), addresses unchanged . _ . _ . _ In ISWL's *Monitor* we see that W4ORT's KG4AA QSL responsibilities go only for QSOs of September and October, 1965 . _ . _ . _ NCDXC's *DXer* sagely cautions tuat QSLs sent direct to remote regions be addressed as plainly as possible, giving minimal indication that IRCs or other goodies are inside . _ . _ . _ W0QKC takes over K0TCF's share of W9WNV's DXpeditionary QSLing . _ . _ . _ WA6AHF's QSL proprietorship for HK0s BKW and BKX begins with QSOs of December 18, 1967.

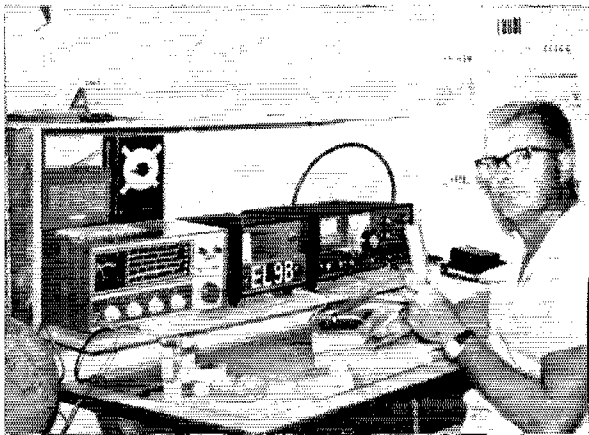
ASIA — VS6AZ's QSL aide, W6GB, is former K6GMA, address unchanged. Walt, who also manages ZL3AB and ZS5PG QSLs, remarks, "There are too many fellows who do not understand what s.a.s.e. means, or are just freeloaders by nature. With increased postage rates, no self-addressed stamped envelope means no QSL." New or casual DXers usually are insufficiently aware of the supply-vs.-demand QSL problem. GC8HT explains it: "A rare DX station, or a mere handful of stations in places like GD GC 7Q7 9L1, etc., face a potential 280,000-plus ops in the U.S.A. and some 145,000 in the rest of the world, almost half a million. The only solution to the confirmation problem is for all of us to help by following necessary QSL instructions." . _ . _ . _ UA1CK/JT1 QSLing neared completion in February but was complicated by receipt of hundreds of cards that didn't jibe with Vlad's logs.

AFRICA — W4HUE becomes W4IC, address the same, and Doc writes, "VQ9TC has left the Seychelles but I expect to receive his logs. Hope the boys will be patient." . _ . _ . _ WA4STL becomes W4GK at his regular QTH and states, "Still have logs and QSLs for 9Q5AB and 7X2AH contacts but I am *not* QSL manager for 7X0AH." . _ . _ . _ "I send very few QSLs direct from Morocco," says CN8FV (W1NTH), recommending the services of his QSL agent, W2GHK . _ . _ . _ W3HNX can confirm 5A3TX contacts scored from October '64 to July of '66 but has no connection with subsequent users of the call . _ . _ . _ VQ9JW's island-hopping QSOs in the Aldabras bailiwick can be confirmed through W2GHK's DXpedition of the Month facilities . _ . _ . _ F9MS tells VERON's *DXpress* he holds FB8YY logs for QSOs on March 9 to December 13, 1967 . _ . _ . _ *DX News-Sheet* has it that South Yemen, formerly Aden, will use the 7O4-7OZ prefix block . _ . _ . _ LIDXA's *DX Bulletin* suggests G. Barrett, c/o The Lodge, Hanslope, Woverton, Bucks., England, for ZD7IP convincers . _ . _ . _ CR5SP, VQ9G, ZD9BE, 7Q7PBD and 9X5GG are behind schedule with log shipments to W2GHK — patience, please. Stu's DXotM activities will mark a fifth anniversary next month, some 400 kiloQSLs handled so far.

OCEANIA — "I'll be on Guam for two more years," notifies KG6AQI. "Best QSL routes are via WA0PQF or the KG6 bureau, the former being fastest. This also holds for Barrigada Amateur Radio Club's KG6ALW contacts for which I have logs." . _ . _ . _ VR1L tells KG6AQI that QSLs should not be sent his way via the Gilberts or Ellice group unless you're willing to tack on three or four months transit time . _ . _ . _ WA9OMR and ZK2AE, who ought to know, testify that ZK2AU's persistent operation is unauthorized. In fact ZK2AE is sure he's the only ham on the island . _ . _ . _ KH6GLU (KP6AP-VR3DY) undertakes QSLing for past, present and future VR3C contacts on the customary basis of s.a.s.e., or s.a.e. with IRCs. "I'll schedule VR3C regularly for latest QSO information because Fanning receives only two ship calls a year, these from Australia." . _ . _ . _ *DX News-Sheet* suggests Rev. H. Hanlin, 1131 NW 24th St., Oklahoma City, Okla., 73106, for '67 KC6BW cards, also noting that VK0IA of Macquarie isle wants QSLs via N. Foxcroft, VK3UO, 181 Victoria Rd., Northcote, Victoria, 3070, Australia.

EUROPE — W2CTN's QSL service for OY6FRA, Faroe club installation, commences with QSOs of last November, according to word from OY7ML . _ . _ . _ ISWL's *Monitor* remarks that France has gone into the F6 prefix after gobbling up two-letter FI possibilities . _ . _ . _ *DX News-Sheet* says UA1KED QSLs still are dispatched 100 per cent by E. Krenkl, RAEM, Chapligin St. 1-A, Moscow, U.S.S.R., but Ernst gets logs from Franz-Josef Land only thrice yearly . _ . _ . _ WB2IEC affirms that he does North and South American QSLing for 9H1R . _ . _ . _ LA6U of NRRL says W9WNV's 3Y0AB label is the only call currently valid for Bouvet isle . _ . _ . _ HV3SJ assures K5YUR he works no c.w., spurious contradictory evidence notwithstanding . _ . _ . _ Now a few specific postal recommendations, bearing in mind that each is neither necessarily accurate, complete nor "official":

EL9s C and B, left and right, operate from a remote mining camp in Liberia's jungle. Ben and Wim prefer 15 meter. You may also work EL9B/2 and EL9B/8 now and then, for Wim's work sometimes puts him on the road. (Photos via Ws 8RWP and 1IKE)



CR4BK, C.P. 90, Sao Vicente, Cape Verde Is.
CR4BL, Box 64, Praia, Cape Verde Is.
DL4QG, SP/4 Sexton, Helm. Spt. Det., APO, New York, N. Y., 09742
HG2KRD, Box 147, Veszorem, Hungary
HK0s BKW BKX (via WA6AHF)
HL9US, Sig. Sect., 8th U.S. Army, AC or SCE, APO, San Francisco, Calif., 96301
HR4SN, S. Navarrete, P.O. Box 2, Isla Tigre, Amapala, Honduras
HS4AK, A. Kosko, J&B, OSD/ARPA, R&D Field Unit, APO, San Francisco, Calif., 96346
I1KN, C.P. 113, Perugia, Italy
JA9BTW, N. Nishida, 3-29-12 Higashiyama, Kanazawa, Japan
JX6RL, % Norwegian Embassy, Reykjavik, Iceland (or via NRRL)
KØILI/KG6, O. Johnson, P.O. Box 1048, APO, San Francisco, Calif., 96334
KC4USF/mm, USCGC *South Wind* (WAGB-280), % FPO, New York, N. Y.
KH6GLU, E. DeYoung, 1942A Iwaho Pl., Honolulu, Hawaii, 96819
OA7BI, E. Cervero, Box 26, Maldonado, Peru
OA8V, P. Wyse, Casilla 2492, Lima, Peru (or via RCP)
OY4OV, O. Petersen, Box 184, 3800, Torshavn, Faroe Islands
SMs 5CAK 5CBN 5EAC 6CPI 7CPI (via WA9AEA)
TA1IB, P.O. Box 699, Istanbul, Turkey
TG4SR, Box 20 Guatemala City, Guatemala
TJ1AR, B.P. 26, Garoua, Cameroon
TJ1AS, R. Zanotti, Box 49, Yaounde, Cameroon
TT8AN, P.O. Box 443, Fort Lamy, Tchad
TU2BX, Box 20647, Abidjan, Ivory Coast
UC2AA, P.O. Box 41, Minsk, Byelorussian S.S.R., U.S.S.R.
VP8HZ (via RCU of Uruguay)
VP8JH, % E. Chilvers, 1 Grove Rd., Lydney, Glos., England
VP9FC, Tudor Hill Lab., % FPO, New York, N. Y., 09560
WB2PXZ/VP9, J. Marchitto, Box 3161, APO, New York, N. Y., 09856
YN1RER, Box 1272, Managua, Nicaragua
YU3TXT, P.O. Box 53, Idrija, Yugoslavia
ZK2AE, H. Coleman, P.O. Box 57, Niue Island, So. Pac.
4J7B, Box 88N, Moscow, U.S.S.R.
5VZAB, S. Daburow B.P. 362, Lome, Togo (or to DJ2VZ)
5W1AT, % H. Berham, GPO, Apia, W. Samoa (or via W4ZXI)
7P8AB, Dr. A. Jaques, P.O. Box 389, Maseru, Lesotho
7Q7AM, Box 215, Lilongwe, Malawi
7Q7PAX, S. Kletzien, P.O. Box 700, Blantyre, Malawi
8P6AM, W. Dowrich, Whitehall Rd., St. Michael, Barbados
9X5AV, H. Verjus, P.O. Box 104, Kigali, Rwanda
9X5BW, W. Berger, P.O. Box 608 Kigali, Rwanda

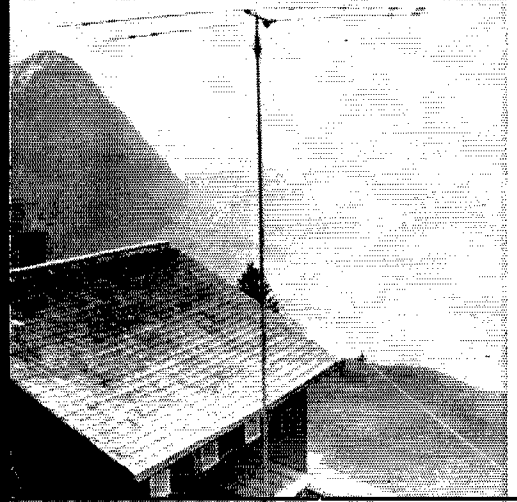
CP1EO (via WAØFVR)
CR7GJ (via CT1FL)
EP2DA (via W2MXB)
EP2DW (via W5IXQ)
G3WYX (via G3RUV)
HC8RS (via HC2GRC)
HK3BLD (via LCRA)
IT5FRU (to I1ZIZ)
JW5YG (via NRRL)
KC6CO (to W6GEO)
KL7FRY (to W8DGP)
OY6FRA (via W2CTN)
TF2WKR (to K2AQG)
VK9CJ (to VK4CJ)
VKØIA (via VK7ZKJ)
VKØJW (see text)
VP2AC (see text)
VQ9TC (see text)
VR3C (via KH6GLU)
VR3DY (to KH6GLU)
VS6AZ (see text)
YN1FR (via WA5OCG)
YS1WKE (via K4RCS)
YS1XEE (via WB4BOJ)
ZD9BH (via ZS6XL)
ZL3AB (see text)
ZL4RB (via G3VIR)
ZS5PG (see text)
5VZRQ (via VE2AFC)
7P8AR (via W4BRE)
7P8YL (to 7P8AR)
7Xs 2AH ØAH (see text)
8P6BU (via WB2UKP)
9H1R (see text)
9Q5AB (see text)
9X5MF (via HB9MQ)
9Y4VU (via WA3EPB)

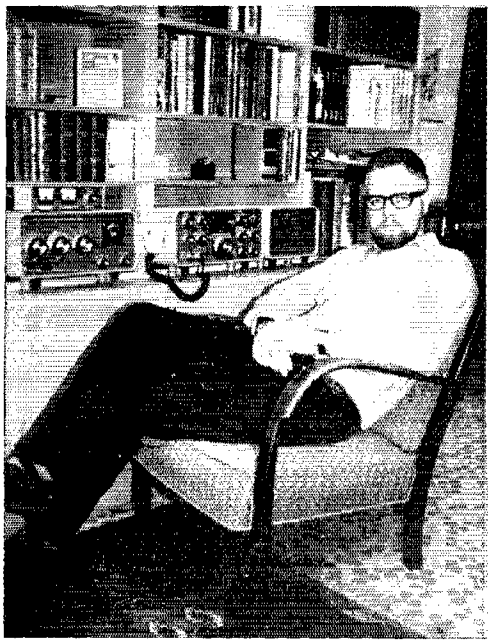
Ws 1JMY 1SWX 2ADP 2DY 2VOZ 4GK 8IBX 9LNQ, **Ks** 2MFY 5YUR 9YRA, **WAs** 1GXE 5PUQ, **WB2s** IEC ZQE, **KG6AQI**, **OY7ML**, Columbus Amateur Radio Association *CARA-scope* (W8ZCQ), DARC's *DX-MB* (DL3RK), *DX News-Sheet* (G. Watts, 62 Belmore Rd., Norwich, Nor. 72. T, England), Florida DX Club *DX Report* (W4BRB), International Short Wave League *Monitor* (A. Miller, 62 Warward Ln., Selly Oak, Birmingham 20, England), Japan DX Radio Club *Bulletin* (JA1DM), Long Island DX Association *DX Bulletin* (W2GKZ), Newark News Radio Club *Bulletin* (L. Waite 39 Hannum St., Ballston Spa, N. Y.), North Eastern DX Association *DX Bulletin* (K1IMP), Northern California DX Club *DXer* (Box 608. Menlo Park, Calif., 94025; attn. K6CQF), Ontario DX Association *Long Skip* (VE3DLC), Southern California DX Club *Bulletin* (WA6GLD), Utah DX Association *Bulletin* (W7LEB) and, last but hardly least, VERON's famous *DXpress* (PAØs FX LOU TO VDV WWP) deserve your thanks for the preceding data. More!

Whence:

EUROPE — Those who are still airworthy after the annual ARRL affair will find other DX contests on the docket this month and next. From 1500 on April 20th to 1700 the 21st, USKA (Switzerland) holds its annual *Helvetia-22 DX Contest* on 10 through 160 meters, c.w. and phone efforts combined. The usual RST- or RS001, RS002, etc., serials will be exchanged between Swiss amateurs and the rest of the world. Each HB station can be worked once per band at 3 points per contact, this point total to be multiplied by the number of Swiss band-cantons worked, for final score (watch for these canton designators appended to HB calls: AG AR BE BS FR GE GL GR LU NE NW SG SH SO SZ TG TI UR VD VS ZG and ZH). Logs postmarked within 30 days of the contest for shipment to M. Roschy, HB9SR, USKA Traffic Manager, Chemin Grenadiers 8, 1700 Fribourg, Switzerland, will be eligible for possible certificates of merit to be awarded high scorers. Good chance to gun for the 22 QSLs necessary to qualify for USKA's coveted H-22 certification! . . . . . The *International Telegraphic Contest*, an annual affair sponsored by Russia's Central Radio Club takes place from 2100 GMT on the 4th of May to 2100 the 5th, 3.5 through 28 Mc. Everybody works everybody in this one, except that "contacts between amateurs in the same city are not allowed." You may use the entire 24-hour contest period but each log entry must cover no more than your best solid 12-hour stretch. "CQM" is the contest call, and the usual RST001, RST002, etc., serials will be exchanged by non U-stations. U.S.S.R. entrants will transmit RSTs plus oblast (district) numerals, and a given station can be worked but once per band. Each completed contact with a station (a) on your continent counts one point (no intracity QSOs), and (b) outside your continent counts three points, this total to be multiplied by the number of different countries accumulated. Log entries go to the Central Radio Club, P.O. Box 88, Moscow, and must be mailed by June 1, 1968. Certificates of merit will be available to certain high-scoring participants, and your submitted logs may help you qualify for such U.S.S.R.-issued sheepskins as W-100-U and R-150-S. Good huntin'! . . . . . The International Amateur Radio Club (Switzerland) *1968 Propagation Research Competition* runs solid through this month, each participant invited to pursue colleagues in the 89 other Contributed to Propagation Research zones world wide on 160 through 10 meters via voice, code or printer. Serial exchange consists

HB9s AFM and GJ (left and right) become HBØs AFM and GJ from time to time, an old Swiss ham custom inspired by Liechtenstein's alpine splendor and your ARRL DX Century Club. (Photos via WA1DJG)





OX3DM teaches physics, chemistry and math in Godthaab when not visiting with DX friends on 20, 15 or 10 meters. Ole's favorite phone spot is 21,333 kc.

of RS or RST plus one's two-digit CPR zone indicator at 1 point per contact, 2 points per mobile contact, or 3 points per mobile-to-mobile QSO. Rush large s.a.s.e. to contest chairman W3ZA for the complex zone data and full details.

ASIA — ARRL President WØNWX jarred the 160-meter DX world at 1305–1300 GMT last January 28th by working KA9MF, 1880 to 1998 kc., for his final top-band continent. Bob's homespun 50-watter was hooked to 700 feet of copper. W1BB, reporting this feat, finds that W8ANO was also heard at KA9MF . . . . . HL9US, manned by WAØFLX and WB6POH, is available daily on 14,050-kc. c.w. around 0030 GMT, 21,390-kc. phone at 2300. Bob and Grant point out that Korea's Kimchi award is no longer issued . . . . . TRC (Turkey) is on the receiving end of a two-year helping of *QST* thanks to NCDXC's WA6AHF . . . . . W2ADP found HB9BJ at the key of 9N1BUZ . . . . . VU2MSK (W3MSK) tells Hq.'s W1YYM that the VU2 gang was primed and ready for the ARRL Test. No fair signing 'em up with the Potomac Valley bunch, Ed . . . . . W3HNK's newly married friend 4X4RD is thinking about DX again . . . . . KR6s eye near-by Daito and Rosa isles DXcursionally . . . . . JTs 1AB 1AD 1AG 1AJ 1KAE and 2AA are reported workable on c.w., 1KAA on sideband, while across the border UAØs KYA YC YO YR and YT abound on 14-Mc. c.w., YE and YP on voice.

AFRICA — Liberian jungle notes courtesy W8WRP via W1IKE: EL9s A, B and C, operating at a mining camp 100 miles from Monrovia, are the sole means of outside communications for their community. All do DXing on 21 Mc., EL9A with a TR-3 and homebrew 3-element beam, EL9B a 350 and similar radiator, and EL9C a T4-X/T4-A and TA-33 up 55 feet . . . . . Ex-CR5CA tells K2KBI he expects to be a CR7 soon . . . . . VE2AFC's buddy 5VZRQ likes 14,135 kc. around 2100 GMT . . . . . K1ATY visited recently with ZS6LJ and other South African amateurs. "It was heartwarming to see all those beautiful tribanders so far from home." . . . . . ZE4JS tells W3HNK he's back on 15 c.w. rarin' to go . . . . . "Much fun in the Test," exclaims CN8FV, due to depart Morocco in June . . . . . African items via literature of aforementioned clubs and groups: 7P8AB, a 15-meter c.w. fan, is ZS6BME's OM, and neighbor 7P8YL is the wife of 7P8AR. . . . Tristan's ZD9BE likes sideband while Gough's ZD9BH holds to straight a.m., both around 14,110–14,150 kc. at 1900–2200 GMT. . . . ZS9s H and L on 20 sideband at 1600–1900 GMT, and Q on 21,090-kc. c.w. at 1800 or so keep Botswana boiling. . . . Many EA8s, 4W1s, etc., appear and disappear so frequently because Swiss Red Cross radiomen work six-week hitches. HB9PL has *eight* 4W1 QSLs in file. . . . VQ8BZ's Rodriguez trip as VQ8BZR produced 114 December two-ways. . . . FH8CD's layoff leaves the Comoros up to FH8CE, 21,200 kc. at 1500 GMT. . . . Two CR4 contacts since February 8, 1968, may qualify you for a special Cape Verde certification. Check with CR4AJ. . . . TJ1QQ's EAØAH effort resulted in 1463 contacts, 893 with W/Ks.

OCEANIA — The Indonesian decree of late December authorizing ham radio quickly produced hundreds of licenses and considerable activity. ARRL Assistant General Manager W1IKE understands that Indonesia intends to remove itself from International Telecommunications Union banned status shortly. Monitor W1AWI . . . . . "In five months I made more than five thousand contacts with stations in 140 countries," recounts Pitcairn's W3DWG/VR6 . . . . . K8WXC of KG6IC writes from Iwo, "KG6IJ has no operator at this time but you may hear the station in contests operated by KA9JP. KC6BY puts Yap on 14,250 or 14,330 kc. almost daily, also 28,635 kc. on week ends, 2200–2400 GMT. KC6BY, KG6s IC and SA experiment with radioprinters near 14,190 kc." . . . . . "I work VR1L regularly and will be glad to arrange skeds with Bob," offers KG6AQI . . . . . Niue soloist ZK2AE writes, "Later this year I'll have an SB-401 on all DX bands. Meanwhile I operate 75 phone with fifty watts of a.m." . . . . . W2GHK says that VK9DR should soon be back at it on Christmas after mainland leave . . . . . Pacific patter via the clubs press: Ex-ZL1ABZ-ZL3VB-ZL4JF opens a one-year tour on Ross isle as ZL5AA. . . . OZ3JX/mm, 14,325 kc. at 1730 GMT, operates aboard *Rutha Dan* with an Australian Antarctic expedition. . . . KC6s AO CL CM and JC offer Eastern Carolines, KC6s AQ BY CD CK and CO represent the Western version, KC6CO due to complete work on a Lee Marvin movie this month. . . . You may previously have hooked Macquarie's VKØJW as VS1JW, 9Ms 4JW, 6JW, 9V1JW, VKs 2BJK or 4GU. John likes 14,075-kc. c.w. and 14,125–14,220-kc. single-sideband. . . . VK6IZ is supposed to become VK2BKK in Sydney. . . . HS3DR, 9M2s BD NF and XX may be signing VS5RCS in Brunei on 1.8 through 28 Mc. about now.

SOUTH AMERICA — "DX conditions next to the equator seem to be outstanding," exults OA8V, ex-KP4AWH, "In forty hours of 10-meter contest work I made 1100 QSOs with 93 countries. I've also been working

(*Continued on page 170*)

OA8V radiates on 75 through 10 meters from Yarinacocha, a jungle spot eight degrees off the equator. Paul, who deals with some of Peru's thirty languages for Wycliffe Bible Translators, formerly signed KP4AWH.

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

In the Beginning

RADIO began as a "man's game," for there is no record of a woman being present when the letter "S" was sent from Poldhu, in 1901, nor do any existing pictures show a woman in the room at St. Johns, Newfoundland as Marconi received that signal. In fact, history doesn't even hint at a feminine touch when wireless was in the pablum stage. The only possible woman appears in 1907, when a Miss Lillian Todd, helped organize the Junior Aero Club of U.S. In 1909, this group became the Junior Wireless Club Limited, with Miss Todd as the honorary president. So far as is known, she is the first woman to be connected with radio.

Most records state that 1915 was the first year to see a woman operator listed. There have been vague hints of others, but none have been verified nor has any evidence been presented to back these suggestions. Now, after sixty-odd years of amateur radio operation, it is worth while to know just who were the gals who spoke familiarly of sync-gaps, decrement, audions, detectors, and who watched the blue spark jump across the electrodes, and remember the ozone in the shack. Thanks to the research of E. A. Rasmussen, W6YPM, with his historical library of all the Government *Call Books*, the Aylesworth Agency *Call Book*, and the Gernsback *Blue Books*, it is possible to give a fairly complete list of the ladies who were a part of the court of King Spark.

1910 Gernsback *Blue Book*

FNFN, assigned to Herrold and Glass. Herrold was Doc Herold, and Glass was a YL.

1911 Aylesworth *Call Book*

NI, Inez Kinney, Ocean Park, California

1913 Government *Call Book*

2MN, Vivian Carrougher, Brooklyn, New York
2IA, Winifred Royce, Brooklyn, New York
6GK, Gladys Kathleen Parkin, San Rafael, California

1913 Government *Call Book* (Supplement #1, October 1913)

8EZ, Mary Alice McConaughy (no address given)

1914 Government *Call Book* (Supplement #2)

1VO, Shirley Haskell, Essex, Connecticut.

1915 Government *Call Book*

8NH, Emma Candler, St. Mary's, Ohio

1916 Government *Call Book*

1NV, Margaret L. Campbell, Rockport, Massachusetts
1ASP, Helen B. Colson, Watertown, Massachusetts
1WX, Miss Cecil Powel, Hartford, Connecticut
6SO, Kathleen Parkin, San Rafael, California
9TZ, Rea M. Lamb, Kenosha, Wisconsin

1917 Government *Call Book*

7FG, Winifred Dow, Tacoma, Washington

1919 Government *Call Book*

1RO, Edith Rotch, Boston, Massachusetts

1920 Government *Call Book*

1DBE, Mae Smith, Manchester, New Hampshire
1PAE, Winifred H. Campbell, Watertown, Massachusetts
4DG, Mable T. Lewis, Ft. Lauderdale, Florida
6BP, Kathleen Parkin, San Rafael, California

1921 Government *Call Book*

1OX, Harriet El Lee, Marlboro, Massachusetts
1CDP, Eunice Randall, New Bedford, Massachusetts
2AEZ, Beverly Clark, New York, New York
2AXB, Gertrude McCollum, Long Branch, New York
2JW, Augustine Wirth, Newark, New Jersey
3AFZ, Della Maskell, Bridgeton, New Jersey
3BCK, Marion Garmhausen, Baltimore, Maryland
5OS, Delma Pearl Anderson, Enid, Oklahoma
5PJ, Mrs. Julia Garrett, Ft. Worth, Texas
9ACB, Lorraine F. Jones, Kirkwood, Missouri

"YL News and Views" is most grateful to W6YPM for doing this research for the column.

* YL Editor *QST*. Please send all news notes to WB6BBO's home address; 1036 East Boston St., Altadena, Calif 91001.

It is unusual to have twelve licensed YLs in one radio club. Seven showed up for this picture of the Jayhawk ARC YLs. Left to right: (front row): Patricia Beard, WAØEMQ, Judy Caldwell, WNØSCW, Cleo Mahoney, WAØSHE. (back row): Vivian Ryburn, WAØPSL, Anita Suptic, WAØHSK, Charlotte Crozier, WAØNDG, Irene Nichol. (Not pictured Ella Koons, WØAYL, Wanda Beattie, WAØPLC, Kathy Draskovitch, WAØLTU, Geraldine Arnold, WAØLHN, Susie Powell.)

Kay, KØBTV, and Marte, KØEPE, Convention co-chairmen, going through the file drawer on the coming convention.

Hostesses for the YL activities of the ARRL National Convention The Alamo YL Club. Seated left to right: Ruth Jank, K5OPT, Ella Munsch, W5TSE, Frances Bruemmer, W5KQG, Aileen Turnage, K5OPV. Standing: Peggy De Lay, WA5GZO, Gerry Buckanan, K5YCE, Inez Cole, W5WXT. Not present when the picture was taken Katherine Pirrie, K5TSZ. (Photo by W5KHL.)

Elaine, WØHEM, and Marge, WAØEGG. Registration Chairman, and YLRL Convention treasurer, with net for paperweight favors.

Spark began to give way to c.w., and, from 1922 on the list of licensed YLs grows in numbers. There may have been others in the earliest days before the licensing laws, if so, the fact that they are women operators is not indicated. The above list gives us the pioneers in what is sometimes called "the distaff side of amateur radio."

There is no record of whether Miss Lillian Todd actually operated a wireless station in 1909, probably as in the case of Annie Ellsworth, and Samuel Morse she gave badly needed moral support. However, the entire amateur service owes Miss Todd a grateful vote of thanks, for her encouraging leadership of the Junior Wireless Club Limited, that later became the highly respected Radio Club of America, that has given so much to the communications field.

The whole picture has changed radically since a YL named Glass operated with the call FN, in 1910. If 2IA, 2MN, 6GK, and 8EZ, were to check over the list of International Abbreviations that they received with their licenses in 1913, they would find many different meanings from the present day list. Two they would find are the same now as they were 55 years ago. QSL has never changed, and QRV meant then the same as it means to every member of YLRL — "I am ready."

Time is Getting Shorter and Shorter!

YLs who suddenly remember "Omygawsh! I hope I'm not too late for the two major YL gatherings this summer —" still have time to register.

ARRL National Convention, San Antonio, Texas, June 7, 8, 9. Plenty of YL activities have been planned, including a Friday night party, "A Get Together," Coffee Session with a special program, and a ladies luncheon. There will be tours, and, of course the Saturday night dance.

YLRL International Convention, June 13–16, Denver, Colorado. They are working towards the deadline in Denver, and everything looks great. These affairs happen only once in four years, and the Colorado Club has something for everyone who attends. Be sure to get your registration in by deadline time. Not one gal who attends will be sorry.

Trillium Memorial Week Winners

Albert Theodore Jensen Memorial Trophy — Steve Cody, VE3BBC

Runners up: Cliff Peterson, VE3AST
Bill Harje, VE3EFX
L. Passingham, VE3ARI

The Trillium Memorial Week is to be an annual affair, with a trophy for the winners. Next one will be November 1968.

TI2JAA, Clemencia Acuna

TI2JAA, is the first woman to receive the Ezzio Mazzali Cup, awarded by the Radio Club of Costa Rica, for humanitarian work. Clemencia's activity in emergency net operation, making arrangements to give assistance to those in need takes up about six hours a day. It was for her tireless work in this field that she received the 1967 award. The inscription on the cup reads: "For the best humanitarian work by a Ham operator for the year."

TI2JAA has been operating for six years, and has been very active in both the Interamerican, and

WN9UDV, Mary Kay Mitchell, a senior at New Trier HS plans to lose her Novice call soon.

WN9RJJ, Helen "Muffy" Koch, Secretary of the WNTH ARC. Also a senior at New Trier High School, Winnetka, Illinois, she plans to take her General Class soon, as well as the Second Class Radiotelephone exam.

Panamerican Nets. The entire Acuna family are licensed amateurs. OM. Jose is TI2JA, and their daughter, Julietta, is TI2KI.

W6QVK — "Gene" Sheetz

Happiness, to Gene, is painting, millinery, the Hammond organ, her family, genealogy, and, of course amateur radio. A member of YLRL, ARRL, the YLRC-LA, and activity with both the Ramona Radio Club of San Gabriel, as well as the Monterey Park Radio Club, she has no time to be bored.

Gene Sheetz, W6QVK.

Gene became interested in amateur radio while she was a journalism student at the University of Nevada. She received her license after the Sheetz family had moved to California in 1937, and has been active ever since.

Her journalistic background made Gene the natural choice for the posts editor of the Monterey Park Radio Club paper, a term as publicity chairman for the Los Angeles YLRC, as well as Ramona Radio Club's Historian. For her work in compiling their history, she was presented "Ham of the Year" award of the Ramona Club in 1962. But that didn't stop either Gene, nor the awards for in 1967, she was again named "Ham of the Year," this time by the Monterey Park group.

As with all of us her family is her main interest and love, but unlike most of us she has extended the interest to the genealogy field, and has compiled a family history that has included tracing over 1000 descendents of her great-great Grandfather Clark.

W6QVK, and OM, Charles, W6PTF, are one of the few husband and wife teams that are members of QCWA. QST

Strays

The Foundation For Amateur Radio, Inc., with headquarters in Washington, D. C. announces the sixth John W. Gore Memorial Scholarship for either graduate or under-graduate study. The Scholarship for 1968–1969 consists of a $500.00 award. It may be re-applied for in succeeding years.

Licensed radio amateurs who intend making a career in electronics or related sciences may now apply for the 1968–1969 scholarship application.

To be eligible, applicants must have completed one year in an accredited college or university and must be enrolled in a course of studies leading to a bachelors or higher degree. They must also be radio amateurs holding a valid FCC license of at least a General Class rating. Preference will be given to applicants from the area served by the Foundation — the District of Columbia, Maryland and Virginia, although those living elsewhere are not excluded.

Scholarship applications should be mailed not later than August 31, 1968, and should be addressed to: Chairman, Scholarship Committee, Foundation for Amateur Radio, Inc., P.O. Box #5902, Bethesda, Maryland 20014.

The Foundation for Amateur Radio, Inc., is a non-profit organization devoted to the advancement of Amateur Radio. It is composed of trustees representing radio clubs in the District of Columbia, Maryland and Virginia area.

John W. Gore, W3PRL, in honor of whom the Scholarship was named, was until his death in 1960 the President of the Foundation. A prominent radio amateur in Baltimore for many years, he was a vice president of the Bethlehem Shipbuilding Corporation there.

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The Post Office Department promises faster mail service with the new Zip codes. Use yours when you write League Headquarters. Use ours, too. It's 06111.

The World Above 50 Mc.

CONDUCTED BY BILL SMITH,* WB4HIP

VK3ATN/KØIJN QSO on 144

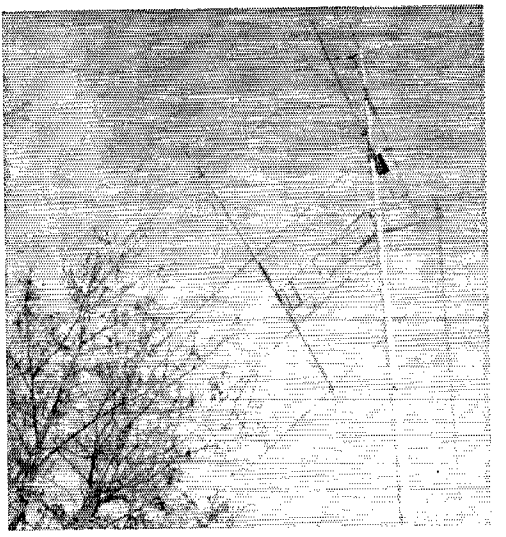
ANOTHER in an ever-increasing number of 144-Mc. e.m.e. (moonbounce) contacts was made February 12, when VK3ATN worked KØIJN at Minneapolis, Minnesota, between 0843 and 0907 GMT.

VK3ATN's capabilities are well-known, but not KØIJN's. Henry Theobalt, KØIJN, has worked alone quietly at his e.m.e. project except for advice rendered by K6MYC. Henry built his 160-element collinear array on a 34-foot long, 3½-inch diameter boom and mounted the nearly 600-pound array on the side of a rotatable tower. The center of the array is 63 feet above ground. The rotating tower handles azimuth positioning, but his elevation control is unique — and likewise difficult to describe. The array is actually mounted on an 'arm' which is moved by a winch arrangement from the ground, selsyns are used for position read-out.

The amplifier is a conventional pair of 4CX250Bs delivering 650 watts to the antenna through ⅞-inch Heliax. A change-over relay and tube pre-amp (Minnesota winters are too cold for transistors!) are mounted at the feedpoint. In fact, all of the equipment Henry used is commercial except for the antenna, patterned after K6MYC's design, and the mount and control mechanism.

Previous to the contact, Henry had never heard his own moon echoes, and had hurriedly prepared for the schedule with VK3ATN. Several stations on the West Coast were aware of the test and several minutes before KØIJN's schedule with VK3ATN, K6MYC called KØIJN blindly and Henry answered him! The time element before the scheduled test and some automobile ignition noise prevented a possible contact between Henry and Mike. But VK3ATN and KØIJN heard each other immediately as their schedule began. Signals were well above the noise level and the contact was easily completed. Henry said his only problem was ignition noise and a stiff Minnesota wind buffeting his array, causing some aiming difficulty.

VK3ATN heard other signals during the test period but was only able to contact KØIJN; high line noise at VK3ATN probably prevented contacts with K6MYC and W6YK. KØIJN heard both California stations, and K6MYC heard all three stations plus his own echoes!



A 160-element collinear mounted 63 feet in the air was used by KØIJN for his e.m.e. contact with VK3ATN. This retouched photograph illustrates the unique elevation method; the entire tower rotates, allowing azimuth control.

The approximately 9405 mile contact between Ray and Henry is the second-longest on record, surpassed only by the 10,417-mile VK3ATN-K2MWA/2 contact on November 28, 1966. *Congratulations, gentlemen!*

International V.h.f. Conference

The East Coast V.h.f. Society is sponsoring the conference May 2-4, in connection with the Garden State Amateur Radio Exposition at Paramus, N. J. The exposition is being held in one of the world's largest shopping centers, the Garden State Plaza, at the intersection of Routes 4 and 17.

Concluding the three-day event is the Saturday night banquet featuring an address by Ray Naughton, VK3ATN, of moonbounce fame.

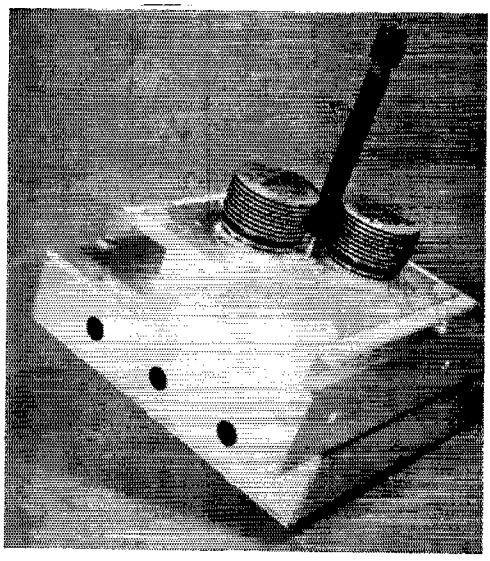
Tickets are available from the East Coast V.h.f. Society, Box 1263, Paterson, New Jersey for $7.95, and $6.95 for YLs and XYLs. Write now because no tickets will be sold at the door.

220-and-Up Directory Ready

Copies of the long-awaited directory have been mailed to all OVS appointees and those who submitted a completed questionnaire. Additional copies are available upon request, accompanied by a stamped self-addressed envelope, with 12¢ postage.

*Send reports and correspondence to Bill Smith, WB4HIP, ARRL, 225 Main St., Newington, Conn. 06111.

† *Declination.* Angle in degrees north or south of the celestial Equator (the circle that would be formed at a right angle around the polar axis).

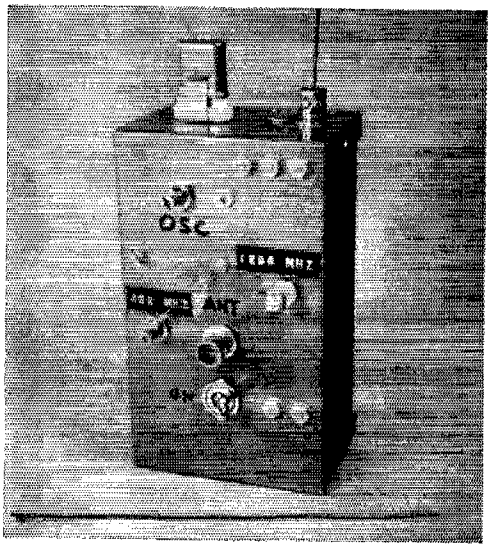


VE2HW built this 1296-Mc. cavity amplifier from the article by WB6IOM, page 17, January 1968 QST. The builder says the amplifier tunes as easily as a 3.5-Mc. final.

U.h.f. Signal Source

VE2HW's OVS report last month mentioned a signal source for 432 and 1296 Mc. Obviously this is a useful device for the u.h.f. man, so I asked him for the details. The schematic and photographs provide the necessary information. There are two antenna connectors on the case, one each for 432 and 1296. The antenna whips are 6¾ and 2¼ inches long, respectively.

VE2HW's address is Don Watters, 427 Hampton Court Road, Dollard-des-Ormeaux, Quebec, Canada.



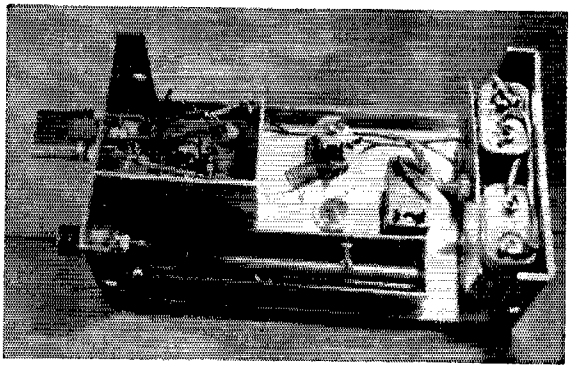
The VE2HW 432 and 1296 Mc. signal source puts out a signal audible for several city blocks. The "osc" trimmer is C_1 on the schematic.

Some Thoughts on 432

Within the past 24 months interest in 432 Mc. has grown markedly. Now many of us are exploring our lowest u.h.f. band, discovering its possibilities for tropo scatter, aurora, e.m.e. (moonbounce), ATV and interference-free f.m. operation. The 30-Mc. wide band has been mostly void of amateur signals except a few hardy souls who pioneer, and government radar. Solid-state developments now make low-noise reception easily obtainable and the varactor tripler allows the builder to inexpensively and easily produce r.f. Twenty watts, typical of a varactor tripler output, and a good antenna, have proven enough for tropospheric DX.

Experience at this frequency is gained mostly through the school-of-hard-knocks. Fortunately some of those so educated have agreed to share their know-how. "Grid," W4GJO, Sarasota, Florida offers the following observations.

"We never used to think of 2 meters as an especially noisy band, but it is, when compared with 432. When tropo conditions are good, 432 is often open longer (sometimes by days) and signals stronger, for a given power level, than 144. Easily



The VE2HW signal source is built into a standard 5¼ × 3 × 2 inch utility box. The trough line is made of a piece of .032 brass sheet 4" long and ¾" on a side. The center conductor is a 4-inch long ¼-inch brass rod.

worked long-distance paths on 432 may be marginal on 144, and those who wait for favorable conditions on 144 before trying 432 are missing many exciting possibilities. We'll never appreciate 432 until there is much more random operating by well-equipped stations.

"As on all bands, the antenna is the weak link in too many cases. There are some very poor commercial 432 antennas on the market, and many ham-built ones are no better. Of all the antennas described in various publications, those that perform the best with duplication are the Tilton Yagis and the extended-expanded collinears. The latter usually win the antenna gain contests, but I suspect this is largely because their greater size, and the fact that the collinear is more tolerant than Yagis of sloppy construction and inaccurate physical measurements. Hours of optimizing can be negated in a moment if Yagi dimensions and construction are not scrupulously followed. Low-loss feedline is a must; RG-8/U is not good enough.

"An aid for evaluating antenna and receiver performance is a stable signal source. I use a crystal-controlled transistor oscillator placed in a garage several blocks from my station. It runs continuously

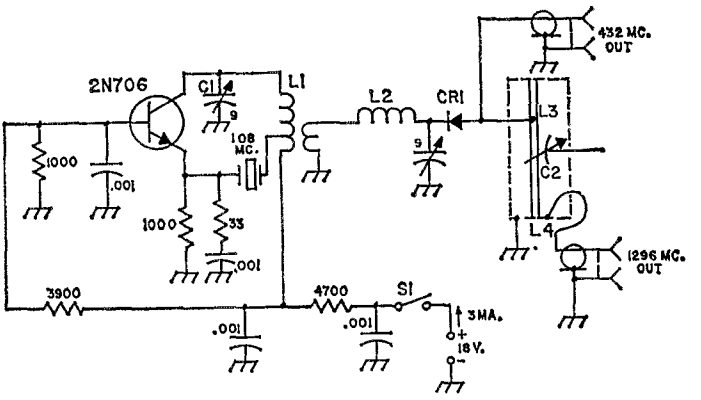


Fig. 1—Schematic diagram of the VE2HW 432 and 1296-Mc. signal source. It is powered by two 9-volt batteries, all resistors are ½-watt, or smaller.

L_1—7 turns No. 22, ½ inch diameter, ½ inch long. Link is 2 turns No. 22 at cold end.

L_2—8 turns No. 22, ½ inch diameter, ½ inch long.

L_3—4 inch long ½ inch brass rod, tap 1 inch from one end. Solder rod into trough at both ends.

L_4—Link 1 inch long No. 20, ⅛ inch wide, bent into loop, close to L_3.

C_1—9-pf. air variable

C_2—No. 8 brass machine screw with ⅜ inch diameter brass nut soldered on thread end, forming capacitor plate after mounting trough, but soldered before L_3 is installed. Use a nylon lock nut on outside of box.

and is perfect for providing a signal of known strength and direction.

"Most ham-built parametric amplifiers I've seen leave much to be desired. Unstable pumps and poor mechanical design are two reasons. When they're good, they're still great, and the *Q* of the device is helpful. But today's transistors come so close in performance, that one need not despair at not having a good stable paramp, especially if you don't have a nearby high-power 432 station."

Al, WØDRL, Topeka, Kansas, an enthusiastic 432 fan, has these comments.

"I've been licensed for 20 years, worked much choice DX and hold DXCC, WAC and WAS, but my best amateur experience was the night I turned on the 432 gear, called CQ, and there was W9AAG answering. I worked five different stations that evening and all the work I'd put into 432 was worth those contacts.

"Since then I've discovered 432 doesn't require the ultimate of equipment. Under favorable conditions I've worked 325 miles with four watts, a pair of Tilton Yagis and 100 feet of RG-8/U. A varactor tripler driven by an existing 2-meter transmitter is an excellent way to begin.

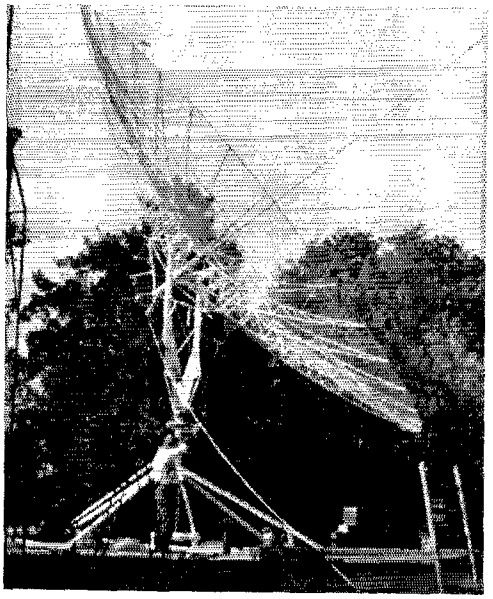
"Propagation is primarily tro pospheric, necessitating a study of the daily newspaper weather maps. One soon begins to predict when and where the band is going to open. I have a file of maps for days when the band was good, and studying them is quite educational. Winter conditions have surprised me. I worked W9BRN in Indiana, about 600 miles, one December night. But the most fun is working tropo scatter — at least I think that's what it is. W9WCD at DeKalb, Illinois has been worked 150 times since last summer. I'm putting 300 watts into 100 feet of half-inch Heliax and a 44-element Tilton Yagi array. I can change the height of the antenna from 30 to 75 feet and still hear the Illinois station 95 percent of the time. The signal usually peaks at about 50 feet, but varies from day-to-day. Another phenomenon I've noticed on this path is a constant flutter or echo effect on the signal. On several occasions I've turned my antenna slightly North of true and separated his signal into two different frequencies, 100 to 200 cycles apart. Returning the antenna to its original true bearing again produced a single signal with an echo.

"A ham willing to put forth some effort in building equipment, studying, and using his ideas, can greatly contribute to the art of amateur radio. For a number of years 2 meters was considered a "local" band, but due to dedicated efforts we've proved the band is capable of excellent DX. I feel 432 is in the same position today; we really haven't given it a chance. The amateur should give serious thought to how he fits into the space communications picture, and if he begins work now, he is sure to be in on the exciting moments ahead."

Al Olcott, K7ICW, at Las Vegas, Nevada has these suggestions.

"The important thing is an antenna that works, whatever it is. There is no such thing as a bad antenna, only bad procedures and methods of using the hardware. West Coast antenna measuring contests have revealed some poorly operating antennas, both commercial and homebuilt. My personal observations of all v.h.f./u.h.f. arrays is that rarely does one exceed 18 db. gain over a dipole. The ARRL *V.h.f. Manual* is very good in its description of tuning 432-Mc. antennas. However, it should be stressed that results may be misleading if the transmitter is putting out r.f. on other frequencies, as well as 432.

"A protection system is necessary in converters using bipolar transistors, to prevent burning out the first-stage with r.f. The use of a shorting-type coaxial relay, or one from the APX-6 equipment, provides protection for all but high-power operation. In that case, a time constant delay may be necessary. The use of hot-carrier diodes or r.f. shunt diodes in the front end of my converter has proven intolerable for weak-signal work at 432. I'm still looking for a diode that will introduce little shunt capacitance; they should have low capacitance, fast rise time and be of the germanium type. Mounting the converter close to the changeover relay is necessary for weak signal detection, to avoid one-quarter and odd-multiple resonant lengths of coax between the relay and the converter. K7ZIR says experi-



Hans Lohmann Rasmussen, OZ9CR, Aasum Odense, Denmark, OZ9FR and several Copenhagen University students built this 25-foot parabolic antenna. It is built of one-centimeter thin-walled steel tubing, obtained from a Danish shipbuilding yard, and covered with wire mesh. The entire antenna, including the drive system, cost less than $200 and has an interchangeable feed dipole for 432 and 1296 Mc. Parametric amplifiers for both bands have been completed and high power transmitters are under construction. *(W3BLC photo)*

ments with 432 transmitters indicate that tuned lines are inefficient and that the cavity method is best."

Al also notes tropospheric variances over mountainous paths, and that a parallel between 144 and 432 conditions can not be established in that terrain. In Canada, most 432 activity is confined to Quebec and Ontario. VE2LI, active on 432 since 1962, says:

"I started with a 6252 tripler, 5894 amplifier, and a single 4CX250B in a square box cavity. My first contacts were arranged by schedule, after it became apparent there wasn't much activity. The antenna was a 32-element collinear and the converter used a 416B r.f. stage, noise figure unmeasured. A parametric amplifier was built, and it worked well as long as the impedance of the array remained constant. It was quite impressive to hear the signal from a test oscillator increase as pump voltage was applied, and the noise remain unchanged, but the paramp was useless in wet weather because the antenna impedance varied.

"There is no great secret to 432 propagation. Watching the barometric pressure has been my labor for years. The low and high pressure areas give one a good indication of what to expect. *(Stalled or slow-moving areas of high pressure may produce excellent tropo conditions.)* In January the barometer often reads very high and signals are extremely good. Winter signals are generally less subject to deep fades than summer signals because there are no pockets of warm air. In the summer, unless the barometric pressure is very high, signals are strong but exhibit very deep fades in a matter of seconds. For long hauls, however, September and October seem to produce the best signals because of warm days and cold nights, triggering temperature inversions. The most favorable time appears to be between 2100 and 2300 local time." *(Sunrise conditions should be equally good due to the heating of the upper air, or the reverse of evening atmospheric conditions.)*

Several conclusions may be drawn from these notes: low power and a well-matched array fed with low-loss transmission line are adequate for many interesting contacts; most commercial and many homebuilt antennas are poorly designed and constructed; a certain amount of simple test gear must be built for ultimate equipment performance; watching 144 for favorable 432 conditions is unreliable, and more random use of the band is needed before its potential is developed.

Aurora contacts have been made on 432, and WAØIQN says theory indicates that 432 aurora signals should be approximately 23 db. down from 144. Amateurs could contribute greatly to the study of aurora above 400 Mc.

