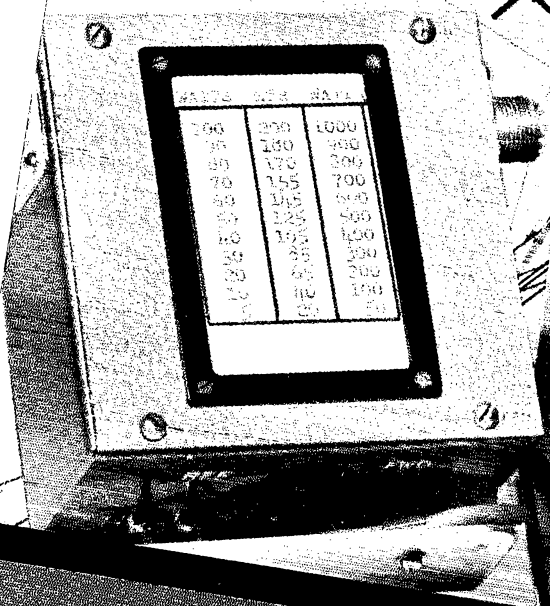


QST

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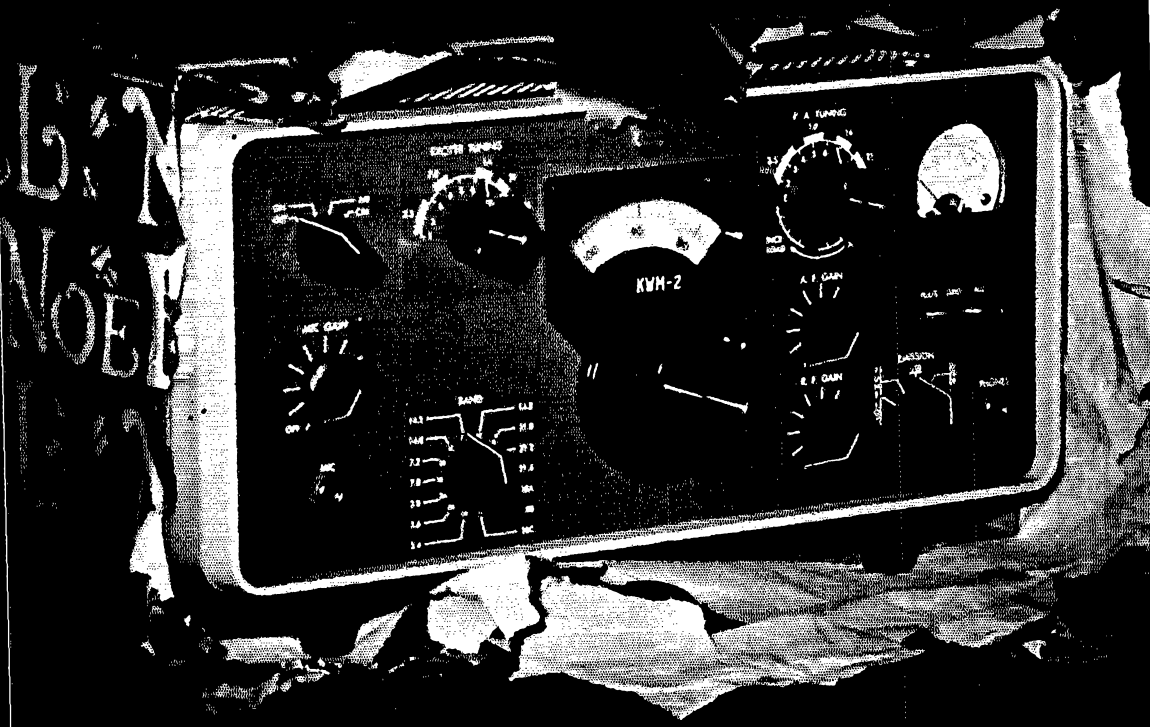
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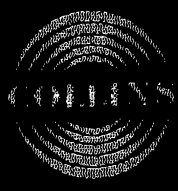
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OUR COVER

The antenna's for decoration but the gadget is the latest in in-line rf wattmeters. For practical information on the designing and building of SWR bridges and reflected-power meters, see page 11.

QST

DECEMBER 1969

VOLUME LIII NUMBER 12

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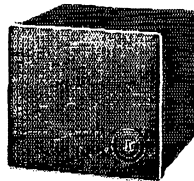
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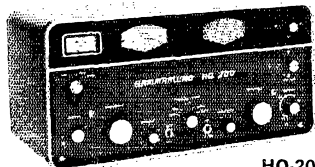


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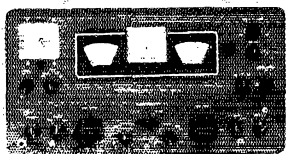
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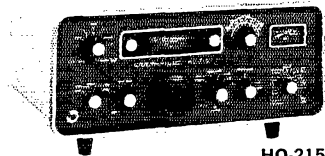
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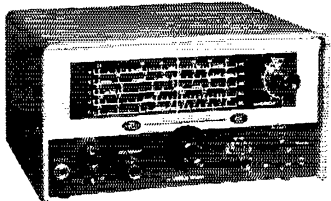
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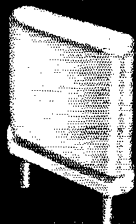
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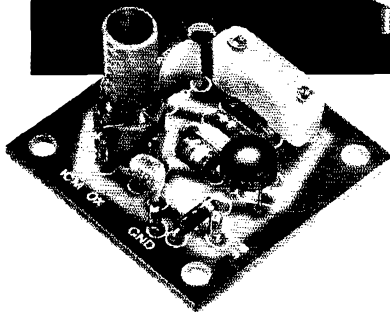
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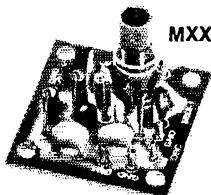
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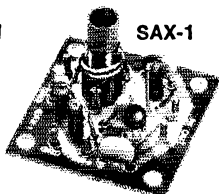
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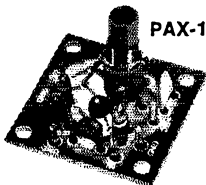
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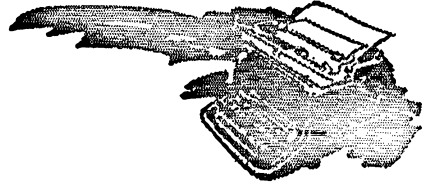
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"It Seems to Us..."



TECHNICIANS AS COMMUNICATORS

WHILE by no means unanimous, the ARRL Board of Directors, at a special meeting the 1st of November, established that the Technician Class licensee need no longer be considered wholly as an experimenter. His *communication* interests and activities, the Board said, have risen to a point where they should now assume a substantial importance in the general scheme of things.