The following articles and publications are suggested for further study of 432 practices. *QST*, March 1966, W1CER's discussion of varactor multipliers, including an easily constructed tripler; *QST*, April 1966, W1HDQ's article, "Yagi Arrays for 432 Mc.;" *The Radio Amateur's V.H.F. Manual* (ARRL), a 432-Mc. cavity amplifier plus many construction tips, and *VHF for the Radio Amateur* published by *CQ Magazine*, page 35, extended-expanded collinears.

There has been nothing offered here that is new, but we hope this brief symposium will develop still further interest in the 420-Mc. band. There is no time like this summer to get started.

OVS and Operating News

50 Mc. DXers were disappointed that there was no recurrence of the early January F_2 openings near the first of February. The m.u.f. hovered several megacycles short of 50 Mc. But on February 11, WA6HXW, near Los Angeles, reported the m.u.f. above 50 Mc. at 1939 GMT and KH6NS laying a potent signal into Southern California. WA6HXW also worked KH6BZF and KH6GKL. All three Hawaiian stations were using s.s.b. in the first 15 kc. of the American phone band. The F_2 opening, which lasted until 2115 GMT, came on the heels of an excellent aurora between 2100 GMT, February 10 and 0800 GMT the following day. The aurora reappeared about 2300 GMT, but was not as intense as the initial display. Numerous aurora contacts were reported during the two sessions.

During the previously reported late December and early January F_2 openings, W5SFW, Amarillo, Texas worked his 50th 50-Mc. state, KH6NS. *Congratulations, Phil!* W5SFW says a 5 kw. beacon is now operating at Point Barrow, Alaska on 46.374 Mc. beamed towards Anchorage.

Reports of *Es* during January and February were received from WA1DPX, Massachusetts; K2TXB/2, New York; W3BWU, Pa.; W6DOR; WA7GFP, Oregon; W4FJ, Virginia and WA8EOW, Michigan. During an opening at 0030 GMT, February 1, K2TXB/2 worked into Southern California on multi-hop *Es*.

W6PUZ/7, Mercer Island, Washington works his 50-Mc. scatter with 60 watts input and a 3-element Yagi 30 feet high. But it has been sufficient for nearly 200 scatter contacts since late November, including more than 50 with WB6NMT over a 1100-mile path! W6PUZ/7 says schedules with WB6NMT produce good residual signals and

nearly 50 per cent copy. Signals during the December Geminids and January Quadrantids meteor showers were nearly solid, but the meteors actually distracted from the weak, residual signal. K7ICW, at Las Vegas, submitted his usual detailed report, including a number of scatter contacts such as an 800-mile haul to WØJXK/7, Idaho. At Beaurepaire, Quebec, 16-year-old Don Falla, VE2DFO, recently became interested in s.s.b. scatter, and reports several nice contacts using a SB-100 and 5-element Yagi. Don says the VE2s would appreciate W/Ks looking north more frequently.

144 Mc. aurora openings DXcited many operators in the northern latitudes during late January and in February. Aurora was reported on January 19, 28, 29 and February 10 and 11. K2HLA, New York, says the January 19th opening was of short duration, and that he worked WA8RQJ in Ohio. The January 28–29 opening was reported by K2HLA and W3KWH in Pennsylvania. W1s, 2s, 3s, 8s, 9s and Øs plus VE2 were worked, the best DX appears to have been W3KWH's exchange with KØMQS, Iowa. The evening of February 10 proved interesting as W3KWH worked W1s, 9s and Øs including KØMQS, Iowa, WØRLI, Minnesota and W9HHX, Wisconsin. W3BDP, Delaware, and W9YYF, Illinois, each worked a new state when they contacted one another over an approximately 700-mile path. KØMQS heard W3BDP, about *950 miles*, but W3BDP could not hear the Iowan. The time was 2045 EST; auroral conditions lasted from about 6 P.M. until midnight, EST. The aurora returned about sundown the 11th and lasted until at least 3 A.M. the 12th. W3KWH worked WA9DOT, Wisconsin, and K4QIF in extreme Southeastern Virginia worked W9BRN, Indiana, and heard W9YYF, Illinois, about 700 miles distance. Two stations, VE2BGJ and K9AWV, Illinois, worked their first aurora and reported contacts with many stations, and the Illinois station heard Vermont's K1BKK, about 800 miles. Also during this session, K8AXU, Ohio, heard K2CBA in New York on 220 Mc. Aurora was also noted the evening of the 12th, but the intensity was not nearly as good as the previous two nights. WA2EMB heard nothing on 432.

While tropo conditions were generally poor, the last two days of January were quite good from Iowa through the Mississippi and Ohio River valleys into Western New York. On the 30th, K2TXB/2 worked KØMQS with extremely strong signals.

Several hardy souls continued random meteor scatter schedules through the annual doldrums of m.s. activity, but you won't convince KØMQS it wasn't worth the effort. Dick worked K7NII, near Phoenix, on February 4th at high noon. The contact was made on a handful of short bursts and gave Dick state number 41.

Remember Tommy, W2UK/KH6UK? He is reported active on 2 meters once again from New Jersey. If you ever have an opportunity to hear Tommy speak, don't miss it!

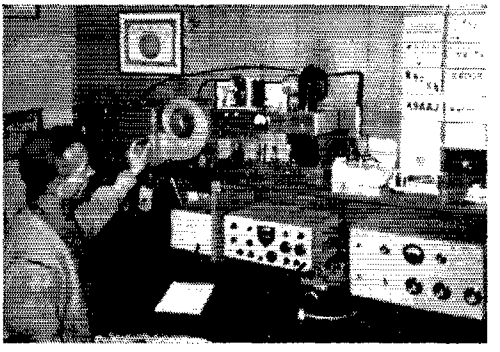
E.m.e. news comes from K6MYC. Mike says SV1AB in Greece is now allowed back on the air after that country's political problems. And because of complications resulting from an extreme drought in Australia, VK3ATN has had to abandon e.m.e. plans for 432 and 1296, but will continue on 144 with his present proven system.

220 Mc. is showing some suggestion of increasing occupancy. W1DZA, Stratford, Connecticut added his contribution to my previously barren 220 portfolio, saying he has completed a 15-element Yagi, coaxial filter and converter for 220, and is at work on a 300-watt amplifier. Headquarters staffer W1ARR noted on a Sweepstakes log from WB6NTL that the Californian is running s.s.b. on 220, has a 32-element collinear, is building an amplifier, and wants schedules. W2SEU says 220 is far from dead, and lists W1NOC, WB2CNK, K2JDI, K2GHU, WA2FFB, W2BPU and WB2KSZ as active. He says the New Jersey stations are active early in the evenings. K1ABR, Cranston, Rhode Island says he now has 20 watts and an 11-element Yagi on 220. K4EJQ, Tennessee, and K4MHS in North Carolina are both said to be readying 220 equipment. And in the Boston area, K4GGI/1, K9AQP/1, WA5IOD/1 and W1MX are all active. WA5IOD/1 runs a 5894 into a 9-element Yagi, while K9AQP/1 has a 832A, FET converter and 8-element Yagi. K1YON reports many of the same stations and says that Tuesday night remains 220 night in New England.

Bob Cooper, K6EDX, has the following comments on 220 activity, "The lack of activity and real interest can be traced to a lack of equipment. It may be a 'chicken and egg' situation, but let's face it, without some type of incentive there isn't going to be much equipment built, and without the equipment there won't be any contacts. I, too, agree the 220 standings are shameful — by the very apathy they indicate on all of our parts." Bob goes on to suggest special multiplier credit for 220 contacts during League v.h.f. contests. However, previous Contest Committee experience has shown little is gained, except to anger operators in the less populated areas of the country. Surely someone, somewhere has a equitable rules system that will help solve some of the contest problems, but alas, there is always *some* 220 activity during contests, but it disappears immediately thereafter until the next contest.

432-Mc. conditions were good on several cold winter nights, keeping interest in the band at a high level. On January 22 W3RUE, Pennsylvania, worked his 13th 432-Mc. state, Tennessee's K4EJQ, and a slow-moving high pressure area opened the band from the midwest to the east coast on January 28 and 29. K8AXU, Ohio, and W9BRN, Indiana, worked on the 28th, 300 miles, and WA9HUV, Illinois was heard by K8AXU in extreme Eastern Ohio. K4QIF, Virginia, caught a good coastal opening as the high pressure area drifted east on the 29th. Rusty worked 13 different stations in four states, the best DX being about 400 miles. And

(*Continued on page 168*)



Al Tyler, WØDRL, has made Kansas readily available on 432 with this homespun station ending in a pair of 4CX250Bs and sixteen 11-element W1HDQ Yagis.

Operating News

GEORGE HART, W1NJM, Communications Manager
ELLEN WHITE, W1YYM, Deputy Comms. Mgr.
Administration: LILLIAN M. SALTER, W1ZJE — *DXCC:* ROBERT L. WHITE, W1CW
Contests: RORERT HILL, W1ARR — *Training Aids:* GERALD PINARD
Public Service: WILLIAM A. OWEN, W1EEN

Poll Survey. What in tarnation, you may ask, is a "poll survey"? ARRL appointees know, because they have received the response sheet, and over 600 of them have returned it, sometimes elaborately decorated with their scribbled comments (although we *asked* them not to!). Affiliated clubs also received it, and a couple dozen returned a consensus. What it is, is a sheet containing a number of proposals of current interest with a request that each recipient's reaction be expressed by a simple "yes" or "no." All these questions had been discussed previously, either in *QST* or a *CD Bulletin*.

A poll survey is not a referendum, or a membership vote, or an election. It's merely one tool of several used to try to ascertain how a representative segment of active amateurs feel about certain topics of current interest in the operating field. It is not binding, but advisory; however, where the consensus is overwhelming one way or the other, it seems advisable either to look to the validity of our sampling or to take immediate steps to implement or withdraw, as the case may be.

The operating membership will be vitally interested in what results have been obtained in this poll survey. A complete analysis and conclusions have been presented in a bulletin to appointees and affiliated clubs, and these will be used as a guide in making changes which seem to be indicated. Many of the return sheets were accompanied by modifying or qualifying letters, most of them extremely well thought out. Although 600 returns from a mailing list of 6,000 or so does not seem particularly impressive, we were pleasantly surprised to get that many. Briefly, here is a rundown of the results based on the first 600 sheets received:

1. Should the number of CD parties per year be reduced? Yes, 123. No, 349.

OPERATING EVENTS (Dates in GMT)
ARRL-IARU-SCM-Affiliated Club-Operating Events

April	May	June
1–30 IARC Propagation Research Competition (p. 75, Feb. *QST*).	2 **Qualifying Run, W6OWP**	1 **LO Time** (League Officials only)
5 **Qualifying Run, W6OWP**	4 **LO Time** (League Officials only)	8–9 **VHF QSO Party**
6 **LO Time** (League Officials only)	4–5 Russian Contest (p. 100, this issue). Nebraska QSO Party (p. 134, this issue).	13 **Qualifying Run, W1AW**
16 **Qualifying Run, W1AW**	11 **FMT** (ARRL Official Observers, only).	14 **Qualifying Run, W6OWP**
20–21 H-22 Contest (p. 100, this issue).	11–13 Georgia QSO Party (p. 154, this issue).	21–23 **Field Day**
20–22 **CD Party** (c.w.)*	15 **Qualifying Run, W1AW**	**July** 13–15 **CD Party** (c.w.) 20–22 **CD Party** (phone)
27–28 Ohio QSO Party (p. 104, March *QST*). Wisconsin QSO Party (p. 122, this issue). PACC Contest (p. 91, March *QST*).		**Sep.** 7–8 **VHF QSO Party**
27–29 **CD Party (phone)***		**Oct.** 12–14 **CD Party** (phone) 19–21 **CD Party** (c.w.)
* League Officials and Communications Dept. Appointees only.		**Nov.** 9–11 **SS** (phone) 16–18 **SS** (c.w.)

2. Apply versatility rating to appointments. Yes, 185. No, 188.

3. Revise the ARRL appointment structure. Yes, 171. No, 211.

4. Eliminate power multipliers:
   a. In the Field Day. Yes, 106. No, 416.
   b. In the Sweepstakes. Yes, 177. No, 371.

5. Give more credit for 100% emergency power in Field Day operations. Yes, 416. No. 62.

6. Give more credit for traffic handling during Field Day. Yes, 306. No, 181.

7. Limit time for setting up for FD. Yes, 344. No, 143.

8. Put into effect some version of an unannounced Field Day. Yes, 238. No, 239.

9. Use a geographical multiplier in Field Day. Yes, 253. No, 147.

10. Put into effect some version of an unannounced Simulated Emergency Test. Yes, 224. No, 91.

11. Move NTS operating schedules one hour earlier from May through October. Yes, 223. No, 137.

12. Substitute a new over-all point system for the present BPL column. Yes, 162. No, 102.

So, on the basis of this survey alone, what changes are indicated? Well, if you go strictly by majority vote, we should give more credit for 100% emergency power on FD, give more credit for traffic handling on FD, limit time for FD setups, use geographical multipliers on FD, have an unannounced SET, put NTS on "daylight saving" time, and replace the BPL with a "point" system. Seven changes, out of 12 questions. But remember, this is a sampling, not a membership vote. In order to be *sure* of the trend of sentiment, we have to examine other methods of judging it and combining them with

DX CENTURY CLUB AWARDS

From January 1, through January 31, 1968, DXCC Certificates based on contacts with 100-or-more countries have been issued by the ARRL Communications Department to the Amateurs listed below.

New Members

W8BVF.....287	K3JYZ.....123	UB5KAF...108	W6EBO.....104	W4FIN.....102	K7VPF.....100
PY4GA.....211	DL1EC.....118	VE2BFP....108	WA8TYF....104	JA1HXW....101	K8AFW.....100
PY4BR.....215	UC2KAG...118	JA1AZR....107	DL9QM.....103	UP2AY.....101	K9UYO.....100
W3BK.....208	LA4UH.....117	W3DPR.....107	K4VHF.....103	W3DHG.....101	WA1CJE....100
SM7ASA....182	WB6NRO...116	K1LWC.....106	K9DEQ.....103	WA4UNK....101	WB2SLQ....100
WB2YNX....165	W1CED.....114	W3FLZ.....106	W1PRT.....103	W8QQL.....101	WA3GGV....100
W7GGO.....139	W3CBF.....113	K5PKA.....105	DJ9ON.....102	W9EVX.....101	W3JET.....100
6Y5RD.....138	SV9WV.....110	W0CWS.....105	K6JAH.....102	K2GPK.....100	W3QZV.....100
WB6NRK....136	VE2DCY....110	DL5NI.....104	UA3GO.....102	K2SFA.....100	WA5OUW...100
KR6JS.....135	KZ5GN.....109	UB5TN.....104	WB2EUU....102	K4WVX.....100	WA9ONB...100
WA5JJH....126	WA1CDW...109	W4PEW.....104	W4CBG.....102	KH6FMS....100	

Radiotelephone

WA4OPW....203	W6PRO.....131	K5TGJ.....110	WB2SAF....103	W4PEW.....102	W3AXW.....100
W6VNH.....163	OX4AA.....120	W8KVF.....110	W6ZC.....103	PZ1CE.....101	WA4UNK....100
5N2AAX....152	WB2RSW....119	W5AC.....109	CT1PQ.....102	W4DQD.....101	W7ZZC.....100
DL9SV.....147	SV0WL.....117	JA0SU.....105	SV0WV.....102	W2BHK.....100	W8HXR.....100
WB2LRK....139	W3BK.....116	K5MFA.....105	W2VDX.....102	WB2HBV....100	9M6NQ.....100
K9ZB1.....136	W4OKO.....111	WA8PYL....104			

Endorsements

Endorsements issued for confirmations submitted from January 1, through January 31, 1968, are listed below. Endorsement listings through the 300 level are given in increments of 20, above the 300 level they are given in increments of 10. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

320	**280**	**240**	VE3XK	W2FLD	YU2NEG	UB5ND	I1FOS
K8IKB	WA2HUV	DJ5AA	W3BWZ	W4KN		W1PEG	K2DDK
W6WX		OH2LA	WB4BDO	WA5RQA	**160**	W2NEP	K4RBZ
		W1MDO	WA6CAL	W6MPY	F3TK	WB2QKT	K8UZX
310	**260**	W2LWI	WB6CIY	W7TLG	HB9AIJ	W4PGK	LA3HI
K2UKQ	DL1QT	WB2FOV	W9OVF	WA7FIG	K4CFB	WA4PFD	OZ6HS
W1UOP	DL7BK	W6FLT	WA0CPX	W0HNA	K9CZV	W5TXN	W2VJO
WA2DIG	HK3AFB	W7RVM			W3CAA	W6QNJ	WB2JOX
W3KDP	K1CDN	W8NPF			W5GZR	WA6TKQ	WB2NZU
W0AUB	K4OEI	WA8MCR	**200**	**180**	W7BCV	WA6ZQN	WB2RSW
	K0BLT	W9YT	DL1AM	K3BSY	W8KC	W8ZNO	W4LXA
	VE1AFY	W0MAF	K1SLZ	K9ALP	W8QBG	WA8PYL	W4OHP
300	VP7NS		K5VTA	LA8PF	WA8SNM	W9JCK	W4WWG
K2TQC	WA4GCS		K0YIP	SM5BFJ	WA8TPL	W9TQA	W5IRG
WB2FSW	WA4HOM	**220**	OZ4FF	UC2WP			W5ZW_X
WB2HXO	W7ATV	JA4XW	PY1BTX	WA1ABW	**140**	**120**	W6EJT
W6ISQ	W9WGQ	K1JHX	VE4SK	WB2PWU	DL1TV	DJ2OEC	W6OJW
W6KTE	W0CKC	K4THA	W1PYM	W0PFG	K4NVI	EA3KT	W8KVF

Radiotelephone

310	**280**	VE1AFY	**220**	**180**	K1SLZ	W5OLG	**120**
W1UOP	K8IKB	W2CES	HP1JC	I1KG	PA0UC	WA5RQA	F5SJ
WA2RAU	PY4KL	W2FXA	W9HPS	K4PSR	VE4AS	W6AOI	K2DGI
	SM5CZY	W3NIG	W0MAF	WA4WTG	VP7NH	WA6DOB	K0GSV
	WB2HXD	W9DNE		WA6AHF	W3KEK	W7RPH	WB2QKT
				WA6DET	WA8SNM	W7WS	W4LXL
300	**260**	**240**	**200**			YU2NFJ	W8GKM
WB2FSW	HK3AFB	DJ5AA	WB2HZG		**160**	YV3CN	WA9PZU
W6WX	K4OEI	JA2ADH	VE3BSJ	**160**	K1DRN		YV4QG
W8BGU	OA4CV	WA4HOM	VE3EVU				

this poll. Where the opposition seems to represent more than, say, a third, it's pretty strong opposition. So, as a rule of thumb, perhaps it would be wise to proceed with caution where the results in the survey alone show less than a 2-to-1 ratio. This would narrow the prospective changes down to three, because our sampling feels *very* strongly only about (1) 100% emergency power on FD, (2) limiting time for setting up FD and (3) having an unannounced SET. For corroboration on other matters, we have to look at other methods.

Don't kid yourself about the amount of work involved in conducting such poll surveys — or in the results of soliciting comments either, for that matter; but we have this thing about being accused of being high handed and arbitrary about decisions on contest and other rules. Therefore, solicitation of opinions and poll surveys on operating questions will continue from time to time, as the time and people to do the work on analysis become available. *Your* opinion is thus solicited. We can't guarantee that it will make things go your way, or even that it can be acknowledged, but it *will* be considered and will have *some* weight. This much we *can* promise.

Those New Calls. It's starting. The masthead of this column will show at least one call change in the department, with perhaps more to follow. In all our operating activities we are starting to hear new calls identifying some oh-so-familiar fists and voices. Some of the holders are having a lot of fun mystifying old friends. "Guess who I am?" is getting to be the name of a new game in amateur radio.

This is fine, for those who want to play it. It's a little less funny to your Circulation Department, which must change mailing stencils for all of them, and to the administrative branch of your CD, which must change *its* mailing stencils for appointees and the like. But it's necessary, so we'll handle it somehow.

When it comes to reissuing all certificates showing the new call in place of the old one, we have to ask for mercy. Please, gang, have a heart! We understand your pride and joy in a new two-letter job replacing that cumbersome three-letter call you've been struggling with all these years. But if you achieved an award under that old call, isn't it appropriate that this be the call that should be shown on the award? It's even possible that at the time the award was achieved, someone *else* held the two-letter call now assigned to you. Changing your call is like changing your name. Suppose you changed your name from Jack Smith to Joe Jones, and you have a closet full of bowling trophies containing the former name. Would you ask the bowling alleys who gave them to you to change the name? Do you think they would take kindly to it if you did?

Besides, why would you want to change your name? — *W1NJM.*

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for January Traffic:

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
K6BPI	5222	1783	1605	178	8788
KØONK	62	2289	2227	37	4615
W3CUL/4	238	752	727	37	1754
W7BA	9	769	692	74	1544
K5TEY	8	816	697	4	1525
WA2UWA	115	730	620	10	1505
W5OBD	27	659	657	0	1343
WA1FVH	62	563	349	177	1151
K3MYS	103	523	453	8	1087
WB6GGL	20	514	504	10	1048
WA4EXB	15	493	394	99	1001
W6RSV	37	489	352	106	984
WA7DXI	51	479	416	32	978
W0IES	53	419	446	2	920
W3EML	48	473	377	1	899
W6KVQ	0	419	419	0	838
W6GYH	73	350	320	23	766
WA1EEJ	74	361	262	29	726
W1EFW	45	359	265	33	692
K5BNH	24	300	280	87	691
W3CUL	102	298	276	14	690
W7DZX	25	354	281	11	671
WØLCX	24	360	263	17	664
W2SEI	22	318	299	9	648
WB2NKN	21	310	291	19	641
K3NSN	257	191	149	42	639
WA7DMA	9	300	309	7	625
WA4SCK	33	281	285	7	606
KØYBD	17	292	238	31	578
W7HMA	22	281	265	5	573
WB6BBO	33	272	262	5	572
WAØDOU	12	278	278	0	568
W6EOT	6	277	274	0	557
WA4WWT	46	261	241	0	548
WA1EYY	50	252	198	47	547
W7ZIW	29	257	252	2	540
KØJPJ	17	255	247	18	537
W6MLF	101	197	219	5	522
W6BGF	30	243	220	23	516
WA9GHZ	16	238	30	230	514
WB4DXX	18	246	241	2	507
W3FGQ	32	270	151	53	506
WAØMLE	122	222	154	8	506
Late Reports:					
K3MYS (Nov.)	53	524	464	8	1049
WAØDOU (Dec.)	11	273	273	1	558
KØZSQ (Dec.)	6	268	10	247	531

BPL for 100 or more *originations-plus deliveries*

K1DGQ 302	W2OE 121	W3TN 107
W4BAZ 228	WA4WZZ 121	K6IBI 107
K7PXA 207	W4RZL 120	WB2UVB 106
KØZSQ 207	WA4SNS 120	K8KMQ 105
WB2QIL 205	WB6INO 119	WA2TBS 104
WB2UQP 202	WA9MHU 119	WA3EEC 104
W8IV 184	WA9QBM 118	WA4DYL 104
WA2UCP 163	WB2PJH 117	VE2ADE 104
K7NQX 156	W1LYQ 116	W3MPX 103
WA6BYZ 143	K2KDQ 116	W3VBA 103
VE2ALE 140	WA3JCA 116	WA4WQU 103
WA4AGH 136	W1TXL 113	WA3GAT 102
K1PNB 133	WAØORO 112	W4ILE 101
WA3FCP 133	WB4GTG 111	Late Reports:
WB2NSV 125	WA3CQO 110	WA8ARJ (Dec.) 128
WA4WSW 125	WA6AUD 110	WB6TYZ (Dec.) 117
	WB2DDQ 107	WB6PKA (Dec.) 111

More-Than-One-Operator-Stations

WØKY 380	K7PXA 207	K6QEH 111

BPL Medallions (See Aug., 1954, p. 64) have been awarded to the following amateurs since last month's listing: WA1EEJ, WB6TYZ, KØAKK, WØIES, KH6GHZ.

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 origination 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.

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, in good standing, are *required* on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must meet the following requirements prior to deadline date listed below: (1) Holder of amateur Conditional Class license or higher. (2) A licensed amateur for at least two years immediately prior to nomination. (3) An ARRL full member for at least one year immediately prior to nomination.

Petitions must be received at ARRL on or before 4:30 P.M. 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* and station call of the candidate and signers should be included with the petition. It is advisable that eight or ten full-member signatures be obtained, since on checking names against Headquarters files, with no time to return invalid petitions for additions, a petition may be found invalid by reasons of expiring memberships, individual signers uncertain or ignorant of their membership status, etc.

Elections will take place immediately after the closing dates specified for receipt of nominating petitions. The ballots mailed from Headquarters to full members will list in alphabetical sequence the names or all eligible candidates.

The following nominating form is suggested. (Signers should be sure to give city, street address and zip code to facilitate checking membership.)

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.

You are urged to take the initiative and file nominating petitions immediately. This is your opportunity to put the man of your choice in office.

—George Hart, W1NJM, Communications Manager

Section	*Closing Date*	*SCM*	*Present Term Ends*
Santa Barbara	Apr. 10, 1968	Cecil D. Hinson	Aug. 10, 1966
Eastern New York	Apr. 10, 1968	George W. Tracy	Feb. 10, 1968
East Bay	Apr. 10, 1968	Richard Wilson	Feb. 10, 1968
Wyoming	Apr. 10, 1968	Wayne M. Moore	June 9, 1968
Louisiana	Apr. 10, 1968	J. Allen Swanson, Jr.	June 10, 1968
Quebec	Apr. 10, 1968	Jim Ibey	June 11, 1968
Eastern Massachusetts	Apr. 10, 1968	Frank L. Baker, Jr.	June 15, 1968
South Carolina	Apr. 10, 1968	Clark M. Hubbard	June 26, 1968
Arizona	May 10, 1968	Floyd C. Colyar	July 14, 1968
Utah	May 10, 1968	Gerald F. Warner	July 15, 1968
Western Pennsylvania	June 10, 1968	Robert E. Gawryla	Aug. 7, 1968
Iowa	June 10, 1968	Owen G. Hill	Aug. 17, 1968
Idaho	June 10, 1968	Donald A. Crisp	Aug. 17, 1968
Western New York	June 10, 1968	Charles T. Hansen	Aug. 17, 1968
San Joaquin Valley	June 10, 1968	Ralph Saroyan	Aug. 20, 1968
Montana	July 10, 1968	Joseph A. D'Arcy	Sept. 9, 1968
Northern Texas	July 10, 1968	L. L. Harbin	Sept. 12, 1968

ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed by members in the following Sections, completing their election in accordance with regular League policy, each term of office starting on the date given.

Southern New Jersey	Edward G. Raser, W2ZI	Mar. 4, 1968
Georgia	Howard L. Schonher, W4RZL	Mar. 26, 1968
Connecticut	John J. McNassor, W1GVT	Apr. 11, 1968
Saskatchewan	Gordon C. Pearce, VE5HP	Apr. 11, 1968

JANUARY CD PARTIES

Previous phone score and QSO highs wilted under a barrage of firepower from the cannons of K2EIU/5 and K6QPH/7 (doesn't anybody ever stay home?), both of whom riddled the previously untouchable target of 400 contacts by a fat margin; Ken, in fact, hit the bullseye for over *500* two-ways, while Alan finished a solid second with a FB performance from Wyoming; K4BAI and K1CEC also racked up over 100K on voice. A3 activity was spiced by operation from VE4NE and KL7FLS — welcome to the fun, Bess!

So much for the sunshine; now a few dark clouds. (1) Some entrants whose scores would normally appear in high-claimed did not bother to list their times of operation. (2) Concerning club operation, **both the operator(s) and the station must hold CD appointments.** About half a dozen fellows disregarded this rule. (3) Several of the gang commented on the juvenile and highly questionable operating tactics of a certain very active phone participant. Such dismally boorish manners have no place in any activity — and certainly not in CD Parties, which are supposed to attract the savviest ops! We hope the offender wises up in a hurry. *— W1ARR*

Claimed scores, QSOs, sections, hours.

C.W.

K2EIU/5	280,840-819-68-20
W8UM (K2SIL, opr.)	279,390-827-67-20
WAØSDC	264,520-772-68-18
K2KIR	264,225-806-65-17
W8SH (K1ZND, opr.)	256,750-783-65-20
WA9ITB	250,240-731-68-20
K4BAI	247,000-753-65-19
W3EIS	213,525-651-65-20
WA2UWA	202,150-622-65-18
KØAZJ	192,465-607-63-20
W1BGD/2	186,795-586-63-14
WB4AIN/4	186,450-559-66-19
K4RIN	185,280-579-64-19
WØTDR	180,180-541-66-20
WB2NZU	159,250-486-65-18
WB2RKK	157,480-501-62-17
WA8ZGC	156,160-481-64-11
VE2DCW	155,295-488-63-20
W4DVT	147,735-462-63-14
K3HKK (K3AHT, opr.)	132,370-427-61-10
W8RYP	128,405-414-61-18
KØORK	127,440-426-59-10
WØINH	120,780-359-66-11
WA8TYF	120,600-397-60-13
K8HKM	120,300-398-60-20
W9PFT	116,565-405-57-17
WA4WWT	114,165-380-59-12
WA7DMA	113,765-369-61-18
WB2UHZ	108,750-369-58-15
VE7ASY	106,200-360-59-19
K1AEC	105,610-351-59-16
W4ILE	104,690-354-58-16
W4BZE	104,460-388-59-10
W9AQW	103,545-351-59- 6
K5OCX	102,555-381-53- 9
WA3JCA	102,480-366-56-20
K4PUZ	102,030-351-57- 7
W1JYH	101,400-331-60- 3
W4KFC	101,185-336-59- 4
W9YT (WAØIAW, opr.)	101,175-355-57- 7
K1TKS	100,605-348-57-16
W6RW (W6s DGH DQX, WB6OLD)	337,350-1038-65-20

PHONE

K2EIU/5	164,160-506-64-20
K6QPH/7	138,600-457-60-19
K4BAI	117,115-390-59-17
K1CEC	103,395-334-61-13
WA2UWA	96,000-320-60-14
WA5IIS	91,155-303-59-18
W9QQG	87,175-312-55-17
WAØSDC	82,360-278-58- 7
W9YT (K9FWF, opr.)	78,590-268-58- 9
K2QDT	71,340-242-58- 8
W1AW (W1ARR, opr.)	70,675-250-55- 9
W1PYM	51,570-186-54-12
W5PWG	49,440-201-48-12
W4ILE	48,000-193-48-14
W9EGQ	47,940-181-51-10
W6ORW	45,645-176-51-18
W3LIS	44,345-175-49- 7
W1JYH	44,250-170-50- 3
K1DGQ	41,850-186-45-20
K2DXV	40,000-153-50- 5
WA1EEJ	36,980-170-43-11
W1FJ1	36,800-157-46-18
WØPAN	36,190-151-47-11
W8DQL	33,000-151-44- 4
WA3BGE/8	32,400-130-48- 8
WA3GLI	32,400-135-48-14
W4KFC	28,800-121-45- 4
WB2RKK	28,470-139-39- 7
VE3DMU	28,000-140-40-11
W2GKZ	27,600-113-46- 5
WB2UQP	26,220-135-38- 9
KØDEQ	25,410-117-42- 5

CODE PROFICIENCY PROGRAM

Twice each month special transmissions are made to enable you to qualify for the ARRL Code Proficiency Certificate. The next qualifying run from W1AW will be made April 16 at 0230 GMT. Identical tests will be sent simultaneously by transmitters on listed c.w. frequencies. The next qualifying run from W6OWP only will be transmitted April 5 at 0500 Greenwich Mean Time on 3590 and 7129 kc. *CAUTION!* Note that since the dates are given per Greenwich Mean Time, Code Proficiency Qualifying Runs in the United States and Canada actually fall on the evening previous to the date given. *Example:* In a converting, 0230 GMT April 16 becomes 2130 EST April 15.

Any person can apply. Neither ARRL membership for an amateur license is required. Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the six speeds transmitted, 10 through 35 w.p.m., you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m. you may try later for endorsement stickers.

Code practice is sent daily by W1AW at 0030 and 0230 GMT, simultaneously on all listed c.w. frequencies. At 0230 GMT Tuesday, Thursday and Saturday, speeds are 15 20 25 30 and 35 w.p.m.; on Monday, Wednesday, Friday and Sundays, speeds are 5 7½ 10 13 20 and 25 w.p.m. For practice purposes, the order of words in each line may be reversed during the 5 through 13 w.p.m. tests. At 0030 GMT daily, speeds are 10 13 and 15 w.p.m. The 0230–0320 GMT runs are omitted four times each year, on designated nights when Frequency Measuring Tests are made in this period. To permit improving your fist by sending *in step with W1AW* (but not on the air!) and to allow checking strict accuracy of your copy on certain tapes note the GMT dates and texts to be sent in the 0230–0320 GMT practice on those dates:

Date Subject of Practice Text from February *QST*
Apr. 1: *It Seems to Us*, p. 9
Apr. 4: *A Zero-Beating Method*,* p. 17
Apr. 10: *The Wooden Yagi*, p. 44
Apr. 18: *Amateur Radio Public Service Corps*,* p. 66

Date Subject of Practice Text from *Understanding Amateur Radio*, First Edition
Apr. 22: *Screen Modulation*, p. 84
Apr. 26: *Carrier vs. Talk Power*, p. 85

* Speeds will be sent in reverse order, highest speed first.

W1AW SCHEDULE, APRIL 1968

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 3 P.M.-3 A.M. EST, Saturday 7 P.M.-2:30 A.M. EST and Sunday 3 P.M.-10:30 P.M. EST. 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 April 12, 1968, Good Friday.

*GMT**	*Sunday*	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*	*Saturday*
0000	.....	.....	.....	.....	RTTY OBS[3,7]	.....	.....
0030			**Code Practice Daily[1] 10-13 and 15 w.p.m.**				
0100	.....	C.W. OBS[1]	C.W. OBS[1]	C.W. OBS[1]	C.W. OBS[1]	C.W. OBS[1]	C.W. OBS[1]
0120-0200[4]	.....	.....	7.080	3.555	7.080[6]	3.555[6]	7.080
0200	.....	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]
0205-0230[4]	.....	.....	3.945	50.7	145.6	1.82	3.945
0230			**Code Practice Daily[1] 15-35 w.p.m. TThSat., 5-25 w.p.m. MWFSun.**				
0330-0400[4]	.....	.....	3.555	7.080	1.805	7.080	3.555
0400	RTTY OBS[3]	.....	RTTY OBS[3]	RTTY OBS[3]	RTTY OBS[3]	RTTY OBS[3]	RTTY OBS[3]
0410-0430[4]	.....	.....	3.625	14.095	7.045	14.095	3.625
0430	Phone OBS[2]	.....	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]
0435-0500[4]	.....	.....	7.255	3.945	7.255	3.945	7.255
0500	C.W. OBS[1]	.....	C.W. OBS[1]	C.W. OBS[1]	C.W. OBS[1]	C.W. OBS[1]	C.W. OBS[1]
0530-0600[4]	.....	.....	3.555[6]	7.080[6]	3.555	7.255	3.555
0600-0700	.....	.....	7.080	3.945	14.100	3.555	7.080
0700-0800	.....	.....	14.280	7.255	3.945	14.100	14.280
2000-2100	.....	14.280	21/28[5]	14.095	21/28[5]	14.280	.....
2100-2200	.....	14.100	14.280	14.100	14.280	14.100	.....
2300-2345	.....	7.255	21/28[5]	21.1[6]	21/28[5]	7.255	.....

[1] C.W. OBS (bulletins, 18 w.p.m.) and code practice on 1.805, 3.555, 7.08, 14.1, 21.075, 50.7 and 145.6 Mc.
[2] Phone OBS (bulletins) on 1.82, 3.945, 7.255, 14.28, 21.41, 50.7 and 145.6 Mc.
[3] RTTY OBS (bulletins) on 3.625, 7.045, 14.095 and 21.095 Mc. 170/850 cycle shift optional in RTTY general operation.
[4] Starting time approximate. Operating period follows conclusion of bulletin or code practice.
[5] Operation will be on one of the following frequencies: 21.075, 21.1, 21.41, 28.08 or 28.7 Mc.
[6] W1AW will listen in the novice segments for Novices on band indicated before looking for other contacts.
[7] Bulletin sent with 170-cycle shift, repeated with 850-cycle shift.
Maintenance Staff: W1s QIS WPR. * Times/days in GMT. General operating frequencies approximate.

A.R.R.L. QSL Bureau

The function of the ARRL QSL Bureau system 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 4¼ by 9½ 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.

W1, K1, WA1, WN1[1] — Hampden County Radio Association, Box 216 Forest Park Station, Springfield, Massachusetts 01108.

W2, K2, WA2, WB2, WN2 — North Jersey DX Assn., P.O. Box 505 Ridgewood, New Jersey 07451.

W3, K3, WA3, WN3 — Jesse Bieberman, W3KT, RD 1, Valley Hill Rd., Malvern, Pennsylvania 19355.

W4, K4 — H. L. Parrish, K4HXF, RFD 5, Box 804, Hickory, North Carolina.

WA4, WB4, WN4[1] — Richard Tesar, WA4WIP, 2666 Browning St., Sarasota, Florida 33577.

W5, K5, WA5, WN5 — Hurley O. Saxon, K5QHV, P.O. Box 9915, El Paso, Texas 79989.

W6, K6, WA6, WB6, WN6 — San Diego DX Club, Box 6029, San Diego, California 92106.

W7, K7, WA7, WN7 — Willamette Valley DX Club, Inc., P.O. Box 555, Portland, Oregon 97207.

W8, K8, WA8, WN8 — Paul R. Hubbard, WA8CXY, 921 Market St., Zanesville, Ohio 43701.

W9, K9, WA9, WN9 — Ray P. Birren, W9MSG, Box 519, Elmhurst, Illinois 60216.

WØ, KØ, WAØ, WNØ — Alva A. Smith, WØDMA, 238 East Main St., Caledonia, Minnesota 55921.

VE1 — L. J. Fader, VE1FQ, P.O. Box 663, Halifax, N. S.

VE2 — John Ravenscroft, VE2NV, 135 Thorncrest Ave., Dorval, Quebec.

VE3 — R. H. Buckley, VE3UW, 20 Almont Road, Downview, Ontario.

VE4 — D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg 9, Manitoba.

VE5 — Fred Ward, VE5OP, 899 Connaught Ave., Moose Jaw, Saskatchewan.

VE6 — Karel Tettelaar, VE6AAV, Sub. P.O. 55, N. Edmonton, Alberta.

VE7 — H. R. Hough, VE7HR, 1291 Simon Road, Victoria, British Columbia.

VE8 — George T. Kondo, VE8 ARRL QSL Bureau of Department of Transport, Norman Wells, N.W.T.

VO1 — Ernest Ash, VO1AA, P.O. Box 6, St. John's, Newf.

VO2 — Goose Bay Amateur Radio Club, P.O. Box 232, Goose Bay, Labrador.

KH6, WH6 — John H. Oka, KH6DQ, P.O. Box 101, Aiea, Oahu, Hawaii 96701.

KL7, WL7 — Alaska QSL Bureau, Star Route C, Wasilla, Alaska 99687.

SWL — Leroy Waite, 39 Hanum St., Ballston Spa, New York 12020.

[1] **These bureaus prefer 5 × 8 inch manila envelopes.**

IMPORTANT NOTICE

Changes of Address

Important postal changes in handling second-class mail matter are now in effect. Please advise us *direct* of any change of address. Four weeks notice is required to effect change of address. When notifying please give old as well as new address *and your zip code*. Your promptness will help you, the postal service and us. Thanks.

EIMAC

3-500Z's used in Drake's linear amplifier for 2 kW PEP at 3.5-30 MHz

The R. L. Drake L-4B linear amplifier shown here uses two of EIMAC's new 3-500Z zero-bias triodes in grounded grid circuitry to achieve 2-kW PEP SSB input and 1-kW dc input on CW, AM, and RTTY. Drive power is 100 watts PEP and 75 watts CW, AM, and RTTY.

Drake chose EIMAC 3-500Z's because these rugged, compact, high-mu power triodes are ideal for grounded grid operation. They can provide up to 20 times power gain in a cathode driven circuit. And the two tubes have a total plate dissipation rating of 1000 watts.

For more information on EIMAC's line of power tubes for advanced transmitters, write Amateur Services Department, or contact your nearest EIMAC distributor.

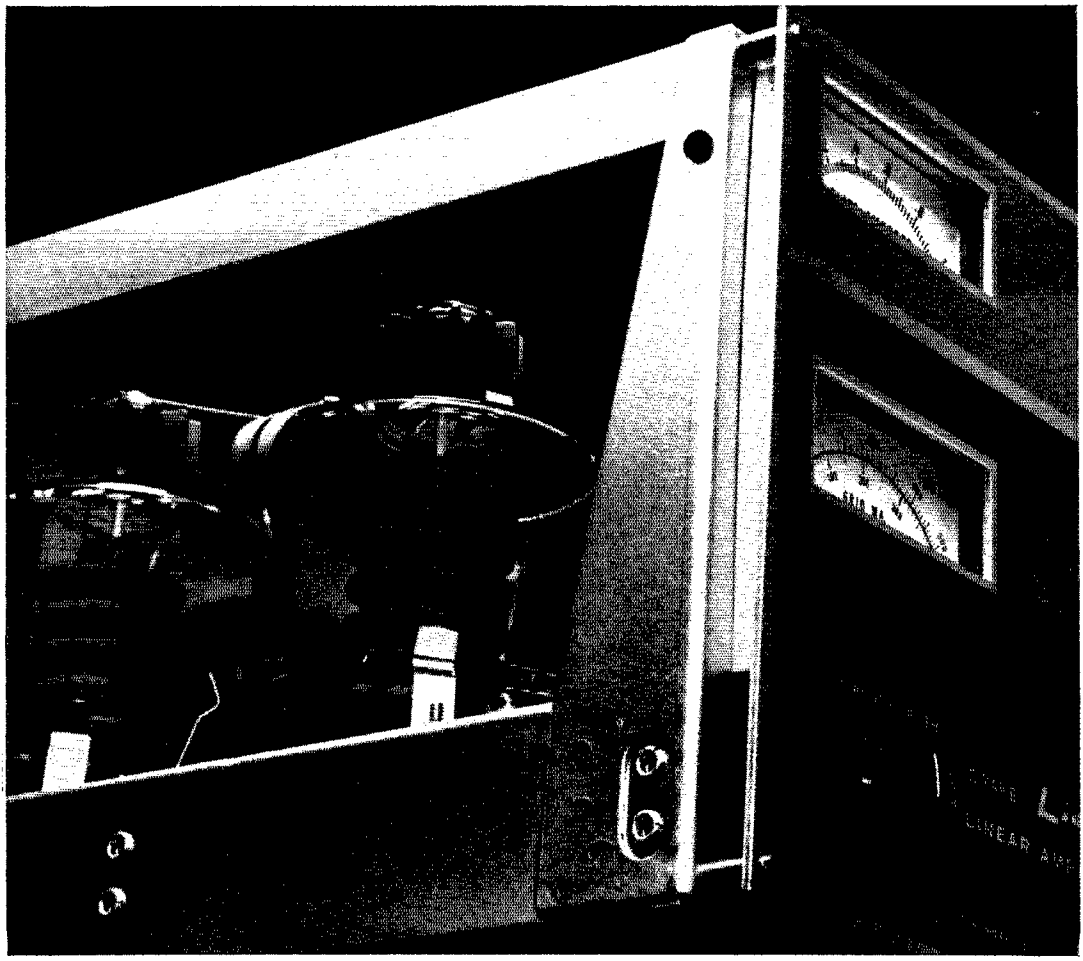
3-500Z TYPICAL OPERATION*

DC Plate Voltage	2500 V
Zero-Sig DC Plate Current**	130 mA
Single-Tone DC Plate Current	400 mA
Single-Tone DC Grid Current	120 mA
Two-Tone DC Plate Current	280 mA
Two-Tone DC Grid Current	70 mA
Peak Envelope Useful Output Power	500 W
Resonant Load Impedance	3450 ohms
Intermodulation Distortion Products	-33 dB

*Measured data from a single tube

**Approximate

EIMAC
Division of Varian
San Carlos, California 94070



EIMAC has a rugged 500 watt tetrode that is ready to talk before you are.

We knew you weren't satisfied with ordinary push-to-talk mobile and airborne UHF/VHF communications systems. Why? They took up to 60 seconds to warm-up. You needed more power and you needed it with "instant talk" speed.

The EIMAC metal ceramic X2099B is the only tetrode combining 500 watts of plate dissipation with instant warm-up. The quick-heat cathode in the X2099B takes only 250 milliseconds to warm up to half power or 70% of peak current. You can drive the X2099B with low level solid state, and you can air cool it.

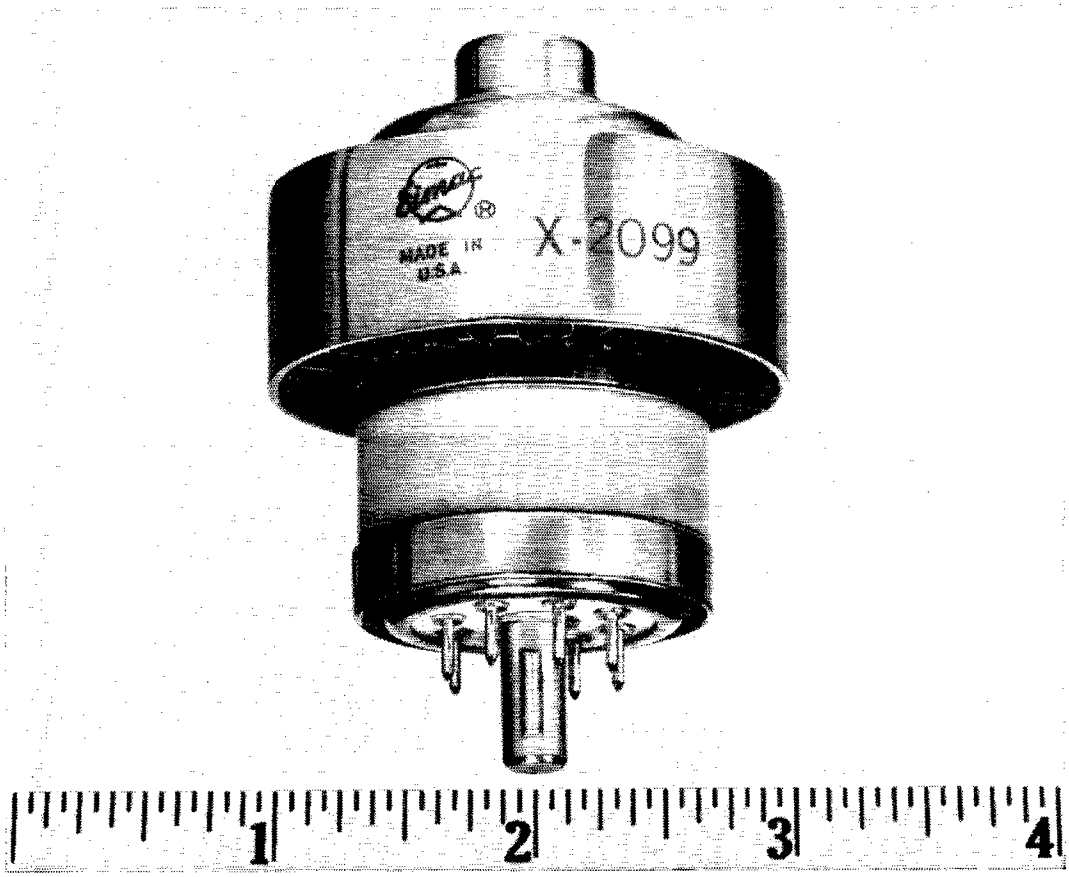
The X2099B is available only at EIMAC. We're ready to talk whenever you are. (415) 592-1221.

Contact your nearest distributor or Varian Field Office for further information. Offices are located in 16 major cities. Ask information for Varian Electron Tube and Device Group.

TYPICAL OPERATING CHARACTERISTICS
Class AB_1 Radio Frequency Linear Power Amplifier

	DC Plate Voltage 1600	2600	
DC Screen Voltage	200	250	V
DC Grid Voltage	−24	−34	V
Zero-Signal Plate Current	250	225	mA
Max Signal DC Plate Current	455	370	mA
PEP or CW Plate Output Power	400	500	W
Third Order Intermodulation Distortion	−36	−38	dB
Fifth Order Intermodulation Distortion	−54	−46	dB
Filament Voltage	2.5	2.5	V
Filament Current	10.0	10.0	A
Warm-up Time (to half power)	250	—	ms

EIMAC
Division of Varian
San Carlos, California 94070



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, John L. Penrod, K3NYG—RM: W3EEB. PAM: W3DKX. K3LGC is back in Delaware and active on 2 meters. W3EEB made the BPL in Dec. W3JYG has been appointed to "Intruder Watch." The recent SET was a huge success. WA3IIX is mobile on 6 meters. WA3FYS has a new v.h.f. receiver and is very active in lower Sussex County. W3DKX has a new Galaxy 5. We regret to announce W3JFR as a Silent Key. W3RDZ is doing a terrific job as OO. Those interested in joining a local radio club in New Castle County are asked to see W3KET or WA3DYG. In Kent County see K3NVV or W3CZS and in Sussex County WA3GSM. These amateurs will fill you in with the details. Net traffic: DEPN, QTC 59, traffic 15; DSMN, QTC 83, traffic 18; DTMN, QTC 34, traffic 1. Traffic: (Jan.) W3DKX 27, W3HKS 26, K3NYG 26, WA3DUM 10, WA3DYG 5, WA3GSM 4, WA3HWC 3, WA3IID 1. (Dec.) K3NYG 66, W3DKX 31, W3HKS 10, WA3HWC 9, WA3FYS 4, WA3IID 2.

EASTERN PENNSYLVANIA—SCM, George S. Van Dyke, Jr., W3ELI (now W3HK)—SEC: W3AES. RMs: W3EML, K3MVO, K3YVG, W3MPX. PAM: K3MYS. V.H.F. PAM: W3FGQ. EPA, QNI 383, QTC 410; PTTN, QTC 285; PFN, QNI 532, QTC 522; EPA V.H.F., QNI 263, QTC 324; EPAEP&T, QNI 558, QTC 263. OO reports were received from W3FGQ, K3HNP, W3BFF, K3RDT, W3NNC, W3KEK; OBS from WA3AFI, K3WEU; OVS from W3FGQ, WA3EEC, WA3CQO, K3VAX, W3CL. Those making the PPL: WA3CQO, WA3JCA, K3MYS, W3EML, K3NSN, W3FGQ, K3VBA, WA3GAT, WA3EEC, WA3FCP, W3MPX, W3CUL. New officers: ARTICS ARC—K3UZO, pres.; WA3HDJ, vice-pres.; WA3GTL, secy.; WA3BCE, treas. PENN Wireless ARC—W3LCY, pres.: K3ZFD, vice-pres.; WA3HBT, corr. secy.: K3HNP, rec. secy.; K3JQH, treas. Delmont ARC—K3WNO, pres.; K3MQR, 1st vice-pres.; W3PSM, 2nd vice-pres.; WA3FZX, secy.; K3JJO, treas. Donald Trayes, 341 Miller St., Bangor, Pa., needs help to get his ham ticket. Any volunteers? WA3FPM is organizing an explorer troop. WA3BSV is cut off from ham radio at school this term. WN3HMK passed the Tech. Class exam. WA3CXZ has a brand-new OVS certificate. The XYL of W3SAO spoke at the R. F. Hill ARC Banquet. WA3CND has a new antenna. WA3HVR made 100 SS contacts on 6 meters. From *Splatter to Splatter* says that W3CAU has had 40 years of ham radio starting with spark and now is s.s.b. W3CUL still is basking in the sunny south. WN3HMU passed the big "G." The Bucks Co. HS ARC is running a car wash to raise money for ham gear. K3HNP complains of key clicks from too many active local hams. W3MVO still is in there strong. W3NNL is busy building a complete solid state station. W3CID is going great on the traffic net. W3MPX is using a Russian tank receiver on MARS. K3WEU finally made WAS. The U. of P. ham station is active in traffic. WA3EWV is conducting code classes for Marion ARC. K3MDG operated in the SET from the State Health Center at Valley Forge Hospital. A club display of ham gear boosted interest in a ham club at school, reports WA3-EMO. W3LI needs help at the Phila. Shriners Hospital to conduct code classes and operate the station. Any volunteers? Looks like the Mt. Airy V.H.F. Club has done it again. Traffic: K3MYS 1087, W3EML 899, W3-CUL 690, K3NSN 639, W3FGQ 506, WA3JCA 395, W3-AIZ 286, K3YVG 256, K3MVO 248, K3PIE 243, W3MPX 240, WA3ATQ 239, K3VBA 230, W3AES 213, WA3CTP 209, WA3CQO 189, WA3CKA 180, WA3GAT 180, WA3-EEC 173, WA3FCP 154, W3VR 147, WA3FPM 117, W3ELI 116, WA3AOJ 115, WA3EXW 102, K3WAJ 101, K3RTX 100, W3CID 94, WA3EMO 90, W3FPC 87, K3WEU 82, K3KJJ 74, K3BHU 73, W3NNL 61, WA3-AFI 60, WA3CXZ 59, K3PSO 58, WA3GLI 53, WA3CND 52, WA3EMQ 48, WA3HGX 46, K3RUA 41, W3ABT 38, W3JKX 37, K3SLG 37, WA3HIT 36, K3MDG 35, W3-BUR 32, W3OY 30, K3KKO 23, K3UZO 23, W3RV 20, WA3BSV 10, K3HKW 9, W3GSX 7. W3HNK 7, K3FOB 4, WN3HMK 4, W3VAP 3, W3ADE 2, WA3BJQ 2, W3CL 2, WA3HVR 2, WA3IAZ 2, K3VAX 2, W3BFF 1, WA3BIV 1, W3CAU 1, W3EU 1, WA3EWV 1, WN3-HMU 1, W3KEK 1. (Nov.) K3MYS 1049.

MARYLAND-DISTRICT OF COLUMBIA—SCM, Carl E. Andersen, K3JYZ—SEC: W3LDD.

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QTC*	*QNI*	*Avg.*	*Mgr.*
MDD	3643	0000Z	Daily	37	378	12.0		K3OAE, RM
MDDS	3642	0130Z	Daily	29	43	5.4		W3CBG, RM
MEPN	3920	2300Z	M-W-F					K3NCM, PAM
		1800Z	S-S					
MTMTN	145.206	0100Z	M-Th-S-S	12	21	10.6		K3NOQ
		0030Z	Tu-F					
CVTN	145.615	0200Z	Sn-F	7	2	1.6		WA3CFK
AREC	3820	2300Z	Sn	4				W3LDD, SEC

New appointees: WA3GTX as OO Class I (upgraded from Class IV); W3VDU as EC for Cecil County; WA3BMM as EC for Montgomery County; W3CDA as EC for Wicomico County; WA3CGT as Asst. EC for Wicomico County; K3OAE as Asst. SEC for MDD operations; WA3GDB and WA3GLP as Asst. ECs for Frederick County. Endorsed appointments: W3JZY as PAM for v.h.f. nets, OPS and ORS; W3MCG as RM and ORS. W3TN again made the BPL. WA3EOP reports activity on MSTN at 2200 EST on 50.4 Mc. WA3GAU, now Advanced Class, is the new pres. of the CARC. WA4QLP/3 is the operator behind the key at W3NDO, U.S. Naval Academy. W3LQY is active again on MEPN. K3LFD reports a full-blown SET from Anne Arundel County, including newspaper publicity. W3ATQ rebuilt his power supply in 3 hours to beat Murphy's Law in the SET. W3GEB is overcoming his space problem for an 80-meter antenna with a basement counterpoise system. W3TMZ has started a new paper for the PVRC called *The PVRCer*. Flu and two term papers wiped out WA3CFK in the SET. WA3GLP also is a victim of school work but has completed a couple of antennas. W3ZNW is performing liaison work between MDD and 2-meter nets. W3JPT has been QRL monitoring phone stations. W3TXQ will now be known as W3CZ and K3CYA is W3FU. W3QA has been spending his time in Rome, N.Y., and K3OAE commutes between Florida and here. WN3IYS was active in the Novice Roundup. Your SCM enjoyed a nice visit with the Springbrook High RAC and met a fine group of young men interested in amateur radio. W3RKK, pres. of the Baltimore ARC, reports an upgrading class for General Class that meets each Wed. evening. Traffic: (Jan.) W3TN 238, WA3HTQ 192, K3GZK 143, W3CBG 141, K3JYZ 127, W3ATQ 126, W3CWC 78, WA3CFK 74, WA4QLP/3 58, WA3ERL/3 51, W3LDD 51, K3LFD 47, W3LBC 46, W3ZNW 44, K3ORW 17, W3GEB 16, W3UE 16, W3LQY 14, WA3GLP 13, W3EOV 12, K3LFN 12, KØECG/3 10, WA3EOP 6, WN3-IYS 6, WA3FRL 4. (Dec.) WA4QLP/3 7.

SOUTHERN NEW JERSEY—SCM, Edward G. Raser, W2ZI—Asst. SCM: Charles E. Travers, W2YPZ. SEC: W2BZJ. RMs: WA2KIP, WA2BLV. PAM and NJPN Net Mgr.: W2ZI. NJN reports QNI 418 stations, traffic 327. NJPN reports QNI 796 stations, traffic 264. W2BZJ reports the SET activity was better than last year. WA2ANL is a new OBS; K2SOL, WB2BGH, WB2FJE and WB2SFX are new OPSs; W2PU, Princeton U., is a new ORS. SCARA's officers are W2BYW, pres.; WB2-FIS, vice-pres.; W2CXC, secy.; WA2SIP, treas. EC WA2ANL reports two new nets in his area: The 6-Meter Net meets at 10 P.M. on 50.4 Mc., the 10-Meter Net at 9:30 P.M. on 29 Mc. WA2DNG sent in his log for the V.H.F. Contest. W2SJI has been in Florida for several weeks. W2MZR is touring California. WB2GTE is trying to contact his daughter in the Peace Corps in Korea. WB2BGH made the BPL in Dec. W2ZVW received his Extra Class ticket. A new NJPN Net Roster was issued Jan. 1, 1968, printed by W2YPZ. If you wish a copy send a radiogram to W2ZI. WA2DID joined Air Force MARS. WB2VMQ and WB2MNF received their Advanced Class licenses recently. WB2WXA is the new Asst. EC for Haddonfield. New officers of the Burling-

ton County RC are W2GFL, pres.; WA2QZQ, vice-pres.; WB2WLS, secy.; WB2OUC, treas. Rancocas Valley ARA officers are K2YBN, pres.; WB2ZMY, vice-pres.; WB2-LWZ, treas.; WB2ZEU, secy. W2ZI and K2MBW are recovering from the flu. Traffic: (Jan.) WA2KIP 145, WB2UVB 135, W2ZI 94, W2BZJ 75, W2PU 65, W2CKF 64, WA2ANL 62, WA2UPC 57, WB2VMQ 42, W2YPZ 31, WB2APX 25, WA2DVU 21, K2SOL 21, W2ZVW 19, W2ORS 17, WB2BGH 13, K2MBW 13, K2SHE 13, WB2MNF 12, WA2ABY 9, WA2DID 2, WB2FJE 2, WB2WXA 1. (Dec.) W2YPZ 10, K2MBW 8.

WESTERN NEW YORK—SCM, Charles T. Hansen, K2HUK—SEC: W2RUF. PAM: W2PVI. RMs: W2EZB and W2FEB. NYS C.W. Net meets on 3670 kc. at 1900, ESS on 3590 kc. at 1800, NYSPTEN on 3925 kc. at 2200 GMT, NYS C.D. on 3510.5 and 3993 kc. (s.s.b.) at 0900 Sun. and 3510 kc. at 1930 Wed., TCPN 2nd Call Area on 3970 kc. at 0045 and 2345 GMT, NYS County Net on 3510 kc. at 1400 GMT and 2345 GMT on Mon. Congratulations to W2OS and W2SEI on making the BPL. The Walton Radio Assn. elected K2EZK, pres.; W2THO, vice-pres.; W2OSL, secy.; WB2AGX, treas.; WB2VNB, act. mgr.; W2FMU, trustee. The CVARA elected W2-RME, pres.; WB2DJJ, vice-pres.; K2JVE, secy-treas.; WA2LFI, publicity. W2RUF has resigned as manager of the NYS C.W. Net because of the pressure of other duties, namely as mgr. of the NYS County Net and the very important job of SEC. W2RUF has been with NYS C.W. so long that her name has become almost synonomous with its mention. The SCM of E.N.Y. and I wish to convey our thanks to Clara for her long years of dedicated service to the job and for the existence of one of our finest nets in NTS. W2MTA, of Newark Valley, has agreed to take over as manager. However, he has asked that Clara remain as a consultant to give the net the benefit of her 20 years experience as net mgr. I am sure that W2RUF still will be an active call on NYS C.W. NFDXA has decided to operate Field Day from Gradl Mountain and has issued its annual challenge to RDXA. Don't forget the W.N.Y. Hamfest and V.H.F. Conference Sat., May 11, at Vince's 50 Acres. The latest report from RARA is 97 new members, bringing the club total to well over 400. The Fulton ARC elected WA2SOO, pres.; WA2-ZXT, vice-pres.; WN2BFH, secy.; WA2GRT, treas.; K2DUR, director-at-large. All amateurs are invited to report monthly to their SCM via Form 1 report cards, available from Headquarters for the asking. The North Country Radio Club elected W2BYZ, pres.; K2SAC, vice-pres.; WA2HEC, secy.-treas. W2CY is the new call for ex-W2PZL. W2SEI takes over as acting 2RN mgr. from WA2GQZ. Traffic: W2SEI 648, W2OE 483, W2MTA 442, WB2OYE 380, WB2GAL 261, W2RUF 254, K2RYH 219, W2LYG 168, WB2SMD 166, WB2VSL 144, W2HYM 140, WA2NDC 120, W2FEB 90, K2DNN 64, WB2YUT 38, W2RQF 31, K2OFV 30, WB2ZDK 28, W2FCG 26, W2-CFP 20, WA2UFI 20, K2IMI 17, W2PZL 17, WB2YUP 15, K2QDT 14, WA2ANE 13, W2BLO 9, K2BWK 8, W2PVI 7, WB2FPG 3, WA2GLA 3, K2SSX 3, WB2VND 3, WA2WVF 1.

WESTERN PENNSYLVANIA—SCM, Robert E. Gawryla, W3NEM—SEC: K3KMO. PAM: K3VPI (v.h.f.). RMs: W3KUN, W3MFB, W3UHN, K3SOH. Traffic nets: WPA, 3585 kc. daily at 7 P.M. local time, KSSN, 3585 kc. Mon. through Fri. at 6:30 P.M. local time. W3YA was island-hopping in the West Indies during the cold snap. K3ZGI is now in California. K3UPC lost his beam and tower to a sleet storm. K3QAY and K3WTZ have been operating 6-meter f.m. regularly in the Erie area. W3UHN has a new two-element quad for 20 meters. W3MIZ is now recuperating at home from an operation. The Indiana County ARC reports it is sponsoring code and theory classes this spring; W3PHD and K3VDE are using new SB-101s. *Kilo Watt Harmonics* reports W3KPI has a new Swan 500; W3SHT is in Florida; W3TQN is attending Penn. Tech.; the Steel City ARC has installed a 64-element 2-meter colinear array 60 feet hight. The Nittany ARC reports that top honors in the 1967 Pennsylvania QSO Party go to WB2UFV as high-scoring non-Pennsylvania station and K3ILC as high-scoring Pennsylvania station. All participants submitting logs will receive the complete results of the QSO Party in the mail. WA3EPQ is now running 1 kw. with full break-in. W3KUN reports WPA was very active in the SET operation this year with 18 sessions, 103 QNI and 143 messages. The WPA Traffic Net for Jan. had 31 regular sessions, 216 messages, 408 QNI plus 10 visitors. Traffic: W3KUN 300, W3NEM 299, WA3BLE 268, K3PYS 217, W3LOS 162, WB2TNB/3 145, WA3AKH 141, W3BLZ 128, K3HKK 86 (W2KAT, K3AHT, WA3HAL ops), K3SOH 53, WA3HAL 38, K3HCT 21, W3KPJ 19, W3LOD 19, WA3-GPK 18, WA3HSI 18, K3RZE 12, K3ASI 8, W3UHN 8, WA3IPU 5, K3KMO 2, K3SJN 2, W3YA 2.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—SEC: W9RYU. RM: W9EVJ. PAMs: W9VWJ, WA9CCP, WA9RLA (v.h.f.) Cook County EC: W9HPG. Net reports:

Net	*Freq.*	*Times*	*Days*	*Tfc.*
IEN	3940 kc.	1400Z	Sun.	13 (39 Dec.)
ILN	3760 kc.	0000Z	Daily	334
NCPN	3915 kc.	1300Z	Mon.-Sat.	158
NCPN	3915 kc.	1700Z	Mon.-Sat.	158
ILPON	3925 kc.	2300Z	Mon.-Fri.	330
Ill PON	50.28 Mc.	0200Z	Mon. & Thurs.	No report
Ill PON	145.5 Mc.	0200Z	MWF	37
TNT	145.36 Mc.	0200Z	Sun.-Fri.	No report

WA9RGZ, WA9EBM and W9IOG were elected officers of the Peoria Area Amateur Radio Club, Sept. 15 has been set for the club's Annual Hamfest in Peoria. The Ninth Regional Net accumulated a traffic total of 1159 during January. W9HPG introduced W9DNP, W9REA, WA9QNU and W9KPC as the new officers of the JARS (Joliet) at the club's inauguration dinner. The Waukegan V.H.F. Society and Amateur Radio Club (WA9LIV) has its 2-meter f.m. repeater in operation. New appointments include WA9QBM as ORS; WA9IAF and W9KFQ as OBSs and WA9QVK as OO. WN9WPE is a new Chicago call. WA9UNR was elected president of the Monitor Club. K9PXK's new QTH is Phoenix, Ariz. K9PXW is now a missionary in Bangalore, India, and will operate from there soon. W9KMN is a new Extra Class licensee. K9HKJ was elected secretary of District 72 School Board. W9MSG, K9PGN, K9AQJ and W9YMF were elected officers of the Chicago Area Radio Club Council, Inc. WN9VKO is now a General and WA9UAG passed the Advanced Class exam. WA9QXT would like Novices to check into his WN Net and those interested may contact him. The Chicago Radio Suburban Association held its Old Timers' Nite Pot-Luck Dinner Feb. 7. K9TXJ has installed a new 18AVQ vertical antenna and is operating on all bands. On Feb. 18 the Rockford Amateur Radio Association held its Hamfest and Swapfest. Make a date for the Central Division Convention Aug. 3 and 4 to be held in Springfield, Ill. Write to 104 North Sixth Street for details. Also write to the Illinois Sesquicentennial Commission, 107 South Fifth Street in Springfield, for information on its QSL awards. New officers of the CATS are K9AQJ, W9ABC, W9GRW and WA9MKQ. The CATS has passed the 200 membership mark to become the largest RTTY club in the world. WA9MHU and WA9QBM are recipients of the BPL award for Jan. traffic. Traffic: WA9MHU 296, W9EVJ 183, WA9OTD 172, WA9QBM 142, K9KZB 116, W9JXV 100, WA9CCP 86, WA9QXT 78, K9BTE 52, WA9SPA 45, W9HPG 42, W9HOT 39, W9LDU 38, WA9LDC 37, WA9TOC 25, WA9PLJ 22, W9PRN 22, WA9SFB 21, K9HKJ 18, W9-IDY 13, W9LNQ 9, WN9VOX 8, K9HSK 6, WA9KQD 5, WA9FIH 4, K9HRC 4, WA9QFT 4, K9HVS 2, W9-KFQ 2, K9TXJ 2.

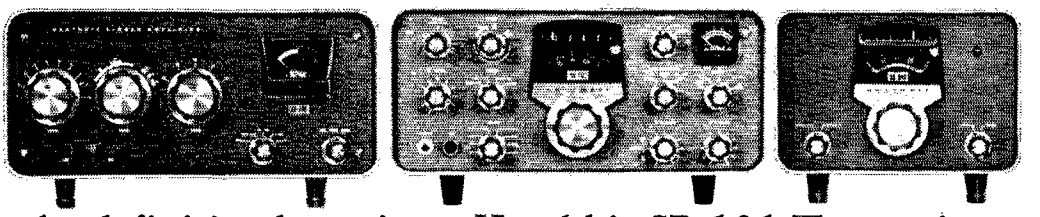
INDIANA—SCM, William C. Johnson, W9BUQ—Asst. SCM: Mrs. M. Roberta Kroulik, K9IVG. SEC: WA9LTI.

Nets	*Freq.*	*Time*	*Tfc.*	*Mgr.*
IFN	3910	1330 Daily 2300 M-F	316	K9IVG
ISN	3910	0000Z M-F 2300 Sat.-Sun. 2130 M-S	489	K9CRS
QIN	3656	0100Z Daily	210	W9HRY
IPON	3910	1250Z Sun.	160	K9EFY
IPON	50.7	0200Z M-T		WA9NLE

W9KAG reports for the River Forecast Net Jan. traffic 36. K9YST reports for the White River Valley AREC Net Jan. traffic 16. W9ILU reports for the Great Lakes Emergency Net Dec. traffic 75. QIN honor roll: W9BDP 30, WA9MTY 28, WA9KAG 24, W9UQP 21, K9DHC 18, K9HYV 18, WA9MXG 16, W9JUK 15, W9QLW 15. Your SCM listed the following call wrong in Jan. *QST*: W9-JUX was listed as WA9JUX and K9JUX. K9HYV was listed as K9HVY in both Jan. and Feb. *QST*. Kokomo ARC's new officers are WA9GKT, pres.; K9VIB, vice-press.; WA9VZW, secy.; W9BFD, treas.; W9MZN, director-at-large; NC officer, WA9QEQ; EC, K9CWG. The Kokomo Emergency Net meets at 0200Z Mon. on 50.7 Mc. K9IVG had antenna trouble. WN9WKA is a new Novice at Hobart. WA9ITB passed the Advanced Class exam. W9BUQ's slow-scan is about ready. At the Indiana Amateur TV and U.H.F. Club's meeting Jan. 27 G3EKE was the speaker on British Amateur Radio and TV. The SET was a success in Indiana. The Red Cross Chapter of Indianapolis had its bomb shelter test to coordinate with the SET. WA9LGQ, Red Cross ARC, was activated to handle emergency. All messages were on 50.7 Mc. starting at 2030 GMT Sat. the 27th until

(*Continued on page 122*)

ver·sa·til·i·ty (vur'se-til'e-ti), n., the quality or state of being versatile; specifically, a) competence in many things. b) ability to move freely in any direction.



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Versatility has real meaning when you operate with this Heathkit trio. With the SB-640 & SB-101 combination you have *five* frequency control options . . . external variable control of transmitting frequency . . . internal or external variable control of transceiving frequency . . . or crystal control of *transmitting* or *transceiving* frequency . . . almost enough versatility to put you in two places at the same time. In operation, whether you are a DX hound, net control, contest operator, or just a guy who likes a lot of action, you'll appreciate being able to move freely anywhere. And with the SB-200 KW Linear you'll be heard anywhere.

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Order the SB-640 for the most versatile use of your SB-101. It's like adding a second receiver; provides external frequency control by LMO or either one of two crystals; features same calibration and smooth dial mechanism as SB-101; powered by SB-101.

Order the SB-200 for maximum power output at lowest cost. 1200 watts PEP, 1000 watts CW; drives with 100 watts; built-in SWR meter, antenna relay, solid-state power supply; ALC; shielded, fan-cooled amplifier compartment; pre-tuned cathode input; circuit breaker protected; 120/240 VAC.

Kit SB-101, transceiver, 23 lbs. **$370.00**
Assembled SBW-101, transceiver, 23 lbs. **$540.00**
SBA-301-2, optional 400 Hz CW filter, 1 lb. **$20.95**
SBA-100-1, mobile mounting bracket, 6 lbs. **$14.95**
Kit HP-13, Mobile power supply, 7 lbs. **$64.95**
Kit HP-23, Fixed-station power supply, 19 lbs. **$49.95**
Kit SB-640, external LMO, 9 lbs. **$99.00**
Kit SB-200, KW linear amplifier, 41 lbs. **$220.00**
Assembled SBW-200, KW linear amp., 41 lbs. **$320.00**

Compare the Specifications

PARTIAL SB-101 SPECIFICATIONS — RECEIVER SECTION: Sensitivity: Less than 1 microvolt for 15 db signal-plus-noise to noise ratio for SSB operation. **SSB Selectivity:** 2.1 kHz minimum of 6 db down, 5 kHz maximum of 60 db down — 2:1 nominal shape factor — 6:60 db. **CW Selectivity:** (With optional CW filter SBA-301-2 installed) 400 Hz minimum at 6 db down, 2.0 kHz maximum at 60 db down. **Spurious response:** Image and IF rejection better than 50 db. **TRANSMITTER SECTION: DC power input: SSB:** 180 watts P.E.P. continuous voice. **CW:** 170 watts — 50% duty cycle. **Oscillator feedthrough or mixer products:** 55 db below rated output. **Harmonic radiation:** 45 db below rated output. **Transmit-receive operation: SSB:** Push-to-talk or VOX. **CW:** Provided by operating VOX from a keyed tone, using grid-block keying. **CW side-tone:** Internally switched to speaker in CW mode. Approx. 1000 Hz tone. **Carrier suppression:** 50 db down from single-tone output. **Unwanted sideband suppression:** 55 db down from single-tone output at 1000 Hz reference. **Third order distortion:** 30 db down from two-tone output. **Noise level:** At least 40 db below single-tone carrier. **RF compression (TALC):** 10 db or greater at .1 ma final grid current. **GENERAL: Frequency stability:** Less than 100 Hz per hour after 20 minutes warm-up. **Dial accuracy — "resettability":** Within 200 Hz on all bands. **Electrical dial accuracy:** Within 400 Hz after calibration at nearest 100 kHz point. **Cabinet dimensions:** 14⅛" W x 6⅝" H x 13⅝" D.

SB-640 SPECIFICATIONS — Frequency output, LMO: 5 to 5.5 MHz. **Frequency output, crystal:** 4.975 to 5.525 MHz. **Frequency stability:** Less than 100 Hz per hour after 20 minutes warmup from normal ambient conditions. Less than 100 Hz for ±10% line voltage variations. **Visual dial accuracy:** Within 200 Hz on all bands. **Electrical dial accuracy:** Within 400 Hz after calibration at nearest 100 kHz point. **Dial mechanism backlash:** Less than 50 Hz. **Front panel controls:** Main (LMO) Tuning dial; LMO/XTAL switch; Crystal Selector switch — XTAL 1/XTAL 2. **Panel light:** ON when transmitting or transceiving frequency is controlled by External LMO. **Rear apron facilities:** Connector to SB-101. Frequency Adjust trimmers XTAL 1 and XTAL 2. **Power requirements (from SB-101 Transceiver):** 150 VDC at 5 ma. 12.6 VAC at 450 ma. **Dimensions:** 6⅝" H. (plus feet) x 10" W. x 11⅜" D. (including knobs).

SB-200 SPECIFICATIONS — Band coverage: 80, 40, 20, 15 & 10 meters. **Maximum power input:** 1200 watts P.E.P. SSB, 1000 watts CW. **Driving power required:** 100 watts. **Duty cycle:** SSB, continuous voice modulation; CW, 50% (key down time not to exceed 5 min.). **Third order distortion:** 30 db or better at 1000 watts P.E.P. **Output impedance:** 50 to 75 ohm unbalanced; variable pi-output circuit. SWR not to exceed 2:1. **Input impedance:** 52 ohm unbalanced; broad-band pretuned input circuit requires no tuning. **Meter functions:** 0-100 ma grid current, 0-1000 ma plate current, 0-1000 relative power, 1:1 to 3:1 SWR, 1500 to 3000 volts high voltage. **Front panel controls:** Load; Tune; Band; Relative Power Sensitivity; Meter Switch, Grid-Plate-Rel. Power-SWR-HV; and Power Switch, on/off. **Tube complement:** Two 572B/T-160-L (in parallel). **Power requirements:** 120 volts AC @ 16 amperes (max.), 240 volts AC @ 8 amperes (max.). **Cabinet size:** 14⅞" W x 6⅝" H x 13⅜" D. **Net weight:** 35 lbs.

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SWAN 410C FULL COVERAGE EXTERNAL VFO

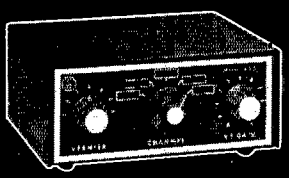
The Model 410C Frequency Control Unit is designed for full coverage of 80, 40, 20, 15 and 10 meters. It is intended for fixed station operation and plugs directly into Model 500C. It may also be used with Model 350C. Eight ranges, 500 kc each, 5 kc calibration.

$115

DUAL VFO ADAPTOR

Provides for the addition of second VFO for separate control of transmit and receive frequencies. Plugs directly into Model 500C and may also be used with Model 350C and other Swan transceivers.

MODEL 22 . . . . . $25



MARS OSCILLATOR

Five crystal controlled channels with vernier frequency control. Plugs directly into Model 500C and may also be used with Model 350C and other Swan transceivers.

MODEL 405X (less crystals) . . $45

SWAN 500C SSB-AM-CW TRANSCEIVER

Five band, 520 watts for home station, mobile and portable operation.

The new model 500C is the latest evolutionary development of a basic well proven design philosophy. It offers greater power and additional features for even more operator enjoyment. Using a pair of the new heavy duty RCA 6LQ6 tetrodes, the final amplifier operates with increased efficiency and power output on all bands. PEP input rating of the 500C is conservatively 520 watts. Actually an average pair of 6LQ6's reach a peak input of over 570 watts before flattopping!

The 500C retains the same superior selectivity for which Swan transceivers are noted. The filter is made especially for us by C-F Networks, and with a shape factor of 1.7 and ultimate rejection of more than 100 db, it is the finest filter being offered in any transceiver today.

For the CW operator the 500C includes a built-in sidetone monitor, and by installing the Swan VOX Accessory (VX-2) you will have break in CW operation.

Voice quality, performance and reliability are in the Swan tradition of being second to none.

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SWAN 117XC MATCHING AC POWER SUPPLY

Complete A.C. supply for 117 volts, 50-60 cycles, in a matching cabinet with speaker, phone jack, and indicator light. Includes power cable with plug for transceiver, and A.C. line cord. Ready to plug in and operate.

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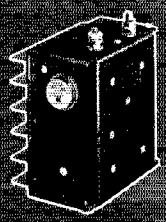

SWAN 14C DC CONVERTER

Converts the above 117XC A.C. power supply to 12 volt D.C. input for mobile, portable, or emergency operation.

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SWAN SPEAKS YOUR LANGUAGE . . . ASK THE HAM WHO OWNS ONE

POWER

VERSATILITY

SWAN MARK II LINEAR AMPLIFIER

Two Eimac 3-400Z Triodes provide the legal power input: 2000 Watts P.E.P. in SSB mode or 1000 Watts AM or CW input. Planetary vernier drives on both plate and loading controls provide precise and velvet smooth tuning of the amplifier. Greatly reduced blower noise is provided by a low RPM, high volume fan.

Provides full frequency coverage of the amateur bands from 10 through 80 meters and may be driven by any transceiver or exciter having between 100 and 300 watts output.

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MARK II POWER SUPPLY

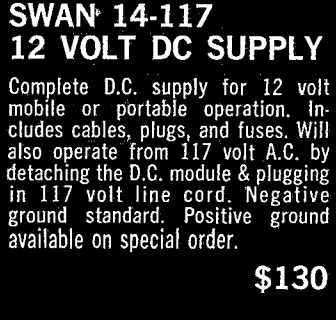
May be placed beside the Mark II, or with its 4½ foot connecting cable, may be placed on the floor. Silicon rectifiers deliver 2500 volts D.C. in excess of 1 ampere. Computer grade electrolytic filters provide 40 mfd capacity for excellent dynamic regulation. A quiet cooling fan allows continuous operating with minimum temperature rise, thus extending the life and reliability of all components. Input voltage may be either 117 or 230 volts A.C.

$235

PLUG-IN VOX UNIT

Plugs directly into Model 500C, and may also be used with Model 350C and other Swan transceivers.

MODEL VX-2 . . . . $35



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Our improved standard 5 band model, now in production and still only . . .

$420

SWAN 14-117 12 VOLT DC SUPPLY

Complete D.C. supply for 12 volt mobile or portable operation. Includes cables, plugs, and fuses. Will also operate from 117 volt A.C. by detaching the D.C. module & plugging in 117 volt line cord. Negative ground standard. Positive ground available on special order.

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0330 GMT Sun. the 28th. 65 messages were handled by 14 amateur v.h.f. stations. On 50.250 Mc. there is a net at 0100Z every evening. WA9OLM is net control most of the time. This net is in the southern part of Indiana. W9HRY reports that 1967 was the best year for QIN for check-ins although he has not been able to top 1959 in total traffic of 6099. *Amateur radio exists because of the service it renders.* Traffic: (Jan.) K9IVG 464, WA9LTI/WA9MTY 454, W9HRY 353, W9QLW 308, K9FZX 305, K9HYV 172, WA9FDQ 160, WA9VFM 140, WA9KAG 131, WA9WFE 119, K9EOH 102, K9STN 84, W9BUQ 75, K9CRS 67, WA9LGQ 65, K9VHY 62. W9SNQ 61, W9DKR 46, WA9BGI 45, W9UQP 43, K9YST 40, W9JUX 36, K9ZLB 36, WA9BHG 32, K9ZBY 32, K9RWQ 29, W9YYX 29, K9EFY 28, WA9CFW 25, W9FWH 19, W9RTH 17, W9PMT 16, WA9AXF 15, K9ILK 15, W9DZC 13, WA9GJZ 13, K9KFM 13, W9LG 13, WA9TKZ 13, W9DGA 11, W9RDT 11, K9FUJ 10, W9CMT 9, W9WGN 9, K9JQY 8, W9CUC 7, K9GBR 6, WA9ABI 2, WA9RNT 2. (Dec.) W9JUX 194, WA9MXG 67, W9RTH 45, WA9BNX 9.

WISCONSIN—SCM, Kenneth A. Ebneter, K9GSC—SEC: W9NGT. RM: WA9MIO. PAMs: W9NRP, WA9QNI and WA9QKP.

Net	*Freq.*	*Time*	*Days*	*QNI*	*QTC*	*Mgr.*
BWN	3985 kc.	1300Z	Mon.-Sat.	430	252	W9NRP
BEN	3985 kc.	1800Z	Daily	732	191	WA9QKP
WSBN	3985 kc.	2300Z	Daily	1347	254	WA9QNI
WIN	3662 kc.	0115Z	Daily			WA9MIO
SWRN	50.4 Mc.	0300Z	Mon.-Sat.		3	K9DBR

New appointees: W9ODD as OPS, ORS and OBS. Renewed appointment: W9PJT as OVS. K2LXY is in Wisconsin for 3 years of studies. The Wisconsin QSO Party will be held Apr. 27 and 28. WA9NDV has made WAS. WA9NBU is operating out of WA8CQR and corresponding with a ham in Ghana. WA9LRW has added an SB-610 to his shack. K9CPM has his shack all set with emergency power. W9ODD has equipped the shack with a Drake R4B/T4X-B and Hunter Bandit 2000C. The Wisconsin WNA Picnic will be held July 7 at Fond Du Lac. New Mancorad Radio Club officers are W9KQB, pres.; K9RFZ, vice-pres.; WA9EZU, secy.-treas. WA9SYD has a new 10-meter antenna, passed the Advanced Class exam and is NCS on BEN. Many stations report participating in the SET. Congratulations to all for the fine showing. Traffic: (Jan.) W9DND 414, W9DYG 331, W9CXY 330, W9ESJ 210, W9IFS 185, WA9NVY 184, WA9NDV 150, WA9QKP 140, W9AOW 123, WA9RAK 109, WA9QNI 89, K9KSA 83, K9FHI 71, W9DXV 69, W9AYK 68, W9ODD 57, W9GXU 51, WA9GJU 50, WA9IZK 48, K9CPM 44, W9NRP 43, K9GSC 41, W9KRD 38, WA9SYD 26, WA9NBU 22, K9JMP 21, W9RTP 20, W9CBE 19, WA9PKM 17, W9MWQ 12, K9TBY 12, W9YT 9, K9EMG 8, W9GOC 8, W9BCH 5, W9IQW 5, K9KSA 5, WA9LRW 5, WA9EZU 4, W9IRZ 4. (Dec.) WA9IZK 92, K9VUJ 2.

WISCONSIN QSO PARTY

April 27-28, 1968

Wisconsin SCM K9GSC alerts Wisconsin amateurs only to the QSO Party to be held April 27 and 28, between 1600 and 2300 GMT both dates. Categories are phone 160-10 meters, phone 6 meters and up and c.w. 160 meters and up. Exchange consecutive QSO numbers, starting with number one, RS(T) and county. You may work each station only once in each category and separate logs for separate categories are required. Cross band, cross mode and multiple transmitters are not permitted. Contacts are not permitted on nets in session. Logs must show time, station worked, reports, band, emission, input, numbers exchanged and county names. No power limit. Score one point for each contact, add the message credit if applicable and multiply by the number of counties worked. 25 points can be added to the contact points (before multiplier) if a message is sent in correct ARRL form to the SCM stating the category, county and input. This must be sent within two days after the contest ends. A copy of the message with handling data must accompany the log for credit. Suitable trophies (for first place winners) and certificates with ribbons will be awarded. Suggested frequencies: 3662 3985 50,400 145,350 and 146,940. Logs must be postmarked no later than May 29, 1968 and sent to Wm. Wachholz, K9HJS, 918 North Third Ave., Wausau, Wisconsin, 54401. Any violation of the contest or FCC rules may result in disqualification. Decisions of the contest committee are final.

DAKOTA DIVISION

MINNESOTA—SCM, Herman R. Kopischke, Jr., WØTCK—SEC: WAØIEF. RAIs: KØORK, WAØEPX PAMs: WAØMMV, WAØHRM. MSN meets daily on 3685 kc. at 0030Z. MJN meets Tue.-Sun. on 3685 kc. at 0100Z. Noon MSPN meets Mon.-Sat. on 3945 kc. at 1805Z, Sun. and holidays at 1500Z. Evening MSPN meets daily on 3945 kc. at 2315Z. Congrats to WAØHRM, new Evening MSPN PAM. Dave took over the duties from WAØJKT, whose college studies prevented him from devoting the time he felt he should to it. Our sincere thanks to WAØJKT for his services these last two years, and to WAØHRM for accepting the appointment. Appointments renewed: WØHEN as EC, OO and OPS and WAØMMV as EC, PAM and OPS. Our thanks to WAØMMV for accepting the PAM duties on the Noon Net for another year. WØZMU, TI2RGS, HC1RT, enjoying a well-earned vacation, showed slides of the facilities of HCJB, the shortwave missionary broadcast station in Quito, Equador, where he is an engineer. EC WAØFFU reports the Lake Superior AREC Net is having excellent activity. WAØDOT passed the Extra Class exam and has his XYL studying for Novice. WAØPXT has gone 6 meters with a mobile using a halo and a five-element beam at his base. OO WAØIAW reports sending 9 violation reminders. KØERQ is back on the nets since KØLWK and VPJ helped get her antenna back up. The Minn. YLs are trying to reorganize on 3820 kc. at 9 A.M. Mon. EC KØICG recently returned from Cal. where he and his XYL visited relatives. Traffic: (Jan.) KØZRD 275, WAØIAW 251, KØORK 158, WAØEPX 116, KØSRK 105, WØTCK 71, WAØHRM 51, WØATO 47, WAØMMV 46, WØHEN 39, WØKNR 36, WØBUC 34, KØFLT 30, WAØODB 30, WAØOLA 30, KØZBI 22, WAØDFT 18, WAØJKT 18, WAØOEJ 18, WØKLG 16, WAØJPR 15, WØSZJ 15, WAØLVK 13, WAØDOT 12, WAØPUH 12, WAØIYM 8, WØISJ 6, WAØNQH 5, WØOET 5, KØSXQ 5, KØCNC 4, WØEQO 4, WAØEZQ 4, WAØPLM 4, WAØSSN 4. (Dec.) WØKLG 10, WN9VXM/Ø 8, WØUMX 8, WAØPXT 7.

NORTH DAKOTA—SCM, Harold L. Sheets, WØDM—SEC: WAØOYL. OBS: KØSPH. PAM: WØCAQ. RM: WAØELO. The Minot Amateur Radio Assn. held its 5th Annual Banquet. Harold Carnahan, c.d. director, was the guest. New officers are WØHJU, pres.; WØHVA, vice-pres.; WAØLXB, secy.-treas.; KØYAF, sgt. at arms. WØDQX has transferred to Blaine, Wash. KØSPH was under the weather for awhile but is back again. WAØHUD and WAØELO have been doing a nice job on TEN Net. WAØHUD has been working on the quad to get back on 10 meters. WAØOVW got the gremlins out of the SB-401 in time for the DX Contest. The International Hamfest date was set for July 20-21 on the American side of the Peace Gardens. WØECX reports that there will be a Ham Picnic at the Kindred Park on June 30. WØNMV has been building a new SB-200 and will soon have it on. The SET program went off with the RACES Net, PON and N.D. CW Net participating. Thanks to WAØAYL, KØSPH, WAØHUD, WAØELO, KØRSA for doing the job of setting it up. WØTUF has all the bugs out of the SR-150. WØCBM is on with a new Swan 500 and works 40 meters more. WØVBE received his Extra Class license. WAØELO passed the Advanced and Extra Class exams and WØHBR reports that his son WAØQBD, who is in the service, passed the Extra Class also. WØDM gave three Novice tests and continues to teach others for the General tests. WØTXQ, from Detroit Lakes, was his guest for a few days. WAØTBR is recovering from eye surgery. The Forx Amateur Radio Club has started Novice classes. Meetings are held at the home of KØRSA.

RACES Net	22sess.	790check-ins	Tfc.84	KØSPH
YLWXNet	24	413	7	WAØMND WAØGRX
CWNet	14	57QNI	39	WAØELO
NDPONNet	8	161	48	WAØHUD

Traffic: WAØHUD 184, WAØAYL 130, WAØELO 87, W9QNI/Ø 32, WØWWL 28, KØPZK 21, KØRSA 21, WAØGZA 20, WØDXC 17, WAØJPT 16, WØDM 15, KØSPH 15, WAØMND 8, WAØTBR 5.

SOUTH DAKOTA—SCM, Seward P. Holt, KØTXW—SEC: WØSCT. RM: WØIPF. Phone Net Managers: KØBSW, WAØLLG. KØHHD/2 and his XYL announce the arrival of a new daughter Feb. 2. KØFKK has been issued the call DL4RE and is mounting a beam for contact home. WAØMRY has completed his keyer 7. WAØHMP and WAØPNB passed the Advanced Class exam. Net Manager KØBSW thanks all who helped to make the net participation greater this past year. RM WØIPF announces that by 10 QNIs within three months

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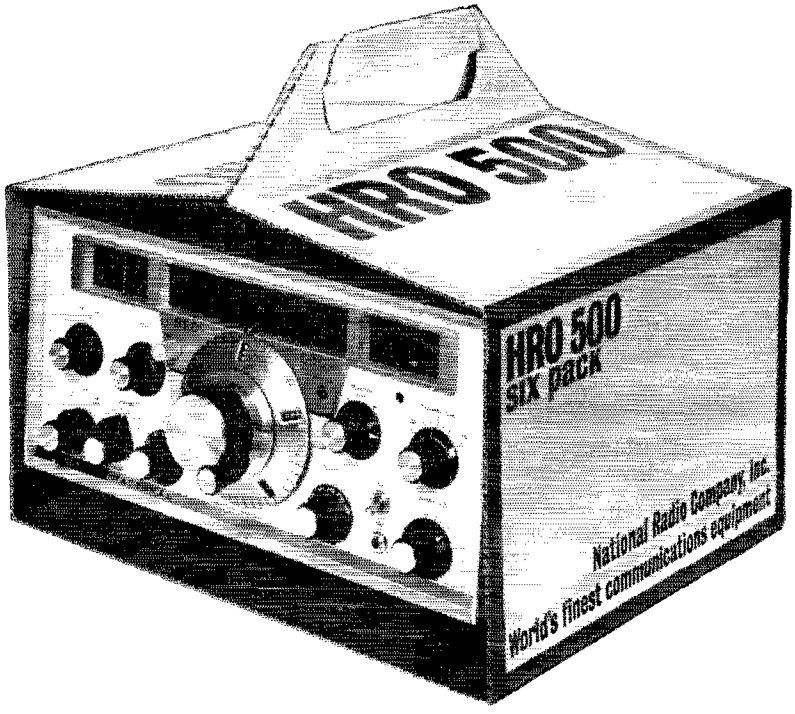

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you may receive a S. Dak. Section Net certificate. Traffic nets: NJQ Net, 278 QNI, 25 QTC, 42 informal. Evening Phone Net, 1275 QNI, 90 QTC, 152 informals. S.D. C.W. Net, 73 QNI, 24 QTC in 14 sessions. Sioux Falls 2-Meter Net, 22 QNI in 4 sessions. Traffic: WØZWL 383, KØVYY 238, WAØLLG 70, WAØMYS 52, WØSCT 42, WAØMWN 29, WØIPF 25, WAØRIQ 21, WAØPNB 10, WAØQMV 10, WØDVB 9, WAØPZA 9, WAØFUZ 6, WAØMRY 6, WØRWM 6, WAØHOJ 5, KØZTV 5, WAØBWJ 4, WAØCKH 4, WØFJZ 4, KØKOY 4, WAØJXH 1.

DELTA DIVISION

ARKANSAS—SCM, Curtis R. Williams, W5DTR—SEC: WA5IIS. PAM: WA5PPD. RM: W5NND. The Central Arkansas Radio Emergency Net (CAREN) has elected W5OFD as net mgr., WA5FAV as asst. net mgr. and WA5FDR as secy.-treas. CAREN has a 2-meter repeater working with input 146.3 and output 145.5 using the call W5DI. WA5LUY and WA5OOY have a repeater working with input either on 50.32 or 146.34 and output on 50.5. New officers of the Central Arkansas ARC are W5DTR, pres.; WA5OOY, vice-pres., WA5QWY, secy.-treas.; and WA5QAK, act. mgr. Several AREC groups had good exercises during the SET. Net reports for Jan.:

Net	*Freq.*	*Time*	*Sess.*	*Traffic*	*QNIs*	*Mgr.*
OZK	3790	0100Z	31	56	268	W5NND
RN	3815	0930Z	37	137	802	WA5PPD
APN	3885	1200Z	27	12	684	K5ABE
APON	3825	2130Z	22	106	412	W5MJO

Activity during Jan. was good with many new stations reporting into our section nets. Traffic: (Jan.) W5OBD 1343, W5NND 241, W5DTR 93, W5MJO 88. WA5PPD 82, W5QFU 81, WA5IIS 47, WA5LYA 21, WA5KEF 17, WA5PKO 13, WA5TLS 13, K5TYW 11, WA5QPI 9. (Dec.) W5QFU 54.

LOUISIANA—SCM, J. Allen Swanson, Jr., W5PM—SEC: W5BUK. RM: W5CEZ .V.H.F. PAMs: WA5DXA, W5UQR.

Net	*Freq.*	*Days*	*Times/GMT*	*Net Mgr.*
LAN	3615	Daily	0030/0400	W5MBC
Delta 75	3905	Sun.	1330	WA5EVU
LaPON	3870	Sun.	1300	W5KC

The Lake Charles gang will put on a hamfest this year. Details later. W5SWS has been mobiling a lot lately. WA5QVN reports the Twin City hams have started code and theory classes. WA5UEB is the new call of the Winnsboro High ARC. K5ANS/5 transmits Official Bulletins via RTTY on 3625 kc. Mon. through Fri., except Wed., at 0000Z. Congrats to W5NYY on his new Advanced Class ticket. WA5EID is plagued by school skeds. WA5OJG says the Batrop boys are toying with joining civil defense. The Springhill AREC group had a very excellent SET exercise with the mayor, councilmen, and press observing from mobiles operated by W5ADE, K5QNK and K5ELJ, in addition to WA5FRU and W5SQO. LAN operated Sat. and Sun. for many hours. The GNOARC also had special exercises. WA5OHH is working on gear for 6 meters. W5GZR, from the Teche Bayou Country, has up a new three-element quad, homebrewed. WA5KLF is working on RTTY equipment. W5EA is not too active except in MARS. W5JFB says the first week end of the ARRL DX contest was exceedingly hot with QRM. W5PBQ heads the OARC for 1968 in Slidell, K5AGI is the proud possessor of an Extra Class ticket. WN5TKF, of the OARC, became the first ham to receive a license in 1968 through the NOLA District Office of the FCC. W5LHS, New Orleans West Bank EC, reports a very fine SET exercise with a visit to the fixed station by the director of the NOLA Red Cross. WN5TZL is a new ham in St. Martinville, a graduate of W5EXI's school. W5NQQ will continue as editor of the *LARK*. My term as your SCM expires in June. Watch *QST* for request for nominations. Traffic: W5CEZ 255, W5KRX 146, W5MIXQ 125, W5MBC 105, K5ANS/5 89, WA5OHH 66, W5GZR 47, W5PM 15, W5EA 14, K5WOD 12, WA5NYY 8, WA5QVN 7, W5KC 4, WA5EID 3, WA5KLF 2, WA5OJG 2, WA5LGO 1.

MISSISSIPPI—SCM, S. H. Hairston, W5EMM—SEC: W5JDF. It is amazing that WA5SKI handles as much traffic and still make such good grades in college. W5LEA still is doing a fine job as NCS, operating c.w., a.m., s.s.b., 80 through 10 meters, with old Navy experience being helpful. W5ODV has taken over as asst. net mgr. and secy. of MSBN and is doing a good job under the leadership of Net Mgr. WA5KEY. Thirty-one sessions were called, with 1301 call-ins and 113 emergency and priority messages delivered. We are glad to welcome K5UYP and his new bride to Jackson and also an old friend with a new call, WA5TNQ. We are always glad to have new amateurs in Mississippi, so we welcome WA5TSU, WN5TSE, WN5TTG, WN5TTQ, WN5TRJ, WN5TRF, WN5TQC, WA5TPP, WN5TOD, WN5TON, WN5TNN, WA5TNQ, WN5TWZ and WN5TWI. Brothers W5BW and K2IDE had a fine reunion, getting together on the Coast and comparing pictures of their rigs from 1915 to the present. Check into our nets: Gulf Coast Sideband Net, daily 1730 CST 3925 kc. Miss. Sideband Net, daily 1815 CST 3888 kc. Miss. C.W. Net, daily 3647 kc. at 1845 CST. Traffic: WA5SKI 210, W5BW 71, W5EMM 22, WA5RXV 17.

TENNESSEE—SCM, Harry A. Phillips, K4RCT—Asst. SCM: Lloyd Shelton, WA4YDT. PAMs: W4PFP, WA4CGK, WA4EWW, WB4GHL.

Net	*Freq.*	*Days*	*Time*	*Sess.*	*QNI*	*QTC*	*Mgr.*
TSSB	3980	Tue.-Sun.	0030Z	29	1990	285	WA4CGK
TPN	3980	M-Sat. Sun.	1245 1400	33	1434	245	W4PFP
ETPN	3980	M-F	1140	23	522	23	WA4EWW
TCN	3980	Thurs.	0200	(Wed. night CST)			W4OGG
TN	3635	Daily	0100	31	273	213	
TTN	7270	Daily	2200	31	40	114	WB4GHL

Section nets were in session for two 8-hour periods on 3980, 3635 and 7270 kc. during the SET. The traffic total was approximately 435. The Nashville AREC Net operates on 50.3 Mc. Tue., Thurs. and Sat. at 2100 CST. W4SGI has a new call, WB4IED. Nomination forms for the award of Outstanding Amateur in Tenn. are available from Tenn. Council secretary, W4PRY, 3810 Redford Ave., Nashville 37215. The deadline is May 1. Presentation will be made at the Crossville Picnic in July. Our thanks to W4IDY for serving as temporary RM. Traffic: W4OGG 315, W4DIY 313, W4FX 183, W4SQE 168, WA4URA 99, W4RUW 95, WA4NEC 90, WB4EKI 88, K4OUK 54, W4WZH 48, W4PFP 44, W4WBK 43, K4FKO 30, K4MQI 25, WA4GLS 24, WA4CRU 23, WB4ANX 22, W4PQP 19, WA4CGK 17, WB4EHD 17, K4PUZ 17, WA4TJJ 16, WB4FCE 14, W4PRY 12, WA4EWW 10, W4SGI 9, WA4AJB 8, WA4YDT 8.

GREAT LAKES DIVISION

KENTUCKY—SCM, Lawrence F. Jeffrey, WA4KFO—SEC: W4OYI. Endorsements: WA4FMY as EC, WA4GHQ and W4WNH as OVSs, WA4WWT as ORS.