The Technician Class arose from FCC Docket 9295, and its birth date is July 1, 1951. It had the full support of the League; indeed, the concept was originally proposed by ARRL back in 1946 but, in view of the dissension this caused in amateur ranks, was dropped so as not to show divisiveness just prior to and during the critical Atlantic City international radio conference of 1947.

Originally the amateur bands authorized for Techs were only those above 220 MHz.; in 1955 the 6-meter band was added, and in 1959, the middle half of the 2-meter band.

From time to time proposals have been made to provide additional operating territory for the Technician. The League favored assignment of the 6-meter band, which as stated was accomplished in 1955, largely on the basis that it was an interesting propagation-study portion of the spectrum where Technicians might indeed contribute to our knowledge. On the other hand, in the earliest stages the League could not support assignment of any part of the 2-meter band, in the feeling that similar experimental opportunities did not exist on that band to the same degree. And the Commission agreed; at one point, even much later, it said:

This class was established expressly for serious-minded experimenters who needed spectrum space in which to air-test their equipment. It was not established as a communicators service and should not be regarded as a stepping-stone between the

Novice and General operator classes. . . .

The Technician Class of amateur license still has as its purpose the provision for serious amateur experimenters to explore the higher frequencies and otherwise contribute to the art.

The "higher frequencies" were considered initially as those above 200 Mc., but with the 1955 opening of 50 Megs. a new lower limit was set. Thus it became more logical to provide operating space in the 2-meter band as well, and the League fully supported the opening of the band to Techs in 1959.

The objectives of experimentation are, at least in some measure, still being achieved. Yet the fact is that the Tech has gradually taken for himself the additional role of communicator. Above and beyond plain ragchewing, one example is heavy participation in vhf nets, such as those of RACES; another is involvement in emergency operations during "Camille." Perhaps the most striking, however, is the surge of interest and participation in repeater operation on the 2-meter band.

It was in recognition of this trend that the Board last May moved to expand privileges available to the Technician. And those actions have now been reaffirmed in three major aspects: (1) proposing to make the entire 144-148 MHz. band available to the Tech; (2) proposing to authorize 29.5 to 29.7 Megs for voice (or other) emission by Techs; and (3) proposing to return to an earlier policy of permitting a Tech simultaneously to hold a Novice license (so that he might get code practice on his way to a higher class of ticket).

The League's petition is now in draft form and is expected to be ready in time for publication in the next issue of *QST*. If the Federal Communications Commission can be persuaded by our arguments in support, the actions could well be milestones in the history of Technician progress.

QST

Special meeting of the ARRL Board of Directors in Hartford November 1st was largely devoted to review, appraisal, and -- in most cases -- confirmation of objectives set earlier. Draft of an extensive filing with FCC on expansion of Technician privileges (see previous page) was approved. Report of the VHF Repeater Advisory Committee on proposed regulations will be published in QST with both pros and cons for members' info and comment.

Hq. is to continue studying occupancy of band segments under the incentive-licensing rules, and make a separate appraisal of effects on our ability to provide disaster communication. A request will be made to FCC to provide for issuance of counterpart calls (suffixes) -- e.g., when moving to another call area.

A special committee will prepare a constitution and by-laws for the new ARRL Foundation, and another committee will study procedures for more efficient handling of Board affairs. A 1970 National Convention was approved for Boston, September 25-27, and one for 1971 aboard the "Queen Mary" in Long Beach, Calif., exact date not yet set. Vice directors will be able to attend one Board meeting per two-year term with expenses paid. An award of recognition of outstanding performance was ordered to WØDMA for 30 years of QSL Manager service. A resolution of hearty thanks was adopted in tribute to retiring FCC Chairman Rosel Hyde, after 45 years of government service.

Nominations are in order for this year's ARRL Technical Merit Award. Pick someone whose contributions to technical advances in amateur radio have been outstanding, and document the nomination to your League director.

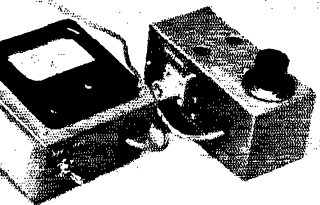
Plaudits to Dave (W6BVN) Bell, who produced the new ARRL color film, for receiving a bronze medal in the non-theatrical classification of the recent New York Film Festival. There are many other bouquets; e.g., the public affairs director at a key network station said "The Ham's Wide World" is the best documentary (other than network-produced) he'd seen this year. Our half-hour motion picture has now been on several dozen TV stations around the country, and copies are in the library of National Educational Television for individual station showings. If you can arrange additional TV exposure in your area, contact your ARRL director, Dave, or Hq.

Watch that expiration date! W2TUK points out that with the number of new calls being obtained by Extra Class hams, there is a strong possibility of failure to note the new license is not a "renewal" extending the term for five years, but only a continuation of the present term. Take a good look at your "new" ticket and post its expiration date in some prominent place in the shack so you won't get caught.

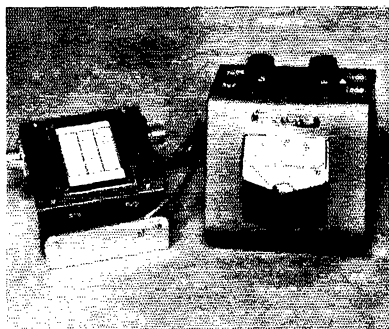
This quote-of-the-month is the final comment of an item "Take a Novice to Launch" in the Anchorage, Alaska, ham club paper: "Take a novice, any novice, add ten minutes to ten hours of time well spent, light a fire under him, take him personally to the pad, and launch him into ham radio. Who knows, once he's in orbit, he'll spend his time looking for harmonics and key clicks rather than trouble."

We take great pride in the election to Life Membership in IEEE of George Grammer, W1DF, ARRL Technical Director and QST Technical Editor.

Nearly 5,000 calls and their DXCC standings are in the yearend list beginning on page 107.



In-Line RF Power Metering



Some Practical Considerations

BY DOUG DEMAW,* WICER

It is neither costly or difficult to build an rf wattmeter. And, if the instrument is equipped with a few additional components it can be switched to read reflected power as well as forward power. With the foregoing feature the instrument can be used as an SWR meter for antenna matching and transmatch adjustments.

Perhaps the most difficult task faced by the constructor is that of calibrating the power meter for whatever wattage range he desires to have. The least difficult method is to use a commercial wattmeter as a standard. If one is not available, the power output of the test transmitter can be computed by means of an rf ammeter in series with a 50-ohm dummy load, using the standard formula, $P = I^2R$. Or, if one is not interested in obtaining power readings the bridge can be used solely as an SWR indicator, as is done with the Monimatch-style SWR bridge.¹

The advantage of the circuits shown here over those of Monimatch bridges is that these instruments are not frequency-sensitive. Monimatch indicators become more sensitive as the operating frequency is increased, thus making it impractical to calibrate them in watts for more than one band, or for more than one portion of a given band. The units described here are more sensitive than Monimatches are. This makes it possible to calibrate them for power levels as low as 1 watt, full scale, in any part of the hf spectrum.

All of the circuits shown in this article are similar to the basic one which was described in an earlier issue of *QST*.² Some of the circuits are those of commercial power meters, and are used to illustrate variations in the basic Bruene design. The reader may wish to experiment with some of these circuits.

Design Philosophy

Referring to the circuit of Fig. 1B, the circuit used by Collins Radio Company, the transmission-line center conductor passes through the center of a toroid core and becomes the primary of T_1 . The multi-turn winding on the core functions as the transformer secondary. Current flowing through the line-wire primary induces a voltage in the secondary which causes a current to flow through resistors R_5 and R_6 . The voltage drops across these resistors are equal in amplitude, but 180 degrees out of phase with respect to common or ground. They are thus, for practical purposes, respectively in and out of phase with the line current. Capacitive voltage dividers, C_3C_7 and C_4C_8 , are connected across the line to obtain equal-amplitude voltages in phase with the line voltage, the division ratio being adjusted so that these voltages match the voltage drops across R_5 and R_6 in amplitude. (As the current/voltage ratio in the line depends on the load, this can be done only for a particular value of load impedance. Load values chosen for this standardization are pure

* Assistant Technical Editor, *QST*

¹ "Monimatch Mark II," *QST*, Feb. 1957

² Bruene, "An Inside Picture of Directional Wattmeters," *QST*, April 1959.

Practically all ham radio stations use some type of rf power meter or SWR indicator for tuneup and transmission line matching. This article points out some of the problems which are frequently encountered in designing and building reflected-power meters and SWR bridges. Examples of practical in-line rf wattmeters are given here, along with complete details for building a unit that will provide two power ranges, forward and reflected, for use from 3.5 to 30 MHz.

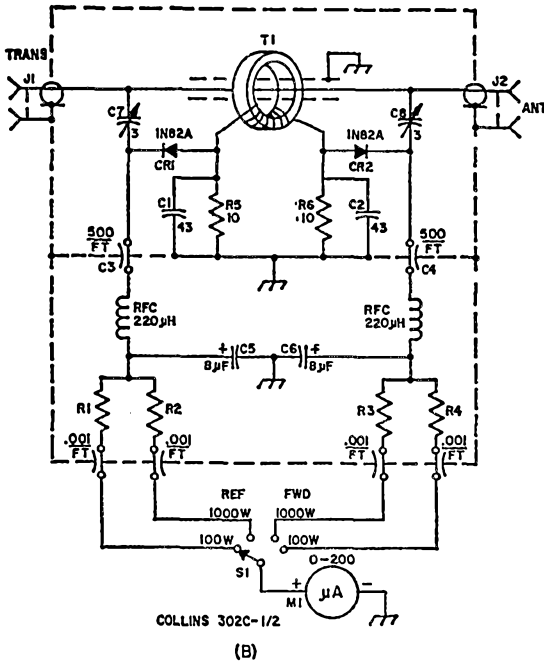
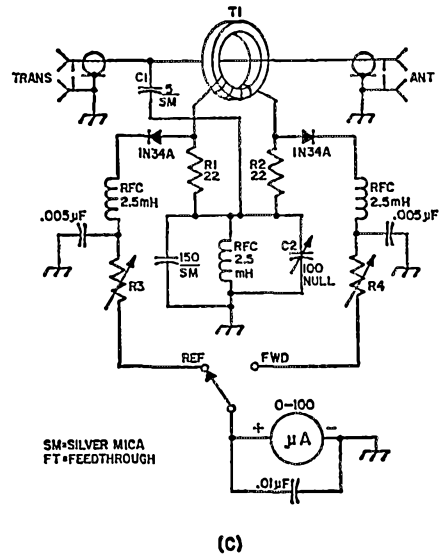
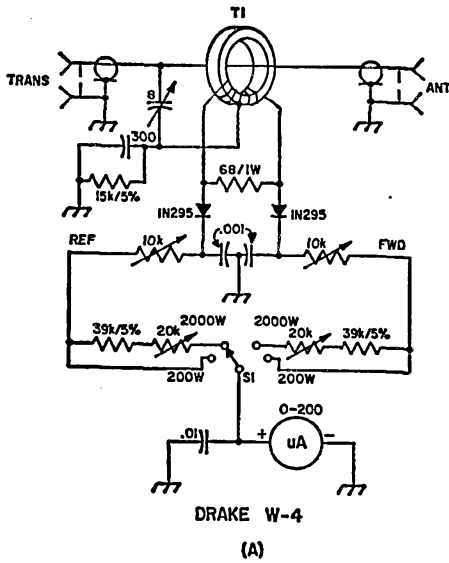


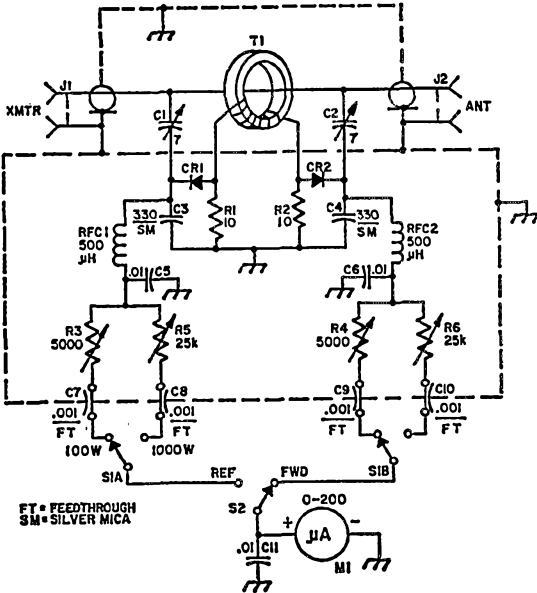
Fig. 1—Schematic diagrams of typical in-line power meters. At A, the R. L. Drake W-4 instrument. It uses a center-tapped transformer at T_1 , and has but one capacitive voltage divider in the sensing circuit. The circuit at B is discussed in the text, and is used by Collins Radio Company. The capacitive voltage dividers in this circuit use two 500-pF feedthrough capacitors in place of the silver-mica capacitors specified in Fig. 2. Capacitors C_5 and C_6 permit a charge time that enables the meter to read near-peak power on ssb. Calibrating resistances R_1 through R_4 are factory selected. The circuit at C is similar to one used by Comdel in their power meter. In this circuit C_1 is a fixed-value (small) capacitor, and the bridge is nulled by the larger capacitor in the divider, C_2 .

resistances that match the characteristic impedance of the transmission line with which the bridge is to be used, 50 or 75 ohms usually.) Under these conditions, the voltages rectified by CR_1 and CR_2 represent, in the one case, the vector sum of the voltages caused by the line current and voltage, and in the other, the vector difference. With respect to the resistance for which the circuit has been set up, the sum is proportional to the forward component of a traveling wave such as occurs on a transmission line, and the difference is proportional to the reflected component.