Net	*Freq.*	*Days*	*GMT*	*QNI*	*QTC*	*Mgr.*
KRN	3960	M-F	1130	424	80	K4KIS
MKPN	3960	Daily	1330	395	214	K4TRT
KTN	3960	Daily	0000	1002	867	WA4AGH
KYN	3600	Daily	0000/0300	473	848	W4BAZ
FCATN	50.7		0200	94	28	WB4AFH

WA4SIQ is looking for stations for the N.E. Kentucky V.H.F. Net. WA4WWT tops Kentucky in traffic again. W4CDA is working hard to promote a 2-meter net in the Danville area on 144.35. New officers of the Northern Kentucky Amateur Radio Club are W4VLA, pres.; WA4LPC, vice-pres.; WA4ZVI, rec. secy.; WA4NXD, corr. secy.; W4OTM, treas. K4RZK is the new secy. of the OVARA. W4PII is pres. of the Queen City Emergency Net. WN4IEN is a new Novice in Central City. Congratulations to WA4WWT on being named Central Area TCC Operator of the Year. The Second Annual Kentucky Traffic Meeting was very successful, thanks to the efforts of W4BAZ, who acted as chairman. Traffic: (Jan.) WA4WWT 548, WA4DYL 495, W4BAZ 366, WA4AGH 281, WA4WSW 246, WA4UAZ 224, WB4AIN 216, W4NBZ 185, WA4SMS 175, WA4VUE 168, WA4KFO 133, K4MAN 125, W4YOQ 104, W4OYI 93, WA4GHQ 90, WA4BZS 64, W4CDA 56, W4GVU 56, WB4BKG 52, WA4IBG 47, K4TRT 44, W4BTA 35, WB4FOT 35, WA4UHR 32, WA4WQZ 32, WA4UGQ 24, W4KJP 22, K4VDO 22, W4MWX 20, WB4BTM 19, K4UMN 16, K4HOE 15, WB4AFH 14, WB4CIY 13, W4SZB 12, W4KKG 11, K4LOA 11, K4FPW 9, W4ADO 8, WB4CJM 1, WA4SIQ 1. (Dec.) K4HOE 19, K4UMN 13.

MICHIGAN—SCM, Ralph P. Thetreau, W8FX—SEC: K8GOU. RMs: W8FWQ, W8RTN, WA8OGR, K8KMQ. PAMs: W8IWF, K8JED. V.H.F. PAMs: W8CVQ, W8YAN. Appointments: K8IGQ and WA8MDK as ECs; WA8IAQ as ORS; W8OWG as OPS. Silent Key: WA8UDA. W8NOH is home and on the air.

Net	*Freq.*	*Time*	*Days*	*QNI*	*QTC*	*Sess.*	*Mgr.*
QMN	3663	2300	Dy	1094	565	63	W8FWQ
WSSB	3935	0000	Dy	926	96	31	K8AYJ
PON-DAY	3935	1600	M-Sat.	386	319	27	WA8OGR
B/R	3930	2230	M-F	838	77	23	K8JED
PON-C.W.	3645	2400	M-Sat.	153	42	27	VE3DPO
M6MTN	50.7	2400	M-Sat.	321	46	26	WA8LRC

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SWM2	145.26	0100	Tue.	125	20	6	W8CVQ
QWN	7160	2230	M-W-F	30	20	15	WA8VOG
NOON 50	50.41	1700	M-Sat.	204	4	27	WA8FXR

New officers: Amateur V.H.F. Assn.—W8JXU, pres.; W8CLH, vice-pres.; W8HKO, secy.; W8VRU, treas. Edison RAA—W8EMP, pres.; W8EQY, vice-pres.; WA8CLG, secy.-treas.; WA8JKC, W8VRB and WA8SVA, board. Calhoun ARC—WA8LRC, pres.; K8IWX, vice-pres.; WA8VXE, secy.-treas.; WA8UDT, fin. secy. Sorry to hear that W8TDA's son was killed in a car crash near Osceola. Among the many clubs out for the "March of Dimes" were the CMARC, SVARA, Plymouth ARC and Hiawatha ARA. The SVARA will put on the Wouff Hong ceremony for the CMARC Lansing convention, Apr. 26 and 27. W8CAM has been running code practice again on 1804 kc. and the Semara has been running code and theory classes through advanced weekly. The SVARA starts a new slow code net at 1800Z in the 3.7 Mc. band. The Van Buren Co. ARC is running a code/theory class for 11 weeks. Thanks to W8ZKL, the Catalpa Club now meets in the VFW Hall in Royal Oak. WA8DEX has a new Collins exciter. K8DX now is on 160 "tobacco road." K8WOZ now is the father of twins—"push-pull?" SVARA's new board: K8IIB, W8CTY, W8KNB, WA8GRI, W8GAI. In 1967 none of Michigan's OOs lived up to minimum requirements. BPLers: K8KMQ, W8IV, WA8ARJ. WA8MCQ is QRP 800 MW, 23 states including Calif. W8IHD made WAC on 21 Mc. Traffic: (Jan.) W8IWF 470, K8KMQ 411, WØGXQ/8 327, W8JTQ 267, W8IV 189, WA8OGR 168, W8BEZ 165, W8QQK 120, WA8LXY 113, K8MXC 112, K8ETU 110, K3KRX/8 109, K8ZJU 108, W8IUC 93, W8FX 77, WA8LAQ 73, W8RTN 62, WA8KME 58, WA8MCQ 55, WA8UPB 52, W8EU 51, K8GOU 47, W8TDA 40, WA8ORC 38, WA8UWQ 38, WA8LRC 32, W8FWQ 31, W8MO 31, W8YAN 30, K8JED 29, W8UFS 27, WA8VOG 27, W8TBP 20, W8OWG 18, W8OAF 17, W8CNL 16, W8IHD 14, W8RHF 14, WA8TSD 14, W8WVL 14, W8MRM 13, WA8GTM 12, W8ILP 12, WA8KRH 12, W8AUD 10, W8SCW 10, WA8VHG 10, W8HKT 9, WN8VRJ 9, WA8GRI 8, W8MWG 8, W8NOH 8, W8MGM 7, WA8LPI 6, WN8WQS 6, W8DSE 5, W8ZHB 1. (Dec.) WA8ARJ 147, K8HLR 30, WA8JDF 18, WA8AXF 15, WA8UPB 14, WN8WZF 9.

OHIO—SCM, Wilson E. Weckel, W8AL—Asst. SCM: J. C. Erickson, W8DAE. SEC: W8OUU. RM: W8IMI. PAM: K8UBK.

Net	*QNI*	*QTC*	*Sess.*	*Ave.*	*Freq.*	*Time*	*Mgr.*
BN	836	534	83		3580	0000&0300Z	WA8CFJ
OSSBN	1925	1029	58	17.8	3972.5	2345Z	K8UBK

Hope that all of you have been getting your station ready to enter the Sixteenth Annual Ohio QSO Party Apr. 27 and 28, sponsored by the Ohio Council of Amateur Radio Clubs. K8LMF and K8ONA vacationed in Florida and received an engraved plaque from the Muscular Dystrophy Assn. for their efforts in the recent drive for funds. K8ONA received the Florida Merit Award. Inter-City RC's *IRC News Bulletin* tells us that a number of its members brought receivers, transmitters and transceivers to the club meeting and all were in working operation so now the members know how each piece of gear works, what the owner likes and dislikes about it. W8WEG tells us WA8FUE joined the Silent Keys following an auto accident in Okla. K8BXT says Warren ARA's 1968 officers are W8TTQ, pres.; W8HCL, vice-pres.; K8BXT, secy.; WA8VNU, treas.; WA8SRB, trustee; WA8KIG is active on 145 Mc., WA8ANV is building a 2-meter solid state transceiver. W8TTQ is building an electronic keyer, WN8RFY is now WA8ZMY and W8HSP was married. Southeast ARC's *Ham-Fax* says WA8AHU is home recovering from surgery. WA8BZR received his Extra Class license. WN8ZBA and WN8ZNC, father and son, are new Novices. K8PJH is home from the hospital recuperating. The Ohio Six-Meter Net meets daily at 0000Z on 50.6 Mc. Write to K8VCW if interested in organizing a daytime c.w. traffic net on the Novice bands for training and service related to school clubs. Toledo's *Ham Shack Gossip* informs us WA8ZFB and WA8ZJF received their Gen. Class. WA8ZGO his Cond. Class. WA8ZHU his Tech. Class and WN8ZFL, WN8ZIF and WN8ZIG their Novice Class licenses. K8KFP graduated from Toledo U. and is moving to Chicago. K8QZK is in Viet Nam and W8TZO is now W8AN. *Smoke Signals* from the Indian Hills RC tells us Santa brought W8POR an SB-300 and SB-400, also W8ICS a scope and Hickok tube tester. Massillon ARC changed the name of its bulletin to *MARC Feedback*, suggested by WA8HZO. W8OUU and WA8CFJ passed the Extra Class exams. K8DIU is in Viet Nam. According to Springfield ARC's *Q Fiver* W8OG spoke to the club on the DX he has been working since

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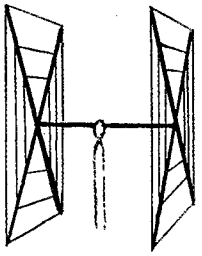
Worked 42 countries in two weeks with my Gotham Quad and only 75 watts . . . W3AZR



CUBICAL QUAD ANTENNAS — these two element beams have a full wavelength driven element and a reflector; the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount; uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a foolproof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you!

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Elements: A full wavelength driven element and reflector for each band.

Frequencies: 14-14.4 Mc.; 21-21.45 Mc., 28-29.7 Mc.

Dimensions: About 16′ square.

Power Rating: 5 KW.

Operation Mode: All.

SWR: 1.05:1 at resonance.

Boom: 10′ × 1¼″ OD, 18 gauge steel, double plated, gold color.

Beam Mount: Square aluminum alloy plate, with four steel U-bolt assemblies. Will support 100 lbs.; universal polarization.

Radiating elements: Steel wire, tempered and plated, .064″ diameter.

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Radiator Terminals: Cinch-Jones two-terminal fittings.

Feedline: (not furnished) Single 52 ohm coaxial cable.

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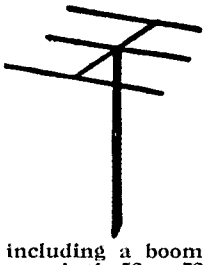
15-20 CUBICAL QUAD	32.00
TWENTY METER CUBICAL QUAD	25.00
FIFTEEN METER CUBICAL QUAD	24.00
TEN METER CUBICAL QUAD	23.00

(all use single coax feedline)

BEAMS

The first morning I put up my 3 element Gotham beam (20 ft) I worked YO4CT, ON5LW, SP9ADQ, and 4U1ITU. THAT ANTENNA WORKS! WN4DYN



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2 El 20	$16	4 El 10	$18
3 El 20	22*	7 El 10	32*
4 El 20	32*	4 El 6	15
2 El 15	12	8 El 6	28*
3 El 15	16	12 El 2	25*
4 El 15	25*		
5 El 15	28*		

*20′ boom

ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, T12FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4AQL, SM5BGK, G2AOB, YV5CLK, OZ4H, and over a thousand other stations!

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his retirement. From the Treaty City ARA's *The Beam* we learn that the 1968 officers are W8LRE, pres.; WA8-KZR, vice-pres.; WA8KQQ, secy.-treas. The Lorain County ARA's *The Monitor* informs us that 1968 officers are WA8WUU, pres.; WA8THF, vice-pres.; Rodney Bendik, secy.-treas., WA8WNG is a new Tech. K8UBK has moved to Greenville. There are seven licensed amateurs in W8BU's family. From WA8COA's column in the *Cincinnati Enquirer* under *Ham Call* we learn The Oh-Ky-In V.H.F. Society's officers are K8OPH, pres.; K8GYH, vice-pres.; WA8LOW, corr. secy.; WA8-YXB, secy.; K8THT, treas., Queen City Emergency Net's officers are W4PII, pres.; WA8GRR, vice-pres.; WA8STX, treas.; WA8COA, comm. mgr.; W8SVU, editor. Officers of the Ohio Valley ARA are W8BVF, pres.; WA8CDP, vice-pres.; K4RZK, secy.; W8ZJM, treas.; WA8ECQ and WA8NXD spent a few days in Mexico. Evendale AR Society's officers are WA8STX pres.; W8GAN, vice-pres.; WA8STW, secy.; WA8BGK, treas.; and WA8TYF trustee of K8LUC; K8YII and K8YNF are back on 50 Mc. after spending 1963 and '64 in Ethiopia as missionaries and the OVARA awarded W8BVF a Drake wattmeter on being the amateur of the year. Westpark Radiops' officers are K8GVK, pres.; W8IPA, vice-pres.; WA8YWX, secy.; WA8VNW, treas.; K8-RKF, trustee. Six Meter Nomads' officers are K8PXR, pres.; K8SYJ, vice-pres.; WA8TTB, secy.; WA8TTO, treas.; W8INT, K8VGF, K8VJB, trustees. Canton ARC's *Feedline* tells us they heard an Ohio Bell man speak on "Communications from Caveman to the Present." WA8TWC is a new OBS. Traffic: W8RYP 329, W8IMI 272, WA8VNU 228, WA8TYF 224, W8NAL 214, W8OHU 206, WA8PQL 203, W8CHT 192, WA8OCG 185, W8SZU 181, W8GVX 162, W8QCU 161, WA8UPI 132, W8ERD 122, W8GOE 119, WA8NTA 117, WA8LAM 113, WA8FSX 99, W8DAE 89, W8PMJ 86, W8FGD 85, K8ONA 78, WA8SHP 68, W8WDG 68, W8OE 65, WA8MTS 64, W8-DHD 63, WA8MHO 53, WA8UNE 48, WA8ZGC 46, W8HII 45, W8EFB 40, WA8PPK 39, WA8DWL 35, K8VCW 35, WA8PMN 33, K8DDG 32, WA8UQR 29, K8BYR 26, W8-FRV 26, W8TV 19, WA8ADU 18, WA8QFK 18, WA8-UTX 18, WA8MVV 16, W8QXQ 16, W8VND 15, K8LFI 14, WA8WJR 13, WA8UFM 12, W8LAG 11, W8ARW 10, WA8KPN 8, W8LZE 8, K8QYR 8, K8EKG 5, WA8AJZ 4, W8EEQ 4, W8WEG 3, WA8COA 1, W8GQD 1.

HUDSON DIVISION

EASTERN NEW YORK—SCM, George W. Tracy, W2EFU—SEC: W2KGC. RM: WA2VYS. PAM: W2IJG. Section nets: NYS on 3670 kc. nightly at 2400 GMT; NYSPTEN on 3925 kc. nightly at 2300 GMT; ESS on 3590 kc. nightly at 2300 GMT. Appointment: WB2UUD as OVS. Our congrats to WB2NKN on making the BPL in Jan. After 34 years in E.N.Y., W2HVR is now W1ERI in Hopkinton, Mass., on the lookout for old friends on the air. In Poughkeepsie, WA2EDN is a new General Class while in New Rochelle, K2SJN is the proud possessor of an Advanced Class ticket. WA2BRF reports a new 832 rig on 2 meters; he also is studying for Advanced Class. Jan. set a new E.N.Y. traffic record with 28 reports received. Congrats to all our traffic stations. At the Schenectady Club, W2ZL and K2EJL presented a program on linear r.f. amplifiers. WB2KHH is the new editor of the club's *SARA News*. The New Rochelle Club seated its new officers at the Jan. meeting. NYS-PTEN member WA2UZK is the net's new 1st asst. mgr. Congrats, Jean. WB2VUK, WB2WAG and WB2WUS are building 2-meter transverters. The Albany gang, including W2JKI, WB2OIM and WB2RGB, were active during the V.H.F. SS. Among those active on 220 Mc. in Dutchess County are K2DNR, K2GXJ, W2HF and WB2-HXZ. The Poughkeepsie repeater on 2 meters, W2CVT, is reported back on the air after minor relay problems. K2DNR is looking for DX skeds on 220. Sam runs 100 watts to a ten-element yagi. Traffic: WB2NKN 641, WB2UHZ 365, W2THE 176, WA2VYT 146, W2EAF 144, WB2VVS 144, WA2VYS 138, WB2YEM 101, W2EFU 45, K2SJN 35, WB2HZY 33, WB2FOA 32, WB2VJB 30, WB2-VUK 18, WA2WGS 15, WB2ZEC 15, W2URP 14, WA2RTZ 12, WB2UEQ/1 11, W2ODC 9, WB2UUD 9, WB2SHU 8, WB2YBQ 8, WA2JWL 3, WA2BRF 2, WA2BUF 1.

NEW YORK CITY AND LONG ISLAND—SCM, Blaine S. Johnson, K2IDB—Asst. SCM: Fred J. Brunjes, K2DGI. SEC: K2OVN. PAM: W2EW.

NLI*	3630 kc.	1915 Nightly	WA2UWA-RM
NLI VHF*	145.8 Mc.	1930 MTWTF	WB2RQF-PAM
NLI Phone*	3932 kc.	1600 Daily	WB2UQP-PAM
NLS Slow*	3715 kc.	1845 Nightly	WB2UQP-RM
Clear Hse	3925 kc.	1100 MTWTF	WA2GPT-Mgr.
Mic Farad	3925 kc.	1300 Ex. Sun.	K2UBG-Mgr.
Mic Farad	3610 kc.	0001 Nightly	K2UBG-Mgr.
All Svc	3925 kc.	1300 Sun.	K2AAS-Mgr.
NYSPTEN	3925 kc.	1800 Daily	K2AAS

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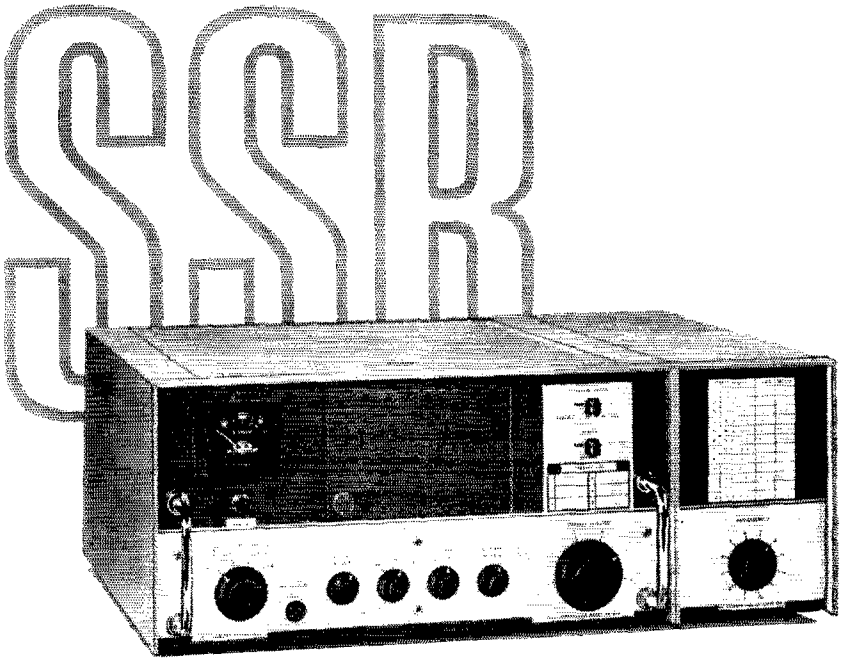

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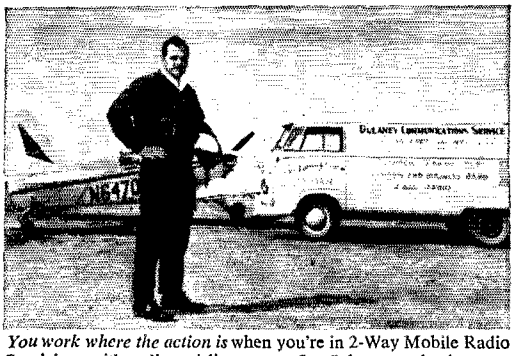
Section nets. All times shown above are local. WN2CVM and WN2COU are two new Novices from Northport. K2QPF has 3 kw. of home emergency power which he frequently tests. K2HTX now has a Ranger on 80 meters. W2HAE has a Polycomm 62 on v.h.f. but still manages to sked 9Y4RA on 15-meter c.w. for some of the family in Brooklyn. WN2DMP picked up an EICO 720 transmitter in Dec., but frosty weather has limited the antenna to the wire coat-hanger variety. WN2DMI built his first transmitter from plain old raw materials, not that greasy kit stuff! The Bronx Amateur Radio Telephone Organization recently added a durable old HQ-129X to its station on the 6th floor of the Bronx. *Attention all club officials:* The policy of the Suffolk County Radio Club is *reserve monthly meetings for guest speaker, eye-ball QSOs and general socializing.* Routine business is handled by an executive committee composed of elected officials, committeemen and appointed committee chairmen. That policy can't be too bad, because for the five years that this one has known the club its membership has averaged a steady 180 members! Give you any ideas? The Great Neck North Senior HSRC is awaiting its new station license. The five stations making BPL this month are WB2PJH, WB2QIL, WA2UCP, WB2UQP and WA2UWA. WA2UCP, EC Kings County, says it was the best SET they've ever had! K2UBG reports the Mike Farad Net was on the SET for 16 hours with 26 stations. WB2DZZ had his traffic total cut to pieces by N.Y.U. finals which had a little help from a blown receiver front-end. WB2HYK has a Model 15 printer ready to go on the RTTY mode. WB2YKL has a TH-3 Junior up around 15 feet for 10 and 20 meters. WB2ZEL has been working feverishly on his SB-101 and should have it completed by now. WB2PTS, who recently made WAC, is using a 10-watt 40/80 c.w. rig. W2DBQ is getting involved in RTTY on MARS where it is called RATT (?!). K6GIL and W2PF ran the QCWA booth at the SAROC Hamfest in Las Vegas, where 60 QCWA members signed in and attended the QCWA Breakfast Jan. 16. W2BCB reports old Santa is late with some of that brand-new up-to-date equipment that's on order! W2RFN and WA2JZX got together to design and build a couple of 160-meter rigs which puts them boh on that jolly old band. Traffic: WA2UWA 1505, WB2UQP 322, WB2QIL 315, WA2UCP 267, K2UBG 248, W2GKZ 195, WB2PJH 169, W2EW 152, WB2RQF 137, WB2DZZ 129, WB2HYK 85, WB2YKL 64, WB2AEK 42, WB2MZE 31, WB2ZEL 31, WB2PTS 30, W2DBQ 27, WA2LJS 24, W2EC 11, WB2UGP 11, K2IDB 10, W2PF 10, WB2BKS 3, WB2RWD 3, WA2QJU 2.

NORTHERN NEW JERSEY—SCM, Louis J. Amoroso, W2LQP—Asst. SCM: Edward F. Erickson, W2CVW. SEC: K2ZFI.

ARPSC Section Net Schedules

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*Tfc.*	*Mgr.*
NJN	3695 kc.	7:00 P.M.	Dy	31	418	327	W2BVE
NJPN	3928 kc.	6:00 P.M.	M-Sat.	31	796	264	W2PEV
NJPON	3928 kc.	6:00 P.M.	Sun.	4	108	59	WA2TEK
NJAN	50,300 kc.	8:00 P.M.	M-F	20	267	154	WA2KZF
ECTN	146,700 kc.	9:00 P.M.	Dy	38	424	276	WB2IYO
PVETN	145,710 kc.	7:30 P.M.	M-F	31	305	319	K2KDQ

New appointment: K2BMI as OO. Endorsements: W2ANG and WB2RKK as ORSs; WB2QLF as OPS; W2DMJ as EC for Wood-Ridge and vicinity; WB2BCS as EC for Red Bank and vicinity; K2KDQ as EC for Passaic and vicinity; WB2IYO as OPS; K2AGZ as OO Class I through IV. K2ZFI, our SEC, reports an excellent turnout for the 1968 SET. W2JDH is wondering how he can get a QSL from one of the 5 Colorado stations he worked for his WAS. W2EWZ met VE2AGY on a recent trip to St. Johns. They QSOed on 40 c.w. in 1955. K2MFX is working on his 2-meter gear. WA2CRF now is on 80 through 10 with 2 meters on the side. W2CVW added a 432 converter to his gear setup. K2GPK has a new quad. K2IEF put up a new dipole for 80. WB2TKP reports he still is trapped by school work. WA2BMR has a new Gleoso receiver. WB2EKN is the newest member of the Gonyagle Net. WB2MVI passed the Advanced Class exam. W2BBK operated PJ5MJ during the DX Test. Business sent WB2RUM to G-Land. WB2KQC is back from JA-Land. WB2RJJ is enjoying his new HW-32. WN2DZE is a new ham in Bergenfield. K2VVI went s.s.b. with a Swan 500. W2PBZ added 7 new ones during the ARRL DX Test. WB2EES is ex-WA0NOH. His QTH is Flanders and he is on with a DX-40 and an HQ-170. WN2DRJ had a ball in the Novice Roundup using the OM Antenna System. Hmmm. WN2CWP is studying for his General. WB2RKK was in both CD Parties and the Virginia QSO Party. WB2ZGP is on 2-meter m.c.w. WA2ZDA is in the "3" Min. Net and uses an HQ-110 and a DX-100. WB2RKK has offered to start a new slow net in the section. WB2QJI has his antenna system up again and built a GG 811. WB2ZCI joined the



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PON. New officers of the State Line RC are WB2-NHD, pres.; K2KBK, vice-pres.; W2BZA, secy.; W2-NYU, treas. New officers of the Bloomfield Amateur RC are WB2VUY, pres.; WB2NCE, vice-pres.; WB2-NCG, secy.; W2EKM, treas. This group meets the 2nd and 4th Wed. at the Bloomfield Civic Center. Traffic: (Jan.) WB2RKK 439, WA2TBS 390, K2KDQ 370, WB2-SEZ 224, WB2VLC 219, WB2ZSH 214, W2LQP 211, WB2-DDQ 204, WB2BXK 185, WB2NSV 181, WA2TAF 95, WA2ACJ 73, W2PEV 71, WA2TEK 70, WA2CRF 57, WB2-NZU 57, WB2ZCJ 49, W2CVW 48, WB2PXO 44, WA2CCF 36, WB2CGI 34, WA2NJB 33, WA2VQP 31, WA2KZF 27, WB2ZDA 26, W2EWZ 20, WB2WFO 16, WB2ZCI 16, WB2SJH 15, WA2JSB 13, K2MFX 11, WB2VGL 11, WB2-RCS 10, WA2GLI 8, WB2ZGP 7, WB2YPQ 6, WB2KPD 5, K2JSJ 4, WB2TKP 4, K2DEL 3, WN2DRJ 3. (Dec.) WB2IVO 162, WA2CRF 73, WA3TEK 34, W2DRV 25, WB2ZCI 2.

MIDWEST DIVISION

IOWA—SCM, Owen G. Hill, WØBDZ—Asst. SCM: Bertha V. Willits, WØLGG. SEC: KØBRE. WØNWX reports working KA9MF on 160 to complete WAC on that band. WØEMA was Iowa winner in the Conn. and Del. QSO Parties, working them simultaneously. WØ-PFP managed to work 58 stations in 24 sections during the V.H.F. SS on 50 Mc. WØLCX has been appointed director of the Central Area of the National Traffic System. Under sponsorship of the Des Moines ARC and the Central Ia. V.H.F. Club, Operation Santa Claus was made possible. This dealt with the collection of toys, food, clothing, etc., for the less fortunate at Christmas time. Another old-timer, WØOSC, is now a Silent Key. KØGEY has been appointed OVS. KØUYN lost his 6-meter beam with the 50-ft. boom.

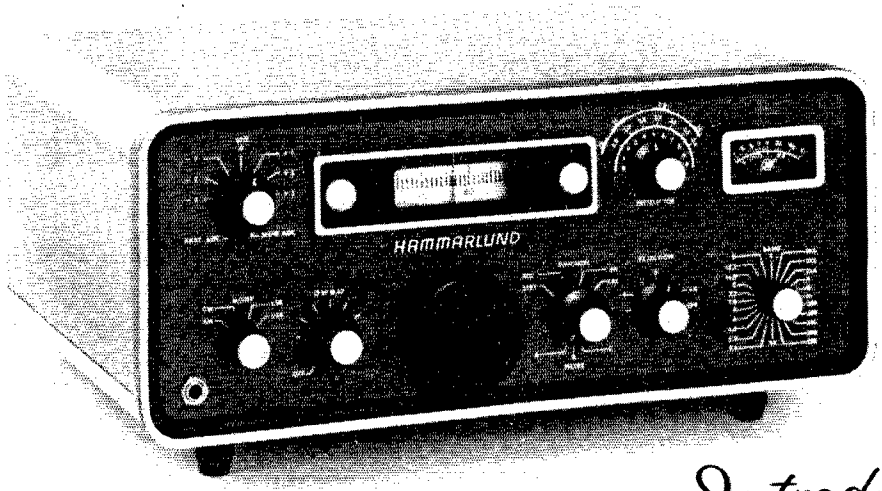
Iowa 75 Meter Net	27 Sess.	QNI 1349	QTC 188
Iowa 160 Meter Net	31 Sess.	QNI 875	QTC 10
Tallcorn Net (Dec.)	23 Sess.	QNI 103	QTC 23

Traffic: WØLCX 664, WØLGG 300, WØCZ 287, KØBRE 84, WAØDAG 50, WØEMA/Ø 47, KØEVC 29, WAØMIT 28, WØNGS 21, KØTDO 14, WAØOTE 13, WAØJUT 9, WØGQ 6, WAØIAW 6, KØGHH 2.

KANSAS—SCM, Robert M. Summers, KØBXF—SEC: KØEMB. PAM: KØJMF. RMs: WAØMLE, WAØ-JFV. V.H.F. PAMs: WAØCCW, WØHAJ, WAØLSH. New ORSs are WAØKPE, WØAVX and WØCGZ. New OBSs are WAØHZS and WAØKDJ. New OPSs are KØPSD and KØGIG. KØTCG is now an OO. The Kansas WC Net, QKS, on 3610 daily at 0100 and 0400Z reports first session QNI 259, QTC 104; second session QNI 166, QTC 49. A group in the midwest has suggested 7255 kc. as a mobile calling frequency and is cooperating with WØLXA on this effort. WAØIYX reports 42 states worked on 160 meters. The Kansas Post Office Net reports for Jan. QNI 792, QTC 126; Kansas Sideband Net QNI 773, QTC 160; Kansas Phone Net Sun. QNI 93, QTC 9, week days QNI 79, QTC 9. New officers of the Newton ARC are KØEMB, WNØSXL, WAØFZG and WAØSWC. QKN, the Kansas Novice Net, reports for Jan. QNI 29, QTC 18; the Kansas 2-Meter PI Net QNI 82, QTC 29. AREC zones 7, 11 and 15 combined with ACARC 2 Wichita, Coffeyville 2-Meter, NCK 2-Meter and Newton 2-Meter Nets reports 48 sessions, 214 QNI, 89 QTC. WAØJII and JIJ are looking for QSOs around 145.35. WAØBHG reports for the Hambutchers Net QNI 776, QTC 133. Coffeyville ARC has announced Apr. 21 as its hamfest date. New officers of the ACARC are WØSPF, pres.; WØAPG, WAØCCX, WØHYR and KØKCS, directors. If your club puts out a bulletin be sure and add your SCM to the mailing list. Traffic: (Jan.) WAØMLE 506, WØINH 487, KØBXF 240, KØ-LPE 202, KØEMB 200, KØJMF 195, WØLXA 161, WAØ-LLC 133, WAØJII 130, WØAVX 113, WAØJOG 113, WAØCCW 107, WØFII 88, WAØQOH 84, KØUVH 72, WAØKPE 68, WAØJQV 56, KØMRI 46, KØHGI 45, WAØKDQ 37, KØDVN 35, KØGZP 33, WAØOZP 31, WOCGZ 29, WØILB 23, WAØLSH 22, KØGII 17, WØ-FDJ 11, WAØLLR 10, KØGIG 8, KØJID 5, WØWFD 5, WAØJFV 4, WNØTAS 4, WNØTCM 3, WAØJFC 2, WNØRQG 1, WNØTEF 1. (Dec.) WØZGY 65.

MISSOURI—SCM, Alfred E. Schwaneke, WØTPK—SEC: WØBUL. I am sorry to report that WØIJS is now a Silent Key. WAØKZT, a former member of UMC RC (WØZLN), was killed in Vietnam. WØKY received ORS appointment. WAØLEK was appointed club technician for WØZLN replacing WØITH, who graduated. SEC WØBUL reports receiving 164 individual station SET messages, 87 net reports for 9 extra net sessions held during the SET. WØBUL also reports 108 confirmed for DXCC. WAØOZO is now Advanced Cl. WAØHQR had WA9GIH as a visitor in K.C. and both passed the Adv. Cl. exam. KØJPJ is back on RTTY. WAØPFU bought an HQ-170 from the local club. KØWIL and WØAMO

Coming to your dealer soon.



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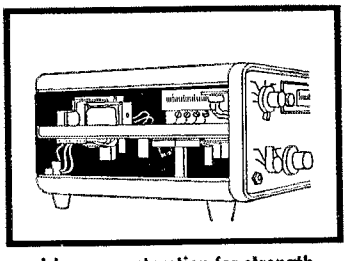

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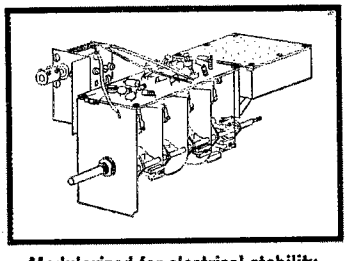

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gave a demonstration of amateur radio to a North K.C. Boy Scout troop. A new tower was erected at Liberty for Clay Co. RACES and PHD ARA. The antenna is a J-pole for 2 meters. Two of the newest members of PHD ARA are WAØEMS and his pupil, 10-year-old Novice Cl. Frank Wonschik. WAØITU is back on the air after replacing a burned-out power transformer. Net certificates for MON go to KØJPJ, WAØPZI, KØIFM, WAØHTN. Net reports:

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
MEN	3885	2300Z	M-W-F	15	228	20	WØBUL
MON	3585	0100Z	Daily	41	194	335	WØTDR
MNN	7063	1900Z	M-Sat.	27	122	128	WØOUD
MoSSB	3963	2400Z	M-Sat.	27	688	177	WØRTO
PHD	50.4	0130Z	Tue.(GMT)	5	104	20	WAØKUH
MTTN	3940	2300Z	M-F	20	203	80	WAØELM
MTTN	(Dec.)			18	237	78	

Traffic: KØONK 4615, KØYBD 578, KØJPJ 537, WØKY 410, KØAEM 216, WØBUL 199, WØOUD 182, WØTDR 128, WAØPZI 107, WAØHTN 96, WAØJIH 70, WØZLN 49, WAØKUH 48, WØRTO 30, KØJPS 24, KØGOB 22, WAØOZO 17, WAØPFU 15, WØBFL 13, WAØHQR 12, KØORB 12, WAØIHV 4, WAØRMW 3.

NEBRASKA—Acting SCM, V. A. Cashon, KØOAL—Monthly net reports for Jan.: Nebr. Emergency Phone Net, WAØGHZ, QNI 1312, QTC 136. Nebr. Morning Phone Net, WAØJUF, QNI 1115, QTC 75. West Nebr. Phone Net, WØNIK, QNI 712, QTC 38. Nebr. C.W. Net (NEB), KØAKK, 0100Z session, QNI 102, QTC 64; 0400Z session, QNI 96, QTC 41. AREC C.W. Net, WAØEEI, QNI 11, QTC 1. Nebr. Storm Net, WAØLOY, 2330Z session, QNI 1052, QTC 107; 0030Z session, QNI 1386, QTC 169. 160-Meter Phone Net, WAØCBJ, QNI 598, QTC 8; Cornhusker Teenage Net, WAØOCW, QNI 418, QTC 126; Nebr. SET Net, QNI 84, QTC 107. SET participation was excellent. Nebr. C.W. Net requests more QNI. Speeds are being reduced to 15 w.p.m. and below to encourage this. For more information, check with RM KØAKK. AREC Phone Net, WØIRZ, QNI 190, QTC 16. Dead End Net, WAØMCX, QNI 280, QTC 14. For net report comparison: Jan. 1967, QTC 1811; Jan. 1968, QTC 2621. Traffic: (Jan.) WAØDOU 568, WAØGHZ 514, WAØQMZ 156, KØAKK 142, WAØORO 134, KØOAL 105, KØJTW 86, WAØLOY 60, WAØOHO 54, WAØGVJ 52, WAØODH 52, WAØOCW 49, KØLDP 46, KØQIX 46, KØKJP 43, KØJFN 39, WAØIBL 27, KØFJT 24, WAØPIE 24, WAØPOC 24, WØAGK 21, KØDGW 21, KØVTD 21, WAØBOK 20, WAØIBB 20, KØIXY 20, WØNIK 20, KØODF 18, KØJPP 17, WAØDXY 14, WØGEQ 13, WØLJO 13, WØBFV 12, KØJFO 12, WAØPCC 12, WAØPSN 12, WAØJUF 11, WAØOQX 11, WØVEA 11, KØRRL 10, WØYFR 9, WAØGAT 8, WØHOP 7, WAØEEI 6, KØHNT 6, WØBFN 5, WAØIKG 5, WØATU 4, WAØIVV/Ø 4, KØECH 3, WAØRPB 3, WAØJKN 2, WAØLRQ 2, KØSFA 2, KØUDW 2, WØWZR 2, WØKFY 1, WØPHA 1. (Dec.) WAØDOU 558, WAØOMY 40.

NEBRASKA QSO PARTY

May 4-5, 1968

Rules: Starts 1600 GMT May 4 and ends 2200 GMT May 5, 1968. Use all bands, c.w. and phone; a.m. and s.s.b. classified as phone. The same station can be worked and counted for QSO points on each band and mode. Single operator stations only. Out of station stations send QSO number, RS(T) and ARRL section. Nebraska stations send QSO number, RS(T) and county. Out of state stations count 3 points per QSO. Nebraska stations count one point per QSO. Out of state stations multiply the number of Nebraska contacts X 3 points X counties; Nebraska stations multiply ARRL sections worked [plus a maximum of ten foreign countries] by the total number of QSOs. Suggested frequencies: 1815 3525 3982 7025 7225 14070 14290 21070 21370 28050 and 28600kc. Be alert for Nebraska mobiles changing counties which may be worked again on the same frequency. Top station in each Nebraska county will receive an award. The top scorer for each ARRL section and foreign country also receives award. (The Awards Committee will issue additional certificates where deemed appropriate.) Logs must show date, time in GMT, exchanges, band, mode, points, a summary sheet with scoring and name and address in block letter. All logs must be received by June 10. Send to: The Lincoln Amateur Radio Club, c/o Gerald L. Corning, KØQIX, 3829 "W" Street, Lincoln, Nebraska 68503. Please include a large s.a.s.e. for results.

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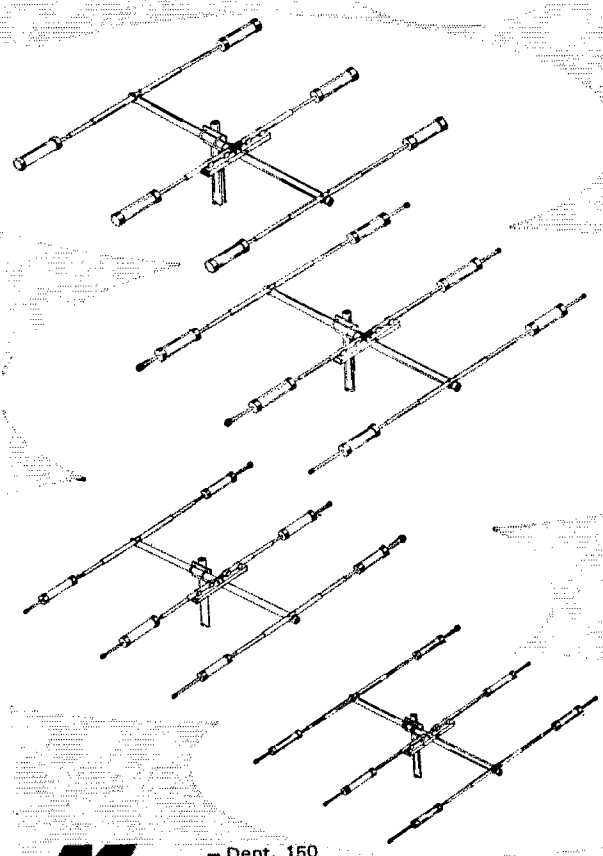

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NEW ENGLAND DIVISION

CONNECTICUT—SCM, John J. McNassor, W1GVT—SEC: W1PRT. RM: W1ZFM. PAM: W1YBH. Net reports for Jan.:

Net	*Freq.*	*Days*	*Time*	*Sess.*	*QNI*	*QTC*
CN	3640	Daily	1845	44	512	854
CPN	3880	Mon.-Sat.	1800			
		Sun.	1000	32	563	309

High QNI: CN—WA1HSN, W1ZFM and WA1IUL. CPN—K1EIC 29, W1YU and WA1IEG 28, W1GVT 27, W1YBH and W1LUH 26, W1MPW 25, WA1HEW 24, K1BOP 22, K1DGK 20, K1SRF 19, WA1BDA 17, WA1EEJ 16. The *Pi-Conn* Bulletin is sent to all ECs by our hard-working SEC, W1PRT. Please take action on it. This made ECs aware of the SET and the need for participation. All clubs: Please make sure there is an active EC in your area. Appointees: Please check your certificate date and send for renewal when due. The CN report includes 15 SET sessions and 278 QTC! The Candlewood ARA is holding a membership drive. The Talcott Mt. U.H.F. Society Club project: 420-Mc. transceivers! Interested? Director W1QV attended a DX meeting in W6-Land. The increase in 2- and 6-meter activity indicates the need for a V.H.F. PAM. Suggested volunteers and nominees are wanted! Congratulations to WA1FVH (1151 total!) and W1EFW on Jan. BPL; WA1HEW on getting his 25-w.p.m. certificate; WN1IZN, a new Novice, on his CP-20 sticker; WA1HLP on his new Gen. Class ticket; WA1GEK on the *V.H.F. Newsletter;* and K1YON on being the most active 220-Mc. station. W1AGJ is building a 2-meter repeater. W1CNY is adding RTTY. WA1FNJ is getting a 2-meter station. With deep regret we add W1ZTQ to the list of Silent Keys. 10, 15 and 20 meters enable amateurs in the Armed Forces to work Stateside. Please make every effort to work them. Traffic: (Jan.) WA1FVH 1151, W1EFW 692, WA1HSN 405, W1YU 344, W1WCG 268, W1LVQ 232, WA1HEW 224, W1BDI 220, WA1FNJ 202, W1NJM 198, WA1IEG 197, W1AW 168, K1UDD 158, WA1GYP 151, W1KAM 114, WA1FGN 109, WA1GGN 93, W1GVT 91, WA1CYV 90, W1MPW 71, K1SXF 71, W1EEN 67, WA1GFW 59, K1TKS 55, WA1FJU 53, W1YBH 41, WA1HWX 28, WA1GOI 27, K1SRF 27, W1CTI 25, W1QV 25, W1PRT 21, K1YGS 13, W1CSM 12, W1CUH 12, W1EIR 8, K1LMS 8, WN1IVG 7, W1BNB 6, W1ZL 5, K1CEC 4, W1CNY 2. (Dec.) W1NJM 178.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, Jr., W1ALP—W1AOG, our SEC, received reports from W1UJF and WA1DXI and many SET messages. Sorry to have to report three Silent Keys, W1LBY, W1HIL, K1TCK. W1ZQQ passed the Advanced Class exam. W1IH has a new s.s.b. rig. K1EKO has her Extra Class. W1KWD is home after a stay in the hospital. WA1DWS is a new OBS. W1TRD is now RO and EC for Maynard. W1ZQM and K1BUF have a new s.s.b. transmitter on the way. W1EUJ has an SB-110A and antennas for all v.h.f. bands. The Norwood ARC elected K1HRV, pres.; WA1HRV, vice-pres.; WA1EOT, secy.; WA1DLU, treas. Meetings are held Mon. nights with code and theory classes. W1KBN did a nice job during the SET handling traffic for the Red Cross. W1BNS/3 is in Butler, Pa., and on 75. The EMN had 31 sessions, 223 QNIs, 257 traffic. EM2MN had 21 sessions, 117 QNIs, 287 traffic. W1ZMO is the new RO for Danvers. K1NFZ is on many bands. WA1BOS is on 6 m.c.w. WN1ION worked VQ8CC with a new antenna on 15. W1HE is home from the hospital. WN1IZB is new in Belmont. WA1EKV is building a 1-kw. rig. W1FJI has a pair of 813s on. K1CLM has a 275 Matchbox. W1EAE took a group to W1AW. WA1IYI, in Weston, is ex-WB6NRO and has DXCC. W6JCF/1 now is a major in the Air Force and is back in W6-Land. The 6-Meter Cross Band Net had 23 sessions, 160 QNI, 32 traffic, reports K1OKE, K1SLZ spoke on the "Legal Aspects of Amateur Radio" at the Framingham Club. W1MOJ is working on a sked for Raytheon hams around the world to talk with each other. WA1GTU is on 20-40. W1MV has his Extra Class license. W1HXK is having antenna problems. WA1DPX worked into W4-Land on 6. Many locals worked TI2NA on 6. K1ZCU is working on dynamic transducers. W1OOP spoke at the Wellesley ARS. WA1s FSI and DRC are teaching the Novice course and WA1CON the General. K1YTY is in Air Force MARS. WAØGSA/1, on leave, visited K1PNB. K1MGP now is secy. of the Chelmsford ARA. W1AQE has over 1600 counties. Appointments endorsed: W1EMG, W1OJQ, W1AQE, K1BUF as ORSs; W1MOJ, W1QFN as ECs; W1HGT as OVS. W1AQE as RM for 15. WA1AIP spoke at the Massasoit ARA with tapes and pictures of the Amateur Radio Oscar Satellite Project. W1BB's group still is active. The Yankee RC had W1MCE discuss and outline the Amateur Extra course that he is going to conduct. The South Shore Radio Club will hold an auction Apr. 18 at the Viking

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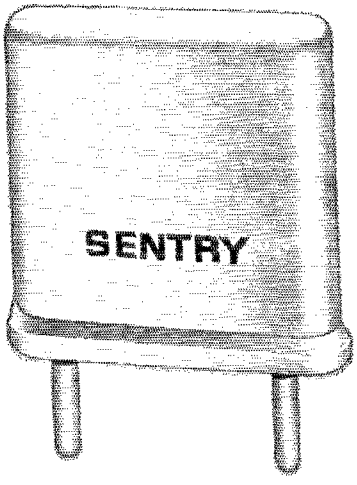

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Club with W1AKY as Mc. The One-Land QSO Party on Apr. 27-28 is sponsored by the New England CHC. Chapter 32. Write to K1VGM for information. K9AQB/1 is working on a 432-Mc. converter. W1MX is on 220 Mc. W1JFG spoke on DX at the Framingham RC. WA1EYY and K1PNB made the BPL. WN1s IIE, ITK and IJK play chess on 2. Anyone interested? The EMN had 31 sessions, 137 QNIs, 250 traffic. 34 stations. EMNN had 13 sessions, 50 QNI, 23 traffic. K1FJM has a Central Elecs. 10-A s.s.b. rig. W1RPF has an NCX-5. also K1YGW. WA1GFT is on 10. K1PQG is on 2. K1OJQ has a kw. for 2. WA1ETC was endorsed as OVS. Traffic: (Jan.) WA1EYY 547, W1OJM 420, K1PNB 346, W1EMG 259, W1FJI 258, WA1FAD 256, WA1HXF 188, K1CLM 148, W1DAL 105, WA1DPX 82, W1ATX 74, W6JCF/1 74, WA1FKQ 54, W1CTR 50, WA1DEC 22, K1LCQ 21, W1DOM 20, K1OKE 17, WA1AJN 15, W1DXK 13, W1-PEX 13, W1DKD 12, WA1CLR 9, WA1HYI 8, W1CT 7, WA1DED 6, WA1DFL 4, WA1GBT 4, K1HHN 3, WA1-DJC 2. (Dec.) W1KBN 74, W6JCF/1 68, W1AKN 2. (Nov.) WA1FAD 340.

MAINE—SCM, Herbert A. Davis, K1DYG—SEC: K1CLF. RM: W1BJG. PAM: WA1FLG. Traffic nets: Sea Gull Net, Mon. through Sat. on 3940 kc. at 1700. Pine Tree Net, daily on 3596 kc. at 199, c.w. With deep regret we pass on that K1ZVN and W1TU are Silent Keys. Charlie was one of the old old-timers and was with Naval radio during WWI. Jack was an old-timer with a young call. He was very active in our nets and on Army MARS, also passing much traffic. The Ellsworth High School has formed an active radio club with fifteen members with Ron Fortier, pres.; Wes Linscott, vice-pres.; Bob McVay, treas. Phil Laffin, past treas. has moved to 6-Land. We welcome K1CLF as our SEC. He has been very active in emergency communications for some time, being with the AREC and RACES. Al is a member of Army MARS. The PAWA has elected K1-RQE, pres.; K1TJK, vice-pres.; K1TEV, chief op. The club welcomes all to its meetings. Traffic: W1BJG 413, W1GU 123, K1SOW 21, W1NND 16, K1TMJ 11.

NEW HAMPSHIRE—SCM, Robert C. Mitchell, W1-SWX/K1DSA—SEC: K1QES. PAM: K1APQ. RM: K1-BCS. Endorsements: W1BXM and K1PSR as OVSs; W1RCC as OPS; K1IIK as OO, ORS and OPS. Please note that your new RM is K1BCS and I am pleased to see a good c.w. man active again. Welcome back. Press. K1MOZ has moved to California. Pete was one of our OBSs. Welcome to new hams: WA1IWH, WN1IYR, WA1IYY and WN1IXZ. 160-meter man K1NBN has been working Europe. W1GGX is now a Silent Key. He will be missed by all of us. W1RCC is working DX on 10 meters. K1UZG reports 123 check-ins and 106 traffic for VTNHN. Yours truly recently worked a UL7 and a UI8 on 80 meters. George said the beam didn't work. Hmmm. K1QES reports 105 check-ins and 24 traffic for the NHAREC Net. Don also reports an excellent turn-out for the Simulated Emergency Test. The MVAREC report by K1DWK shows 171 check-ins and 13 traffic. WA9TDL is looking for a New Hampshire contact on phone, so all you phone men stay alert. Traffic: K1BCS 152, WA1EUJ 72, WA1HXH 70, K1PQV 54, W1MHX 49, K1QES 21, WN1IIH 2, W1SWX 2.

RHODE ISLAND—SCM, John E. Johnson, K1AAV—SEC: K1LII. RM: W1BTV. PAM: W1TXL. V.H.F. PAM: K1TPK. RISPN reports 31 sessions, 333 QNI, 103 traffic. SET messages were received from W1YKQ, W1-ZPG, K1ABR, W1VXL, W1BTV, WA1EEJ, W1TXL, W1JHF, K1ZFD, K1YGY, WA1AUL, W1JFF, WA1-DRB, WB2UQK and K5CBA. Under the new incentive licensing W1CNB now has a new two-letter call. W1AM. Congratulations. The W1AQ Club of Rumford elected the following officers: K1AGA, pres.; K1AMG, vice-pres.; K1LII, treas.; W1WAC, secy.; W1EJ, trustee. W1AQ has started to prepare for Field Day and elected K1AMG as chairman of that committee. The club has planned some renovations to the building and hopes to have them completed before this fall. The SCM still has several appointments open and any ham who can qualify should contact the SCM for applications. Clubs with special activities or programs should have their club secretaries send information on them to the SCM for publication in *QST*. Traffic: WA1EEJ 726, W1TXL 373, W1YKQ 193, W1BTV 190, K1YEV 67, WA1CSO 31, K1-TPK 19.

VERMONT—SCM, E. Reginald Murray, K1MPN—

Net	*Freq.*	*Time*	*Days*	*QNI*	*QTC*	*Mgr.*
Gr. Mt.	3855	2230Z	M-S	776	39	W1VMC
Vt. Fone	3855	1400Z	Sun.	270	—	W1UCL
VTNH	3855	2330Z	M-F	123	106	K1UZG
VTCD	3990½	1500Z	Sun.	30	19	W1AD
VTSB	3909	2230Z	M-S	554	62	W1CBW
		1330Z	Sun.			