The Collins circuit uses two 8- μ F capacitors, C_5 and C_6 , to permit the meter to approach the PEP level during ssb operation. The dc voltages in the forward and reflected lines charge the capacitors to permit a near-peak reading. The discharge rate is set by the series calibrating resistors, R_1 through R_4 , and is dependent upon which of them is switched into the metering line at a given time. The circuit of Fig. 1B uses two 43-pF capacitors, C_1 and C_2 , to cancel the inductive reactances of R_5 and R_6 . Such reactance may become manifest at the high end of the range for which the instrument is built. If reactance is present in that part of the circuit the meter readings may not be accurate, especially at 10 and 15 meters. The capacitors were not needed in the circuit of Fig. 2, perhaps because the resistor leads were very short when they were mounted on the etched-circuit board.

Some Design Hints

It is important that the layout of any rf bridge be as symmetrical as possible if good balance is to be had. The circuit-board layout for the instrument of Fig. 2 meets this requirement. Also, the input and output ports of the equipment should be isolated from the remainder of the circuit so that only the sampling circuits

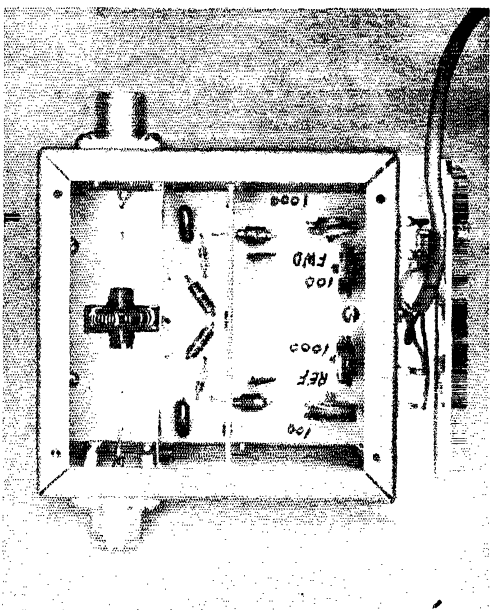


FT = FEEDTHROUGH
SM = SILVER MICA

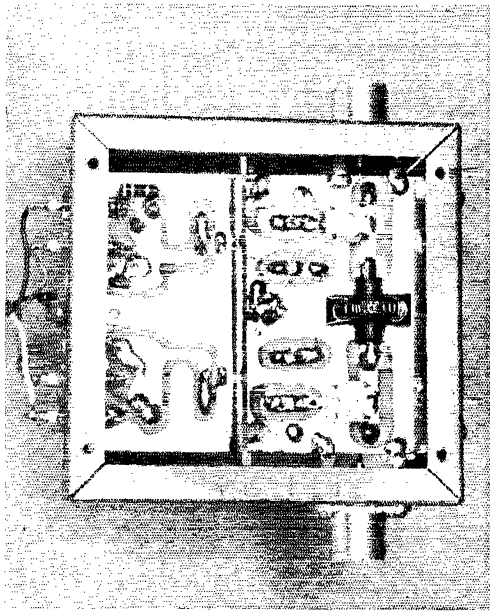
WATTS	M1	WATTS
100	200	1000
90	180	900
80	170	800
70	155	700
60	145	600
50	125	500
40	105	400
30	85	300
20	65	200
10	40	100
5	20	50

Fig. 2—Schematic diagram of a practical power wattmeter. A calibration scale for M₁ is shown also. Fixed-value resistors are 1/2-watt composition. Fixed-value capacitors are disk ceramic unless otherwise noted. Decimal-value capacitances are in μF. Others are pF. Resistance is in ohms; k= 1000.

- C₁, C₂—1.3 to 6.7-pF. miniature trimmer (E. F. Johnson 189-502-4. Available from Newark Electronics, Chicago, Ill.).
- C₃-C₁₁, incl.—Numbered for circuit-board identification.
- CR₁, CR₂—Small-signal germanium diode. 1N34A, etc. (see text).
- J₁, J₂—Chassis-mount coax connector of builder's choice. Type SO-239 used here.
- M₁—0 to 200-μA meter (Triplett type 330-M used here).
- R₁, R₂—Matched 10-ohm resistors (see text).
- R₃, R₄—5000-ohm printed-circuit carbon control (IRC R502-B).
- R₅, R₆—25,000-ohm printed-circuit carbon control (IRC R252-B).
- RFC₁, RFC₂—500-μH rf choke (Millen 34300-500 or similar).
- S₁—Dpdt single-section phenolic wafer switch (Mallory 3222J).
- S₂—Spdt phenolic wafer switch (Centralab 1460).
- T₁—Toroidal transformer; 35 turns of No. 26 enam. wire to cover entire core of Amidon T-68-2 toroid (Amidon Assoc., 12033 Otsego St., N. Hollywood, Ca. 91607).



Top view of the rf head for the circuit of Fig. 2. A flashing-copper shield isolates the through-line and T₁ from the rest of the circuit. The second shield (thicker) is not required and can be eliminated from the circuit. If a 2000-watt scale is desired, fixed-value resistors of approximately 22,000 ohms can be connected in series with high-range printed-circuit controls. Or, the 25,000-ohm controls shown here can be replaced by 50,000-ohm units.



Bottom view of the rf head for the circuit of Fig. 2. The fixed-value resistor at the lower left does not belong in the circuit, but was added as a shunt for one of the calibrating controls which was too high in value—a 50,000-ohm unit that was on hand. The shield partition shown here proved unnecessary and can be eliminated.

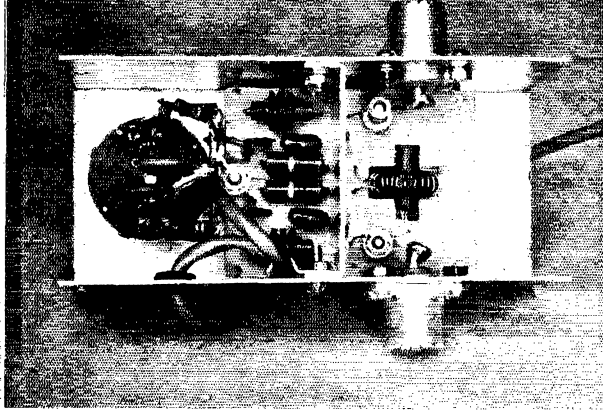


Fig. 3—Inside view of the 5- and 50-watt power meter rf head. Component values are the same as in the circuit of Fig. 2, except for the calibrating resistances (see text). An aluminum shield isolates the through-line and toroid from the remainder of the circuit. A 50- μ A meter is used in this model.

feed voltage to the bridge. A shield across the end of the box which contains the input and output jacks, and the interconnecting line between them, is necessary. If stray rf gets into the bridge circuit it will be impossible to obtain a complete zero reflected-power reading on M_1 even though a 1:1 SWR exists.

Referring again to Fig. 2, resistors R_1 and R_2 should be selected for the best null reading when adjusting the bridge into a resistive 50- or 75-ohm load. Normally, the value will be somewhere between 10 and 47 ohms. The 10-ohm value worked well with the home-made instruments shown here. It was found that half-watt resistors exhibited somewhat less inductive reactance at 30 MHz than did some one-watt units tried. R_1 and R_2 should be as closely matched in resistance as possible. They need not be exactly 10 ohms, so a vtvm can be used to match them. The resistors used for the circuit of Fig. 2 were actually 10.5 ohms each, and were chosen from an assortment of "10-percenters" on hand.

Silver-mica capacitors C_3 and C_4 were close enough in value so that special selection was not required. There should be enough leeway in the ranges of C_1 and C_2 to compensate for any difference in the values of the 330-pF capacitors. Ideally, however, C_3 and C_4 should be matched in value.

Diodes CR_1 and CR_2 should also be matched for best results. An ohmmeter can be used to

select a pair of diodes whose forward dc resistances are within a couple of ohms of being the same. Similarly, the back resistances of the diodes can be matched. The matched diodes will help to assure equal meter readings when the bridge is reversed. (The bridge should be perfectly bilateral in its performance characteristics.) Germanium diodes are used in the bridges described here, but silicon diodes can also be used. Silicon diodes conduct at a higher voltage than germanium diodes do — approximately 0.7 volt — and will not work too well in low-power wattmeters. Some silicon diodes were tried, but ceased to conduct at approximately 8 watts in the circuit of Fig. 2. This effect can cause misleading results when low values of reflected power are present during antenna adjustments. The SWR can appear to be zero when actually it isn't. The germanium diodes conduct at approximately 0.3 volt, making them more suitable for low-power readings.

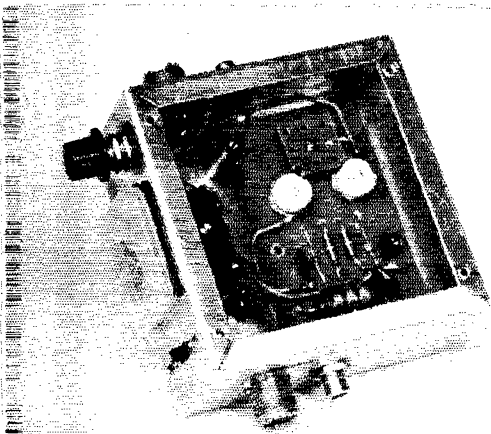
Any meter whose full-scale reading is between 50 microamperes and 1 milliamperes can be used at M_1 . The more sensitive the meter, the more difficult it will be to get an absolute reflected-power reading of zero. Some residual current will flow in the bridge circuit no matter how carefully the circuit is balanced, and a sensitive instrument will detect this current flow. Also, the more sensitive the meter, the larger will have to be the calibrating resistances, R_3 through R_6 , to provide high-power readings. A 0 to 200-microampere meter represents a good compromise for power ranges between 100 and 2000 watts.

Construction

The power meter of Fig. 2 is built in two sections. The rf circuit and the calibrating resistors are housed in a 4 X 4 X 2-inch aluminum utility box. All components other than J_1 , J_2 , and the feedthrough capacitors, are assembled on the etched-circuit board.³ Switches S_1 and S_2 , and the meter, M_1 , are installed in a sloping-panel utility box which measures 5 X 4 inches. Four-conductor shielded cable — the shield serving as the common lead — is used to join the two pieces. There is no reason why the entire instrument cannot be housed in one container, but it is sometimes awkward to have coaxial cables attach to a unit that occupies a prominent place in the operating position. Built as shown, the two-piece instrument permits the rf pickup head to be concealed behind the transmitter, while the control head can be mounted where it is accessible to the operator.

³The etched-circuit board pattern and parts layout sheet for this power meter are available from ARRL Hq. Send 25 cents and a SASE. Ready-made circuit boards can be purchased from Stafford Electronics, 427 S. Benbow Rd., Greensboro, N. C. 24701.

Fig. 4—Inside view of a 3-watt power meter for QRP rigs. Its circuit is given on page 16 of June 1969 QST. Ceramic trimmers are used for nulling the bridge. Type SO-239 connectors are paralleled with phono jacks to add versatility. A 4 X 4 X 2-inch utility box houses the entire unit.



Toroidal transformer T_1 fits into a cutout area on the circuit board. A 1-inch long section of RG-8/U cable — vinyl jacket and shield braid removed — provides a snug fit in the center hole of the toroid, and is used to complete the line between J_1 and J_2 . The inner conductor of the RG-8/U section solders to the circuit board, thus holding T_1 in place.

A flashing-copper shield divides T_1 and its center-conductor line from the remainder of the circuit. This partition is shown in dotted lines in Fig. 2. It is mounted on the non-foil side of the circuit board and is secured at each end to solder lugs which are mounted under the retaining screws for J_1 and J_2 .

The circuit board is held in place, at the end near T_1 , by means of an aluminum L bracket. The circuit-board end nearest the feedthrough capacitors is held in place by a No. 6 spade bolt. A solder lug is mounted under the No. 6 nut (outside the case) which secures the spade bolt. The lug serves as a connection point for the common lead between the rf head and the control box. Two solder lugs are mounted under the bottom two retaining screws of each coax connector. The free ends of the lugs are soldered to the copper foil of the circuit board.

A partition is visible in the foil-side view of the rf head. It can be eliminated if desired, since it did not prove necessary when the unit was tested. Similarly, an extra shield partition is shown on the top side of the board. It too can be eliminated, for it turned out to be unnecessary. The flashing-copper shield discussed earlier is the only one required for the circuit of Fig. 2.