Compact... all in one package

DRAKE MODEL TR-44B Communications Station

The TR-44B consists of an R-4B Receiver and a T-4B Transmitter in the same cabinet with built-in speaker. Ideal package for Ham Radio, Mars, RACES, Civil Defense, National Guard, Semi-Military, Government or Commercial.

Basically a 120 watt output AM-SSB-CW transceiver with provision for ten crystal-controlled channels and ten 500 kc tuneable ranges with 1 kc dial accuracy. Receive and transmit on different frequencies by using crystal controlled transmit and tuneable receive. Receive and transmit on same frequency, either crystal-controlled or tuneable.

Operates on frequencies from 3 to 30 MHz (except no transmitting 5.0 to 6.0 MHz and no tuneable range for transmitting 11.0 to 11.5 MHz). It also operates 1.8 to 2.3 MHz standard or 2.3 to 3.0 MHz on special order. Receiver section of TR-44B may be operated 1.5 to 30 Mc with the exception of 5.0 to 6.0 MHz. Crystals for fixed frequency channels and for tuneable ranges available.

Two power supply units for TR-44B: Model AC-4 operates from 120-240 V, 50/60 cps source. Model DC-4 operates from 12 V DC. Both these supplies operate transceiver on any mode continuous duty.

TR-44B is housed in a perforated metal cabinet 11½"H x 10¾"W x 12¼"D. Unit less power supply weighs 30 lbs.

Amateur Net...

$795.00 Less power supply and crystals

TR-44B offers all the advantages of a transceiver plus features found only in a separate complete receiver:

• Four bandwidths of selectivity, 0.4 kc, 1.2 kc, 2.4 kc and 4.8 kc • Passband tuning • Noise blanker • Notch filter and 25 kc crystal calibrator • Product and diode detectors • Crystal lattice filter • Solid state permeability tuned VFO • AVC • Minimum overload and cross modulation.

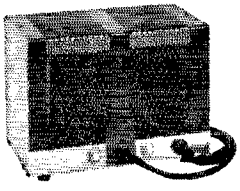
MORE MUSCLE!

DRAKE L-4B LINEAR AMPLIFIER

No increase in price! Amateur Net... **$695.00***

- Two new Eimac 3-500Z tubes give 1000 watts total plate dissipation
- Built-in RF directional watt meter calibrated 300 and 3000 watts forward and 300 watts reflected
- Vernier plate tuning control
- Front panel AGC threshold adjustment and stand-by switch
- Epoxy finish and eye-ease panel

• **Frequency Range:** Ham bands 80 thru 10 meters. All frequencies 3.5 to 30 Mc covered with some retuning of coils • **Plate Input:** 2000 watts PEP-SSB, 1000 watts DC on CW, AM and RTTY. Class B grounded grid with inverse feedback • **Drive Requirements:** 100 watts PEP-SSB, 75 watts CW, AM and RTTY • **Input Impedance:** 50 ohms. Broad band tuned input for low distortion, high efficiency • **Output Impedance:** Adjustable Pi-Network matches 50 ohm line with SWR not to exceed 2:1 • **Built-in Antenna Relay** • **Two Taut-band Suspension Meters** • **Quiet,** low velocity, high volume blower • **Power Requirements:** 230 V, 50-60 C, 15 amps or 115 V, 50-60 C, 30 amps • **Tubes:** Two 3-500Z • **L-4B** 13⅛"W, 7⅞"H, 14⅜"D. **Wt.:** 32 lbs. • **Power Supply** 6¾"W, 7⅞"H, 11"D. **Wt.:** 43 lbs.



*Power Supply is included in price of L-4B. Solid State, excellent dynamic and static voltage regulation. Separate for a more flexible installation.

For more information, see your distributor, or write:

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The Vt. Trading Post Net had 38 check-ins. Welcome to Novice WN1IZD (Brattleboro) and congrats to new Advanced Class WA1IYK (S. Hero). Operation Educational Amateur Radio has scored again with a radio exchange between Montreal and Burlington grade schools. Congrats, fellows. WA1GUV has been active on 160-meter c.w. Remember Mar. 31 is the deadline to get your logs in for the Vt. QSO Party. Traffic: K1BQB 260, W1FRT 66, K1MPN 44, K1UZG 42, W1MRW 16, K1SLU 12, WA1GUV 11, W1KJG 2.

WESTERN MASSACHUSETTS—SCM, Norman P. Forest, W1STR—RM: W1DWA. PAM: K1DGQ. SEC: Open. Western Mass. (c.w. net) reports 31 sessions and total traffic of 122. Attendance in the order of activity is W1DVW (100%), K1AEC, K1WZY, K1IJV, WA1ISJ, W1DWA and W1AMI. The phone net reports Jan. as a very good month with special thanks to W1FJI for helping out with net control. Art is in Eastern Mass. Mike has done a very fine job getting the WMPN started but wouldn't you know, his company is transferring him to Illinois. A new PAM will be needed if the net is to survive. Any takers? Total QNI 251, total traffic 312. The HCRAI is having George Grammer, W1DF, at its Apr. 5 meeting. The topic will be s.s.b. The VARC is having a color-slide show featuring the ham shacks of the members. The Hilltoppers (HARE) has a new cast-iron stove and 3-gallon coffee pot. K1DPP is building a curtain array for 432 and 1296 Mc. His 12-year-old boy is studying to take the Novice exam. The HCRAI 10-Meter Net, which operated on 28.990 Mc. has an average of 11 stations calling in on Wed. nights. The Connecticut Valley V.H.F. Net continues to attract quite a few stations (145.35 Mc., Mon. at 9 P.M.) WN1HPM built a 75-watt linear for 2. Traffic: K1DGQ 352, W1EOB 209, K1AEC 156, K1IJV 144, W1DWA 118, W1DVW 103, W1UKR 60, WA1GAB 46, W1STR 38, WA1EYF 32, W1AMI 18, WA1ISJ 14, W1ZPB 9, WA1ABW 6.

NORTHWESTERN DIVISION

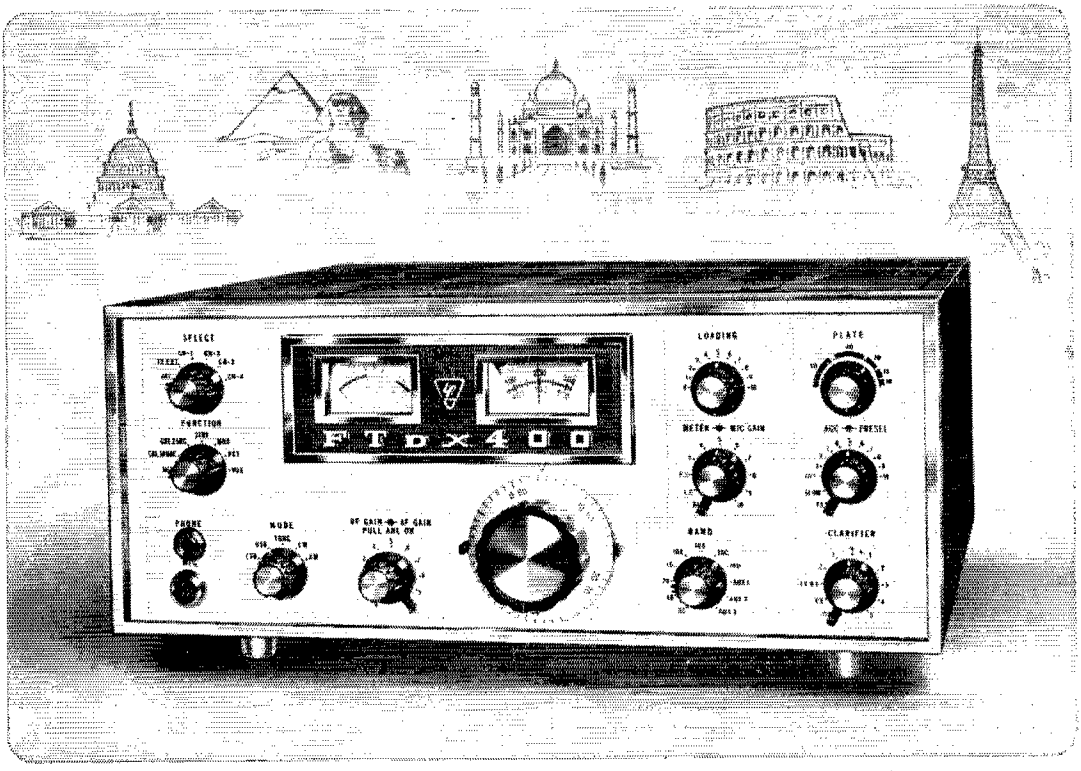
ALASKA—Acting SCM, Albert F. Weber, KL7AEQ—KL7EVO erected his new sixteen-element 2-meter colinear with the help of KL7GBG. KL7FRZ spent the month of January repairing his 753. KL7EKZ reports from Sitka that the Sitka Club has started Novice classes, and KL7EMA is back from the University and on the air. The Arctic Club of Fairbanks also has started Novice classes, and is pushing hard to get everybody on c.w. KL7EKZ also reports that he has ordered a new HQ-180 for the station. W1ICB/KL7 will be spending most of the summer out on the chain doing field work. Now that the days are getting longer, the gang around Fairbanks is talking about bunny hunts, and we even hear talk about a surprise winter Field Day like a few years back. It could happen. Traffic: KL7CAH 299.

IDAHO—SCM, Donald A. Crisp, W7ZNN—SEC: K7THX. The FARM Net convenes at 0200 GMT on 3935 kc. week days. K7ECV is reported recovering after a serious illness. K7HLR is moving to Utah. WA7BDD was active with SET traffic on PAN and RN7. K7MFZ is building a new high-power supply. W7IBG has a new SB-34. W7IWV is in the hospital. W7OWA again is active after a serious illness. W7ZNN has worked 300-mile DX with a single transistor on 80-meter c.w. K7THX, Idaho SEC, reports very fine participation during the SET and lots of interest among Idaho hams in building a strong Idaho Emergency Corps. FARM Net report: 838 check-ins, 104 traffic handled. Traffic: WA7BDD 229, K7OAB 70, WA7ETO 37, W7GGV 23, W7ZNN 13, WA7EWV 12.

MONTANA—SCM, Joseph A. D'Arcy, W7TYN—SEC: W7RZY. RM: WA7DMA. PAM: W7ROE.

Montana Traffic Net	3910 kc	0100 GMT	M-F
Montana PON	3950	1515 GMT	Sun.
Montana RACES	3996.5 kc.	1600 GMT	1-3 Sun.
Montana Section Net	3950 kc.	1700 GMT	Sun. QN148 QTC 81

The Annual SET was held in the state of Montana with the following areas holding on-the-air tests: Harlowton, K7CHA EC; Billings, K7UPH EC; Bozeman, W7NPV EC; Butte, K7MRZ EC; Helena, K7PFQ; Laurel, W7LBK EC; Great Falls, K7EGJ; Anaconda, W7VNE. There was a record turnout around the state. If you are not now a member of the AREC, check with your local EC and get signed up. If you are interested in the section c.w. net, check with WA7DMA and he will fill you in on the details. If you are inerested in helping out with the WIMU hamfest, write W7WYG at Great Falls, Montana PON traffic: 34. Traffic: WA7DMA 625, W7RZY 296, K7PWY 121, W7TYN 117, K7DCH 108, K7EGJ 59, W7LBK 59, WA6MDL/7 45, WA7DBN 21, W7SMY 12, K7SIK 10, W7CJN 7, W7OIQ 6, K7ELW 5, W7FIS 4, W7FLB 3, W7IUM 3, K7JAT 3, K7MOW 3, K7WRH 3, W9INR/7 3.



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FTDX-400

Latest arrival on the American scene, Spectronics presents the FT dx 400. Yaesu engineers have looked into the future to provide the present day amateur with a complete station in one package.

The usual "accessories" are standard equipment in the FT dx 400. Features built-in power supply, dual calibrators — 100KC and 25KC, break in CW with sidetone, fully adjustable VOX system, four switch selected crystal controlled transmit channels in addition to VFO positions, and varactor controlled clarifier offers receiver offset tuning capability.

Remember, all these extras are included in this new imported transceiver. Check the specs and ask your local dealer for a demonstration dx trip with the FT dx 400.

$599.95 including power supply and all accessories except speaker.

SP-400 matching speaker **$14.95**

DEALER INQUIRIES INVITED

SPECIFICATIONS

FREQUENCY RANGE: 3.5-4Mc, 7-7.5Mc, 14-14.5Mc, 21-21.5Mc, 28-30Mc (3 more 500KC receiver bands can be added).
FREQUENCY STABILITY: Less than 100 c/s drift in any 30 minute period after warm up.
ANTENNA IMPEDANCE: 50 to 120 ohm unbalanced.
MAXIMUM INPUT: 500W P.E.P. SSB, 440W CW, 125W A.M.
CARRIER SUPPRESSION: —40db
SIDE BAND SUPPRESSION: —50db (at 1,000 c/s)
DISTORTION PRODUCT: Down at least 25db
AUDIO BANDWIDTH: 300-2,700 c/s
RECEIVING SENSITIVITY: 0.5uV,. S/N 20db (14Mc SSB)
SELECTIVITY: 2.3Kc (—6db), 3.7Kc (—55db)
IF AND IMAGE RATIO: More than 50db
AUDIO OUTPUT: 1 watt @ 5% distortion
OUTPUT IMPEDANCE: 8 ohm, 600 ohm
TUBES AND SEMICONDUCTORS: 18 tubes, 9 transistors and 33 diodes
POWER SOURCE: AC 117 volts, 50/60 c/s
DIMENSIONS: 15¾" wide x 6¼" high x 13¾" deep
WEIGHT: 50 Pounds

SPECTRONICS

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OREGON—SCM, Dale T. Justice, K7WWR—RM: W7ZFH. PAM: K7RQZ. Section net reports: WA7AHW reports for the AREC Net, sessions 31, check-ins 741, contacts 83, traffic 32. QSTs 4 and maximum number of counties 17. W7ZFH reports for the OSN, sessions 22, check-ins 108, traffic 85. WA7HOR is operating maritime mobile from the USCG cutter *Modoc* off the Oregon coast. WA7GCE is operating a code practice net at 0500Z Wed., Thurs. and Sat. on 3743 kc. Rusti has frequent check-ins from as far away as Alaska and Indiana. She also has several students at her shack for each session. K7BPR has a super flea-power rig (96 mw.) on 10- and 15-meters c.w. He has worked 35 states and two countries. Quite impressive! Look for him on 21.075, 21.021, 28.022 and 28.050 Mc. Thurs. afternoons and all day Fri. and Sat. The January SET was extremely successful with a large amount of traffic and some excellent local simulated disasters giving the mobiles and fixed stations a real workout. Reports were received from the Portland area, Josephine County area and the Yamhill County area. The Portland Area Two-Meter AREC Net now meets at 0330Z. Traffic: (Jan.) K7RQZ 359, K7IFG 161, W7ZFH 120, K7WWR 106, WA7DCC 67, K7NTS 66, WA7DPK 31, WA7BYP 28, K7OUF 27, WA7HKV 21, WA7AHW 20, W7DEM 17, WA7EES 16, WA7GLP 9, K7EZP 5, W7KTG 5. (Dec.) WA7HKV 45, WA7EZJ 17.

WASHINGTON—SCM, William R. Watson, K7JHA (now W7BQ)—SEC: W7UWT. PAM: W7BUN. RM: K7CTP.

WSN	3590 kc.	0215Z	Daily	QNI 336	QTC 435	Sess. 31
NTN	3570 kc.	1930Z	Daily	QNI 966	QTC 364	Sess. 30
WARTS	3570 kc.	0200Z	Daily	QNI 1699	QTC 125	Sess. 31

The 1968 SET is now history with the most active Washington participation ever attained. New appointments: W7JHR as EC; WA7FKM, W7ZHZ, K7MGA, K7THG, K7YFJ as OPSs. A Public Service Award went to W7BTB for his FB job during the Alaska Flood. The Yakima Club is proceeding on plans for a state-wide hamfest to be held in July. New officers of the Rodeo City Radio Club are WA7EXX, pres.; K7OOM, secy.-treas. The Clark County Amateur Club reports a number of Novice graduates awaiting licenses. Another fine bulletin was received from the Mt. Baker Club. Over 70 net certificates were issued to new members of the NTN and WARTS Nets in a good kick-off for 1968. K7VNV and W7OEB have good Novice and General classes under way. The Richland Club reports that K7RSM is a member of the *Pueblo* crew being held in North Korea. Clallam County ARC has 30 students in amateur classes at Peninsula College. W7AXT had an FB write-up in the local press during the SET. W7HMA passed the 35-w.p.m. CP run. W7ZIW passed the 30-w.p.m. CP run. Grays Harbor ARC reports activity is picking up on the 6-meter FM Net. WN7GYR is now WA with a new General. He also reports the largest Novice class ever held. W7ZA, W7EQY and K7MCA now are located in new QTHs. WN7FUF received the 1967 Tacoma Club prize for signing up the most new members. K7UDG has a new Galaxy 5. W7UWT has a set of slides with taped narration on the ARPSC available for club meetings through the ECs. It is recommended that the XYLs also be invited to see it. W7JY presented an FB exhibit of amateur museum pieces at the Boeing Club meeting. We regret to report the passing of W7ZJM Jan. 29. SCM note: We have dropped all inactive Washington appointees and supplanted new and interested amateurs. Appointments are, as always, subject to continuing activity and interest. Traffic: W7BA 1544, WA7DXI 978, W7DZX 671, W7HMA 573, W7ZIW 540, K7PXA 357, WA7DZL 330, W7PI 328, K7CTP 243, W7KZ 207, W7JEY 148, K7JHA 146, W7UWT 136, W7BTB 134, K7TCY 129, W7IEU 115, W7MCW 106, K7UDG 100, W7AXT 80, WA7ACQ 54, K7VNB 48, K7OVN 42, WA7HKR 37, K7THG 35, W7APS 34, WA7FKM 33, W7GYF 33, W7OEB 24, W7BUN 23, W7AIB 21, WA7GVP 21, K7OXL 20, WA7HSJ 19, WA7DBQ 17, W7AMC 16, K7MGA 15, W7RXH 14, K7YFJ 14, W7SYE 11, W7ZHZ 10, K7SUX 9, W7AJV 6, K7EFB 5, W7UU 2.

PACIFIC DIVISION

HAWAII—SCM, Lee R. Wical, KH6BZF—SEC: KH6GHZ. PAM: KH6EEM. RM: Vacant. RACES Nets (40, 10, 6 and 2) coordinate with KH6AIN.

Net	*Freq.*	*Time (GMT)*	*Days*
League Appointees	7.290 Mc	0700Z	Wed.
Friendly Net	7.290 Mc.	2030Z	M-F
Pacific Interisland	14.330 Mc.	0830Z	M-W-F

My apologies for missing Jan. *QST* column, but business commitments on Midway Island precluded my return to Honolulu in time to file that report. The 10- and 15-meter bands continue to improve for the best DX propagation. May I say our Alohas to KH6GGR. KH6BJ/6 writes from his new QTH, 1574 Mary Avenue, Sunnyvale,

1 is excellent
2 are amazing

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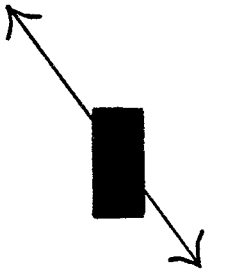
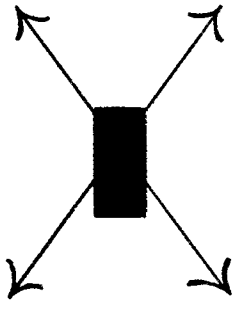
Guaranteed impressive, superior performance over a single antenna system. Most uniform signal pattern superior to any single mounted antenna because of uniquely detailed phasing design. More consistent communication with virtually no fading or blind spots when changing direction in travel. No matter what your needs —HUSTLER will be the only antenna system you'll ever need to buy!

If you have been a happy mobiler—you already have the Hustler mast and resonators. Now for the very best mobile signal, duplicate your present mount, mast, resonators, and buy the Double Talk 20 foot harness.

Model DTLS . . User Net $7.95



Turn the corner and you could get lost with a single antenna.

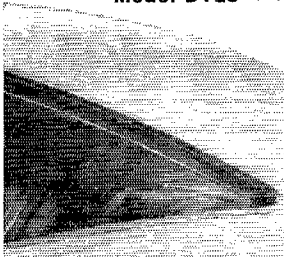


Constant communication with virtually no fading or blind spots when changing direction in travel.

A must for continuous measurement of standing waves. Observe SWR at all times with consistent accuracy.

Model CM-52

User Net—$29.95



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Calif. 94086. He'd like me to pass his address to the many readers in hopes that you'll all drop him a line. Those of you who want those "call plates" for the autos, a contact at City Hall is Lt. DeMello, phone 941-3311 ext. CD desk. Lately we've been hearing old familiar voices on the bands with brand-new two-letter calls. News has reached me that many have passed the Advanced Class test and received their new tickets. *A reminder*: For those of you on the Island of Oahu, the Advance and Extra Class tests are conducted at 8 A.M. sharp Tue. and Wed., Room 502, Federal Bldg. (downtown Post Office Bldg), Honolulu. KH6GHZ is feeling fine after minor eye surgery. KH6GEW was elected pres. of the Honolulu ARC. Outside islands, please forward your election results to your SCM for publication. KH6EEM folded his antennas and moved into his new quarters. The ARRL DX Test was a success again this year. These past two years, where KH6ers are DX hunting the W/K, VE/VOs during this contest have demonstrated an excellent decision on the part of the ARRL Contest Awards Committee at the prompting of your SCM and such prominent DX contesters as KH6IJ, to name a few. Those of you who have QSL envelopes on file with KH6DQ, QSL Mgr. Hawaii, are reminded that postal rates were increased several weeks ago. Help KH6DQ, the Postal Dept. and yourself for continued service by sending that increased postage rate to the KH6 Bureau, Box 101, Aiea, Hawaii 96701. The Honolulu DX Assn. is gaining in momentum. Keep those reports coming in to your SCM, see page 6 *QST* for his address.

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: WA7BEU. WA7ESM has gone RTTY with a Model 15. WØFKY/K7ZOK is now running 800 watts p.e.p. on 6 meters. W7PBV has a new W-51 Tri-ex tower and is back on 2 meters. W7PRM and WA7CQS have their a.f.s.k. units completed for RTTY. W6RAY/7, trustee for K7GQD, reports all club station activities at Jackass Flats, Nev. have ceased because of lack of equipment. The Southern Nevada f.m. repeater is down for modifications. W7YYC has a new f.m. base station and handie-talkie. W7CSB has a new Rohn Crank-up tower. A QCWA chapter has been formed in Nevada. W7YRY has a new Spaulding tower supporting a quad for those signals down under. W7CJK and son, WN7DKL, have a new Spaulding tower and three-element quad. WN7DKL passed the General and is hounding the postman daily for his new license. W7TVF is on 14.015-Mc. c.w. daily 0300-0500Z and will QSL those needing Nevada. K7ZOK is the new EC for Las Vegas. W7AKE received the first SNARC certificate using 2-meter f.m. Traffic: WA7BEU 41, W7YDX 8, W7PBV 2.

SACRAMENTO VALLEY—SCM, John F. Minke, III, WA6JDT—RM: W6LNZ. ECs: WB6MXD, K6RHW, W6SMU, WB6RSY, WA6TQJ.

Net	*Freq.*	*Time*	*Days*	*Mgr. or NCS*
NCN	3630	0300Z	Daily	WB6HVA
NCN/2 (Slo-speed)	3630	0430Z	Daily	WB6HVA
Yolo Co CD	146.94	0300Z	Tue.	WA6TQJ
SCEN	146.25	0500Z	Wed.	WA6CXB

The above listed nets are ARPSC nets (NTS and AREC). If you wish your net listed, is in that category, and operates solely within the Sacramento Valley section, give me the details. WB6RSY, Redding, and K6KRL, Colusa, received Section Net certificates for their participation in the Northern California Net (NCN). New officers of the Sacramento ARC are WB6MZX, pres.; W6PUI, vice-pres.; WA6CXB, secy.; WB6RVR, treas. The John F. Kennedy Senior H.S. Electronics Club is a new club in Sacramento with WB6WJO, pres.; WN6YQQ, vice-pres.; WB6VKK, trustee. New officers of the Oroville ARS are K6ZNL, pres.; WB6FMI, vice-pres.; W6BLW, secy.; WB6RPM, treas. New officers of the Chico gang (GEARS) are WB6KAI, pres.; K6UHD, vice-pres.; WA6SCJ, secy.; WA6AMI, treas. Club bulletins were received from the Sac'to ARC, RAMS, GEARS, Oroville ARS, NHRC and AF MARS. W6ZJW is putting up a new beam. WB6VBB lost his new quad in the Jan. winds. OPS WB6MAE is getting ready for the Extra Class. Traffic: (Jan.) W6LNZ 70, W6NKR 57, WB6MAE 36, WB6RSY 28, K6KRL 7, WB6QZZ 6, WA6JDT 5, WA6CXB 1. (Dec.) WB6RSY 49, K6KRL 15.

SAN FRANCISCO—SCM, Hugh Cassidy, WA6AUD—W6KVQ made the BPL again. W6WLV's total included a lot of SET traffic. W6HVN, of AMRADs in San Francisco, was the speaker at the Feb. Marin Radio Club meeting. The Humboldt Amateur Radio Club now meets the 1st and 3rd Tue. at WB6DGJ's QTH. W6ZC was voted into the Northern California DX Club. New officers of the Humboldt County Radio Club are W6JSY, pres.; K6SBI, vice-pres.; W6SLX, secy.-treas. WA6RXM, Marin County OO, is at Occidental College

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in Southern Calif. New ORSs are WB6JQP and WB6FLT. W6BIP, W6GQA and W6WLV were active in the Jan. CD Party. K6TWJ represents the section on the Golden Bear Net while W6KVQ, W6NLM and K6TZN are heard on the Mission Trail Net. The Marin Club has changed its Sun. morning Red Cross Net to 3915 kc. W6EAJ is working on a 100-watt solid state transmitter for his 160-meter work. Also active on the 160-meter band recently were W6ERS and WA6IVM. WA6PYN reports working KH6-Land on 6 meters. WA6NDZ has his mobile unit operating. If you have not received a copy of the San Francisco Section *Courier*, in its 4th year of publication, drop a line to the SCM. W6CYO handled an emergency situation recently in connection with a death in the jungle interior of South America. WA6BYZ handled a large amount of SET traffic as the outlet for the NCN in San Francisco. Also active was W6CXO at Red Cross Regional Hq. in San Francisco with the operation direct by W6JWF. Several clubs in the section were represented at the Pacific Division meeting in Oakland in Mar. The appearance of JT1KAA on 20 meters in early Feb. found W6PTS, W6ZC and WA6AUD working the Mongolian station for Zone 23. The Cathay Radio Club in San Francisco is trying to reorganize. If interested contact K6KQN. The San Francisco Section Net meets regularly on 3900 kc. at 1830 local time, Mon. and Fri. The NCN is looking for a regular Marin County outlet on this c.w. traffic net. 3630 kc. at 0300Z. Those needing code practice should try the NCN slow-speed session at 0430Z, same frequency. Traffic: W6KVQ 838, WA6-BYZ 248, W6WLV 197, WA6AUD 190, K6TWJ 67, W6BWV 24, W6CYO 9.

SAN JOAQUIN VALLEY—SCM, Ralph Sarovan, W6JPU—The Northern California and Southern California DX Clubs held their Annual Convention in Fresno on Jan. 27-28, 1968, with 268 in attendance. Among those seen there were W6KTW, WA6WXP, WB6-JRL, K6RPH, W6JUK, W6JPU, W6KUT and W6HYG. WB6ETQ is operating XEØETQ in Mexico and is on 40-meter s.s.b. around 6 P.M. daily. The Fresno Amateur Radio Hamfest is around the corner. Remember the date, the first week end of May, and send in your reservations to FARC, P.O. Box 783, Fresno, Calif. WB6DCP has a Collins station on the air. W6JUK is using a BTL linear amplifier. The SET conducted by WB6TFU was successful. WB6TFU and WB6ETR have been operating the Fresno Veterans Hospital "Studio" for over a year, handling many messages by radio, and sending them over land lines. W6NKJ is building a 2-meter converter. The Kern County Amateur Radio Club is holding code and theory classes with WA6SCE and WB6ZWG in charge. W6ADB still is active on NCN. W7AAF/6 and WB6PCQ are learning the Morse code. WB6INO is recuperating from surgery, and is very active on WCARS. WB6JZH is on 2-meter f.m. Traffic: WB6HVA 356, WB6INO 311, W7AAF/6 224, WA6SCE 202, W6ADB 116, K6KOL 75.

SANTA CLARA VALLEY—Acting SCM, Edward A. Gribi, WB6IZF—Asst. SCM: Ed. Turner, W6NVO. SEC: W6VZE. RM: W6QMO. Section meeting places: Bay Area AREC Net, 3900 Sun., 1830 GMT.
Northern California Net, 3630, Daily, 0300 GMT.
Monterey Bay Emergency Net, 147.16, Tue. 0400 GMT. Our best wishes to W6ZRJ, past SCM, now Pacific Division Director. Doc can often be found monitoring 7255, WCARS frequency, during the day. SEC W6VZE has been busy stirring the AREC pot. The Menlo Park-Redwood City-Palo Alto gang was particularly ingenious in soliciting participation contest style in the 1968 SET under the leadership of EC W6DEF and ROs K6ANN and WA6QGX. W6UOK, WB6MED and WA6-VGR took the "win," "place" and "show" awards. The Palo Alto Amateur Radio Club, under new pres. WB6-WLH, was very active in originating SET messages to the outside world. Others who reports lots of SET traffic were EC W6PLS and W6YBV. W6PLS also ploughed through QRM in the Old Old Timers Club First QSO Party. W6OH continues to work the nets—Mission Trail, Golden Bear, Weather, WCARS, etc. W6AUC was MC at the Annual QCWA Dinner. WA6-OXE is now out of the hospital and active on 7255 and 3952. Now that W6HC, retired Division Director, has more spare time is it possible that we heard him on sideband recently? Welcome to K2AFQ from New Jersey, now in San Mateo. Greetings to WB6JGS, who comes to Palo Alto from Concord. W6HXY runs the Monterey Bay Emergency Net and recently had 32 check-ins on the Mon. night check-in. K6DYX keeps the RTTY clatter going on the RATTS Net on 3620. WB6LYD is handling bulletins on v.h.f. teletype. Asst. SCM W6NVO attended the Christmas Dinner of the Central California Radio Council. W6MMG reports that the San Carlos Radio Club had 23 show up for new code classes. The club has a new shack for its station,

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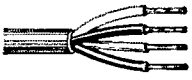

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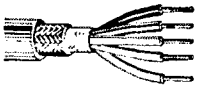

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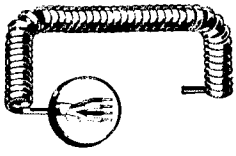

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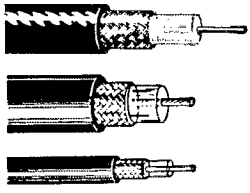

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K6DKX, at Firehouse #2, San Carlos. Traffic: W6RSY 984, WA6LFA 291, K6DYX 214, W6YBV 186, W6DEF 178, W6HC 162, W6VZE 110, W6PLS 43, W6OII 24, W6ZRJ 22, W6AUC 11, W6ACW 10, W6RFF 6.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Barnett S. Dodd, W4BNU—Asst. SCM: James O. Pullman, WA4FJM. SEC: WA4LWE. RM: K4CWZ. PAM: W4AJT. V.H.F. PAM: W4HJZ. WA4KWC says the Buncombe County ARC is starting General code and theory classes soon. WB4BGL participated in the Virginia QSO Party. K4ZKQ has his new radio shack about completed. WA4QLP, who is now a midshipman at the U.S. Naval Academy, checked into the nets and handled traffic while on Christmas leave home. K4TTN is the new editor of *Smoke Test*, the fine bulletin of the Buncombe County ARC, because of the resignation of W4NQA, who has moved to Connecticut to assume duties at ARRL Headquarters as Assistant Circulation Manager.

Net	*Freq.*	*Time*	*Days*	*QTC*	*Mgr.*
THEN	3865 kc.	0030Z	Daily	217	WA4GMC
NCN (L)	3573 kc.	0300Z	Daily	102	WA4CFN

Traffic: (Jan.) WB4BGL 299, W4EVN 225, W4LWZ 191, W4RWL 178, W4FDV 90, WA4CFN 89, K5TGA/4 87, WA4FJM 71, K4CWZ 60, WA4ZLK 60, W4AJT 55, WA4VNV 52, WB4CVM 46, K4VBG 43, W4BNU 42, K4EO 41, K4CDZ 39, W4ZZC 37, W4NAP 26, WA4GMC 22, WA4AOZ 21, W4RF 17, WA4KWC 16, WA4UQC 16, WA4AKX 13, WB4CKS 12, K4PKE 12, W4YMI 12, K4TTN 10, K4ZKQ 8, WA4VLJ 7, W4ACY 5, WA4QLP 5. (Dec.) WA4GMB 34, WA4AOZ 30, WA4QLP 7.

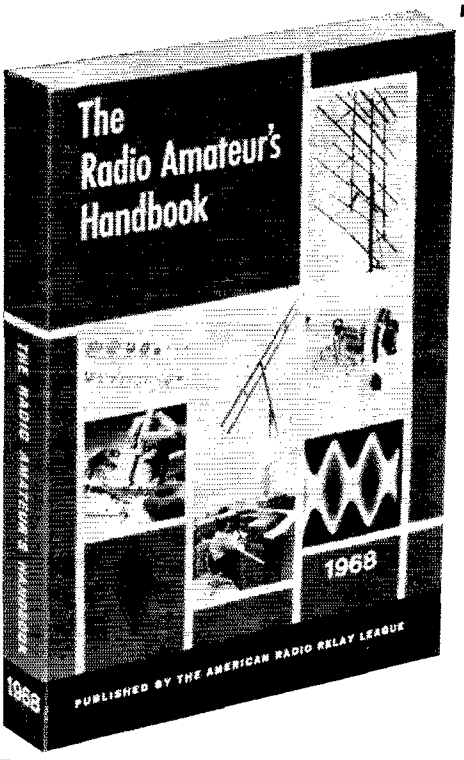
SOUTH CAROLINA—SCM, Clark M. Hubbard, K4LNJ—SEC: WA4ECJ. Asst. SEC: W4WQM. RM: K4LND. PAM: WA4EFP.

SCN	3795 kc.	Daily	0000/0300Z	
SCSSBN	3915 kc.	Daily	0000Z	Tfc. 134

Congratulations to WB4DXX on making the BPL. K4NJS again is active on 80 and 40. W4NTO is QRP from Oklahoma City until Mar. W4JA, with a $\frac{5}{8}$-wave vertical on 2 meters, QSOed West Palm Beach, 700 miles, using 2 watts. WA4HFA has a 50-ft. tower and a new 15-meter beam. Welcome to WN4IMH from Anderson. Traffic: WB4DXX 507, W4FVV 51, W4NTO 51, K4LNJ 37, WA4NWI 26, W4JA 24, K4EIB 10, WA4HFA 6.

VIRGINIA—SCM, H. J. Hopkins, W4SHJ—SEC: K4LMB. RMs: K4MLC, WA4EUL. PAM: W4OKN. The new EC for the city of Norfolk is WA4BUE. The Roanoke Division ARRL Officials meeting is expected to be held some time in Apr. Keep your ears open for details. Because of recently initiated FCC procedures, W4PTR became W4DM and W4YGY has been assigned W4HM; W4ZMT is rumored to have a two-letter call. The Virginia Century Club held a banquet in Virginia Beach which was attended by Director W4KFC and W4QCW, of Richmond, who showed slides of his African expedition. W4KFC addressed the Tidewater Club and displayed slides of a contest expedition to Curacao. WA4TKB and WA4TCF are OM and XYL who frequent VSBN. W4ZM favors more SET exercises throughout the year. Objective: training. WB4GTS/WA2UFI votes WB4GTG as the most promising teen-age amateur of the year. W4GEQ and WB4GTG are recently-appointed ORSs. The number of Virginia amateurs preparing for a higher license grade are encouraging. Good show, gang. Traffic: (Jan.) W4DVT 341, WB4GTG 259, W4ZM 226, K4KNP 207, K4TSJ 189, WB4FDT 180, K4CG 169, WA4EUL 149, W4RHA 147, W4BZE 122, K4FSS 115, WB4DRB 110, W4SZT 110, WB4GTS 88, W4TE 82, WA4PBG 75, W4MUJ 74, WA4FCS 72, K4MLC 69, WB4CVY 68, W4QDF 51, W4KFC 49, W4OKN 49, W4SHJ 49, WA4JJF 42, W4GEQ 38, WB4DOY 34, W4IA 29, WB4IBF 27, W4YZC 27, K4GR 26, W4DM 23, W4WG 21, W4ZMT 19, WA4NJG 16, WA4TKB 10, WA4TCF 9, W4JUJ 8, WB4GYV 7, W4MK 6, W4OP 6, WA4DAI 4, W4KX 4, K4SDS 4, WA4URN 4, K4YEE 4, W4ZAU 4, W4LK 2. (Dec.) WB4CVY 66.

WEST VIRGINIA—SCM, Donald B. Morris, W8JM—SEC: W8IRN. RMs: K8MYU, K8TPF. PAMs: K8CHW, W8IYD. New officers of the East River ARC, Bluefield, are W8HNC, pres.; W8DYA, vice-pres.; K8UOA, secy.; K8ZDY, treas. WA8TWR has a new Heath Apache. Correction on Kanawha ARC's officers: W8HCY is secy.; WA8UHL, treas. W8HZA was quite active in the SET; he also worked 62 stations on 160 in 4 hours. K8MYU, WVN (e.w.) Net Mgr. accepted the RM post, formerly held by W8HZA, W8AVW, WA8AVZ, WA8TWR, W8AKW, WA8OXI, W8VII, W8FFC. WA8PFB and WN8ZJR are organizing the Greenbrier ARC, with WA8-



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PFB as secy. pro tem. K8GAG moved to Charleston. Operating RTTY in the Morgantown area are K8LGS/8, WA8TGG, WA8IMY, WA8YSB, W8GUL and W8CUL. The WVU Club Station, W8CUL, has 4 operating positions, emergency power and all-band operation, any mode. The West Va. Phone Net reports 31 sessions with 1114 stations handling 287 messages. WA8OPM, WA8VYZ, WA8SHT and K8HHV were active in the WVN CW Net. This net with 31 sessions handled 157 messages. A joint meeting of the State Radio Council and Convention Assn. was held in Charleston. Traffic: W8SQO 283, K8AIYU 253, WA8POS 158, W8IRN 79, WA8RQB 76, WA8YSB 66, W8CKX 57, W8HZA 57, K8BIT 50, W8IMX 23, K8MQB 23, WA8TWR 22, W8JM 21, WA8NDY 20, W8GUL 13, WA8LAL 13, W8WEJ 13, W8IYD 11, WA8WCK 10, K8ZDY 5, W8TGF 4, WA8UIH 4, WA8VYZ 4, W8UPH 3, K8YUW 3, WA8CKN 2, W8IHC 2, WA8LFZ 2, W8MLX 2, K8PRC 2, W8QEC 2, K8QYG 2, WA8BUM 1, K8CFT 1, WA8CRW 1, W8ETF 1, WA8FZS 1, W8GWR 1, W8KBM 1, WA8KQX 1, WA8LFW 1, K8OQL 1, K8RLC 1, K8SOR 1, WA8UFX 1, W8VOI 1, WA8WIX 1.

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, Richard Hoppe, KØFDH—Asst. SCM: A. E. Hankinson, WAØNQL. SEC: WØSIN. PAM: WØCXW. Colorado Sectional Nets all participated in operation SET in one of the busiest operations we have had. Congratulations to the Columbine Net on taking top honors with a QNI of 1053 handling 276 formal messages. The Colorado Code Net also was valuable in scheduling extra sessions for maintaining a continuous liaison with TWN during the SET. We were all sorry to learn of the passing of Ray S. Eldridge, KØPGQ, on Jan. 9. Ray's contributions to amateur radio, particularly in helping Novices with c.w., will be greatly missed by his many friends. The Boulder Amateur Radio Club will hold its Annual Auction Apr. 21 at 1 P.M. at the National Guard Armory in Boulder. You're all invited to come and browse through the goodies. Anyone willing to coordinate 2-meter nets with NTS? Please drop me a line. A late report from KØZSQ shows that she earned BPL last Dec. with a total of 531. Traffic: (Jan.) WØIES 920, KØZSQ 411, WØLRN 313, WØKAU 238, WAØMNL 218, KØECR 63, WØSIN 63, KØMNO 25, KØGVA 11, KØIGA 10, WAØJTB 8. (Dec.) KØZSQ 531.

NEW MEXICO—SCM, Kenneth D. Mills, W5WZK—Asst. SCM: Marty Petsonk, WA5MCX. SEC: K5KTQ. PAM: W5DMG. RM: WA5FJK. ORS: K5MAT. WA5FJK and K5MAT have succeeded in forming a new net on 3.760 Mc. at 1900 MST on Tue. for the purpose of handling traffic. The net call is NMN for the New Mexico Net. All check-ins are invited for practice in c.w. traffic-handling. WA5FFL reports he has been handling telephone relays at the rate of two or three a week on the Intercontinental S.S.B. Net on 20 meters. WA5FFL was upgraded to Extra Class in Nov. '67. The first meeting of the NMN had a QNI of 5 and a traffic count of 5. K5MAT is Net Control. K5MAT worked New Hampshire for WAS. Attend the Division Convention in Cheyenne, Wyo., June 29 and 30. Traffic: (Jan.) K5MAT 43, WA5FJK 36, K5DAB 20, W5NON 19, W5MYM 16, WA5JNC 10, W5NUI 9, WA5BLI 7, W5BWV 6, WA5MIY 5, WA7SBV/5 2. (Dec.) K5MAT 75.

UTAH—SCM, Gerald F. Warner, W7VSS—SEC: W7WKF. RM: W7COX. Traffic nets:

BUN	Daily	7272 kc.	1930Z
UARN	Sat.-Sun.	3987.5 kc.	1500Z

Several of the Northern Utah Clubs participated in the ARRL SET. A few individuals also generated messages in the SET indicating interest in the ARPSC. WA7HSW qualified for a net certificate for his high level of participation in the BUN. WA7IAW is nearing completion of a new kilowatt amplifier and improved receiver setup for 2 meters. Attendance during the UARN Net sessions is on the increase, up nearly 50 percent in the last 9 months. F.m. activity on 2 meters in Utah still is growing on 146.94 Mc. WA7ARK, K7AWY and WA7BEX, in SLC, are regularly heard on 2-meter f.m. Nominations for SCM in the Utah section are being accepted until May 10. Rules for nominating can be found in *QST* operating news. Traffic: W7OCX 157, WA7BME 102, K7SOT 76, K7CLS 64, K7ERR 16.

WYOMING—SCM, Wayne M. Moore, W7CQL—SEC: K7NQX. RM: WA7CLF. PAMs: W7TZK, K7SLM, OBSs: K7SLM, K7NQX. Nets: Pony Express, Sun. at

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0800 on 3920; YO daily at 1830 on 3610; Jackalope Mon. through Sat. at 1215 on 3920; WX Net, 0630 Mon. through Sat. on 3920. The Rocky Mountain Division Convention will be held June 29-30 at the Hitching Post in Cheyenne. New appointment: K6UVJ/7 as EC for Cheyenne. W7VDZ now has a couple of beams up and is on the air s.s.b. W7BXS is traveling the southland for a couple of months. Another new Casper ham is WA7JES. The SET went very well in the state. It's not too early to start planning for Field Day. Casper now holds the traveling trophy. Traffic: WA7CLF 367, K7NQX 289, WA7EDC 164, K7ITH 73, W7TZK 64, WA7EUX 50, W7YWW 47, W7DXV 36, K7HHW 28, K7VWA 22, W7NKR 13, K7TEG 11, WA7BDI 5, W7-HLA 4, W7GSQ 3, K7JED 2.

SOUTHEASTERN DIVISION

ALABAMA—SCM, Edward L. Stone, K4WHW—SEC: W4FPI. RM: WA4EXA. PAM: WA4EEC. New ECs: WA4FOI, Tallapoosa County; WA4CNH, Lee County; K4KMG, Bibb County. WN4IDZ is a new operator in Athens. WA4ZWU is a new Decatur General. The Huntsville and Decatur Clubs now have classes in session covering Novice to Advance Class. A real good place to learn c.w. net procedure and improve your operating ability is on 3725 kc. at 5:30 P.M. CST with the AEND Training Net. WA4UXC, net mgr., will be most happy to have you QNI. Your SCM and SEC wish to congratulate the Alabama nets and operators for the fine effort during the SET. The increased reporting of station activities this month looks good. If you did not get your report in this month, make it a must next and all succeeding months. V.h.f.ers: Start getting ready for the summer openings and the V.H.F. QSO Party. All clubs and Field Day groups should have their committees working hard; June 21 will soon be here. Traffic: (Jan.) WA4EXB 1001, K4PXR 417, WA4-AVM 302, K4WHW 161, W4FVY 157, K4AOZ 134, W4-FPI 118, K4BSK 84, WA4MTG 76, WA4VEK 72, WB4DIN 69, WA4FYO 64, K4PMO 58, WA4JSM 52, WA4UXC 52, K4TNS 51, WB4EKJ 43, WB4BAS 42, WB4EKK 29, K4KJD 29, W1BKI/4 28, WA4LQN 24, WA5TOT/4 23, WA4GGD 22, W4WLG 22, K4KMG 21, WA4VUG 21, WA4AZC 20, WA4ROP 20, WB4ADT 19, WB4BLX 17, W4UDJ 14, K4DRQ 11, WA4PIZ 11, K4CZZ 8, W4DGH 8, K4RSB 6, WA4DYD 5, K4UUC 5, K4EAO 4, WB4GZW 4. (Dec.) WAVUG 36, WA4-ZFA 36.

CANAL ZONE—SCM, Russell E. Oberholtzer, KZ5OB—The CARC and the Panama Radio Club were guests of the CZARA on a moonlight cruise through Galliard Cut on the Pan Canal *Las Cruces*. About 50 KZ5s attended; also W2AFZ, TG9RU/HP1, TG9RC/HP1 and TG9LN. K2RPM, W5ENZ and W4DXJ were recent visitors to the Zone. Pacific Siders report activity on 6 and 2 meters. KZ5MW (WA5SHN) QSYs to S. Carolina for a discharge. The CARC club station, KZ5PA, is on the air again with a Drake TR4, RV4 and L4. CP1FG visited with KZ5JC. KZ5LM finally joined the s.s.b. ranks with a Swan 500. KZ5CT and KZ5SA put up a new 50-ft. tower and expect to be going real strong with their TR3 and a new Hunter Bandit. KZ5AJ raised a two-element quad. Traffic: KZ5WH 185, KZ5AD 96, KZ5OA 93, KZ5NH 84, KZ5MV 50, KZ5-FX 45, KZ5WR 36, KZ5OB 27, KZ5JC 18.

EASTERN FLORIDA—SCM, Jesse H. Morris, W4-MVB—Asst. SCM: William J. Blasingame, Jr., WA4-NEV. SEC: W4IYT. Asst. SEC: W4FP. RM C.W.: W4ILE. RM RTTY: W4RWM. PAM 75M: W4OGX. PAM 40M: W4SDR. V.H.F. PAM: WA4BMC. WA4NEV has been appointed Asst. SCM of Eastern Florida. This has become necessary because your regular SCM must spend two or three months out of the state. In my absence Bill will attend to the traffic reports and all routine matters. All correspondence directed to me will be forwarded by Bill. The resignation of W4TUB as PAM for 75 meters has brought about a change in the PAM status. It was decided to leave the number at two for the time being, with W4OGX taking over as PAM for 75 meters and W4SDR remaining as PAM for 40 meters. It is with deep regret that we must announce that the following Florida amateurs have joined the Silent Keys: W4WSW, W4GOX, K4HNS, W4DVK, W4-HDC and K4HH. Our sympathies are extended to all the families. WN4FLW now is WB4FLW. Ted received his Advance Class license and is already at work on the traffic nets. The SET in Florida has been termed a success by W4IYT. It is too early to tell but the change in time might bring about our best effort in Eastern Florida. W3CUL and W3VR have returned to Florida for the winter, as is obvious by the traffic listing below. Welcome back, Mae and Al. Vero Beach ARC officers for 1968 are W4LEP, pres.; WB4ABX, vice-pres.; K4EL, secy.; WA4QVJ, treas. North Florida

Amateur Radio Society officers for the new year are K4DSN, pres.; WA4VZF, vice-pres.; W4ORT, secy.; WA4TAQ, treas.; WA4FJA, act. mgr. Traffic: (Jan.) W3CUL/4 1754, WA4SCK 606, WB4EPD 435, W4ILE 359, WB4AIW 334, W4FP 276, WA4WZZ 262, WA4FGH 230, WA4NBT 224, K4YSN 218, W4FPC 209, W3VR/4 175, W4SDR 149, W4SMK 142, K4LEC 137, K4EBE 119, WA4OHO 108, K4COO 101, WA4IDH 98, WA4TWD 83, WA4NBE 80, W4AKB 79, W4GUJ 76, WB4DDO 71, W4EHW 71, K4SHJ 71, W4MVB 69, W4TRS 66, K4EBO 61, K4DAX 59, W4OGX 59, WA4FJA 58, W4SME 57, WB4DSP 50, W4IYT 46, WA4CIQ 44, WB4HKP 33, W4YPX 33, W4PBK 32, W4ZAK 29, W4DVO 27, K4LPS 25, WA4EYU 23, K4IEX 23, W4KHY 22, W4LEP 22, W4NGR 22, W4TJM 21, WN4FSF 20, W4GDK 18, W4CWI 17, WA4UFO 17, W4VPQ 17, WN4FLW 15, W4BKC 11, WA4TJS 11, WA4PWF 9, K4BLM 7, W4MSH 7, K4RCP 7, W4YJY 5, W4CBE 1. (Dec.) WA4EYU 26.

GEORGIA—SCM, Howard L. Schonher, W4RZL—Asst. SCM: James W. Parker, Sr., W4KGP. SEC: W4DDY. RM: W4CZN. PAMs: WA4WQU, K4HQI. The Georgia Single Sideband Net is considering the possibilities of a late session. K4HQI and WB4FMJ report good 50-Mc. activity, possible F2 DX Jan. 2 and 3 with W6s in about noon each day. KH6NS was reported heard about the same time. On the 4th and 5th the W5s were coming through. During this period MUF checked to be 46 Mc. Athens area 2-meter activity was tripled during '67. The Lanierland Amateur Radio Club worked 13 states during the V.H.F. SS. W4FEW has a new TR-108. K4UJL is active again on v.h.f. WN4GTB has a 22er and is building a dream shack. WB4EMQ has a 32-element colinear. The Atlanta Area 2-Meter Net operates 145.350 at 0105. WB4APC QRD Viet Nam.