Check-out and Tuneup

Once the instrument is wired and ready to test it should be inspected for unwanted solder bridges between the circuit-board foils. It is usually a good idea to scrape out the rosin buildup between the foils, and this can be done with the blade of a small screwdriver. A continuity check for "opens" and "shorts" should also be made before power is applied to the unit. Make certain that the diodes are installed for the correct polarity — the banded ends (cathodes) toward C_1 and C_2 .

Connect a noninductive 50-ohm dummy load to J_2 . A Heath Cantenna or similar load will serve nicely for adjustment purposes. Place S_2 in the FORWARD position, and set S_1 for the 100-watt range. An rf ammeter or calibrated power meter should be connected between J_2 and the dummy load during the tests, providing

Inside view of the modified Heath HM-15 bridge. The new components are grouped at the center of the chassis on a 5-lug terminal strip. The nulling capacitors are connected between the inner line and the terminal strip. Press-fit aluminum shield covers are slipped over the trough line to aid in rf isolation. One cover is in place; the other is at the right of the photo. Improved shielding might be effected by installing an aluminum plate between the terminal strip and the two nulling capacitors.

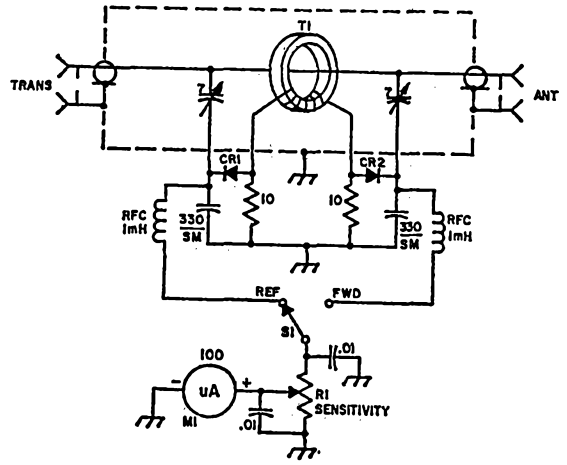
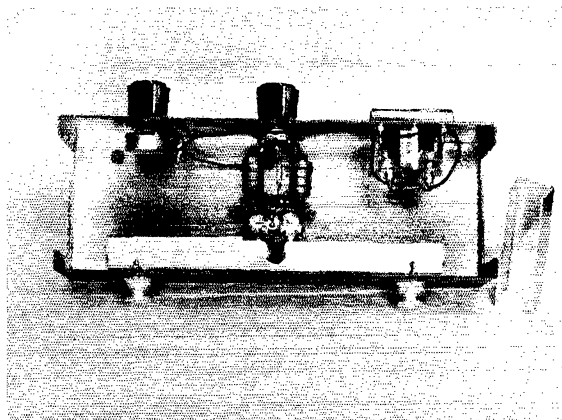
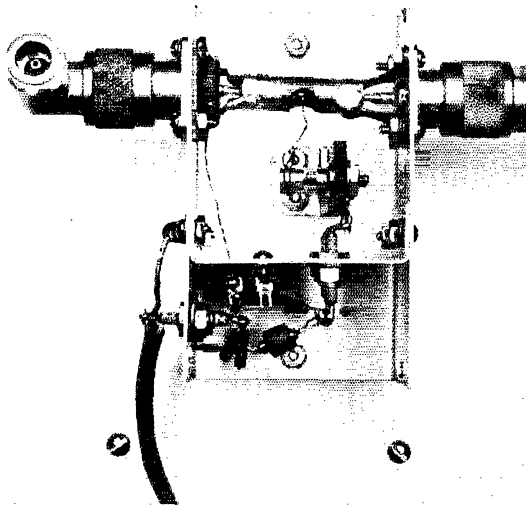


Fig. 5—Schematic diagram of the modified Heath HM-15 SWR meter. CR_1 , CR_2 , M_1 , R_1 and S_1 are original components from the HM-15. T_1 is the same as in Fig. 2. See text for additional details.

power calibration points against which to plot the scale of M_1 . Apply transmitter output power to J_1 , gradually, until M_1 begins to deflect upward. Increase transmitter power and adjust R_4 so that a full-scale meter reading occurs when 100 watts is indicated on the rf ammeter or other standard in use. Next, switch S_2 to REFLECTED and turn the transmitter off. Temporarily short across R_3 , turn the transmitter on, and gradually increase power until a meter reading is noted. With an insulated screwdriver adjust C_2 for a null in the meter reading.

The next step is to reverse the coax connections to J_1 and J_2 . Place S_2 in the REFLECTED position and apply transmitter power until the meter reads full scale at 100 watts output. In this mode the REFLECTED position actually reads forward power because the bridge is reversed. Calibrating resistance R_3 is set to obtain 100 watts full scale during this adjustment. Now, switch S_2 to FORWARD and temporarily place a short across R_4 . Adjust C_1 for a null reading on M_1 . Repeat the foregoing steps until no further improvement





Inside view of a 2000-watt power meter built by WIKLK. This bridge is patterned after the circuit of Fig. 1B. Point-to-point wiring is used throughout, thus avoiding the need for a circuit board. Two piston trimmers are used for the nulling capacitors and are mounted one above the other on a phenolic block. The two 500-pF feedthrough capacitors are part of the capacitive voltage dividers.

can be obtained. It will not be necessary to repeat the nulling adjustments on the 1000-watt range, but R_5 and R_6 will have to be adjusted to provide a full-scale meter reading at 1000 watts. If insufficient meter deflection is available for nulling adjustments on the 100-watt range, it may be necessary to adjust C_1 and C_2 at some power level higher than 100 watts. If the capacitors tune through a null, but the meter will not drop all the way to zero, chances are that some rf is leaking into the bridge circuit through stray coupling. If so, it may be necessary to experiment with the shielding of the through-line section of the rf head. If only a small residual reading is noted it will be of minor importance and can be ignored. In the circuit of Fig. 2 there remained approximately one half a meter division when the null was reached, and this occurred only on the 1000-watt range. Since this was representative of less than 2 watts of power it was deemed inconsequential.

With the component values given in Fig. 2 the meter readings track for both power ranges. That is, the 10-watt level on the 100-watt range, and the 100-watt point on the 1000-watt range fall at the same place on the meter scale, and so on. This no doubt results from the fact that the diodes are conducting in the most linear portion of their curve. Ordinarily, this desirable condition does not exist, making it necessary to plot separate scales for the different power ranges.

Tests indicate that the SWR caused by insertion of the power meter in the transmission line is negligible. It was checked at 28 MHz

and no reflected-power could be noted on a Bird wattmeter. Similarly, the insertion loss was so low that it could not be measured with ordinary instruments.

Other Circuits

Additional circuits and photos are shown for variations in the basic design used at Fig. 2. A low-power model, having scales for 5 and 50 watts, is shown in Fig. 3. It uses fixed-value resistors for meter calibration. The required values of resistance were first determined by temporarily inserting a potentiometer in the meter line, obtaining the required full-scale reading, then substituting fixed-value resistances of the proper ohmage. The meter readings for the two power ranges do not track in this model.

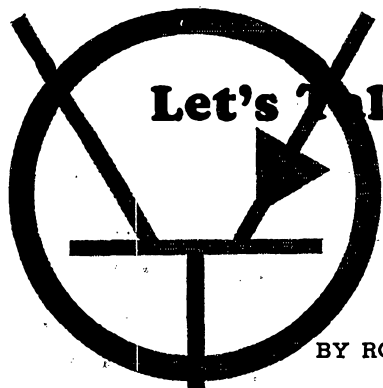
A low-power meter was designed for use with the QRP transmitter described in June 1969 *QST*. It is shown in Fig. 4, and has a full-scale calibration of 3 watts. To obtain additional sensitivity, the primary of the toroidal transformer consists of a one-turn link instead of the single wire that would normally pass through the hole in the toroid core.

Some experiments were conducted to see if a Heath HM-15 SWR bridge (a Monimatch type) could be modified to work in a Bruene circuit. The results were satisfactory, and the circuit is given in Fig. 5. No attempt was made to obtain a calibration scale for the meter. The unit is being used as a simple SWR indicator, but now has better sensitivity in the lower part of the hf spectrum — 7 watts, full scale, from 3.5 to 30 MHz. Also, the instrument is no longer "frequency-conscious" as was the case before modification. The original pickup lines were discarded, the fwd-REV panel switch was rotated 180 degrees so that the labels were correct for the new circuit, and press-fit shield covers were installed on the trough line as shown in the photo. A power scale could be plotted by setting the sensitivity control in a fixed position — possibly replacing the existing control with a screwdriver-adjust type. A new 100- μ A meter could be installed to provide a better scale for calibration in watts.

It was necessary to dismantle the trough line so that the toroidal transformer could be slipped over the inner line. A few wraps of mylar tape were wound over the center of the inner line to insulate the toroid winding from the line, and to provide a snug fit to keep the toroid in place. The trough was notched out with a nibbling tool to allow clearance for the toroidal transformer. Additional shielding can be added between the line and the rest of the circuit to further assure a zero meter reading in the reflected position.

It is hoped that the experimenter will find sufficient information here to enable him to build a power meter that will satisfy his specific needs. These instruments are not intended for use above 30 MHz, but it is hoped that a later issue of *QST* will describe some power meters for vhf use.

QST



Let's Talk Transistors

Part 2—Crystals, Donors, Acceptors and Holes

BY ROBERT E. STOFFELS*

IN Part 1 we discussed the electron, the proton, and the neutron, and the role each plays in the structure of matter. We pointed out that an atom of each element is composed of a particular number of each of these subatomic particles, and that no two elements contained the same number of each.

The protons and neutrons, each considerably heavier than the electrons, together form a "nucleus," and the electrons, very light in weight, rotate in orbits around this nucleus, in much the same manner as the planets rotate around the sun. The "atomic weight" is the sum of the numbers of protons and neutrons in the nucleus, and the "atomic number" is equal to the number of electrons rotating about the nucleus.

We pointed out that all electrons in a particular atom are not equidistant from the nucleus, but rather that they rotate in specific, well-defined orbits. Each of these orbits can hold, for various reasons, only a certain number of electrons, and it is the electrons in the outermost orbit that determine to a large extent the characteristics of each particular element.

We introduced "free" electrons, and defined them as those electrons in the outer orbit of an atom that are loosely held by the nucleus, and therefore are able to wander quite freely (it is the wandering of these electrons, you will recall, which constitutes electric current). Those atoms with a relatively large number of free electrons are conductors (copper, silver, aluminum), and those with relatively small number of free electrons are insulators (glass, mica).

Finally, we pointed out that between these general classes of conductors and insulators there is another category, known as semiconductors. The number of free electrons in these materials (e.g., germanium, silicon) is somewhere between

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The author describes the structure of semiconductor atoms, with their wandering negative electrons and positive holes, to clarify how rectifier action is provided when electrical potential is applied.

the number present in insulators and the number in conductors; therefore they have an electrical resistance somewhere between the resistance of conductors and of insulators. We suggested, in our final paragraph, that the ability to conduct electricity (and therefore the resistance) of each of these semiconductors could be varied by external means. It is this principle which is used in the construction of transistors.

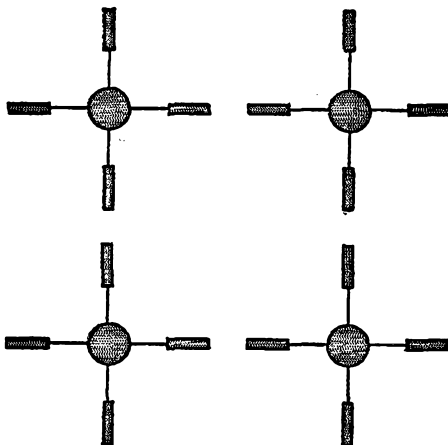


Fig. 2-1—Schematic of germanium or silicon crystal.

In this article we shall investigate the manner in which a piece of germanium is arranged, so far as its atoms are concerned, and will see how such a piece of germanium can be "disarranged" to create a very interesting phenomenon.

Crystals

Materials such as germanium, silicon, carbon (and for that matter, snow) are usually found in crystalline form — that is, instead of being in a conglomerate mass, the atoms arrange themselves in a very orderly manner. For instance, in a crystal of snow the atoms are always at 60-degree angles. A crystal of germanium or silicon forms a cubical pattern and, drawn from a two-dimensional standpoint, might look like Fig. 2-1. (Note that we have simplified the drawing of these atoms by showing the nucleus and all electrons except those in the outermost orbit as a single circle; the four outer-orbit electrons, on the other hand, are shown as small bars).

You will note that some of these electrons have become associated, on a one-for-one basis, with electrons from adjacent atoms. Two electrons thus tightly bound together form what is known as a covalent bond, or an electron-pair bond. Because these electrons are so bound, however, they are not free to take part in electrical conduction. Consequently crystalline materials such as germanium and silicon normally are poor conductors. Materials such as copper and silver do not form simple crystals of this sort (they form, rather, into complex polycrystalline structures); they do not have these tight covalent bonds, and consequently have more free electrons to serve in the conduction of electricity.