Net	*Freq.*	*Days*	*Sess.*	*QNI*	*QTC*
GSSB	3975	2000 Dy.	47	1291	549
GSN	3595	0000/0300 Dy.	82	662	381
GTN	3718	2200 Dy.		132	35

WB4EMF built a 300-watt transmatch for $5.00. K4RIN, in graduate school, has four more hours for MS in Physics. W4ISS has stacked "J" beams for 2. W4HYW went back to hamming after wasting time with higher learning. Traffic: W4RZL 486, W4FOE 474, WA4WQU 295, WA4RAV 191, W4FDN 174, W4PIM 143, K4BAI 103, W4DDY 81, K4JFY 73, WB4AJR 62, WB4COD 57, WB4EMF 50, WA4JES 38, WA4LLI 33, K4RIN 33, W4ARH 9, W4ISS 3, K4TXK 3, W4HYW 2, WB4APC 1.

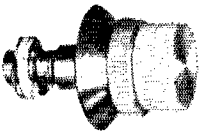
GEORGIA QSO PARTY

May 11-13

The seventh annual Georgia QSO Party is sponsored by the Columbus Amateur Radio Club, Inc. and starts 2100 GMT Saturday May 11 and ends at 0300 GMT Monday May 13, 1968.

There are no time or power restrictions and contacts may be made once on phone and once on c.w. on each band with the same station. *Exchange:* QSO number, RS(T) and QTH; county for Georgia stations; state, province or country for others. (Georgia to Georgia contacts are permitted.) *Scoring:* Each complete contact counts 2 points. Georgia stations multiply their total QSO points by the number of different states and Canadian provinces worked. DX stations may be worked for QSO points but do not count as multipliers. Out of state stations will use the number of Georgia counties worked for their multiplier (a possible total of 159). *Awards:* Certificates to the highest scoring station in each state, province, country, and Georgia county. Second and third place awards will be made in sections where additional recognition is deemed to be warranted. A plaque will be presented to the Georgia station submitting the highest s.s.b. score and one to the station with the highest overall Georgia score. Plaques will also be awarded to the highest scoring out of state entry and to the Georgia club with the largest aggregate score. *Frequencies:* c.w., 1810 3590 7060 14060 21060 28060; s.s.b., 3975 7230 14290 21410 28600; Novices 3725 7175 21110.

Your log should show date and time of contact, stations worked, exchanges, band, type of emission and multipliers claimed. Include a signed declaration that all contest rules and operating regulations have been observed and mail your entry no later than June 3 to: Columbus Amateur Radio Club, Inc., att. Charles K. Epps K4BVD, 1638 Forest Avenue, Columbus, Georgia 31906.



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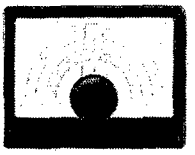
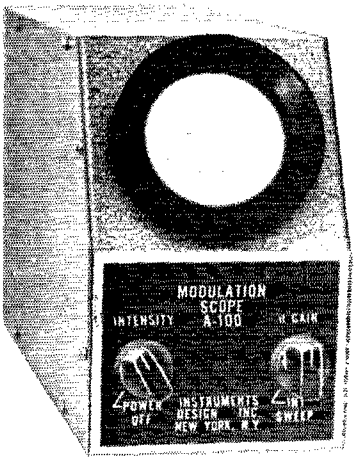


NEW 6/36 DRIVE

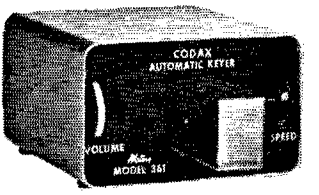
Improved model with improved clutch mechanism for even longer life. New black escutcheon is plastic coated to insure great durability. Co-axial spindle provides 6:1 and 36:1 under control of one knob.

Model 4103/A $7.50



- AM, CW or SSB
- Wave envelope or trapezoid patterns
- No tuning required
- Up to 60 Mc
- Will handle 5W to 1 KW
- Uses standard connectors
- Internal sweep
- Size: 9½" deep, x 5½" high, x 3½" wide Weight: approx. 5 lbs.

$29.95



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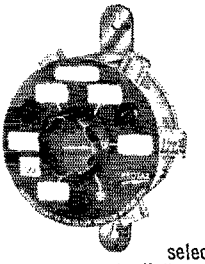


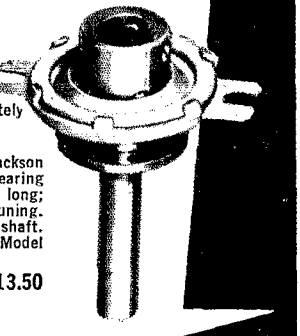
Waters Mod. 376
PROTAX ANTENNA SWITCH

Functions as a regular selector switch with 5 side mounted (radial) connectors. Has the additional feature of automatically grounding the entire antenna system when the rig is not in use. Complete with knob, mounting hardware and escutcheon plate. Power handling 1000 w. VSWR less than 1.2:1 up to 150 MHz.

$12.50

PRECISION PLANETARY-VERNIER for exceptionally fine tuning

Shown approximately actual size.



Superb craftsmanship by Jackson Bros. of England. Ball bearing drive. ¼" dia. Shaft 1⅛" long; 6:1 ratio. Vy FB for fine tuning. Easily adaptable to any shaft. Comparable value $5.95 Model 4511 DAF.

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See a Factory Demonstration of the complete line of WATERS EQUIPMENT, including the new 381 Transceiver System, 10 A.M. to 4 P.M., Saturday, April 20th, at ARROW, 97 Chambers St., New York City.

WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4IKB. PAMs: (H.F.) WA4ZGI. (V.H.F.) W4UUF. RM: W4BVE. Section nets:

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*
WFPN	3957 kc.	2300Z	Daily	31	761	94
QFN	3651 kc.	2330/0300Z	Daily	62	—	—

Pensacola: The Five Flags ARA now has its own quarters at the Red Cross office and a Clegg 22er, loaned by K1ZKR/4. WA8SQG/4 is moving to Milton. W4UUF has been appointed V.H.F. PAM and OVS. W7BNR/4 improved his signal on WFPN with a new 75-meter antenna. Fort Walton/Eglin AFB: The EARS station, W4SRX, is back on all bands with the erection of a tri-band beam. EC WB4EER conducted a surprise SET drill on 145.2 Mc. Detuniak Springs: K4KHV/4 is now equipped with 2 kw. of emergency power. Panama City: Bay County C.D. moved its 2-meter net to 145.2 Mc. to be compatible with other N.W. Fla. counties. Port St. Joe: EC K4RZF installed antennas for 75 and 2 meters at the new County C.D. Hq. Tallahassee: W4JGD was appointed ORS and acts as liaison between QFN and WFPN. Cross City: K1FVW/4 is stationed here with the USAF; he runs 200 watts to a vertical. Traffic: K4VFY 426, W4IKB 197, W4BVE 116, WB4GYX 79, WB4DHZ 42, W7BNR/4 33, WA4JIM 32, WB4FLK 12, WA4EOQ 8, WA4EPH 4.

SOUTHWESTERN DIVISION

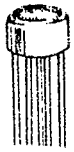
ARIZONA—SCM, Floyd C. Colvar, W7FKK—PAM: W7CAF. RM: K7NHL. Congratulations to K7NOS on receiving his General Class license. WA7ERH has a new mobile installation in a Chevy II. OBS K7MTZ is recovering after a period of time in the hospital. The wheels are turning toward preparations for the 1968 ARRL Southwestern Convention to be held in Phoenix this fall. K7PLO is doing a fine job as editor of the *W7IO Newsletter*, a publication of the Arizona Amateur Radio Club. Congratulations to WA7IFD on receiving his ARRL Code Proficiency Certificate for 20 w.p.m. The Tucson amateurs welcomes all newcomers to the area to meet them on 145.350 Mc. New officers of the Arizona Amateur Radio Club are W7LXX, pres.; W7CEL, vice-pres.; W7CSZ, treas.; WA7DGY, secy.; W7CAF, act. mgr.; K7PLO, editor. Traffic: K7NHL 302, K7UYW 146, WA7IFD 18, W7FKK 11.

LOS ANGELES—SCM, Donald R. Etheredge, K6UMV—SEC: K6QPH. Asst. SEC: K6AVQ. PAM: W6MLZ. RMs: W6BHG, WA6KZI, WB6BBO. Congratulations are in order for WB6GGL, W6GYH, WB6BBO and W6MLF on making the BPL on Jan. traffic. Late kudos to WB6PKA on making the BPL in Dec. '67. K6CYG now is licensed as W6EL. A new member of the W6LS Club is K6YDM. The Los Angeles Council of Radio Clubs has elected W6MLZ as chairman and W6UEI vice-chairman. Operation "Hello Mom" for servicemen in Vietnam handled 600 pieces of traffic from the Southwestern Division Convention location. The *Queen Mary* is being prepared for amateur radio operation by the Associated Radio Amateurs of Long Beach. The output of the K6MYK repeater is being changed. K6EA is doing some antenna maintenance after his vacation. W6FD is host to out-of-state guests presently. WB6UHF is telephone relaying. WB6KPN recently introduced a pack of Cub Scouts to ham radio. WB6OLD notes a new addition to the gear collection, namely an NC-270 receiver. WB6TQS is a newly-qualified ORS appointee. WB6KGK is newly-elected to NCS of SOCON 2. W6HUJ finds time a premium because of job requirements. W6AM reports better reception as a result of cooperation of the Edison Co. W6RCV reports a 40-meter dipole up. W6KW, Southwestern Division ARRL Director, is distributing a questionnaire to League members in preparation for the League's Board Meeting. John also has a new SR-2000 transceiver. WB6GHB is looking for 432-Mc. walkie-talkie enthusiasts. W6TXJ has been doing quite a bit of 40-meter mobiling recently. The Rolling Hills HS Radio Club reports WB6VVO, prexy; WB6PKA, vice-prexy; WB6UME, treas.; WB6TOV and WB6TOX, directors. The TRW Radio Club now hosts licensing classes. Contact WB6WDS. The So. Cal. V.H.F. Club, K6BPC, is attempting to secure equipment and parts for the Aalesund Radio Club of Norway. Free transportation of all donations of any size/weight has been arranged. The club is interested in component parts for v.h.f. u.h.f. use. Anyone interested in traffic-handling or AREC activities is invited to contact the SCM for full particulars. Traffic: (Jan.) WB6GGL 1048, W6GYH 766, WB6BBO 572, W6MLF 522, K6CDW 210, WA6KZI 194, WB6TMC 90, WB6OLD 84, WB6TQS 83, WB6PKA 79, W6BHG 67, K6ASK 25, W6PCP 18, W6HUJ 16, WB6AEL 12, K6EA 12, K6UMV 12, W6AM 10, W6USY 8, WB6-

FAIRCHILD

References
73 MAGAZINE
FEBRUARY 1968

RF/IF LINEAR AMP



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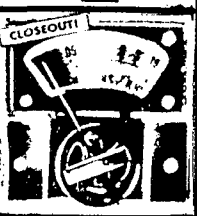

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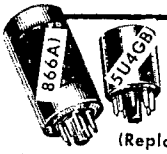

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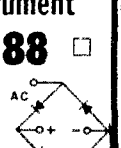

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600 ☐	15¢	1600 ☐	69¢		

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100 ☐	9¢	800 ☐	25¢
200 ☐	12¢	1000 ☐	39¢
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PIV	Sale	PIV	Sale
200 ☐	12c	1000 ☐	45¢
400 ☐	16c	1200 ☐	59¢
600 ☐	19¢	1400 ☐	69¢
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PIV	3A	6A	12A	55A
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100	☐ .07	☐ .22	☐ .25	☐ .75
200	☐ .09	☐ .30	☐ .39	☐ 1.25
400	☐ .16	☐ .40	☐ .50	☐ 1.50
600	☐ .20	☐ .55	☐ .75	☐ 1.80
800	☐ .30	☐ .75	☐ .90	☐ 2.30
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QMF 7, W6FD 6, WB6SXY 5, W6TN 5, W6YRA 4, W6DGH 3, K9ELT/6 3, W6RCV 2. (Dec.) WB6PKA 144. *(Sept.) W6FD 80. W6HUJ 19.*

ORANGE—SCM, Roy R. Maxson, W6DEY—Congratulations to SEC WA6ROF, RM K6IME and the 100% turnout of ARPSC officials and members and fellow amateurs of the Orange section on their participation in the SET. A number of messages addressed to the SCM indicated activity of various members and groups and your SEC received 71 messages from AREC members, which represented many sources of disaster information. Kudos go to EC WB6RVM for the excellent job he did as NC of the 75-Meter Net and the planned use of mobiles and emergency-powered stations during simulated disaster tests. Thanks to all for your assistance, and if you missed this one be prepared for the next. W6CPB telephone relayed from the USS *Frontier to* OC. K6IBI has RTTY and is having a ball. WB6WMX is a new General. W6BUK is getting tired of cramped quarters and hopes to have a new mobile home shortly. W6FB had as visitors W6AX, W6BTM, W6CWT and WA6DZR. He also participated in the SET and in the OOTC QSO Party: W/E of Jan. 27, WB6CQR, EC 2 meters has appointed as Asst. ECs WA6VPP, WB6WOO and WB6HJL. K6GMA worked England on 75 meters. Traffic: (Jan.) K6IBI 355, K6QEH 341, WB6JFO 309, WA6ROF 248, K6IME 90, WB6RVM 74, WB6TYZ 59, W6WRJ 47, K6MCA 39, W6PQA 8, WB6TIF 7, W6FB 6, WB6UCK 6, W6CPB 2. (Dec.) WB6TYZ 222.

SAN DIEGO—SCM, James E. Emerson, Jr., WB6GMM—After eight hardworking years as SEC for the San Diego section W6SK has decided to take a well-deserved rest. Stepping into these all important shoes is WA6KHN. Even though Walt is one tough Marine he'll need *your* help. The San Diego County Amateur Radio Council's new officers are W6BKZ, chmn.; K6KX, vice-chmn.; WA6TAD, secy.; W6NSR, treas. With our Division Convention being held in San Diego in '69 these people have a lot of hard work ahead of them. Let's *all* give them our support. The S.D. V.H.F. Club's officers for this year are WA6OSB, pres.; WB6AXW, vice-pres.; WA6SKT, secy.-treas. Sporting a new 1.1-kw emergency generator is WA6QAY. Our annual SET was a huge success, thanks to WB6KSA, your newly-appointed PAM. W6BGF made the BPL in Jan. Six local hams accounted for 142 check-ins during the Dec. '67 SCN sessions. As a result we have 3 new ORSs in our section, K6CAG, WA6QAY and W6YKF. The SOBARS reports the following officers: WA6DDD, pres.; W6GBF, vice-pres.; WA6TAD, secy.; WB6RES, treas. UC at SD boasts a new ARC with WB6KMH in the pres. chair, WB6WSV, vice-pres.; and WB6WSU, secy.-treas. This club provided communications at the National Glider Meet at Torrey Pines in Feb. Traffic: K6BPI 8788, W6EOT 557, W6BGF 516, W6VNQ 495, K6CAG 228, W6LRU 215, W6ECP 124, WB6GMM 91, W6SK 54, WA6QAY 45, W6YKF 35, WB6UMT 14, WN6VKU 2.

SANTA BARBARA—SCM, Cecil D. Hinson, WA6OKN—SEC: K6GV. W6ORW was active during the CD Party with 176 contacts in 51 sections. W6ORW is very active and I had the pleasure of working him during my recent activities in TI2- and TI8-Land. Look for W6ORW on 2 meters also as he is completing his v.h.f. rig. WB6BWZ has a Model 18 from MARS and will be RTTY as soon as the converter and a.f.s.k. units are constructed. K6GV was active during the recent SET until his KWM-2 failed. Our SEC, K6GV, reports some 13 other local stations active during the SET. W6OED is a prospective RM appointee. WB6VKN just received his General. W6PPZ has completed a home-brew 15-meter beam. W6ZRR is working old South Dakota buddies on 14,240. WB6FOG is recovering from his illness. K6TOE is on c.w. again after trying phone for six years and is having a ball. WA6QDA has moved to Arroyo Grande but still is active in the Estero ARC. WN6YRZ is trying his hand at 15 and 40 meters. WN6YWF has 3 months Novice experience on 15 and 80. WA6QDA is putting up a new TH3 beam. Yours truly is happy to be back after a month on the sailing schooner *The Swift of Ipswitch* during which time the TR-3 performed well and I had the pleasure of talking to many friends from as far away as 5 degrees north. Traffic: W6OED 12, W6ORW 9, W6JTA 8.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. L. Harbin, W5BNG—Asst. SCM: E. C. Pool, W5NFO. SEC: W5PYI. PAM: W5BOO. RM: W5LR. I am worried about the attitude of many hams, at least in the Northern Texas section, about the new incentive licensing regulations recently adopted by the FCC. I am still getting complaints about the new regulations adopted by the ARRL. The League did offer suggestions along with some 200 hams who

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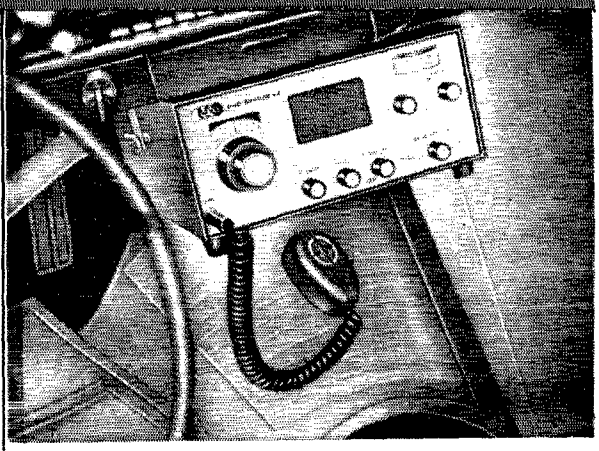

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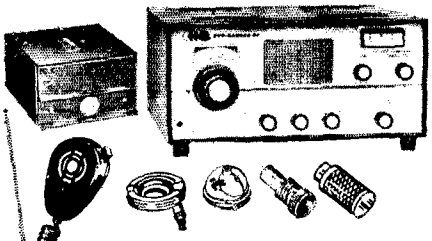

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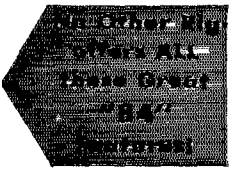

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had the necessary energy and interest to write to the FCC about its proposed rule-making. Why don't you read up on the regulations and find out who actually makes the rules. I believe you will find that the League does not make the rules so why blame them. W8GIU/5 is doing a fine job as OO. W5PBN has been appointed OO. W5HRM was invited to give talks to two civic clubs in Mineral Wells, Tex. According to the write-up in the Mineral Wells paper he did a fine job explaining the why and wherefore of the amateur offering a public service. Ralph explained how the amateurs got started and their contributions to radio in general. Ralph is EC for Palo Pinto County and is very active in RACES. The KC Club of Ft. Worth, the Irving ARC and the Arlington ARC are holding classes in theory and code for upgrading licenses. K5WXW has a new four-element 10-meter beam. W5DHR is now a real live sailor operating MM and is near the Azores. Gene is on 14.317 s.s.b. Listen for him on that frequency. K5IHD has made DXCC. W5GVE, an active v.h.f. ham, is in Waco now. Bill recently moved to Texas from Alabama. The 7290 Traffic Net reports 44 sessions, 2174 stations with 1063 QTC. Traffic: (Jan.) K5BNH 691, WA5QQR 70, W5PBN 45, W5JSM 33, W5BNG 17, W8GIU/5 16, W5LR 5. (Dec.) WA5QQR 63, W5PBN 41.

OKLAHOMA—SCM, Cecil C. Cash, W5PML—SEC: WA5AOB. PAMs: 75-W5MFX, 40-K5TEY, 6-WA5JGU, 2-K5ZCJ. New ECs: WA5DZP, Ponotoc Co.; W5KOZ Okla. Co. Congratulations to Extra Class K5TCG and Generals WA5SEB and WA5SEC. The new pres. of the Central V.H.F. Club is W5HXL. Vice-pres. is K5VRL, with WA5QYK, secy.; WA5JGU, treas. WA5KZA has completed the basic electronics extension course from U.S. Army Signal School. The Jan. SET operation was a great success. The Okla. Co. group simulated a tornado (for which Okla. is so famous) and operated out of the c.d. emergency shelter and the mobile van on 75, 6 and 2 meters, plus constant contact with the WX station, Highway Patrol, Police, Sheriff's Dept., Fire Dept., CAP and Red Cross. Garfield Co. was on 75 and 2 meters with two-state coverage through Wichita and Tulsa 2-meter relays and simulated a lost man in the wilds of the great plains of Western Okla. Comanche Co. was on 75 and 2 meters with direct contact of all outlying communities with the c.d., Red Cross and Police, simulating radiation fallout checks and reporting to the base station by mobile. Muskogee Co. was on 75 with traffic to National and State Hq. Net reports:

Net	*Sess.*	*QNIs*	*QTCs*	*Net*	*Sess.*	*QNIs*	*QTCs*
OLZ	23	98	167	SSZ	19	77	159
OPON	26	184	70	STN	26	672	206

Traffic: K5TEY 1525, W8VDA/5 147, W5PML 65, WA5-AOB 52, WA5KZA 47, W5KOZ 42, W5MFX 41, W5FKL 40, K5DLP 38, W5LOB 29, WA5DZP 28, WA5IMO 27, W5UYQ 23, WA5QIQ 19, W5PWG 13, K5CAY 10, K5-CBA 8, K5ZCJ 8, K5WPP 6, K5OCX 4.

SOUTHERN TEXAS—SCM, G. D. Jerry Sears, W5-AIR—SEC: K5QQG. PAM: W5KLV. RM: W5EZY. Congrats, fellows, on participation in the SET, the first Southern Texas has had simulated. For several years it seems it always turned out to be the real thing. K2EIU/5 reports 1325 contacts in the Phone and C.W. CD Party. WA5QKE now has his Advanced Class license and is working on his Extra. W5AC has a new ESCO RTTY converter and will be on the air with 19 and 100 soon. K5LQJ, for W5AC reports operation on both phone and c.w. in the ARRL DX Contest. The first week end on phone over 200,000 points were made. PAM W5KLV reports good response for the National ARRL Convention, also the STEN Convention coming up in Kerrville May 3, 4 and 5. EC K5HZR advises he had plenty of practice during the flood on Jan. 18 in San Antonio so did not operate in the SET. EC W5TFW advises that new officers of the Port Arthur ARC are WA5JTZ, pres.; WA5DUG, vice-pres.; W5CNH, secy.-treas.; WA5HGH, act.; W5FCD, historian. The El Paso, W5ES, bulletin reports the club is starting new code and theory classes. Goliad County now has a licensed amateur, WA5TMT. Cpt. William Mills now is located at Fort Monmouth, N.J. in the Signal Corps., operating as WA5TMT/2. Brownsville EC W5KR's *Off Resonance* bulletin lists new officers for the Texas Southmost ARC as WA5GZI, pres.; W5KFI, vice-pres.; W5KR, secy.; WA5ISH, treas.; WA5HBI, K5SJA and K5EHY, directors; and also indicates two new amateur radio clubs are being formed. W5HBL heads a group of Union Carbide employees and a new club is being formed at St. Joseph's Academy. Traffic: (Jan.) WA5INZ 344, K2EIU/5 182, WA5QKE 127, W5-QJA 109, WA5GZX 107, WA5MBC 107, WA5LVJ 101, W5EZY 98, K5HZR 98, W5AC 91, W5ABQ 79, W5KLV 55, WA5DIK 42, WA5MXY 38, WA5IQL 37, W5AIR 33,

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0-200 Ma. D.C.	4.99	5.99	5.99	7.99	7.99
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K5HMF 25, W5TFW 20, K5WYN 5. (Dec.) K2EIU/5 170, W5AC 119, W5QJA 94, WA5MXY 90. (Nov.) WA5-INZ 528, W5AC 89.

CANADIAN DIVISION

ALBERTA—SCM, Harry Harrold, VE6TG—SEC: VE6FK, PAM APSN: VE6ADS. ECs: VE6SA, VE6SS, VE6XC, VE6PL, VE6AFQ. ORSs: VE6BR, VE6ATH, VE6ATG. OPSs: VE6HM, VE6SS, VE6AFQ. OOs: VE6HM, VE6TY. OBSs: VE6HM, VE6AIF. Make your registrations now for the International Glacier-Waterton Hamfest to be held at Waterton Lakes National Park July 20-21. Supper will be served at 6 P.M. Sat. and breakfast Sun. at 7:30 A.M. with a good program for all. Make your own arrangements for accommodations. Preregistrations $3.00 per amateur and family. All monies should be sent to the Hamfest Committee, P.O. Box 54, Red Deer, Alberta; preregistrations cut-off postmarked July 1. We regret having to report the passing of VE6AHW, Hinton, Alberta. The Vulcan Club should soon have another class ready for exams. Calgary, Edmonton and Red Deer are busy these days making for the International Hamfest, along with provincial ARLA, with the Border Area Club looking after the supper and breakfast and the Vulcan Club looking after communications. Traffic: VE6ATH 160, VE6AJA 103, VE6HM 83, VE6FK 23, VE6ADS 21, VE6SB 19, VE6SS 17, VE6AM 16, VE6AO 15, VE6ARU 12, VE6ATG 10, VE6TG 10, VE6XC 8, VE6AKA 5, VE6BL 4, VE6AFQ 3, VE6PZ 2.

BRITISH COLUMBIA—SCM, H. E. Savage, VE7FB—The SET was the best yet for B.C.; 3755 had 110 check-ins during the twelve hours in two parts. The East Kootenay ARC is looking for the history. Any past members have information? VE7AS had six feet of water in his basement during our heavy rain. Most of his equipment and tools were damaged. The Beaver Valley ARC sends along very interesting member activities, crystal-grinding, etc. Fort George ARC's officers are VE7BGX, pres.; VE7BCF, secy. VE7OF found that antenna blows rigs up if left off. VE7JF has returned from the Canary Islands. Royal City ARA's officers are VE7YM, pres.; VE7ABS, vice-pres.; VE7APJ, secy.-treas. VE7ATG is Alderman of Fort St. John. The BCARA Centennial Dogwood QSO Party winners were out-of-B.C., W8AJW; B.C., VE7EH. Penticton ARC's officers are VE7DB, pres.; VE7APV, vice-pres.; VE7BNU, secy. VE7IR/9V1OQ is s.s.b. on 20 in the Canadian portion. VE7JF returned from the Canary Islands and reports only two days of sun and that was not there. It seems VE7BK's island in B.C. is the sun spot of the world. Right, Barry? Traffic: (Jan.) VE7-APF 40, VE7BLO 37, VE7BHH 36, VE7AC 29, VE7BLS 28, VE7FQ 25, VE7AAJ 5. (Dec.) VE7BHH 83, VE7-ASY 76.

MANITOBA—SCM, John Thomas Stacey, VE4JT—VE4OT has moved to Alberta and VE4RV is now operating from Swan River. VE5MW is now a resident of Flin Flon and VE7BPK is awaiting transfer there by the Air Force. VE4NE took part in the CD Contest on phone. VE4HI, VE4HK, VE4OL and VE4TC are busy testing their 2-meter f.m. mobiles for the upcoming snow-shoe race. The MAARC has decided to name its newsletter *The Manitoba Amateur* with issues slated in Feb., May, Aug. and Nov. VE4HI is editor. VE4EL now has his General. VE4GV sports a new Galaxy V and VE4AU a new Warrior linear. VE4DQ assumes duties as public relations officer for the Brandon ARC. The Fifth Annual International Hamfest will be held July 20 and 21 on the American side of the Peace Gardens. Only the C.W. Net was active in the 1968 SET. VE4ST reports that she is the only VE4 member of CLARA and invites all distaff amateurs to contact her regarding membership. The CLARA Net meets Sat. at 1700 GMT on 14140 kc. Net reports: Phone Net—sessions 31, QNI 720, QTC 25. C.W. Net—e-sions 32, QNI 183, QTC 124. Traffic: (Jan.) VE4EI 124, VE4JT 78, VE4NE 54, VE4RW 43, VE4FO 14, VE4YC 12, VE4EF 10, VE4JA 8, VE4LQ 6, VE4XN 6, VE4QJ 4, VE4GN 3, VE4FX 2, VE4IW 2, VE4JF 2, VE4RB 2, VE4SC 2, VE4DQ 1. (Dec.) VE4FO 14.

MARITIME—Acting SCM, William J. Gillis, VE1NR—Asst. SCM: R. P. Thorne, VO1EI. SEC: VE1HJ. This is my first column as Acting SCM and I will do my best to serve the section until a new SCM is elected. It is with deep regret that we record the passing of VE1RT and VE1CM into the ranks of the Silent Keys. Sympathy is extended to VE1HJ, whose father recently passed away. VE1AED is now in Cyprus with the Canadian Armed Forces. VE1AMC has acquired an HQ-170 and VE1ALS an HRO-60. VO1AQ received his

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WAVE and Centennial Awards. VO1DU has a new SB-101A and VO1IR is on s.s.b. with an HW-12. New Labrador calls are VO2EH, VO2GB and VO2GD. VO2AK has a new Heathkit keyer. The ARCOWL held a very successful Christmas Party for the children of Wabush, APN, sessions 52, QNI 475, QTC 124. Traffic: (Jan.) VE4AMR 88, VE1MX 87, VE1ARB 60, VE1RO 32, VE1OM 31, VE1ABS 29, VE1IT 16, VE1RY 2. (Dec.) VE1ABS 30.

ONTARIO—SCM, Roy A. White, VE3BUX—AREC Asst. National Coordinator: VE3YC. SEC: VE3EUM. The big news in Jan. was the SET Exercise. The activity was good and a special thank you to all those who worked so hard. The c.w. boys did a good job and their traffic-handling skill quickly separated the men from the boys. It was pretty to see the way s.s.b. and c.w. punched its way through when the going was tough. *Odds and Ends.* The Ottawa Valley Mobile Club has 35 or more on the 2-meter repeater setup and Ottawa-to-Montreal mobile-to-mobile is quite the thing. VE3CIL finally broke down and went s.s.b. and VE3-ESE is increasing his power on 2 and 10 to a gallon. Wow! OFN still is looking for good controllers with s.s.b. equipment but able to copy a.m. and c.w. too. Any takers? VE3EUM is looking for ECs. If this is up your alley, give him a call. It would be appreciated. VE3CGO has just been appointed District Commissioner for the Guides and Brownies. Congrats, Doreen! Sorry that VE3YC has given up as EC for the Ottawa district but thanks for a swell job, Jack! We are going to miss you. Your SCM, with VE3CJ and VE3EUM, attended the RSO executive meeting in Oshawa to talk about mutual problems. It's nice to experience that sort of cooperation. By the way, hats off to the RSO for a splendid job on behalf of the blind amateurs in Ontario. A lot of the boys are going to be surprised to find that their ARRL appointments are null and void unless they get their certificates into the SCM for endorsation, so please get with it, fellows. Better check that membership status too! Traffic: (Jan.) VE3BZB 189, VE3DV 135, VE3GCE 131, VE3GI 129, VE3ATI 124, VE3EBH 101, VE3DPO 98, VE3FGV 73, VE3DBG 68, VE3BQL 63, VE3EHL 59, VE3AWE 55, VE3BLZ 47, VE3AUU 30, VE3NO 26, VE3DU 24, VE3BUR 18, VE3ETM, 18, VE3EBC 12, VE3EXW 12, VE3GLD 11, VE3DH 7, VE3DVE 6, VE3VD 4. (Dec.) VE3EBH 101, VE3DU 33.

QUEBEC—SCM, J. W. Ibey, VE2OJ—SEC: VE2ALE. RM: VE2DR. PAMs: VE2BWL, VE2AGQ. To say the Jan. SET was a success in this section would be an understatement. The fine work of those participating deserves our thanks. VE2ASL, formerly of St. Jean, is now VE2ASL/LX. There are now six ARRL affiliated clubs in our section. VE2SD is going great with his KW-2000. The fine translation into French, of some important phases of ARRL organization by VE2BWL deserves praise as also does the six-page *RTQ Newsletter* by VE2BRD. VE2ADE and VE2ALE made the BPL. Sincères félicitations à VE2AP qui a convolé en pleine période des fêtes. Tous les amis lui souhaitent le bonheur qu'il mérite. Le congrés annuel de RAQI aura lieu cette année à Plessisville et déjà plusieurs amateurs de cette localité travaillent fébrilement à l'organisation du Congrés. Le Radio Club de Québec (VE2CQ) a reçu les duchesses et le bonhomme Carnaval lors d'une soirée sociale du mois de janvier dernier. Bienvenue aux nouveaux amateurs qu'on peut entendre régulièrement sur le 80 mètres: VE2AJT, VE2BVO, VE2AHZ, VE2DGN, VE2DEJ. Traffic: VE2ALE 222, VE2BVY 200, VE2OJ 171, VE2BWL 167, VE2DR 156, VE2ADE 154, VE2AJD 71, VE2BRD 69, VR2AGQ 64, VE2DCW 61, VE2BWL 58, VE2WM 39, VE2EC 22, VE2BMS 17, VE2CP 10, VE2BAI 4.

SASKATCHEWAN—Acting SCM, Gordon C. Pearce, VE5HP—Information on the SET exercise will be outlined in the next issue as reports are not in and one area test still is to be carried out. Interest in teletype is increasing in Saskatoon, Estevan and Regina. The availability of used RTTY equipment still is a problem. PAM VE5PZ is doing a good job. The AREC ECs, all confirmed: VE5DO, VE5NX, VE5RJ, VE5BO and VE5IL. Start thinking of the Saskatchewan Hamfest, to be held in Saskatoon June 29 to July 1. Directors of our SARL Districts are VE5WC, VE5LM, VE5TN, VE5RE, VE5NX, VE5EO, VE5LU, VE5YR, VE5SF, VE5IL and VE5FX. Let's hear from them on all phases of their districts. New hams reported to have obtained their tickets are VE5KE, VE5SJ, VE5YB, VE5SE, VE5AE, VE5DH, VE5FP, VE5RT, VE5KR, VE5DJ, VE5SP, VE5VO, VE5NH, VE4FY (a newcomer), VE5-OS, VE5XD and VE5DE. Traffic: VE5HP 57, VE5RJ 53, VE5LM 19, VE5RE 8, VE5BO 7, VE5LQ 7, VE5CF 6, VE5OG 6, VE5PZ 5, VE5WL 4, VE5EQ 3, VE5OO 3, VE5TS 3, VE5AQ 2, VE5FU 2, VE5IG 2, VE5LL 2, VE5QN 1.

ALL in excellent condition: Valiant, factory-wired, $250.00; NC-300, calbrator and speaker, $225.00; MM-2 Wave Analyzer, $55.00, Johnson 275-watt coupler, $45.00. Heath AM-2 Reflectometer, $10.00. W5LZL, 500 Cliffside Drive, Dallas, Texas 75080. Tel: 214-231-3895.

IMPRESSIVE Executive style ham stationery. Inexpensive. Write K3GWD Press, Harry Veon, RR 2, Wampum, Penna. 16157.

EICO 753 SSB transceiver, HB power supply, $180.00; Eico 460 'scope, $80.00; HB transmitter, AM modulator, VFO, 80 W, $35.00; 2 signal gens 2 tube-testers, multimeters, RLC Bridge, other misc. test equipment. Contents of large spare-parts collection offered very cheaply, including tubes, sockets, resistors, capacitors, controls, meters, much more. Will sell as lot or separately. Write or call for details. Al Goldstein, WA2ITQ, 245-30 Grand Central Parkway, Bellerose, New York 11426. Tel: 212-428-8103.

VIKING Ranger, push-to-talk. Used less than 20 hours. $190.00. NC-98 rcvr, built-in side-tone generator, $60.00; Gonset Super 12 conv., $15.00; Morrow 5BRF 10-80 meter converter, $10.00; Gonset Super Six, $10.00; surplus crystals, $1.00; Dow DK-60 coaxial relay, $6.00; Lafayette bug, $7.00. SWR meter, $10.00; Drake TV-1000 low-pass $5.00. Push-to-talk mike base, $10.00; Lafayette HE-50 10-meter transceiver with VFO, $60.00. R. D. Connor, W1ZQP, 47 Bedford Dr., No. Grafton, Mass. 01536. Tel: 839-6054.

FOR Sale: SB-100 modified with two crystal filters, HP-13 and HP-23 power supplies, SB-600 speaker, $500.00. Marauder HX-10, $200. All are in mint condx. WA2DLX, R. S. Caverhill, Stanley Road, Cazenovia, N.Y. 13035.

GONSET G-66 mobile receiver, 6, 12, 115 volts, 6 bands, AM, CW, SSB. Excellent. $90.00. G. L. Anderson, 301-A Talge Hall, Collegedale, Tenn. 37315.

SSB Transceiver, Transistor, tube driver-final. See Dec. 1967 QST. Set of printed circuit boards, $20.00. Boards for other projects. Send for list. Ivan Whitehouse, 16911 S.E. Foster Rd., Portland, Oregon 97236.

WANTED: 1932 Ford Majestic Radio. Manufactured by Gibson and Gruno in Chicago, Illinois. Consists of two metal boxes 6 x 9 x 8 inches (one has a motor generator in it and the other a series of tubes), wooden speaker box and a control head with remote control cables. J. R. Jackson, 21485 Silchester Circle, Northville, Michigan 48167.

HOWARD Radio: 75A-4, serial No. 5591, $395.00; SW-140, $119.00; R4A, $269.00; NC-300, $159.00; GSB-100, $179.00; B&W 5100B w/51SBCB, $195.00; M40, $69.00; M160, $69.00; Bonner 4 w/8 Servos, $240.00; Poly-calls, $29.00. Free list. Box 1269, Abilene, Texas 79604. Tel: a.c. 915-OR2-9501.

SELL: HRO, rack, spkr, coils 1 to 7, power supply, and rcvr. Section. Good operating condx. Best offer. K1QQX, 420 Willard Ave., Newington, Conn. 06111.

FOR Sale: Transistor TV camera (AT.V. XT-1A) with separate p/s and extra 1" Vidicon. $95.00 f.o.b. C. A. Weed, WA1BDJ.

COLLINS 75S3-B, 312B-4, 32S-3, 516F-2, cables, manuals, factory cartons, all like-new, sell for $1,100 or your best offer. Eugene J. Berenz, K9ZPJ, 4542 N. 105 St., Wauwatosa, Wis. 53225. Tel: 414-466-2184.

75A1, mint, $150. Pick-up deal only, sry. Lafayette Precon, $25.00. WB2AXH, 94 Brittle Lane, Hicksville, L.I., New York 11801.

KWS-1 in top shape, no alterations. This is top-flight SSB-KW but haven't used it twice in 5 years and I am going to sell it to best cash offer in 30 days or less. Will ship. Also G-E 30 to 54 Mc. FM xmtr, 500 watts to PR 4-125; complete in 6 ft. cabinet, with meters. $350.00. 3 Kw diesel power plant, 1200 rpm for continuous duty. 230/115 VAC. W9DSV, Box 87, Webster, Wis. 54893.

SELL: Perfect Novice station: Collins 75A-1 rcvr. Homebrew 30 watt Handbook xmtr. Coax switch, $175.00. Will consider breaking up. Adam Kerner, Ex/WN2ZTL, 25 Crescent Rd., Great Neck, L.I., N.Y. 11021. Tel: (516)-466-8927.

NATIONAL NC-270 receiver. Excellent condition. 80-6 mters, c.w., A.M. and SSB with Hallicrafters R-47 communications speaker: $160.00. G. F. Lipper, WB2AEX, 3688 Jules Lane, Wantagh, New York 11793. Tel: (516)-PE1-0722.

ESTATE Sale: K7AX. DeLuxe Hallicrafters demon. station: SR-2000 s/P-2000 power supply; HT-46 and SX-146 combo; SR-42A w/HA-26 VFO; HA-1 keyer; R-51 spkr/clock; 14AVQ and 18AVQ verticals; TH6DX beam: Ham-M rotator, many other accessories. All items new or used less than 6 months. Manuals and original shipping boxes. Sell as package or individual items. Write for complete list and prices. Bruce Duncan Estate, 517 Dexter Avenue N., Seattle, Washington 98109.

TOROIDS: 88 mhy, unused, center-tapped, 5/$1.50 postpaid. Heath DX-60A, new, $55.00; matching HG-10 VFO, new, $20. 3 head Tee-Dee with sync, $50. Johnson 250-39 TR, $18.00; Johnson Valiant, $125.00; CDR AR-22, $20.00; Eico 495 calibrator, $7.00; Eico 753 transceiver with p.s., $160.00; National NCX-3 transceiver, $165.00. RTTY page-printer paper, $5.50/case. Wanted: Clegg 22'er, Gonset Communicator for 2M. Twoer. Matchbox, NC-300, Ham-M, Stamp for list. Van, W2DLT, 302Z Passaic, Stirling, N.J. 07980.

WANTED: Collins 51J-4. Will swap Nikon F Photomic with F:1.4, 58 mm lens, F:2.8, 35mm W/A lens, 105mm F:2.5 lens; also Nikon SP with 35mm w/a lens, 135mm F:3.5 telephoto lens. Camera equipment in mint condition with little use. W. J. Garrett, 1114 Ossington Avenue, Flint, Michigan 48507. Phone 313-233-6449.

SAVE On new/used National-SBE-Ameco: callbooks. Jackaloupe Engineering, Box 1054, Laramie, Wyoming 82070.

FOR Sale: Jones SWR meter, B&W low-pass filter, Mark heliwhip and base; Heath HO-10 'scope, 08 'scope sweep generator audio generator electronic switch. Intercom variac 500 watts, also other things. Send for list and prices. Edward Schofield, 301 North 3rd St., Lantana, Florida 33460.

NEED 500 microsecond sonic on magnetic delay line or what have you? Louis Patla, 1357 Ocean, Santa Monica, California 90401.

NOVICE'S Sale: Gud condx: DX-40, $35.00; VF1 VFO, $10.00; Mint condx, HA-350, $115.00. Write WA3HLI, 805 Indiana Ave., Monaca, Penna. 15061.

FOR Sale: HRO-60, 80-6 meter coils, speaker, $249.00; CE-20A, deluxe 80-10 VFO, $110.00; P&H 600A 6-meter transverter, $15.00; Elmac AF-67, $39.00 or you make offer. F.o.b. WA4TNU, George Reeves, Rte. 4, La Grange, Georgia 30240.

75A-4, serial No. 5640; 3 mechanical filters, $475.00; Eico 460 'scope, $75.00; Sony 464-D tape recorder, $75.00; Viking Invader 2000, $450.00. All one owner, with manuals. O. C. Lindsey, W5OBX, 1919 Ramada, Houston, Texas 77058.

DRAKE TR-4 with a.c. power supply, never used! In original carton, Ameco output meter, Electro-Voice microphone, complete station $500.00. First check gets it. K9AGN, S. Derighter, 403 Sunset Dr., Wilmette, Illinois 60091. Tel: AL6-1504.

WANTED: Johnson or Heathkit SS-B adapter. K2KKU. Tel: (914)-668-3677.

SELL: HT-37, Mohawk RX-1, $300 pair, or will sell separately. Both factory reconditioned summer 1967. Both perfect. WA9-AUM, Box 63, Wiley Hall, Hanover, Indiana 47243.

SX-101A Hallicrafters receiver in perfect condx: $185.00. Charles Clark, 2910 Orchard Lane, Wilmette, Illinois 60091.

KWM-1, matching a.c. supply. Immaculate: $250.00. Charles Jaeger, 436 Bellevue, Oakland, Calif. 94610.

WANTED: Used National Technical Schools FCC license course $3. J. J. Moran, 4205 Arthur St., Hollywood, Florida 33021.

FOR Sale: SX-110, clean, like new: $93.00. Shipping and insurance paid. John, K8TVO, 331 Hillside Dr., Canfield, Ohio 44406.

FOR Sale: SR-150 transceiver and SWR bridge, PS-150 (with p.t. mike) A.C. power supply; PS-12 D.C. power supply; mobile mount Newtronic whip antennas with loading coils for 80, 40, 20, 15 and 10 meters. Package deal only. First best offer. Sry, no breaking up. K1VWI, 140 Glen, New Britain, Conn. 06051.

SX-101 Mark IIIA, and speaker, $140.00 and Lettine. 40 watt xmtr, $10. Both OK. W2LZW.

SX-100 for sale, in excellent condx, for SSB, AM and c.w. reception. First $175.00 takes it. W2TIW, phone: 201-796-2932. O-52 28th St., Fair Lawn, N.J. 07410.

VIKING Ranger F/W, $110.00. BC-221, $45.00. 250 QSTs 1933-1960: $30.00. A. Urquhart, 198-26 Epsom Course, Hollis, L.I., N.Y. 11423.

HEATHKIT MR-1 receiver, in gud condx, $50.00; Homebrew 2-811A 500-watt linear, w/supply, $80.00; Hy-Gain 40-10 trap doublet, $12.50; Hy-Gain 15-meter beam, $20.00. WA2POY, Kirschner, 274 Michael, Oakhurst, New Jersey 07710.

STATION Sellout: DX-100, HQ-170, NC-88, Viking Matchbox, Heath SWR, Headset, keys, manuals, all mint condx. Guaranteed. $400 takes package. Will sell separately. All inquiries answered. K3ANU, 1305 West Russell St., Philadelphia, Penna. 19140.

WANT KWS-1 and/or 75A-4. Must be in excellent shape. KWS-1 must also be over serial number 1200. Also want SC-201. Name price. Henry, WB2CNA. Tel: 201-327-9090.

SELL: Harvey-Wells TBS-50, CW-AM xmtr, w/pwr supply and 40 mtr. VFO, great condx, $50.00; Heath GR-64 SW and Novice rcvr w/Heath GD-125 "Q" multiplier. Mint condx, $40. Heath VX-1 voice-control $10. $80 takes all. Gone SSB. Mark Franz, WA5SHT, 5107 Harvest Hill Road, Dallas, Texas 75234.

2-METERS. Plate modulated 500 watts, $125.00. Twoer, $30.00. Gonset III, $140.00. K1MBA, John Templeton, 49 Saw Mill Dr., Wallingford, Conn. 06492.

SALE: Unused (3 pcs): Gonset G-76 with AC, DC supply; Hallicrafters SR-34 transceiver. All clean and in vy gud condx. Also Stenman monitorscope, antennascope, Hentot QF-multp. Write for prices, etc. Mrs. Dan Riordan, 1708 Park Blvd., West Sacramento, Calif. 95691.

SALE: Viking II, with matching VFO and KW low-pass filter: $85.00. Command xmtr, $5.00. F.o.b. K3BYJ, 111 Elm Ave., Morrisville, Penna. 19067.

KEYER Sale: Omega DA digital automatic I.C. keyer (with DA-3 option). $65.00, ppd. in mint condition. WB6YVW, 1755 N. Wilcox, Hollywood, Calif. 90028.

KWM-2, PM2, CC2, excelnt condx. Sale or trade for 32s and 75s/PS. Need separate operation for MARS. K7HRW, 1775 Mill Street, Reno, Nevada 89502.

SELL: Drake 2B, in mint condx, DX-40 with VFO, both in gud condx, sell separately or all for $225.00. Michael Phillippe, RR #1, Versailles, Indiana 47042.

"HOSS Trader" Ed says if you don't buy your ham gear from him, you may pay too much. Limited supply of new equipment in factory sealed cartons, while they last. New Swan 500 Transceiver, Regular Price, $495.00, Cash Price $395.00: One—new Drake TR-4, Serial #26033, Regular Price $599.95, Cash Price $479.00: Package Deal: New Eico 753 Kit 3 Band Transceiver and new Eico 751 Kit AC supply with speaker, $249.00, Cash Price $169.95: New Mosley Classic 33 and Demo Ham-M Rotor, $189.50: New Displayed BTI 2000 Watt Linear, $659.00. Demonstrator Equipment with factory warranty: Demo Ham-M Rotor, $94.50: Displayed Swan Mark II Linear, $495.00: New Demo SB-34, $329.00: Demo Drake T-4XB, $359.00: Demo Drake R4-B, $369.00: Special Rohn 50 ft. Foldover Tower, prepaid: $185.00. Ed Moory Wholesale Radio Co., Box 506, DeWitt, Arkansas 72042. Phone 946-2820.

QSTS 1920 to date: 1920—6 copies; 1954—10 copies; other years 11 or 12 copies. To 1932 mostly torn or missing covers and pages, in poor condition; 1933-1936 half ditto, 1937-1948 about three torn covers per year; 1949 to date good condition. 560 copies, as is, $175.00. CQ: 232 copies 1945-1967 incomplete, good condition, $90.00. Plus transportation. W2ML, 42 Prescott, Garden City, N.Y. 11535.

HAM, over 18, to instruct at a children's camp in the Pocono Mountains in Penna. Own equipment required. Please explain type equipment and further qualifications to Pocono Highland Camps, 6528 Castor Avenue, Philadelphia, Penna. 19149.

SB-300 Heath SSB receiver, with AM filter, $225.00 or your best offer. Includes shipping. M. Pollack, East Larchmont Drive, Colts Neck, N.J. 07722.

Index of Advertisers

An I.C. Electronic Keyer

(Continued from page 25)

lower minimum speed. A value of R_1 larger than about 50,000 ohms may cause erratic performance. Reducing R_2 will increase the maximum speed. C_1 must be a good quality capacitor; the small imported electrolytics do not work well, and the tantalum capacitor specified is recommended. (A paper capacitor would be ideal, but larger than all the rest of the circuitry.)

Resistors R_4 through R_8 and capacitors C_3 through C_5 can easily vary over a 2 to 1 range with no degradation in performance. In fact, the circuit works with R_4 and R_5 shorted and R_6-R_7 open! So use what's in your junk box.

To prevent r.f. pickup, keep the leads to the keyer paddle, speed pot, and power supply as short as possible.

(Note: Send a post card to the first author, WØZHN, for printed-circuit board and parts availability and assembly information.) QST

Guidelines For Transistor Transmitters

(Continued from page 39)

There is no end to the list of suggestions which apply to the subject of solid state transmitter design. The intent of this article is guidance; it is not intended to be absolute. Several sources of information are referenced below; however, the author invites comments and additions from people who are knowledgeable in this field. QST

References

Nelson, D. W., "A Solid-State AM Transmitter for Two-Meter Operation" *RCA Ham Tips* Vol. 26 No. 4, Fall, 1966.

RCA Silicon Power Circuits Manual, March, 1967, pp. 294–355.

Minton, R., "Design trade-offs for r.f. transistor power amplifiers" *The Electronic Engineer*, March, 1967, p. 70.

Turner, Carl, "Exploding the Second-Breakdown Myths" *EEE* Vol. 15, No. 7, July, 1967.

World Above 50 Mc.

(Continued from page 109)

WØDRL in Kansas worked W9FZD, Wisconsin, for what is likely the first 432 contact between their respective states. In Southern California, WB6NMT says he hopes to schedule KH6EEM on 432 this spring and summer.

Those reporting building projects underway in anticipation of scheduling by the time you read this include 500-watt finals at K8AXU and W4ET, Virginia, and K4GL, exW8PT, has a kw. and a 96-element collinear ready in South Carolina.

1296 Mc. was highlighted this month by the e.m.e. efforts of the Crawford Hill V.H.F. Club, W2NFA. At the time of this writing they had arranged at least four schedules for the two-day test period. K6MYC, WB6UAP, K6HCP and K6UQH were organizing a joint effort for a contact with W2NFA using a hybrid WB6IOM amplifier and an 8-foot dish, and K4QIF was hoping to have his 10-foot

(Continued on page 170)

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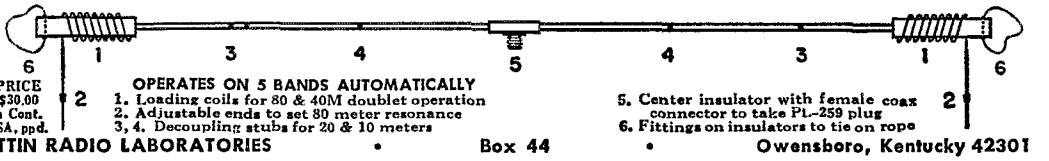

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CM-1½: An intermediate tape, especially for General Class exam study. No instruction; just practice. ½ hr 11 WPM; 1 hr 14 WPM; ½ hr at 17 WPM. Includes coded groups and straight text.

CM-2: For Extra-Class license study. Mostly straight text; some code groups. 1 hour at 20 WPM; ½ hour each at 25 and 30 WPM. For real QRQ, play this tape at twice speed!

CODEMASTER tapes are 2-track monaural; available in two sizes: 7-inch reel (3¾ IPS) and 3¼-inch reel (1⅞ IPS). Will play on any but full-track machine. **SPECIFY both type and size** of tape you want. Any tape, $5.95 postpaid USA 4th class. Any two tapes, $11.00; all three, $15.00 PPD. Immediate delivery. CODEMASTER tapes are made only by Pickering Radio Company. Satisfaction guaranteed. Dealers: inquire.

(Continued from page 168)

dish mounted and fed with 100 watts in time for the test. We hope to have a full report on the results next month, deadline permitting. QST

Multiband Ground-Plane

(Continued from page 18)

ARRL Handbooks) and s.w.r. bridge are connected, and the tuning network adjusted for maximum forward and minimum reflected power. Initially, it will be necessary to determine experimentally whether series or parallel tuning is required for the particular combination of band, feeder length, and antenna length selected.

The tuned-line-fed ground-plane vertical antenna gives excellent performance, can be easily constructed in just a few hours even by a beginner, requires a minimum of installation space and costs less than five dollars, excluding the transmatch and s.w.r. bridge. The tuned circuit of the transmatch provides excellent discrimination against harmonic output from the transmitter. Ease of construction and portability make this antenna an ideal one for Field-Day use.

In case one wonders about the mismatch between the line and the antenna, the secret is in the use of open-wire line. The loss in such a line with an s.w.r. of 25:1, at 10 meters, is less than the loss in RG-58/U when the latter is matched.

How's DX?

(Continued on page 101)

75-meter s.s.b. with KA7AB, VS6DO and 9M2NF right through our jungle QRN. My linear blinks all the camp lights so I hold it down to about 600 watts. Antennas are a 42-ft.-high quad for 10, 15 and 20 meters, and a 60-ft. vertical for 40 and 80 assisted by ten buried radials each about 50 feet long." . . . . . 9Y4VU tells W8IBX his new homebuilt electronic keyer takes two hours to warm up for proper operation. Almost human! . . . . . PZ1CF, according to W3HNK, welcomes Stateside QSOs on 14,332 kc. at 1900–2000 GMT.

HEREABOUTS—"We have eight or ten active OX3 stations up here," assesses OX3DM, teaching at Godthaab. "OX3s are Danish or Greenlanders, OX1s and OX5s are Americans." . . . . . W3HNK says TI2JCC hopes to sign "/2" from Syracuse U. soon, also that KV4EY is going barefoot after popping filters in his linear supply . . . . . "Clearing the frequency of a rare DX station seems to be the problem of the day," comments W2ADP, also mentioning his QSL collection for QSOs with thirteen other ADP-suffixed stations . . . . . Ws 3CER and 4YKH may sign ZF1CP or other Cayman call on 7 and 21 Mc. later next month . . . . . WN1ION, digging for Asia and Oceania, is horrified by the prehistoric phone signals that come drifting and splashing through the 21-Mc. Novice segment . . . . . K7VPF claims a new wet-string antenna DX record after raising two 3A1s and a KH6 . . . . . If you hear K6VVA/7 'twill be Nevada . . . . . Giant-killer K2MFY closed out the old year with 105/85 countries worked/confirmed via his 45-watt Adventurer, dipoles and unipoles. "DXCC this year," vows Ed . . . . . in a frontal attack on the language barrier, WB2ZQE devises friendly conversation pieces in a variety of foreign tongues. We tried this long ago with Spanish and got a QRQ burial by an eager CM6 . . . . . DL8VQ/W2 greets European friends on c.w. from Syracuse these days . . . . . W1WQC finds Navassa isle still officially off limits for DXpeditioners . . . . . The XE2 PBTC batch of U.S. Sixes tuned up in the Test for possible Revilla Gigedos DXcitement . . . . . W6s DOD and KG were selected as co-DXers of the Year by Northern California DX Club cohorts. W6NJU gained like distinction among Southern California DX Club brethren. QST

The Post Office Department promises faster mail service with the new Zip codes. Use yours when you write League Headquarters. Use ours, too. It's 06111.

Getting Rid of L.F. Harmonics

(Continued from page 27)

filters and the feed line. The use of ordinary switches is not feasible because of the danger that harmonics will leak around the switch contacts and reach the antenna. With phono plugs and jacks it takes only a few seconds to change bands.

Half-Wave Filters For Four Bands

The unit shown in the photograph consists of four half-wave filters, one each for 80, 40, 20, and 15 meters. The circuit of Fig. 1 is used for each of the four filters. None is included for 10 meters because for this band a low-pass filter should be used to take care of harmonics falling in the television channels. A low-pass filter for TVI was described in a recent issue of *QST*[3].

A 4 × 5 × 6-inch aluminum Minibox is used to house the filters. Any metal enclosure could be used, such as a chassis with a bottom plate to insure good shielding. Cost of the unit shown was kept low by using plastic pill boxes for coil forms and a single wire size for all coils. We checked with several drug stores and all of them had the boxes in various sizes and shapes (we paid 15 cents for 8 boxes). The ones we used are 1 inch in diameter and 2 inches long. With the exception of the 80-meter coils, the length on each coil is 1 inch. The coils are mounted by drilling a hole in the bottom center of the form and then bolting the coil forms end-to-end on the partition in the Minibox.

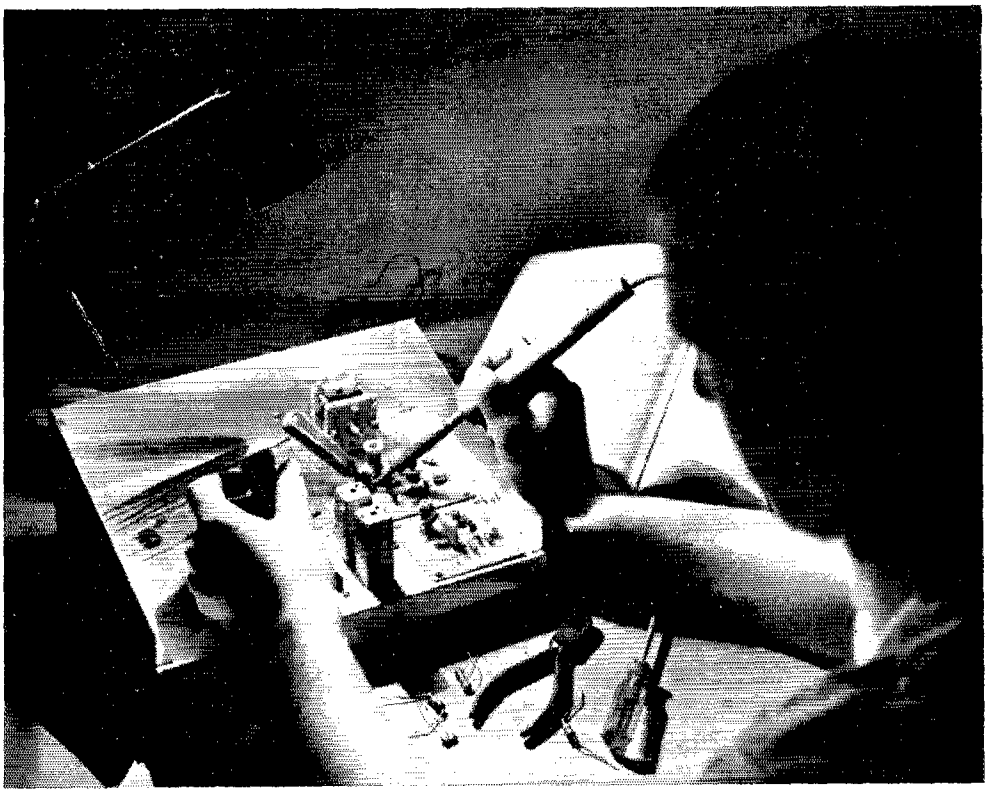
To use the filter, merely open the coax line near the transmitter, install phono plugs on the line, and connect the filter in series with the line. Be sure to change filters when you change bands or you might burn out the capacitors.

The capacitors and coils used in this model will easily handle 75 watts with a maximum s.w.r. of 3 to 1. Some readers may want to build filters for higher power, but unfortunately we don't know of any source of mica capacitors capable of handling higher power, at least without paying an arm and leg for them. For the high-power gang a transmatch is the logical route to follow.

Some Additional Information

Many newcomers have the mistaken idea that a dipole cut for a given band won't radiate harmonics because it is essentially a one-band antenna. This isn't true. *Any* antenna will radiate harmonics. Also, it should be apparent that either trap-type multiband antennas or multiple dipoles with a single feed line make excellent harmonic radiators.

A Novice — or for that matter any higher-class license holder — should always make sure that each stage of his rig is tuned up properly. Never use more than rated driving power on each stage. Always assume that you have harmonics and take steps to keep them from being radiated. If you keep these things in mind you should be able to stay out of trouble with the F.C.C. Equally important, you won't be causing unnecessary interference to other hams. QST



You don't have to be a builder or experimenter. For every DXer or ragchewer there comes a time when he needs some technical answers—to trouble-shoot, modify or just to improve performance. And just to keep up with new developments in amateur radio these days is hard enough.

This is where League membership can pay off many times over. As a member, you get your own copy of QST every month with the best coverage of what is new and important in our art—right now. Your own personal technical information service via ARRL's top technical staff. All this and much more for just $6.50, your annual dues. Can any ham afford not to be a League member?

THE AMERICAN RADIO RELAY LEAGUE, INC.
NEWINGTON, CONNECTICUT 06111

Please enroll me as a member of ARRL. Enclosed is $6.50 (for Canada and the U.S.; $7 elsewhere) to cover my membership dues for one year and twelve issues of QST.

NAME_____ CALL_____

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(Please see other side of this page for list of available League publications.)

I would like the following League publications shipped to me postpaid. I am enclosing payment of $_____. (These prices apply only to the USA.)
Ship to this address:

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- ☐ **ARRL HANDBOOK** $4.00 — The standard comprehensive manual of amateur radiocommunication
- ☐ **UNDERSTANDING AMATEUR RADIO** $2.00 — Written for the beginner—theory and how-to-build it.
- ☐ **VHF MANUAL** $2.00 — A new and thorough treatment of the amateur v.h.f. field
- ☐ **LICENSE MANUAL** 50¢ — Complete text of amateur regs, plus Q&A for amateur exams
- ☐ **HOW TO BECOME A RADIO AMATEUR** $1.00 — All about amateur radio and how to get started
- ☐ **A COURSE IN RADIO FUNDAMENTALS** $1.00 — Use this in conjunction with the Handbook
- ☐ **ANTENNA BOOK** $2.00 — Theory and construction of antennas
- ☐ **SINGLE SIDEBAND FOR THE RADIO AMATEUR** $2.50 — The best s.s.b. articles from QST
- ☐ **THE MOBILE MANUAL** $2.50 — The best mobile articles from QST
- ☐ **HINTS AND KINKS** $1.00 — 300 practical ideas for your hamshack
- ☐ **OPERATING MANUAL** $1.00 — The techniques of operating your amateur station—DXing, ragchewing, traffic, emergencies, etc.

(Please see the other side of this page for an application for membership in ARRL and 12 issues of QST)

THE AMERICAN RADIO RELAY LEAGUE, INC., NEWINGTON, CONN. 06111

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 box number without identifying signature cannot be accepted.
(3) The Ham-Ad rate is 35¢ 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 10¢ per word will apply to advertising which, in our judgment, 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 10¢ 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 35¢ 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.

INVITATION: New York Radio Club invites New York Area hams and SWLs to its regular monthly meetings the second Monday of each month, thru June 1968 at the Hotel George Washington, Lexington Ave. and 23rd Street at 8 P.M. W2ATT, New York Radio Club.

DAYTON Hamvention April 27, 1968: Wampler Arena Center, Dayton, Ohio. Sponsored by Dayton Amateur Radio Association. QSO in person at the nation's foremost radio event of the year. Technical sessions, exhibits, hidden transmitter hunt. Bring the XYL for an outstanding Ladies Program. Join the satisfied participants who return year after year in celebrating Ohio Amateur Radio Week. Watch the Ham Ads for information or write Dayton Hamvention, Box 44, Dayton, Ohio 45401.

BREAKFAST Club Hamfest July 20 and 21, Palmyra, Illinois. Errol Workman, K9CIL.

SPRING Auction of the Rockaway Amateur Radio Club will be held Friday evening April 26, 1968, at 8:00 PM at the American Irish Hall, Beach Channel Drive (at Beach 81st St.), Rockaway Beach. Come to the best auction in the New York area. For detailed directions, write to P.O. Box 205, Rockaway Park, N.Y. 11694. A1, WA2TAQ.

A.W.A. Historical Radio Meet for old time amateur and commercial operators, historians and collectors, Smithsonian, Washington, D.C. Oct. 5th. Write to W2QY, Lincoln Cundall, A.W.A. Treas., for details.

ROCHESTER, N.Y. headquarters again for the big Western New York Hamfest and VHF Conference, Saturday, May 11. For free copy of program of tickets, write P.O. Box 1388, Rochester, N.Y. 14603.

MOTOROLA used FM communication equipment bought and sold. W5BCO, Ralph Hicks, 813B No. Federal Hiway, Fort Lauderdale, Florida.

PRE-WORLD WAR I operators will find many of their old buddies are members of the Old Old Timers Club. Pictures and thumbnail sketches will also appear in the coming Bluebook. We welcome all applicants whose first wireless contact was more than 40 years ago but give special consideration to those pre-World War I Pioneers, including Charter Membership. Write to W5VA, Secretary of the Old Old Timers Club, P. O. Box 840, Corpus Christi, Texas 78403.

TRADE ARRL 1968 Handbook for one of 15 old Handbooks not in W4AA historical library. Need govt. Amateur Callbooks 1922 through 1926, early wireless magazines and catalogs. Wayne Nelson, Concord, N.C. 28025.

TUBES, Diodes and Transistors wanted. Astral Electronics Corp., 150 Miller St., Elizabeth, N.J. 07207.

SELL, swap and buy ancient radio set and parts magazines. Laverty, 118 N. Wycomb, Landsdowne, Penna.

TUBES Wanted. All types higher prices paid. Write or phone Ceco Communications, 120 West 18th St., N.Y. 11, N.Y. Tel: 242-7359.

DUMMY Loads, 1 KW, all-band, $7.95; wired, $12.95. Ham Kits, P. O. Box 175, Cranford, N.J. 07016.

WANTED: 2 to 12 304TL tubes. Callanan, W9AU, 118 S. Clinton, Chicago 6, Ill.

MANUALS for surplus electronics. List 10¢. S. Consalvo, 4905 Roanne Drive, Washington, D.C. 20021.

QSLS?? America's finest!! Large variety samples, 25¢. De-Luxe 35¢. Religious, 25¢. (Refunded). Sakkers, W8DED, Box 218, Holland, Michigan 49423.

QSLS "Brownie" W3CJI, 3111 Lehigh, Allentown, Penna. 18103. Samples 10¢. Catalog 25¢.

QSLS stamp and call brings samples. Eddie Scott, W3CSX, Fairplay, Md.

C. FRITZ—QSLs that you're proud to send, bring greater returns! Samples 25¢ deductible. Box 1684, Scottsdale, Arizona 85252 formerly Joliet, Illinois).

QSLS-SMS. Samples 10¢. Malgo Press, Box 373, M.O., Toledo, Ohio 43601.

DELUXE QSLs Petty, W2HAZ, P.O. Box 5237, Trenton, N.J. 08638. Samples, 10¢.

10¢ Brings free samples. Harry R. Sims, 3227 Missouri Ave., St. Louis, Mo. 63118.

QSL, SWL, cards that are different. Quality Card stock. Samples 10¢. Home Print, 2416 Elmo Ave., Hamilton, Ohio 45015.

CREATIVE QSL Cards. Personal attention. Imaginative new designs. Send 25¢. Receive catalog, samples, and 50¢ refund coupon. Wilkins Printing, Box 787-1, Atascadero, Calif. 93422.

RUBBER Stamps $1.15 includes tax and postage. Clints' Radio, W2UDO, 32 Cumberland Ave., Verona, N.J. 07044.

QSLS, finest YLRL's, OMs samples 10¢. W2DJH Press, Warrensburg, N.Y. 12885.

QSLS. Professional, neat. 10¢. Filmcrafters, Box 304, Martins Ferry, Ohio 43935.

QSLS, SWLS, XYL-OMS (sample assortment approximately 9¢) covering designing, planning, printing, arranging, mailing, eye-catching comic, sedate, fabulous, DX-attractive, prototypal, snazzy, unparagoned cards (Wow!) Rogers KØAAB, 961 Arcade St., St. Paul, Minn. 55106.

3-D QSL cards, recognized leader among raised designs. Compliments aplenty! Prized collector's item. Samples 25¢ (refundable). 3-D QSL Co., Monson, Mass. 01057.

QSLS, SWLS, WPE. Samples 15¢ in adv. Nicholas & Son Printery, P.O. Box 11184, Phoenix, Ariz. 85017.

QSLS 300 for $4.35, samples 10¢. W9SKR, George Vesely, Rte. #1, 100 Wilson Road, Ingleside, Ill. 60041.

QSLS 3-color glossy 100, $4.50. Rutgers Vari-Typing Service, QSLS's. Free samples, attractive designs. Fast return. W7IIZ

QSLS-100 3-color glossy $3.00; silver globe on front, report form on back. Free samples. Rusprint, Box 7575, Kansas City, Mo. 64116.

ORIGINAL EZ-IN double holders display 20 cards each in plastic, 3 for $1.00 or 10 for $3.00 prepaid and guaranteed. Free sample to Dealers or Clubs. Tepabco, John, K4NMT, Box 198T, Gallatin, Tenn. 37066.

QSLS: 3-color glossy: 200, $6.99 postpaid. Samples, 10¢. Gates Print, 317 11th Avenue, Juniata, Altoona, Penna. 16601.

QSLS's: Quality with service. Samples free. R. A. Larson Press, Box 45, Fairport, N.Y. 14450.

QSLS's. Free samples, attractive designs. Fast return. W7IIZ Press, Box 2387, Eugene, Ore. 97402.

QSLS. Kromkote glossy 2 & 3 colors, attractive, distinctive, different. Choice of colors 100-$3.00 up. Samples 15¢. Agent for Call-D-Cals. K2VOB Press, 240 West Kinney St., Newark, New Jersey 07103.

QSLS Glossy coated, 100, $2.00. 3 and 4 colors. Samples, dime. Bob Garra, Leighton, Penna. 18235.

PICTURE QSL Cards for your shack, etc. Made from your photograph 1000 $14.50. Also unusual non-picture designs. Samples 20¢. Raum's, 4154 Fifth St., Philadelphia, Penna. 9140.

QSLS by K1FF, $2.00 for 100. Others at reasonable prices. Samples 25¢ deductible. K1FF QSLS, Box 33, Melrose Highlands, Mass. 03177.

QSLS. Gorgeous rainbows, cartoons, etc. Top quality! Low prices! Samples 10¢ refundable. Joe Harms. WA4FJE/W3COP, 905 Fernald, Edgewater, Fla. 32032.

EXCLUSIVE QSLS. Picture, custom, standard. Over 250 styles available. Samples dime. K1NCZ Press, 535 Walpole St., Dept. C, Norwood, Massachusetts 02062.

RAISED Lettering QSLs. Ace Printing, 6801 Clark Ave., Cleveland, Ohio 44102.

QSLS by Jansen, K2HVN, samples 25¢. 860 Atlantic St., Lindenhurst, New York 11757.

QSLS, samples, 20¢. Fred Leyden, W1NCZ, 454 Proctor Ave., Revere, Massachusetts 02151.

RUBBER Stamps. Return mail delivery, postpaid. Basic price, $1.00 first line, 50¢ each additional line. Request type style chart. Fulton Rubber Stamps, Route 216-A, Fulton, Maryland 20759.

QSL Free Samples. CBM Printers, 5161 N. Hopkins, Milwaukee, Wisconsin 53209.

QSL cards. Finest quality. Economical prices. Fast service. Free samples. Little Print Shop, Drawer 9848, Austin, Texas 78757.

HUNDRED QSLs, $1.25 and up, postpaid. Samples, dime. Holland, R3, Box 649, Duluth, Minn. 55803.

RUBBER Stamps, 3-line address $1.50. J. P. Maguire Company, 448 Proctor Avenue, Revere, Massachusetts 02151.

CANADIANS: Motorola two-meter repeater 50 watts AN/TRC 34-20X20X16 with two receivers. $160.00. VE2AJP, 8740 Notaire Girard, Montreal 38, Que. P., Canada.

CANADIANS! Hallicrafters mobile supply PS-150-12DC, $99.00. MR-150 mount, $30.00. VE6GN, 49 Holland St., Calgary, Alta., Canada.

SELL: Heathkit SB300E with all filters, plus speaker U.S. $230.00; SB-400E, U.S. $315.00. Both together for U.S. $500. VE2AJQ, 1150 Sherbrooke St. E., #601, Montreal, P.Q., Canada.

HAM'S Spanish-English manual $3.00 Ppd. Gabriel, K4BZY, 1329 N.E. 4th Ave., Fort Lauderdale, Florida 33304.

TUBES, test equipment, transmitters or receivers. Any and all types bought for cash or trade on new or used ham gear. Air Ground Electronics, 64 Grand Place, Kearny, New Jersey 07032.

1916 QSTS needed for personal collection. Price secondary. Ted Dames, W2KUW, 308 Hickory Street, Arlington, New Jersey 07032.

FOR Sale: SB-101 and SB-200. Wanted, kits to wire. Heath preferred. 12% of cost, some in stock. Professionally wired. Lan Richter, K3SUN, 131 Florence Drive, Harrisburg, Penna. 17112.

WE buy all types of tubes for cash, especially Eimac, subject to our test. Maritime International Co., Box 516, Hempstead, N.Y.

SUMMER Camp ham radio instructor wanted, at top N.H. boys' camp. Counsellor and instructor age 19 + . Must have General license or higher. We have complete equipment for training and operation. Write to Camp Cody, 99 Park Avenue, New York City 10016. Tel: (203)-226-4389.

JOYSTICK Variable frequency antenna systems solve space problems. Available immediately. SWL Guide, 218-S Gifford, Syracuse, N.Y. 13202.

CASH Paid for your unused Tubes and good Ham and Commercial equipment. Send list to Barry, W2LNI, Barry Electronics, 512 Broadway, N.Y., N.Y. 10012. Tel: (212) WAlker 5-7003.

GOODIES. Cash for Teletypewriters, parts. List. Typetronics, Box 8873, Ft. Lauderdale, Fla. 33312.

WANTED: Tubes and all aircraft and ground radios. Units like 17L, 51X, 618T or S. R388, R390, GRC. Any 51 series Collins unit. Test equipment, everything. URM, ARM, GRM, etc. Best offer paid. 22 years of fair dealing. Ted Dames Co., 308 Hickory St., Arlington, New Jersey 07032.

HAM Discount House. Latest amateur equipment. Factory sealed cartons. Send self-addressed stamped envelope for lowest quotation on your needs. HDH Sales Co., 170 Lockwood Ave., Stamford, Conn. 06902.

INTERESTING Sample copy free. Write: "The Ham Trader." Sycamore, Illinois 60178.

WANTED: For personal collection: Learning the Radiotelegraph Code, Edition 4; How to Become a Radio Amateur, Edition 9; The Radio Amateur's License Manual, Edition 2, 11, 12. W1CUT, 18 Mohawk Dr., Unionville, Conn. 06085.

RTTY gear for sale. List issued monthly, 88 or 44 Mhy toroids, five for $1.50 postpaid. Elliott Buchanan & Assoc., Inc. Buck, W6PVC, 1057 Mandana Blvd., Oakland, Calif. 94610.

WANTED: Tubes, all types, write or phone Bill Salerno, W2ONV, 243 Harrison Avenue, Garfield, N.J., Tel: GArfield Area code (201)-773-3320.

WE'RE Trying to complete our collection of Callbooks at Headquarters. Anyone have extra copies of Government Callbooks 1922-1925 and Radio Amateur Callbooks 1928-1934? ARRL, 225 Main St., Newington, Conn. 06111.

TUBES, test equipment, transmitters or receivers. Any and all types bought for cash or trade on new or used ham gear. Air Ground Electronics, 64 Grand Place, Kearny, New Jersey 07032.

WANTED: Model 28 Teletype equipment. R-388, R-390A. Cash or trade for new amateur equipment. Alltronics-Howard Co., Box 19, Boston, Mass. 02101.

SELL: CQ, QST. Handbooks, old radio magazines, any quantity. Buy old radio gear and publications. Erv Rasmussen, 164 Lowell, Redwood City, Calif. 94062.

NOVICE Crystals: 40-15M, $1.33, 80M, $1.83. Free list. Nat Stinnette, Umatilla, Fla. 32784.

TOROIDS, 88 mh uncased, 5/$2.50. Postpaid. Humphrey, WA6FKN, Box 34, Dixon, Calif.

WANTED: Military and commercial laboratory test equipment. Electronicraft, Box 13, Binghamton, N.Y. 13902.

SAVE On all makes of new and used equipment. Write or call Bob Grimes, 89 Aspen Road, Swampscott, Massachusetts. 617-598-2530 for the gear u want at the prices u want to pay.

MICHIGAN Hams! Amateur supplies, standard brands. Store hours 0830 to 1730 Monday through Saturday. Roy J. Purchase, W8RP. Purchase Radio Supply, 327 E. Hoover St., Ann Arbor, Michigan 48104, Tel. NOrmandy 8-8262.

RTTY Channel filters, octal mounted, 2125/2975, $5.95 pair. Special filters for TT/L-2. SASE for information. 88 Mh. toroids, uncased, 5 for $2.50. Herman Zachry, WA6JGI, 3232 Selby Ave., Los Angeles, Calif. 90034.

TOQOOBES. Tranzeesters. New, guaranteed. 6CW4, $1.40; 811A, $4.25; 6146B, $4.00; 6146A, $2.55. Also transistors. Write needs. Free catalog. Note new address. Vanbar Distributors, POB 91-Z, Paramus, N.J. 07652.

WANT: Gianinni Microtorque potentiometers. Must be linear taper. Thompson, 5 Palmer, Gorham, N.H. 03102.

CLEARWATER, Florida 33516. Save on new Galaxy MK-2 with AC-400. Richard Leis, W4UHO, 1300 Milton St.

TR-4, $480.00; AC-4, $83.00; DC-3, $123.00; R4-B, $360.00; T4-XB, $360.00; MX-4, $17.50; RV4, $83.00; L-4B, $580.00; W-4, $43.00; factory-sealed boxes, fully guaranteed. Mel Palmer, K4LGR, Box 10021, Greensboro, N.C. 27404. Tel: 919-299-8767.

WANTED: Military, Commercial, Surplus, Airborne, Ground, Transmitters, Receivers, Testsets, Accessories. Specially Collins. We pay cash and freight, Rifco Electronics, Box 156-Q345, Annandale, Virginia 2203. Phone 703-569-5480 collect.

HQ-100 Hammarlund receiver. In excint condx. $75.00. R. Will, 1900 Chicago, Minneapolis, Minn. 55407.

GOVERNMENT Amateur Callbook for 1924 wanted. K2NP, 926 Woodgate Ave., Elberon, N.J. 07740.

WANTED: Parabolic dish for radio astronomy and 1215 moonbounce. Bill, WA9PWR, 509 Fifteenth Ave., Green Bay, Wis. 54303.

FOR Sale: Make offer in your 1st letter: Johnson T-R switch 250-39; DB 20 Preselector; BC-348R, 24 hour clock, Precision sig. gen. E-200, Sylvania CRT 5BP1, Century tube-tester SS-1, Hallicrafters SX-42, Knight xmtr 50W, Heath Kits, Audio gen. HG-8, RF gen. SG-8, capac. tester CT-1, linearity pattern gen. LP-1, Eico 'scope 460, 'scope 425, Modulator 730, battery eliminator 1050, sig. gen. 377, tube-tester 625. W2UGM, 66 Columbus Ave., Closter, New Jersey, 07624. Call 201-768-1884.

1000 PIV @ 1.5 amp. epoxy diodes, includes by-pass capacitors and resistors. 10 for $3.75 ppd U.S.A. Fully guaranteed. East Coast Electronics, 123rd St. Boniface Road, Cheektowaga, N.Y. 14225.

ESTATE Liquidation. SSAE brings list quality equipment. Paradd Engineering, 284 Route 10, Dover, N.J. 07801.

VIKING 500, in excint condx, spare 4-250, manuals. Will ship c.o.d. guaranteed no bugs: $195.00. NC-303, like new condx. Just aligned. Ship c.o.d. New tubes, manual, $195.00. Ham-M rotor, used one year, complete. Ship c.o.d. $50.00. New Eimac 4-400, $20.00. Never used. L. D. McCreary, 319 College, Franklin, Ky. 42134.

WANTED: Commercial and Military Test Equipment, Waveguide and Coaxial Components by Hewlett-Packard, Tektronix, General Radio, Measurements, and others. Tucker Electronics Company, Box 1050, Garland, Texas 75040.

NEED 500 microsecond sonic on magnetic delay line or what have you? Louis Patla, 1357 Ocean, Santa Monica, California 90401.

WANT KWS-1 and/or 75A-4. Must be in excellent shape. KWS-1 must also be over serial number 1200. Also want SC-201. Name price. Henry, WB2CNA. Tel: 201-327-9090.

2-METERS. Plate modulated 500 watts, $125.00. Tweer, $30.00. Gonset III, $140.00. K1MBA, John Templeton, 49 Saw Mill Dr., Wallingford, Conn. 06492.

COLLINS 75A-4 with .5/2.1/3 filters and Panadapter, $450.00: 75A-3 with .8/3 filters $250; Valiant f/w $145, HA-1 and siamese paddle, $50.00, Dumont 'scope, $35.00. KW linear with spare 813s, manual, etc, $125.00. All guaranteed, F.o.b. Cincinnati. College forces sale. Malcolm Montgomery, 3414 Telford Street, Apt. 1, Cincinnati, Ohio 45220. Tel: 513-281-1046.

MY Drake 2B for sale: $160. Lampkin 105-B freq. meter, $210.00. A. L. Albright, 1524 Dean St., Sulphur, La. 70663.

HAMMARLUND SPC-10 wanted. W2ADD.

CLEGG 22'er, $180.00. WA5HTS.

SX-100 for sale, in excellent condx, for SSB, AM and c.w. reception. First $175.00 takes it. W2TIW, phone: 201-796-2936. O-52 28th St., Fair Lawn, N.J. 07410.

CLEANING House: Perfect Drake TR-3 with AC-3, $365.00: Gonset GSB201 linear, modified for transceiver use, a real bomb, $180.00: New 4-400A in carton, $12.50: pair of new 7843s with new Johnson sockets. Complete, $21.00. P&H Model AFC-2 compressor, built-in supply. Switchable three position audio filter, like new, cost $55.00. Sell for $15.00. Pair of new 3-400Zs, $25.00 each. DC supply for Heath compact linear, only 10 hours use, $69.00. Money-back guarantee; all items freight paid in USA. Jack Yeoman, W8VHY, RR #4, Washington C.H., Ohio 43160.

FSK Info wanted for Swan 500. Also, RTTY converter, RTTY transmitter. W1CNY, 228 Hickory Hill Lane, Newington, Conn. 06111.

ESTATE liquidation of W9FEH: Hammarlund HQ-145X w/spkr, Ranger I, Johnson Courier linear, Stanoor battery charger No. 132, Eico VTVM 555, Hickok tube checker 51X, Mosley V-4-6, QSTs 1945 to 1966, COs 1947 to 1954. Xtals, meters, tubes, and capacitors. SASE for list. All reasonable offers considered. Write Mrs. E. J. Gerard, 1521 S. Dixon Road, Kokomo, Ind. 46901 or tel: (317)-452-1761.

TR-3 and AC-3 supply, $400.00; 75S-1 with Waters notch-filter, $290.00: Heath SB-200, $175.00. All in perfect condition. Bill McCord, WA9NKI, 246 1/2 Carroll St., Hammond, Ind. 46320.

SALE: Hammarlund HQ-180, $275.00; Heath MT-1 Cheyenne, $45.00; HP-10 mobile supply, $15.00; HP-20 AC supply, $25.00; Viking II, $75.00: Hallicrafters HA-5 VFO, $30.00. C. H. Willard W2EZB, 110 Winchester Dr., New Hartford, N.Y. 13413.

GLOBE Scout 680-A, good condition, $35.00; vertical antenna 80-6 meter, 23 ft., $15.00; first check takes it. Tel: (614)-451-8870. Dave Gibb, 2171 Pinebrook, Columbus, Ohio 43221.

FOR Sale: 75A4, serial 4190, .5, 2.1, 3.1 filters with SB-610, $475.00. HT-37, 3 xtals full 10 mtr. coverage, $250. B&W L1000A linear with input tuned ckts. $175.00. HX-20, HR-20, HP-20 plus mobile mike: $250.00. Joseph Soroka, Jr., W3LGD, P.O. Box 88, Irwin, Penna. 15642.

FOR Sale: Model 19 RTTY with w/TD: 2 high-voltage A66/p.s., 500 w/modulator, with 6 ft. rack. Tel: (518)-877-5787, K1LAG.

GLOBE 6 and 2 meter tranmsitter, $85.00; 2 meter converter $25.00; 6 meter beam, $12.00; B&W 5100-B transmitter, $115.00; Lafayette HA-225 receiver, 80 to 6 meters, $80.00. Bruce, 80-42 250th St., Bellerose, L.I., N.Y. 11426.

FOR Sale: Heath TX-1, $165.00; HO-140X with speaker, $125.00; xtal mike with stand, $6.00. Vibroplex Original $15.00; operating desk for above, $20.00. $300 takes all. Pete Steensma, WA2LMP, 321 Sunset Blvd., Wyckoff, New Jersey 07481.

WANTED: License Holder (as on ARRL License Manual) and an inexpensive "bug." John Ross, WNØSTQ, 845 W. 57 St., Kansas City, Missouri 64113.

QSTs, March 1927 through 1960. Complete run, in binders. Excint condx. Make offer. Mrs. Sylvia Allen, 5300 Fifth Avenue, Apt. C2, Pittsburgh, Penna. 15232.

RECEIVER: Hammarlund HQ-100C, with clock. Mint condition. Worth $185.00 new. Asking $95.00. Dr. M. L. Turoff, 36 Timer Mill Road, Stamford, Conn. 06903.

QRP Xmtr wanted. (Abt. 5 watts) and miniature receiver must be battery powered. WB6VUS. 3128 Camino Avenue, Hacienda Heights, Calif. 91745.

SALE: Bound QSTs 1958 thru 1966. Red binding, gold markings. Advertising and miscellaneous removed. Front covers retained. $4.00 each. Lot for $35.00. Unbound 1967 for $2.00. W5LZL. 500 Cliffside Drive, Richardson, Texas 75080.

PROP Pitch rotors, brand new, small 10:000:1. $45.00. John Link, 1081 Aron St., Coca, Fla. 32922.

WRL's used gear has trial-guarantee-terms. SB300, $249.95; SSR, $399.95; 75S1, $299.95; Apache, $99.95; HA10, $189.95; SX-99 $89.95; G-76, $79.95; 910A, $209.95; Thor VI and AC, $149.95; HW12, $89.95; HW32, $89.95. New lower prices on hundreds more. Free "Blue Book" listing. WRL, Box 919, Council Bluffs, Iowa 51501.

RADIO Shack transistor regulated d.c. supply 0-20 volts metered, $12.00; Knight C-577 audio compressor, wired. A must for trans with no ALC, $15.00; Four Cetron 572B/T160Ls, used about 10 hours at ½ rated voltage, $48.00; Two 811As bought surplus for spares. Tested but never used, $2.50 each, 2 coax ant. relays 115 v.a.c. with extra external spdt. $8.00 each. Above guaranteed new condition. Mail m.o. or certif. check, add extra for post, insurance. Will refund difference. Also have heavi-duty hi-voltage supply tapped 2200, 2600 v.d.c. in rack panel. $45.00 local. Will deliver up to 150 miles north of Boston, $5.00 ext. W1JGJ, J. Haskell, Jr., 25 Whitney St., Saugus, Mass. 01906.

COMPLETE Station, Swan 350 transceiver/power pack, Turner microphone, used 4 months. Hornet Tribander beam AR-22 rotor, both new, 100 ft. coax, $325.00. R. Moulik, K9ZIA, 2230 S. Clinton Ave., Berwyn, Ill. 60402. Tel: GU4-4457.

WANTED: KWM-2 late model, in mint condition, mobile supply, and mount. Russell Hobert, 520 Homestead Ave., Mt. Vernon, New York 10550.

SELL: Eico 753 transceiver (solid state VFO) and 751 AC power supply, $175.00. Byron Crawford, 725 Woodhaven, Baton Rouge, La. 70815.

T-O Keyer, Model HA-1, $50.00; Autronic Key, $10.00; both are in mint condition. WA8RPC, Terry Minsel, 916 Wilhelm St., Defiance, Ohio 43512.

WANTED: Hallicrafters HA-6 transverter. Please include price and condition in your first letter. K9KFR, Robert Johnson, 5230 Forest Ave, Fort Wayne, Ind. 46805.

TWO Meter SSB. Gonset GSB-2 SSB Communict Communicator 900B with 901A a.c. power supply. Three months old. $315.00 F.o.b. W9OEO. Box 25, Mokena, Ill. 60448.

HALLICRAFTERS HT-32, $240.00; SX-101A receiver, $185.00; SR-160 with PS-150, $235.00; Eico 753/751, $150.00. All are in mint condition. List of others available. W2FNT, 18 Hillcrest Terrace, Linden, N.J. 07036. Tel: 201-486-6917.

WANTED: "Radiotelegraph Key" tie clip (was RCA advertising gift). Price and condition? W2ML, 42 Prescott, Garden City, N.Y. 11535.

WANTED: Drake 2-LF low frequency converter for Drake 2-C receiver. Write WAØPMR, Steven Schmidt, RR #3, New Ulm, Minn. 56073.

400-B Globe King, very clean, manual and spares, $100 or best offer. Elliott, K6ILM, 835 Valencia St., San Francisco, 94110.

SELL Swan 350, in excellent condition. $350.00 Dr. Patrick, Box 100, Caldwell, Idaho 83605.

SELL: Collins mechanical filter FL-1 part 526933700 for 32-S1 Exciter, $35.00; also 500-cycle filter for 75S-1 receiver, $15.00. K6RWO, 2423 Daventry Road, Riverside, Calif. 92506.

SWAN 500 and 117XC: like new. Used about 20 hours. In original cartons. Sell as package, $500.00 or best offer. Steve Zumbrun, K9YTL, 11 Kessler Blvd., West Drive, Indianapolis, Indiana 46208.

WANTED: Collins 30S-1 linear. Give number, year, condition and price. Bunge, Box 4099, Tucson, Arizona 85717. Tel: 296-6466.

TX-62 9 months old, $85.00; Ameco 2 mtr. conv. w/p.s., CN144k, $25.00; 1 kw. amplifier 4-811A, 2500v p/supply, $75.00. Norman C. Smith, WIZWC, RR #1 Town Farm Road, New Milford, Conn. 06776. Tel: 203-354-5460.

75A4 for sale. In excellent condition: $395.00. N. Konos, W1LMP, 8½ Summit Avenue, Salem, Mass. 01970.

SALE: X-10 crystal calibrator, $8.00; Dow-Key coaxial antenna relay DK-60G2C, $18.00; Ameco c.w. oscillator-monitor, $4.00. All for $25.00. WB4FJO, Sherm, 1509 Carolina, Kingsport, Tenn. 37664.

WANTED to buy: Gud clean Collins 51J4 or 51S1 receiver. Bob Anderson, W1LBA, 428 Central Ave., Milton, Mass. 02186.

SELL: QST 1935-1965 run. Four for $1.10. 1935-36-37-38-39-40 bound, each year $5.00. Also have duplicate copies. W1KMN, Hugo Eckman, 9 Blaine Avenue, Augusta, Maine.

SELL: Hallicrafters Hurricane SR-2000 transceiver, factory-sealed, unopened cartons. Sorry, reason for selling this beautiful professional equipment: illness. $1300, or your offers. E. Grieco P.O. Box 549, Meriden, Conn. 06450.

SELL: Best offer: Heathkit Mohawk receiver RX-1 with speaker, crystal calibrator, and manual. Factory aligned. 10-160M including SSB. 2-6m capability with converter. Like new. J. A. Kuzneski, 3 Concord Drive, Middletown, Rhode Island. 02840. Tel: 401-847-5410.

DRAKE R-4A, T-4X, AC-3, MS-2, Turner mike, practically new original cartons. Shipped collect for $750.00. W5IUW, Box 2, Wylie, Texas 75098.

FOR Sale: National NC-303 receiver, in excellent condition. $150.00 F.o.b. Gary, Indiana. Joseph Kujawik, 2249 Crest Road, Gary, Indiana 46408. Phone 8873845.

MOVING into an apartment, Selling SX-111 with speaker, $160.00; HT-41 amplifier, $175.00; Ham-M rotor with cable, $90.00. Presentation key, $25.00. Call C. L. James Kirek, 203-521-6008. 98 Riggs Avenue, West Hartford, Conn. 06107.

EXCELLENT F/W Ranger, PTT, $100; mint condx Dow-Key DK-60-G2C (115 VAC) coaxial relay, $9.00; Collins F-455-60 (6 Kc mech. filter/75A-4), $40.00; immaculate RME DR-23 Preselector, all new tubes, $28.00; 10 M Wonder Bar B&W coil, $8.00. Ship ur cost. W7GXC, 414 Fountain Circle, Murray, Utah 84107.

SAVE: Spring sale. Swan 500 and 117XC, $489.90; Galaxy V Mk 2 and AC-4, $439.90; D.C. 3, $88.00; Drake TR-4, AC4 and MS-4, $599.00; T4X or R4A, $315.00; T4XB or r4B, $365.00 each. Used T4X or R4A, $279.00; used NCL-2000 (new tubes), $369.90; Drake L4B, $589.90; Drake MN4, $65.00; Ham-M, $95.00; Mosley TA-33, $98.00; Hy-Gain TH3-MK2, $95.00; RG/8-U 10¢ ft. with purchase of any beam. Poly quads, 15% off list. Save on our Dayton *ARRL* Handbook Special. New ARRL Handbooks, $2.95. See "U-All" at the Dayton Hamfest, Ham's Best in the Midwest. Evansville Amateur Radio Supply, 1629 S. Kentucky Ave., Evansville, Indiana 44174. Wm. Ogg, WA9RMO.

SELL: Two unused 4-400As, $15.00 each. Jennings 20-750 uufd, 10000V vacuum variable, $10.00. Make your own drive. Four Jennings 50 uufd 10000 fixed vacuum capacitors, $2.00. All items F.o.b. Martin Peterson, 1311 West 5th St., Winona, Minn. 55987.

SELL Or swap: Vintage de Forest D-12, Freshman Masterpiece, Atwater-Kent Model 40 receivers. For interesting ignition model engines. Offers to R. O. Knutson, 1000 23rd Ave. SW, Austin, Minnesota 55912.

WANTED: History of W2CT. Need information about Awards, activities, etc., of previous licensees. Will deal for QSL cards or equipment. F. S. Wilcox, 2607 Broadview Dr., Yorktown Heights, N.Y. 10598. Tel: 914-245-4120.

COLLINS 75A-4 and KWS-1, in excellent condition; 0.5, 2.1 and 3.1 Kc filters, spare pair 4-250Bs. For sale at $1000. W6RTG, 1800 W. First St., San Pedro, Calif. 90732, fone 832-5227.

SWAP BC-221 with power supply delivered for new Skymaster 2-element Tri-E Fiberglass quad kit delivered. WA5-ENP, 218 Karen Drive, Lafayette, La. 70501.

WANTED: Borrow or buy Ranger I assembly manuals. WA4-QPN, R. Kump, 341 W. Blue Heron Blvd., Riviera Beach, Fla. 33404.

R-100A Knight rcvr. In excint condx. $50.00. WAØNSY, Mark Meyer, 1613 Highland Court, Rapid City, South Dakota 57451.

WANTED: Collins CC-2, CC-3 carrying cases, 136B-2 noise blanker. Heinlein, 107 Wyoming, Boulder City, Nevada 89005.

WANTED: Polycomm two meter transceiver. Joe Birenbaum, K1QFN, 309 Ocean Avenue, New London, Conn. 06320.

SX-111, in excint shape: $125.00 or your best offer. WA9-OMD.

SELL: HW-22A and AC power supply. Professionally wired. W2IRX, tel: GE9-4504.

NCX-3 plus NCX-A p/s. In original cartons. $255. K2OSA, 249 E. Shore Drive, Massapequa, L.I., N.Y. 11758. Tel: 516-541-1322.

SWAP: In mint condx, NCX-3: Heath GW-14 CB for Hi-Band FM gear. WØRSA, 519 Brown, Pueblo, Colorado 81005.

JOHNSON Thunderbolt linear 2 Kw PEP, $230.00; Hallicrafters Panadapton SP-44, $15.00 F.o.b. Ed Kuligowski, 63 Connecticut Ave., Massapequa, L.I., N.Y. 11758. Tel: 516-541-3172.

FOR Sale: Lafayette HA-350 receiver, DX-60 xmtr, Hy-Gain 80-10 vertical trap. All in gud condx. Will ship. First $200 m.o. takes it. WA9QMY, RR #2, Box 34-A, Berne, Ind. 46711.

WANTED: Johnson Model 240-305 SSB adaptor. Advise condition and desired price in your first letter. A. Corrado, 208 Second Street, Hood River, Oregon 97031.

COLLINS 75A4, in mint condx. Late serial number, with vernier dial and 2.1, 3.1, 6 kc. mechanical filters. $425.00. K1HNO, Stewart Mitchell, 104 TeaTicket Path, Teaticket, Mass. 02536. Tel: 617-548-5671.

SWAP: Want: Have two Collins R388s in excint condx, for one R390A or R391 in same condx. Need: Collins PTO #70HIZ. Inquiry or offers invited. P. F. Collins, K9BNJ, tel: A317-4526662.

COLLINS KWM-2, 30L1, 312B5, F2, MP-1, mike, 351D-2, T-O keyer, MM-2 RF analyzer, new Webster Bandspanner and mount, Ham-M rotor, Hy-Gain 3-band beam and field-strength meter. For sale. Mint condx, original cartons. F.o.b. $1500 complete, or will sell individually. Paul Jacokes, 618 Hammond St., Durham, N.C. 27704. K4RSI.

COLLINS 75A-4 Serial 4213. Clean and in original packing. $400. No modifications. Ivan Fry, 202 W. High St., Minerva, Ohio 44657.

HEATH DX60A, HR10, and GH10B, perfect condition. $125.00. WB6VUS, 3128 Camino Ave., Hacienda Heights, Calif. 91745.

WANTED Grebe CR18. Keith Olson, W7FS, Star Rte. 1, Box 398, Belfair, Wash. 98528.

CERTIFICATE will be issued by Henry Ford Museum to any station that works the Motor City Radio Club station, W8MRM, during the 24 hours prior to the Old Timers Night banquet. Work W8MRM on May 4 (GMT) on or near 3.663, 3.900, 7.070, 14.300, 50.178, 145.350, or 146.96 Mc. QSL for certificate. Peter Tippett, WA8VIF, Secretary, Motor City Radio Club, Greenfield Village, Dearborn, Michigan 48124. (Novice contacts by schedule.)

WE have buyers for used ham gear, Collins, Drake, Swan, WRL, Hallicrafters, Hammarlund, National, Johnson, SBE, etc. Let us sell your used ham gear for you. Write Ken, WØZCN, Electronic Engineering & Equipment, 1028 Central Ave., Fort Dodge, Iowa 50502.

CHRISTIAN Ham Fellowship now being organized for licensed amateurs for the purpose of Christian fellowship and distributing gospel tracts among amateurs all over the world. Christian Ham Callbook, $1 donation. Free details by writing to Christian Ham Fellowship, 5857 Lakeshore Drive, Holland, Michigan 49423. (Request free folder "Twice-born Hams".)

FOR Sale: Homebrew 20-meter SSB exciter with linear, $50.00; Drake 1A rcvr, in mint condx, $130.00. Globe xmtr and VFO, $40.00. K2MGR, "Kurt," 203 9th St., Hicksville, N.Y. 11801. Call (516)-WE1-6033 after 4:30 PM.

COLLECTORS: First time offered: 262 issues QSTs dating from 1923; 143 CQs dating from 1945. Many other old items. Books, parts, etc. Send for complete list. L. S. Comyns, 10067 Pico Vista Rd., Downey, Calif. 90240.

WENT SSB. Valiant, $135. NC-125, $50.00. New 4-1000, $45.00; Shure 515 mike, $25.00. New Dow-Key relay, $11.00. W1BNH, 8 Peach Highlands, Marblehead, Mass. 01945.

HALLICRAFTERS SX-146 receiver, excellent condition, $140.00. Will deliver to 100 miles radius. T. Rustick, 48 Emerson Road, Clark, N.J. 07066.

HALLICRAFTERS S-40 receiver, gud cond, $49.00. Richard Demaret, 6451 Spring Terrace, Falls Church, Virginia 22042.

SELL OSTs 1954 thru 1960. Best offer. F.o.b. W8KQE, 23515 Drake Road, Bedford, Ohio 44146.

SELL: Ranger II, $125.00. W2DTE, 29-29 213 Street, Bayside, L.I., N.Y. 11360.

SB-34 with calibrator, mike, mobile mounting plate. Also RL Drake W-4 directional wattmeter. Nearly new. Must Sell! Best first offer received! W4EXP, Ike Lee, P.O. Box 486, Orange Park, Fla. 32073.

DX-60, $60.00; HR10, $50.00; HG10, $30.00. All in like-new condx. W. N. Giles, 128 Manor St., Roanoke, Va. 24019.

GREBE CR8 wanted. Please state condition and price. Also tubular audiotron double filament tube, burned out filaments OK. W7EH, Lee Faber, 4348 East Palo Verde Dr., Phoenix, Arizona 85018.

E-Z Way 41-ft. galvanized tower. Ham-M rotor. Hy-Gain Model TH-3 antenna. Total price: $250.00. Herb Foster, W2ELQ. Tel: 201-962-4167, 67 Catherine Court, Ringwood, N.J. 07456.

NOVICE station: $70.00. New Conar 3-band receiver, factory aligned; matching 25-watt transmitter, key, crystal. Tel: 937-0314. Ronald Polk, 3121 W. Lane, Phoenix, Arizona 85021.

NATIONAL NCX-5 Mk II with NCX-A AC power supply console. Perfect salesman's sample. $500. Will finance. K4AFT, Gwynn, Va. 23066.

WANTED: Swan 350 or 500. Complete with 110v, AC supp, and spkr in A-1 shape, or an SSB transciever equivalent, A-1 shape. Fairly priced. W3PFD, 2025 7th Ave., Beaver Falls, Penna. 15010.

FOR Sale: Hallicrafters HT-32A transmitter, $250.00; Hallicrafters SX-101A receiver, $175.00. Late models in as new condition, very stable and reliable. No trades. Prices f.o.b. E. V. Hicks, K4HJE, 817 Charles Drive, Greensboro, N.C. 27410.

SONY Transistor TV camera, video output, $150.00; Collins KWM-1 with a.c. supply, DX adapter, noise blanker and speaker. All like new condx: $400. Needs: 75A-4. Write W2PNT, Richard Roos, 136-66 71 Rd., Flushing, L.I., N.Y. 11367.

FOR Sale: Quadruplex Mark II radio control set with servos and batteries. WA3FBP, 206 Cecil Ave., West Lawn, Penna. 19609.

COLLINS 75S3B mint condition: $450.00. W6FEX, 4900 La Calandria Way, Los Angeles, Calif. 90032. Tel: 222-2551 evenings.

ART-13 w/AC power supply of 3400 v. CT @ .400a. All other AC-DC voltages, filters, conds. All you need for top quality linear. $50.00. F.o.b. W6RTD, 31 Celine Dr., Santa Barbara, Calif. 93105.

WRITE, phone or visit us for the best deal on new or reconditioned Collins, Drake, Swan, National, Galaxy, Gonset, Hallicrafters, Hammarlund, Hy-Gain, Mosley, Waters, SBE, Henry linear, BTI linear, towers, rotators, other equipment. We meet any advertised cash price on most equipment. We try to give you the best service, best price, best terms, best trade-in. Write for price lists. Your inquiries invited. Henry Radio, Butler, Missouri 64730.

COLLINS KWM-2 and AC power supply. Perfect. W1CPI, tel: 401-783-2702.

FOR Sale: KWS-1, $595., and 75A4, $395, guaranteed like-new. Waters Model 331 grid dip meter, brand new, $75.00. (Regular $129.75). Shipping charges extra. J. Ogle, W1LSS, 304 Bushy Hill Road, Simsbury, Conn. 06070. Tel: 203-658-4029.

SELL: HQ-160 receiver, like new, with original box and manual: $170.00. W. Rau, Box 136, Henderson, Minn. 56044.

FOR Sale: all in like-new condition with manuals. Original owner. Will consider offers. Hallicrafters HT-37, $250.00; HA-2 with p/s, $175.00; SR-42 with mobile p/s kit, $150.00; Hammerlund HQ-170AC, $275.00; HX50, $250.00. Idoni, WB2OJH. Tel: (516)-CU-5-6350. Weekdays after 7 PM; Sat. and Sunday afternoons.

GALAXY V Mk II with matching calibrator, AC-35 supply, speaker, new in original factory cartons $425.00. Galaxy 2-Kw linear, new, in original factory cartons, $375.00 including power supply. Like-new Heath HW-12 with calibrator, AC supply in perfect condition, $120.00. Ron Milliman, 606 Solona, Tempe, Arizona 85281. Tel: 602-966-9921.

WANTED: Transmatch. Send description and price. Kirt Fanning, 6021 Edgewood, La Grange, Ill. 60525.

DRAKE R-4, $240.00; SB-400, $240.00. Used very little. Richard Petersen, 1207-28 St., S.E., Cedar Rapids, Iowa 52403.

NC-300, like-new condx, $150.00 firm! First check takes it. Tel (614)-451-8870. "Dave," 2171 Pinebrook, Columbus, Ohio 43221.

ELMAC Wanted, complete station. State electrical and physical condx, lowest price. Wilber Cox, K9UIV, 810 Pendleton Ave., Anderson, Ind. 46014. Tel: 642-2233.

COLLINS Transmitter COL-52318 ¼ Kw phone/cw. New, in original packing. $350.00 or will swap for FM communications sets, freq. meter, etc. W2OEA, Higley, 1196 Elberon Ave., Elberon, N.J. 07740.

FOR Sale: Clean SB-300, $200: SB-400, $250.00. All cables, manuals. W6MWF, 10213 Las Tunas, Rancho Cordova, Calif. 95670.

SACRIFICE: Heath SB-300 receiver. Professionally wired. Mint condition. On air ten hours. All three filters $250.00. Knight T-60 Novice transmitter. Excellent, few crystals, $40.00. First certified check. J. F. Huffman, 69 Fairview Road, Clark, New Jersey 07066. Tel: 201-381-7951.

FOR Sale or trade: Akai X-355 tape-recorder. Cost $800. NCL2000 linear, Swan 140 modified to Triband with power supply, speaker, ptt mike. Need Heathkit SB-200, SB-110, HD10, SB-640. Any reasonable offer accepted. All inquiries answered. WB6MJQ, Box 12, RCABMEWS, APO New York 09023.

SELL: HW-12. Clean, $75.00 plus shipping. W4LXA, 752 High St., Harrodsburg, Ky. 40330.

SALE: New Eico 753 multi-band transceiver, wired AC and mobile supplies. Excellent, $250.00. Mrs. Sylvia Allen, 5300 Fifth Ave., Apt. C-2, Pittsburgh, Penna. 15232.

WANTED: Regency ATC-1 transistorized mobile converter. Andy Nelson, WB2CHU, 205 West End Ave., New York, N.Y. 10023.

SELL/Swap: OSTs 1934-1960, missing April 1937, January 1944, October and November 1945, July 1946, and April 1953. Cash or trade toward a good receiver. M. F. Steward, 1775 Ridge Road, North Haven, Conn. 06518.

DXERS. Table of Great Circle bearings, distances, centered on your QTH. Over 300 prefixes. $3.00 airmailed. Radio Amateur Services, 400 Hillside Ct. #1, E. Lansing, Michigan 48832.

MONIT Radios, MR-10, 152-174 Mc, and 33B, 30-550 Mc., both $85.00. Realistic RP-3050, 30-50 Mc, and Hallicrafters CRX2, 152-174 Mc, both $85.00. Turner, TV-1, 54-200 Mc., signal booster, $20.00. All in mint condx. C. Harrow, 2081 S E 19th Ave., Pompano Beach, Fla. 33062.

SELLING Globe 6PMC 6M converter, power supply, $15.00; Heath IM-10 service bench VTVM, $35.00; HM-10 tunnel-diode GDO, $30.00. With manuals. Stuart, 511 Laughlin, Princeton, N.J. 08540.

SB-10 wanted, in gud condx. Will answer all replies immediately. Jim Delaney, 1815 Ashland Ave., St.Paul, Minn. 55104.

SELL: SX-110, speaker, manual. Good Novice rcvr, $80.00. Dirk Tjossem, WAØPXU, 618 Elmwood, Marshalltown, Iowa 50158.

HALLICRAFTERS HA-6 transverter and power supply, $120.-00: Lafayette HA-350 ham-band receiver, with calibrator, $80.00. AF-68 transmitter, $40.00: Johnson 6 and 2 converter 10-meter I.F. $25.00: Heath UT1 power supply, $15.00: WRL PSA63A power supply, $15.00. Philip Schwebler, W9GCG, 4536 N. 50th St., Milwaukee, Wis. 53218.

WANTED: Collins 312B5 PTO or 399C-1 PTO. Also want mobile transceiver. K3BHB, 903 Western Ave., Jeannette, Penna. 15644.

SB-610 monitorscope, $75.00: SX-88 receiver, unmodified with manual, $180.00. Variac $5.00. F.o.b. Walt Joyce, 2118 East Q-5 Ave., Palmdale, Calif. 93550.

SELL, Swap, buy antique receivers, radio magazines, catalogs, handbooks. Spencer, 44 Sabrina, Wellesley, Mass. 02181.

FOR Sale: Heath Apache transmitter for $130.00. In excellent condition. Will ship. WA4ZGQ, Rodney Bland, 512 Roberts St., Ahoskie, N.C. 27910.

HEATH SB-300 receiver, with SSB, AM and CW filters. Speaker mounted inside cabinet. In excellent condition: $240.00. Norman Spiva, K2ENM, 197 Watchung, Chatham, N.J. 07928.

FOR Sale: Heath Apache TX-1. Very clean. $90.00. Also like new Hammarlund HQ-170C. $165.00. K1MWF, L. J. Burns, RFD Plainville, Conn. 06062.

HALLICRAFTERS SR-42A new, never used, original carton, matching HA-26 VFO and Shure 404C mike, $190.00. Jeff Ross, 125-12 Cranston Ave., Rockaway Park, N.Y. 11694.

YAESU FT-DX-400 transceiver for sale. W8A0, 2912 Riverview Boulevard, Silver Lake, Ohio 44224.

MASTER Mobile antenna 80-20-15 bumper mount, new, $35.00 postpaid; AR-22R antenna rotor, 100 ft. control cable, new, $40.00. Postpaid. WB6MCK, Route 2, Box 1941, Escondido, California 92025.

SELL: DX-100, in gud condx, $80.00: Heath VFI, $15.00: Hallicrafters R-45, $75.00; Heath Q-multiplier, $5.00. All f.o.b. Heard S. Lowry, K4VFA, 915 Madison St., Manchester, Tenn. 37355.

HAMMARLUND HX-50, $225.00: HQ-160 with speaker, $165; two meter trans 522 in cabinet with power supply, metered, $25. 00. W2DED. 178 Hillcrest Ave., Cranford, N.J. 07016.

DUMONT 304-H oscilloscope, like new, 2 spare CRTs, manual. $50.00; won't ship. sry. Turner 254X PTT desk mike, $8.00 WA1AZW, 37 Foster Dr., Framingham, Mass. 01701. Tel: 1-617-879-0013.

SELL: Collins 32S1 with 516F2 power supp., $395.00: also National NCX-3, $160.00; all units very clean condx. Will ship in original cartons f.o.b. Rochester, N.Y. Richard Gillberg, K2DAT, 319 Lake Meadow Drive, Rochester, N.Y. 14612.

TRADE LM10, BC-312, Zenith R-1000-1, SASE for list. T. Gosman, 143 Roxton Road, Plainview, N.Y. 11803.

HAM Stationery. Very impressive executive style. Inexpensive. K3GWD Press, RR #2, Box 366, Wampum, Penna. 16157.

WANTED: Used 8 AVQ or 14 AVQ antenna for Novice station. Brian Blair, 7114 Meade St., Pittsburgh, Penna. 15208.

MAKE an offer: These items must be sold—SX-117 Hallicrafters rcvr, crystal-filter transmitter, exciter HXIQ Marauder by Heathkit. HA1Q kilowatt linear amplifier by Heathkit. Contact D. Allen Frame, Kinsley, Kansas 67547.

QSTS July 1924 through 1965. Best offer, plus shipping. E. Amarantes, 1643 Lincoln Avenue, San Jose, Calif. 95125.

SELL: Collins 32V2 transmitter and Hammarlund HQ-170AC; both in excint condx. Many extras. Make offer. R. Schwendt, W2ZEW, 5 Brook Lane, Bordentown, N.J. 08505.

SELL: 144 Mc. station: Sola 250 volt one amp. supply, SASE for description. WØDAK, 1641 Eleanor, St. Paul, Minn. 55116. Tel: 698-3054.

EICO 753, $80; Hy-Gain 14AVQ vert., 40-10M, $15.00; 12V Heath supply, $12.00; DX-35 Heath, $15.00. R. Sumption, 142 E. Murray St., South Bend, Indiana 46637.

NOVICE Equipment, like new condx: Knight R-100 receiver, Eico 723 transmitter, Callbook, ARRL books, 80/40 Dipole, coax. Make offer. Kim Miller, Route 1, Edgerton, Ohio 43517.

AMPLEX 2 meter amplifier, 1000 watts c.w. and SSB; 600 watts AM, pair 4x250Bs Chimneys, blower and instruction manual: $125.00. George Heabler, 121 Parana Drive, Newark, Ohio 43055.

FOR Sale: Antique RCA radiola 60, early AC/DC superhet broadcast band receiver. Set is complete with speaker and operating. WW II National low-frequency receiver 14 to 600 kcs., operating. KØGVB, Gary Ernst RR 2, West Branch, Iowa 52358.

FANTASTIC Buy: Drake 2B with CRY/CAL Hallicrafters HT-37, brand new. Pair of 813s liner amp, and power supply: SWR bridge; D-104 and G Stand; only $450.00 if you buy all, or write for individual low prices. K4TAS, Jim Williams, 3300 Margrave Rd., Columbia, S.C. 29203.

FOR Sale: Viking II and matching VFO, $85.00; BC-348 with AC power supply, $35.00; DX-40 and VFO, $40.00; HQ-110-C, $85.00; HQ-129X, $65.00; TR-106 6 meter new, wired by experienced builder, $80.00. Will ship. All have manuals and all are in excellent condition. H. Dale, WB4FBI, 22 Stonewall St., Dawson, Georgia 31742.

COLLINS 75SB with 500 cycle filter, $500; 32S3, used only 2 hours, $575; 75S3, $375.00; 32S1, $350.00; 516F2 power supply, $85.00; Central Electronics 200V $400.00; NCL-2000 with new finals, $185.00; new Drake TR-4, never plugged in, $500.00, with power supply; D-104 mike with G stand, $20.00; WRL Globe Champ 300A, $95.00. All gear in gud wkg condx. K1AGL, Stan Partyka, 141 Waite Ave., Chicopee, Mass. 01020. Tel: 413-592-2952. Call person-to-person, pls.

LAFAYETTE HA-410 10 mtr. transceiver, microphone, 12 VDC/115 VAC, excint condx, $110.00; W62KDB/5, W.O.C. John Bednarz, RA11760225, 68-17A1, Box 175, 2nd Warrant Officer Candidate Company, U.S. Army Primary Helicopter Center, Fort Wolters, Texas 76067.

TH-6, $90.00; 80-40 Cliff Dweller, $80.00; 32 Ft. spire tower, $50.00; TR-44, $35.00. KØJHE, 3430 So. 130th St., Omaha, Nebraska 68144. Tel: (402)-333-8176.

GLEGG 66'er, new, $195.00 cash/m.o. cash & carry. Stan, WB4IRK.

SELL: Collins 62S-1, $700; (perfect); Valiant, $95.00 (perfect); HRO-7, A, B, C, D, E, F, $85.00 dependable/clean). John Wagner, W8AHB, 3890 Tubbs, Ann Arbor, Michigan, 48103.

PREPARE For new FCC exams! You need Posi-Check. Multiple choice questions, diagrams, explained answers. IBM sheets for self-testing. Same form as FCC exams. General Class, $3.25; Advanced Class, $3.50; Extra Class, $3.75, 295 to 300 questions or diagrams in each. Each complete for a specific exam. Basic questions duplicated if they apply. Third class postage prepaid. Add 26¢ per copy for first class mail: 54¢ for air mail. Send check or money order to Posi-Check, P.O. Box 3564, Urbandale Station, Des Moines, Iowa 50322.

RADIO Operator experience seeking employment. Telephone N.Y. 516-732-1929. E. H. Halkitis, 511 Hawkins Rd., E. Selden, L.I., N.Y. 11784.

SELL: HT-32A, $225.00. R. Van Wuyckhuyse, 412 Humboldt St., Rochester, N.Y. 14610.

FOR Sale: NC-300, $160.00; Viking Valiant I, $150.00; will ship. Kenneth Lucas, 665 East 66th St., Indianapolis, Ind. 46220. Phone 317: 2550547.

REWARD For *information leading to procurement of manual* on Yuba-Dalmotor mobile linear and power supply. Roy Brougher, W4IK, 3743 Wesley Drive, Montgomery, Ala. 36111.

WANT Swan Transceiver 350, etc. Will buy accessories. Must be in good condition. Write giving details and price minimum. R. Shaull, W8NBP, 1748 Hanley, Lexington, Ohio 44904.

WEBCOR 2712 Tape-recorder, mike, carrying case and manual: $50.00. $15.00 each for R-47 speaker, Vibroplex Key with wedge Johnson Signal Sentry with power supply, W9RZZ, 60302.

PROFESSIONALLY Built Heath 75 M. Singlebander, AC supply, $195.00; Kodak M-65 comb. 8 mm. Super8 projector. $65.00 (trade?). Everything brand new, guarantee cards. Harold Greene, 377 Oldham, Pembroke, Mass. 02359.

'SCOPE Eico 460 aligned, calibrated, guaranteed, $60.00; HW32. First phone built. Heath updated, $75.00. Heath SB-610 'scope. Mint condx. $55.00. Manuals, F.o.b. WA5SKI, Lewis Trailer Park, #3, Columbus, Miss. 39701.

MICHIGAN Area Hams! Single channel 4 ft. span r/c plane, 6 meter transmitter and receiver, Servos, engine and accessories. Finished, never flown. Pick up in St. Clair, Michigan for $70. Also Twin City RTTY terminal unit, $40.00, Globe Scout 65B, $30.00. R. Wanat, WA8LIX, 4404 Judith Lane, #2A, Huntsville, Alabama 35805.

VIKING Valiant I, with manual. Clean, good condition; $135.00. Call after 6:00 PM, or write, WB2VBT, Jerry Hermel, 51 Barry Dr., Westbury, L.I., N.Y. 11590. Tel: (516)-334-7746.

WANTED: September 1943 issue of "Electronic Industries". Mrs. Jane Morgan, 402 Oak Grove Ave., Menlo Park, Calif. 94025.

NATIONAL NCX-3 for sale. $180. WØGEP, 907 Deandell, St. Louis, Mo. 63135.

WANTED: Johnson Matchbox. 275 watt. Jeff C. Schwartz, WA5TYX, 1013 Gorgas Circle, Fort Sam Houston, Texas 78234.

JOHNSON Pacemaker, SSB-AM-CW transmitter. Gud condx, $125.00. Ed Steeve, W9ZWC. 7122 N. Odell, Chicago, Ill. 60631.

SELL HQ-100, excellent, especially good for Novice: $75.00. Clock and speaker included. Tom Fitzpatrick, WB4FOT, 1923 Oxford Cir., Apt. 5, Lexington, Ky. 40504.

WANTED: Complete station, transceiver or transmitter, receiver, 20 and 10 beams, Ham-M, galvanized tower, power supplies. Barton Yager, W4FC, 2271 E. Vina Del Mar Blvd., St. Petersburg, Fla. 33706.

SELL: HA-10 1 Kw linear, in excellent condition, $125.00; HQ-13 Ham-Scan in excint condx, $50.00. Art Jones, 2214 Westmoor St., San Antonio, Texas 78227.

FOR Sale: NC-303, $185.00; HW-12, with HP-13 mobile power supply, $125.00; R45/ARR7, *built-in a.c. supply, panel controlled*, $75.00. J. Jones, W5BRQ, 931 National St., Vicksburg, Miss. 39180.

SELLING: Lafayette HA-63 receiver; Heath VF1, VFO and *DX-60 transmitter. 4 crystals. All for $85.00. You pay shipping.* C. Dodson, WA3JHA, RFD 3, Aberdeen, Annapolis, Md. 21403.

TR-4, AC-3, $435.00; HT-32, $215.00; Tektronix 511AD 'scope, $200. All in mint condx, may trade. Need Collins. Don Burns, 4410 Reading Road, Dayton, Ohio 45420. Tel: (513)-256-0345

NEW Swan 500C including 117XC supply. Unopened sealed cartons, factory warranty: $495.00. Three available. Don Payne, W4HKQ, c/o Payne Chevrolet Oldsmobile, Box 525, Springfield, Tennessee 37172.

POLY-COMM 6 meter transceiver for sale. Built-in VFO, fixed-mobile power supply, and Nuvistor front end. Jack Elias, WA3EVG, 2416 So. 7th St., Phila., Penna. 19148.

LAMPKIN 105B frequency meter; 205A quad scale modulation meter, 111 PPM meter. All in new condition, with manuals. $400.00 for all. John Leech, 9 Berkshire Road, West Chelmsford, Mass. 01863. Tel: (617)-251-8324.

WANTED: A 3 to 30 Mc converter: Regency ATC1; Gonset Super Six, etc. State price and condx. Walt Kenyon, W6IJA, 1695 North Point, San Francisco, Calif. 94123. Tel: WA11344.

SELL 6.5 KVA generator, 120-240, single-phase 60 cycle, water-cooled on trailer. 40 hours since complete rebuild. $550.00. R. Ellis, 1356 Elizabeth, Las Vegas, Nev. 89109.

VIKING Valiant, F/Wired, rugged, dependable, $180.00. HW-32, scratchless, few hours, $80.00. K. Meyers, W8IBX, 2160 E. Main St., Columbus, Ohio 43209.

VIKING II, Viking II VFO, Viking 6N2, Viking 6N2 VFO, National NC-300, National NC-300 converter cabinet with six meter converter and Ameco 2-meter preamplifier. Good working condition, $600.00. K5GFB, Andy Anderson, 520 Pasadena Ave., Metairie, La. 70001.

NEW QTH, Can't erect 48 ft. Spaulding SS tower, AR-22 rotator, Hy-Gain 203BA beam; BN12 balun, cables, used one year. Excellent. Ready for station wagon pick-up. Cost $359.00. Will sell for $175.00. W2BKG. Tel: (201)-757-3091.

FOR Sale: KWM-1 Collins transceiver in mint condition, complete with DX Adaptor and variety of crystals and 312B-1 speaker cabinet; 516F-1 a.c. input and 516E-1 12-volt input D.C. power supplies: 351D-1 mobile mount and cable assembly. All in excellent condition. $500 all, or best offer! RTTY converter Navy type CV-57 complete with all connectors, with additional CV-71 I.F. input unit; all like-new condx, made by RCA. $150.00. Will prepare for shipment. Guaranteed satisfaction or will return money. Sy Hernandez, W2BSA/1, River Road, RFD 1, Essex, Conn. 06426. Tel: (203)-767-1410.

DELCO AM-FM radio, late model, damaged for parts complete $1.49. 8 lbs. Printed circuit boards Delco Radio early model in various stage of production. DS-25, DS-26 transistors and other components 15¢ per lb. Postage extra. Art Taylor, W9FYC, 601 Rex St., Muncie, Indiana 47303.

CRYSTALS Airmailed: SSB, Nets, MARS, Marine, etc. Novice .05% crystals $1.50. Custom finished etch stabilized FT-243 .01% any kilocycle or fraction 3500 to 8600 $1.90, (Five or more this range $1.75 each), (nets, ten or more same frequency $1.45). 1700 to 3499 and 8601 to 20,000 $2.75 with overtones supplied above 10,000. 10,001 to 13,500 Fundamentals $2.95. Add 50¢ each for .005%. Add 75¢ each for HC-6/u metal miniatures above 2000. Many ARRL publication and QST builders crystals, groups or singles. Be specific. Write for order-bulletin. Crystals since 1933. Airmailing 10¢/crystal, surface 6¢. C-W Crystals, Marshfield, Missouri 65706.

COLLINS 75A-1 revr, in excellent condition; $110.00. I will ship. T. A. Write, WA5RRW, Qtrs, 31-3 N.A.S., Pensacola, Fla. 32508.

HQ-170-C, $175.00; DX-100 and SB-10, $150.00. You ship. SASE for small parts list. WØKVA, 2029 Calumet, Independence, Missouri 64050.

WANTED: 2 meter AM transceiver with Squelch. John Stiles, K7DGV, Box 114, Sweetgrass, Montana 59484.

GALAXY 300 with PSA-300 AC supply and VX-1 VOX, $200. HT-37, $225. Peter Hansen, W8TWA, 2137 Earhart Road, Ann Arbor, Michigan 48105.

REBUILDING Antenna? Write Walt's Ham Hardware Headquarters: Brass, Stainless, Nylon Threaded, Washer, Hardware. Assorted Stainless Washers. 35¢ Postpaid. Many packet bargains. Send stamp. W8BLR, Straesser, 29716 Briarbank, Southfield, Mich. 48075.

TO settle the estate of Charles H. Ackerman, WAØJSY, the following Collins equipment must be sold: best offer over $1700 will buy all. Collins transverter 625-1; Collins receiver 755-3B, Collins transmitter 325-3, and Collins power supply 516F2. Contact Ben Graves, 5539 N. Garfield, Kansas City, Mo. 64118. Phone Gladstone 2-5549.

DRAKE TR4; speaker/p.s. unit. As new, guaranteed. $500.00. W2CE. Tel: 516-FR9-0415.

NEW Drake TR-4 w/a.c. and d.c. pwer and spkr, never used: $550. New G-50 w/Rotron. $190. WA2COO.

COLLINS 75S-3, $375; 30L-1, $375. Condx excint. L. Macomber, *4 Yorktown Road, Setauket, N.Y. 11785.*

DRAKE R-4B, $345.00; Hammarlund HQ-180AC, $345.00. Just bought a 51S1. Jack West, 6747 N. Octavia, Chicago, Illinois 60631.

75A-4 for sale. Perfect condition. Matching spkr, 6 and 3.1 KHz filters. S/N 4570. Original owner: $400.00. W2OCG, 3 Henry St., Great Neck, L.I., N.Y. 11023.

DELHI 50 ft. self-supporting amateur tower; handles 30 lb. beam with no guy wires. New condx: $165.00. F.o.b. Fayetteville, Ark. Fred Mertin, Route 2, Fayetteville, Ark. 72701.

COLLEGE Expenses force sale. HBR-8, $80.00, or your best offer. BC-653-A xmtr with extra parts, tubes, 400 v./200 Ma. power supply. David Muller, Drew University, Madison, New Jersey 07940.

WANTED: Plug-in coils for Pilot Superwasp and National Thrillbox SW-5; Atwater Kent model 12 breadboard, Radiolas IX, X, Murdock, Marconi, and E.I. components. Dr. Russell Hanselman, 914 Columbian, Oak Park, Illinois 60302.

HEATHKIT HO-10 d.c. 'scope, in excint condx, $90.00; Heathkit AM-2 VSWR bridge, $7.00; McCoy Silver Sentinel 9 Mc. Filter with crystals, $15.00. W2PZP, John Hillman, 49 Northland Lane, Matawan, N.J. 07747. Telephone (201)-566-5260.

75A-4 Collins receiver, S/N 5811, 3.1 k.c. filter, in excint condx. $525.00. HT-37 transmitter, like new, $300. Heath HA-10 linear amplifier, perfect, $185.00. Steve Antonoff, Jr., K8YOU, 1697 Western Reserve Rd., Poland, Ohio 44514. Tel: (216)-758-1801.

COMPLETE Drake station, in mint condition: R4, MS4, 2LF BCB converter, full 10M, and 160M coverage, T4X, AC3 and all cables, $785.00. Waters compreamp, $21.00; Vanguard 6M converter BCB IF, $10.00. Roberts, 1055 Stereo taperecorder, $125.00. WB2QFR, Joe Heffler, 2200 Morris, Bronx 10453, tel: (212)-295-1694.

COLLECTOR'S Item: Thompson & Levering Co., Philly, Penna., Serial 17556 bridge, WW I vintage. Size 9 x 7 x 3, boxed. W2COT, 12 Washington Park, Maplewood, N.J. 07040.

FOR Sale: 75S-1 receiver with Waters rejection tuning, S/N 11288, $275, 32S-1 transmitter with 516F-2 power supply S/N 10722, $450.00. Both in like-new condition with original shipping boxes. Package for $700. Will consider trades on entire package. Also Viking 500 transmitter, in exc. condx, $275.00; B&W LPA linear amplifier, $150.00. Gordon Kittel, K3AIG, 16 Jacqueline Drive, Paoli, Penna. 19301. Prone (215)-647-2750.

TOROIDS: 88 mhy. unused, center-tapped, 5/$1.50 postpaid. Heath DX-60A, new, $55.00. 3 head Tee-Dee with sync., $50. National NCXD mobile supply, $40.00, BC221Q frequency meter with original book, $45.00. Apeco copier and supplies, $35.00. A.B. Dick 420 mimeograph (fine for ham club bulletin work) $35.00; Eico 753 transceiver and a.c. supply, $165.00. Wanted: Matchbox, Ham-M, Clegg 22'er. Stamp for list. Van, W2DLT, 302Z Passaic, Stirling, N.J. 07980.

ATV Camera, new, self-contained, power supply, video output and 3-6 transmitter. $265.00. W2MCA, Rivili TV, 287 W. Merrick Road, Valley Stream, L.I., N.Y. 11580. Tel: (516)-101-8090.

BUG, Vibroplex, perfect, like-new. $11.00. K2TBZ. Tel: (Brklyn) 748-7473.

KNIGHT T-60, $40.00; Lafayette VFO, $20.00; Rider Advanced code-course, $4.00; Astatic TT-30 mike, $5.00. Sy Balsenbaum, WA2CHE, 9424 Ave. A., Brooklyn, N.Y. 11236.

WANTED: NC200, TR3 or similar w/ps. W3JAK/MM, USNS Norwalk, F.P.O., New York, N.Y. 09501.

SELL: 10 complete sets QST 1951 thru 1960 $25.00, plus shipping. M. A. George, 35 Ridgeway Ave., Pittsfield, Mass. 01201.

HQ-170, like new, $175.00; HT-40 with 9 crystals $45.00; Champion bug, $10.00; Bud filter, LF601A, $7.00; Mosley CM-1 rcvr, $75.00. Joe Danielson, WA8RCP, 25 Lincoln Ave., Niles, Oh'o 44446.

CATHODE-Ray tubes for sale! 5 inch oscilloscope tubes: 5BP1, 5BP4, 5CP1. Also 832, 371B and others. Each under $8.00 or will trade for equipment. Write, Box 808-308, Easton, Penna. 18042.

RTTY: Model 14 T.Ds, rebuilt, refinished, 60 speed with sync motor, $48.00; with governed motor, $35.00. Model 14 typing reperfs, cleaned, adjusted, 60 speed with sync motor, $35.00. C. H. Plummer, Cherrybrook Drive, R.D. #4, Princeton, N.J. 08540.

HT-44 with PS-150-120, $240.00; Drake 2B with crystal calibrator, $190.00. Selling both in excellent condition. Also available, SB-33, $140.00; works well with Heathkit MP-10, $18.00. F.o.b. Railex Lompoc, WA6PGA, RFD A-97. Nite rate fone less than $1.00: 805-736-3762 for info.

BANDIT 2000B. Used about 3 hours, and in perfect condition. $285.00. John Harlin, 113 East Court, Iowa City, Iowa 52240.

COLLINS 32V-1, Hallicrafters HT-32B and SX-115, National HRO50T-1, all in excint condx, and little used (reason for selling). Handbooks and QSTs almost complete since 1937. Miscellaneous usual station gear. Send for descriptive list and details. Will accept first good offer (lot or items). K1PTU, Ex-W3DTD, 120 Montvale Rd., Weston, Mass. 02193.

HOWARD Radio: SW140-$119.00; R4A-$269.00; NC300-$149.00; B & W 5100 B w/51SB-$195.00: M40 and M160-$69.00 each; PCN8-Poly Com-$89.00; NC183-$99.00; SW350 w/AC and DC-$395.00-Selectible S.B. & 100 Kc. Calib; HA6 with AC-$170.00. Free List. Box #1269, Abilene, Texas 79604-Tele. A/C 915-OR2-9501.

SELL: 5" wide-band Precision Instrument Corp., Model S-55 'scope, $125.00; Paco, Model R-30 R.F. signal generator, $35.00; Eico Model 944 Flyback & yoke tester, $30.00 Eico Model 715 Transmatch complete antenna checker, $42.00, Mercury Model 120 Tube-tester, checks all latest tubes, $40.00. All equipment in A-1 condition and guaranteed to be perfect! F. W. Cooper, 8258 Brittany Place, Pittsburgh, Penna. 15237.

(2) EICO sweep/marker generators #368; Knight Flyback Checker, Paco in-circuit cap checker, Soundax auto radio (1964 Rambler), will swap for SWL equipment or sell. Derek H. Rout, 1347 Easy St. N., Glendale Heights, Illinois 60137.

WANTED: Collins S/Line, 75S3B-C, 32S1, 516F2, 312B4, 30S1. Mint condx. only. Prefer Serial Numbers and age. H. Castillo, 2323 Gatewood St., Los Angeles Calif. 90031.

WANTED: Taylor Windscope or separate wind direction and speed indicator, or equivalent. W2EV.

WANTED: 80 and 40 m. broad band final coils for C.E. 600L amplifier. G. M. Schartau, WA4UKE, Rte. 4, Box 1737, Huntsville, Ala. 35803.

MOVING: Sell Gonset Comm. IV, 6m with Ameco 621 VFO, Telrex beam, Drake filter, cables, $255.00. Perfect homebrew 6M SSB Superhet rcvr, Dow relay, $30.00. Many extras. All less than 3 months new. 80m ARC-5, heavy AC p/s, $25.00. Hank, WA2OVG, 53 Downing St., NYC 10014. Tel: (212)-OX1-4711.

HOSS-TRADER Ed Moory has a limited supply of the following New Equipment for cash: R4-A, $339.00; SB-34, $395.00; NCX-200 and AC-200 supply, $349.00; New Swan 500, $399.00; BTI LK-2000 Linear, $675.00; Mosley TA-33 Beam and Demo Ham-M Rotor, $188.00; SPECIAL Rohn 50 ft. Fold-over Tower Prepaid, $189.50; Drake L-4 Linear, $559.00; SLIGHTLY USED GEAR: TR-4, $449.00; T-4XB, $349.00; AC-4, $79.00; 2-A, $149.00; R4-B, 339.00; TR-3, $369.00; Swan 250, $229.00; Swan 500-C, $419.00; HT-37, $179.00; SR-150, AC & DC supplies and mobile mount, $475.00; Ham-M Rotor, $89.00; Factory Reconditioned SB-33, $179.00; Galaxy 5 MK II, $339.00; Swan 240, $169.00; Swan 175, $89.00; ED MOORY WHOLESALE RADIO CO., Box 506, DeWitt, Arkansas 72042. Phone 946-2820.

SELL: HQ-170AC receiver with S-200 speaker, in excint condx. $250.00, with manual in original cartons. C. Russell, 101 Sunset, Vicksburg, Miss. 39180.

HALLICRAFTERS SX-146 receiver, Heath DX60A transmitter, Hy-Gain 14AVQ vertical with 80-meter loading coil, plus roof mount. All less than 9 months old. All in pert. condx. Originally sold for over $375. Will sacrifice for $275.00, or trade for c.b. equipment or stereo tape-recorder of equal value. Steve Armeros, 1019 So. Weadock, Saginaw, Mich. 48601.

QSTS and COs for sale. QSTS: 8 copies 1946, complete run 1947, 1948, 1949. A few missing through 1950-1967. CQ, 1946, 7 copies; 1947, 11 copies; 1948, 1949, 9 copies each. 1950-1967, a few missing in this run. Fair to excellent condx. Offer? K4ZBW, 504 Carol Way, Atlanta, Ga. 30327.

FOR Sale: Linear amplifier, homebrewed, 4-250As grounded grid, 53 in. cabinet on wheel castors. Needs a little dressing. $150.00. Picture for sincere request. 32S-3 homebrewed power supply, $50.00. W8DFA, William S. McFadden, 29 Vernon Ave., Wheeling, West Virginia 26003.

SELL: Valiant, factory-wired, Gonset Communicator II, Morrow Twins, MB-6 and MB-565 with mike and power supply with cables. All in working condition with manuals. All for $350.00. Will ship collect. A. Drabicki, W2ESS, RD #1, Clifton Springs, N.Y. 14320.

SELL: Heath Seneca, $150.00 or your best offer. Wanted: Collins 51J1-4. Send details. Fran Stengel, Jr., 349 Stony Road, Lancaster, N.Y. 14086.

MOVING QRT. Sell DX-20 with 2 antennas, T-R switch, $25.00; R100A, $65.00; Knight VF-1, $10.00; Vibroplex Original, $20.00. All for $100. Bob WA4OUS, 112 Holly Road, Williamsburg, Va. 23185.

FOR Sale: Johnson Matchbox with SWR meter; 275 watt model. Sell locally, $65.00. W. Paskin, 8 Brighton 10th Court, Brooklyn, N.Y. 11235. Tel: (212)-646-1832.

WANTED: 75S3B and 32S3 with accessories. Will pay cash. Sy, no trades. Dr. Paul Powell, 100 S. McGee, Borger, Texas 79007.

SCIENCE Fiction or pulp magazines wanted. Have cash or 1930 ARRL Handbook to trade. Horvat, POB286, Tangent, Oregon. 97389.

HEATH SB-101, with SB-600 and AC power supply inside. Excellent wiring and performance. Used only three hours. Guaranteed perfect in every respect. With manuals and carton, $395.00. Barney Leibowitz, WA3GJQ, 201 S. George Street, Cumberland, Maryland 21502.

SACRIFICING 4-1000A linear, RF section in KWM-2 cabinet but twice height vacuum variables. Separate power supply, 6000 volts. Solid state variac controlled. A real beauty, $395. Two Bell-Howell 16 mm motion picture cameras, 70DE and 240EE. Each has 3 lense and case, both flawless. New each cost $375. Trade for ham transceivers or? WA6MSE, Don Cordray, 6803 Amestoy Ave. Van Nuys, California 91406. Tel: (213)-344-6309.

COMPLETE Swan 240 rig, for base and/or mobile. Includes: Swan 240 xcvr, Swan transmitter control unit with VOX and xtal calibrator, Swan A.C. and D.C. power supplies, mobile master Tri-band ant. $350.00, or offer. Craig, K7YAU/6, 1065 Ranchero Wy #15, San Jose, Calif. 95117. Tel: (4088)-246-6198.

MODEL 15 Printer, Electrocom FSC, Valiant with accessories, other equipment, pick-up deal only, sry. Joe Bradley, W4KZH, 1402 D Ave., West Columbia, South Carolina 29169, phone 794-4191.

KWM-2, PM-2, MP-1, 351 D-2, SM-1, Manuals, original cartons, mint, package deal: $900.00. WA4AEB, Tryon, N.C. 28782.

COLLINS 30L-1 w/spare Waters tubes: $375.00; NCT 2000 linear, $385.00. Want: Collins mikes MM-1, MM-2, and SM-1; E-Z Way Tower, gud G.C. rcvr, KWM-2 w/blanker, 312B-5, DC mount and supply, 62S-1, 30S-1, BTI or Henry 2-4K. Have almost new S/Line as possible trade. Ashton, W1WNY. Tel: (203)-655-9997.

SSB Xcvr, Eico 753K transistor VFO, in excint condx: neat wiring, clean, unmodified, all manuals. No P.S. $120.00. Tel: 669-8744, Gary Confrey, Rte. 80, Killingsworth, Conn. 06417.

SIXER in good condition, Mike and xtal, $30.00. Boyd Nelson, Indian Hospital, San Carlos, Arizona 85550.

HALLICRAFTERS SX-99 receiver, Good for Novice, $60.00. John Lockhart, Jr., 2348 Hillside Ave., St. Paul, Minnesota 55108.

SELL: L/V power supply: Heath VF1, military clock (24-hours) and some variable condensers. All for $5.00. Frank Rodeo, K2JBZ.

OSCILLOSCOPE: Heathkit Model 06, $20.00; HA-6 six-meter transverter, $49.00. Power supply for ARK-5 or Johnson 6 and 2, $8.00. Peter, WB2PAA. Tel: (516)-IV-9-4295.

QSTs 1948 through 1967; COs 1947 through 1967. Best cash offer F.o.b. Quakertown, N.J. R. H. Asmus, Suite 423, 744 Broad St., Newark, N.J. 07102.

FOR Sale: Hy-Gain Hy-Tower, $50.00; Super Hustler Resonator RM75S, $12.00; and a pup tent with floor $15.00 (field-day item). All A-1 condition. KØAHO, 45 Green Meadow Park, Clear Lake, Iowa 50428.

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San Antonio, Texas
June 7 - 9

Municipal Auditorium

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Convention activities have been designed to help you get the most out of Amateur Radio in the years ahead. Topics of varied interest will be presented by top speakers from NASA, Southwest Research Institute, FCC, ARRL, and MARS. Special program for the Ladies—Fashion Show, visit to HemisFair, tour of city, luncheon, SWOOP initiation—hosted by the ALAMO YLs.

Pre-Register Before May 1st

Registration $4, preconvention party $4, dance $5, and banquet $4. This totals $17, you can save $3 if you pre-register before May 1st (entire package will cost you $14 for pre-registration).

Because of HemisFair, rooms will be extremely scarce, so it is advisable to get your registration NOW!

Write San Antonio Radio Club, 100 N. Winston Lane, San Antonio, Texas, 78213. (Include type of accomodations desired.)

See January and March QST for additional information.

WANT *MORE* FOR YOUR MONEY?

If you want to get the greatest of operating pleasure, from a most reasonable investment, then you want Drake's new R-4B receiver and their new T-4XB transmitter. Add the new L-4B linear amplifier, and you'll have the BIG sock that brings plenty more satisfying solid QSO's!

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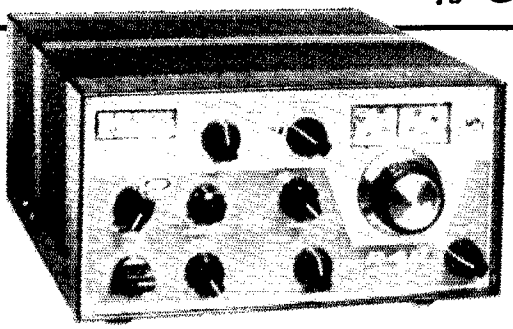
73 *Bil Harrison* W2AVA



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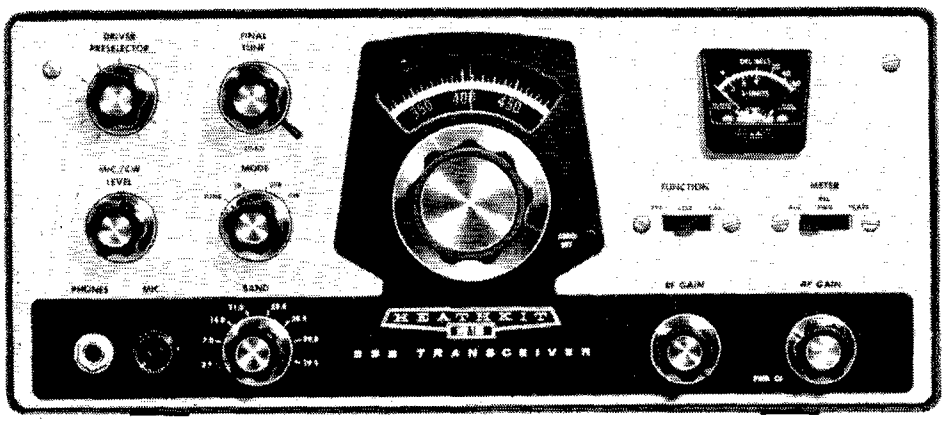

NEW HEATHKIT® HW-100 5-BAND SSB-CW TRANSCEIVER

You asked for it . . . a multi-band version of the Heathkit "single-banders" . . . low-cost SSB operation on 10 or 15 meters . . . an SSB transceiver equal or superior to many assembled rigs, but at *much lower cost.* That's the HW-100.

How did Heath do it? We expanded on the "single-bander" design . . . borrowed from the heritage of the famous SB-101 . . . took a look at the competition . . . and produced the most SSB equipment you can get for the money.

Check the features and the specifications:

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Kit HW-100, 18 lbs., no money dn., $22 mo. **$240.00**
Kit HP-13, DC power supply, 7 lbs., $7 mo. **$64.95**
Kit HP-23, AC power supply, 19 lbs., $5 mo. **$49.95**
Kit SB-600, 8 ohm speaker, 6 lbs. **$18.95**

HW-100 SPECIFICATIONS — RECEIVER. Sensitivity: Less than .5 microvolt for 10 dB signal-plus-noise to noise ratio for SSB operation. **Selectivity:** 2.1 kHz minimum at 6 dB down, 7 kHz maximum at 60 dB down (3.395 MHz filter). **Input:** Low impedance for unbalanced coaxial input. **Output impedance:** 8 Ω speaker, and high impedance headphone. **Power output:** 2 watts with less than 10% distortion. **Spurious response:** Image and IF rejection better than 50 dB. Internal spurious signals below equivalent antenna input of 1 microvolt.

TRANSMITTER. DC Power input: SSB: (A3a emission) 180 watt P.E.P. (normal voice; continuous duty cycle). CW: (A1 emission) 170 watts (50% duty cycle). **RF Power output:** 100 watts on 80 through 15 meters; 80 watts on 10 meters (50 Ω nonreactive load). **Output impedance:** 50 Ω to 75 Ω with less than 2:1 SWR. **Oscillator feedthrough or mixer products:** 55 dB below rated output. **Harmonic radiation:** 45 dB below rated output. **Transmit-receive operation:** SSB: PTT or VOX. CW: Provided by operating VOX from a keyed tone, using grid-block keying. **CW Sidetone:** Internally switched to speaker or headphone, in CW mode. Approximately 1000 Hz tone. **Microphone input:** High impedance with a rating of —45 to —55 dB. **Carrier suppression:** 45 dB down from single-tone output. **Unwanted sideband suppression:** 45 dB down from single-tone output at 1000 Hz reference. **Third order distortion:** 30 dB down from two-tone output. **RF Compression (TALC):** 10 dB or greater at .1 ma final grid current. **GENERAL. Frequency coverage:** 3.5 to 4.0; 7.0 to 7.3; 14.0 to 14.5; 21.0 to 21.5; 28.0 to 28.5; 28.5 to 29.0; 29.0 to 29.5; 29.5 to 30.0 (megahertz). **Frequency stability:** Less than 100 hertz per hour after 30 minutes warmup from normal ambient conditions. Less than 100 Hz for ±10% line voltage variations. **Modes of operation:** Selectable upper or lower sideband (suppressed carrier) and CW. **Dial calibration:** 5 kHz. **Dial mechanism backlash:** Less than 50 Hz. **Calibration:** 100 kHz crystal. **Audio frequency response:** 350 to 2450 Hz. **Front panel controls:** Main tuning dial. Driver tuning and Preselector. Final tuning. Final loading. Mic and CW Level control. Mode switch. Band switch. Function switch. Meter switch. RF Gain control. Audio Gain control. **Side controls:** Meter Zero control; Bias; VOX Sensitivity; VOX Delay; ANTI-TRIP; Neutralizing. **Tube complement:** OA2 Regulator (150 V); 6AU6 RF amplifier; 6AU6 1st receiver mixer; 6AU6 Isolation amplifier; 6AU6 1st IF amplifier; 6AU6 2nd IF amplifier; 6BN8 Product detector and AVC; 6AU6 VFO Amp.; 6CB6 2nd transmitter mixer; 6CL6 Driver; 6EA8 Speech Amplifier and cathode follower; 6EA8 1st transmitter mixer; 6EA8 2nd receiver mixer and relay amplifier; 6EA8 CW sidetone oscillator and amplifier; 6GW8 Audio amplifier and audio output; 12AT7 Heterodyne oscillator and cathode follower; 12AT7 VOX amplifier and calibrator oscillator; 12AU7 Sideband oscillator; 6146 Final amplifiers (2). **Diode complement:** 6 Germanium Diodes: Balanced modulator, RF sampling, and crystal calibrator harmonic generator; 9 Silicon Diodes: ALC rectifiers, anti-trip rectifiers, and DC blocking; 1 Zener Diode: cathode bias. **Transistors:** 2N4304 FET- VFO; 2N3393 — Voltage regulator. **Rear apron connections:** CW Key jack; 8 Ω output; ALC input; Power and accessory plug; RF output; Antenna; Spare. **Power requirements:** 700 to 850 volts at 250 ma with 1% maximum ripple; 300 volts at 150 ma with .05% maximum ripple; —115 volts at 10 ma with .5% maximum ripple; 12 volts AC/DC at 4.76 amps. **Cabinet dimensions:** 14-13/16" W. x 6-5/16" H. x 13-3/8" D.

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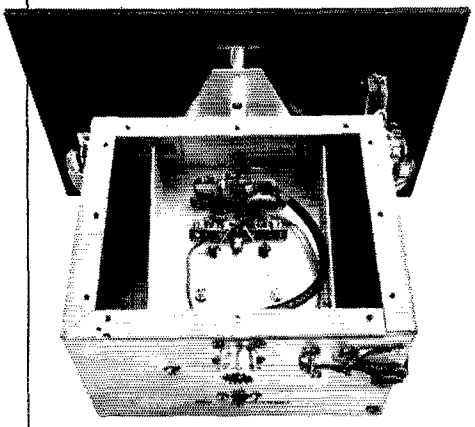
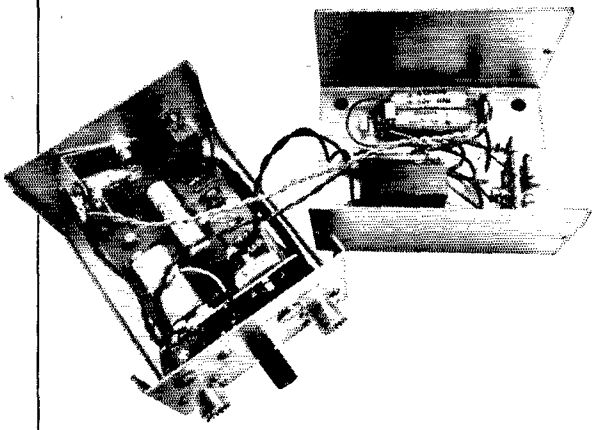


Here's an almost drift-free VFO built around the RCA-3N128 MOS/FET for flexible operation. After just 30 seconds warm-up, it tests out at less than 30 cycles drift in a two hour period.

Look in The Radio Amateur's Handbook, 1968 edition or write to RCA, Commercial Engineering, Section D37-SD, Harrison, N.J. 07029 for full design details, including parts list, schematic, and building tips.

All listed RCA devices are available from your RCA Industrial Semiconductor Distributor

Build this VFO calibrator



If you're interested in MARS and have just a "ham-bands-only" receiver, this may be your answer to VFO calibration outside normal bands. It uses two RCA-1N3193 rectifiers; two 1N34A signal diodes; one RCA-2N2614 and seven RCA-2N3241A transistors—provides calibrating beats at 100 kHz points as well as 50, 33, 25 and 20 kHz. Handy, too, for calibrating test equipment.

Look in August 1967 QST or write RCA, Commercial Engineering, Section D37-SD, Harrison, New Jersey 07029 for August 1967 "Ham Tips." RCA Electronic Components, Harrison, New Jersey.

RCA