N-Type Germanium

The crystal shown in Fig. 2-1 is not such a permanent and indestructible thing that it cannot be tampered with slightly. We can, in fact, "steal" one of the germanium atoms, and replace it with an atom of, for instance, arsenic. Now, arsenic is somewhat different from germanium — specifically, it has five electrons in its outer orbit instead of four. Consequently, if we were to draw the new crystal (Fig. 2-2) we would find that we had an extra electron floating about. (Please note that the piece of material containing this one atom of arsenic among the many atoms of germanium is not, simply because it has an extra electron, negatively charged. For the nucleus of the arsenic atom has just as many protons as there are electrons rotating about it. Consequently, although there is something of a "lost sheep" electron, the entire piece of metal is still electrically neutral).

Because these special atoms of (in this example) arsenic are somewhat unnatural to the germanium, they are called "impurities." In this case, the impurity atom had an extra electron that it was trying to "donate;" any such impurity with five electrons in the outer orbit, instead of four, is called a "donor" impurity.

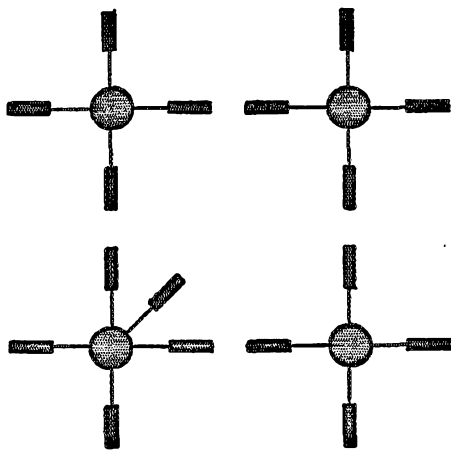


Fig. 2-2—Same crystal as Fig. 2-1 but with an atom of arsenic substituted for an atom of germanium.

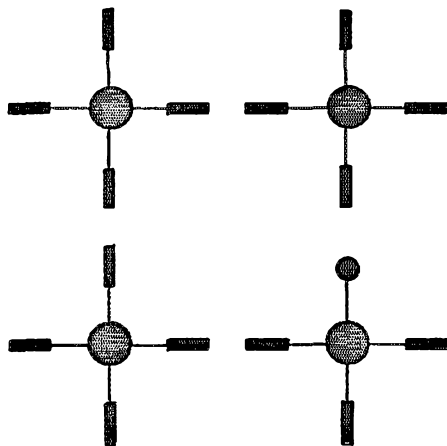


Fig. 2-3—Same crystal as Fig. 2-1 but with an atom of aluminum substituted for an atom of germanium.

This extra, or "excess," electron is not tightly bound to its own nucleus. In fact it has been found that, at room temperature, there is enough thermal energy to cause this electron to break away from its nucleus and wander at will through the space between the crystal lattices. Germanium having such an "excess" electron, with its negative charge, is called "n-type" germanium.

It should be once again emphasized that, however far this electron may wander, the entire crystal is still electrically neutral. For although there is a "wandering" electron carrying a negative charge, there is also a nucleus with one additional proton carrying a positive charge.

This "wandering" of excess electrons is extremely important in the study of diodes and transistors, and in fact is the very means that is used to conduct current.

P-Type Germanium

Just as it is possible to replace one of the germanium atoms having four valence electrons with an arsenic atom having five valence electrons, so is it also possible to replace a germanium atom with an impurity atom containing only three electrons in its outer orbit. Aluminum is such a material. If we were to draw a simplified picture of a crystal so formed we would have something resembling Fig. 2-3. Note that each valence electron of each atom combines with a valence electron of an adjacent atom, with the exception of the one electron that has no adjacent electron with which to pair up. We apply a name to this "emptiness" which should contain an electron; it is called a "hole" — and we call such an impurity an "acceptor" impurity, since it would like to accept an electron to fill this void. Germanium thus lacking an electron and its negative charge is called "p-type" germanium.

It is possible that an electron from an adjacent electron-pair bond may acquire enough energy to break this bond, and to enter the above-

mentioned "hole" — forming, on the one hand, a new electron-pair bond, and on the other hand a new "hole." (To put it another way, the electron has moved in one direction, and the "hole" has moved in the other direction). This concept of "holes," although different from anything most of us have encountered before, is extremely important for understanding the operation of transistors. What happens may better be understood from the following analogy:

Consider a long, straight, four-lane concrete highway, and further imagine that it is completely filled with automobiles stopped at a traffic signal. For simplicity, assume that all of the automobiles are painted black, and all are the same size. If you were hovering over this highway in a helicopter all you would see is a double string of black cars — electrons.

Now, what happens when the traffic light turns green? As each of us can testify, all the cars do not start at once. The first cars in the line start up, *each leaving a vacant spot behind it.* This vacant area, appearing from your helicopter's vantage point as a white spot, is newly created. It did not exist before, and in the truest sense of the word is a "hole." This hole is immediately filled up by the next car, thus creating another hole one car back. And so it goes; as each car starts up it fills a hole in front of it, and creates a new hole behind it.

Occasionally a car jumps from one lane to another, thus leaving a double hole in one lane and no holes in the other. But there will always be a number of holes, and they will move "backward" down the line of traffic — exactly opposite from the automobile "electrons."

In the above example the electrons always moved in one particular direction, and the holes moved in exactly the opposite direction. In the case of the germanium crystal with one aluminum impurity atom, the motion is not quite so direct. It is, indeed, quite a random thing; electrons will not flow in any particular direction unless they are under the influence of an electric potential.

This leads us to the next "characteristic" of a hole. Under the influence of an electric potential (as in the circuit shown in Fig. 2-4), the electrons in the crystal tend to flow in the general direction of the positive plate of the battery (Remember, *opposites attract*). Consequently, the holes flow away from this positive battery plate, or toward the negative plate of the battery. Therefore we are not at all incorrect in assigning a positive potential to this non-existent "hole." In fact for an understanding of transistors, it is convenient to consider the holes as specific particles, which, when in motion, constitute an electric current just as surely as does an electron.

There are several things which should be remembered, however. First, a "hole" can exist only in a semiconductor material; since it depends for its existence upon the type of crystalline structure we have been discussing, a hole cannot exist in a conductor.

Second, recognize that although the electron is considered (in the field of electronics) to be indestructible, the hole is not so fortunate. For when an electron fills the void of a hole, this particular hole is destroyed. Another hole may have been formed (depending upon the source of the electron), but it is a *new* hole.

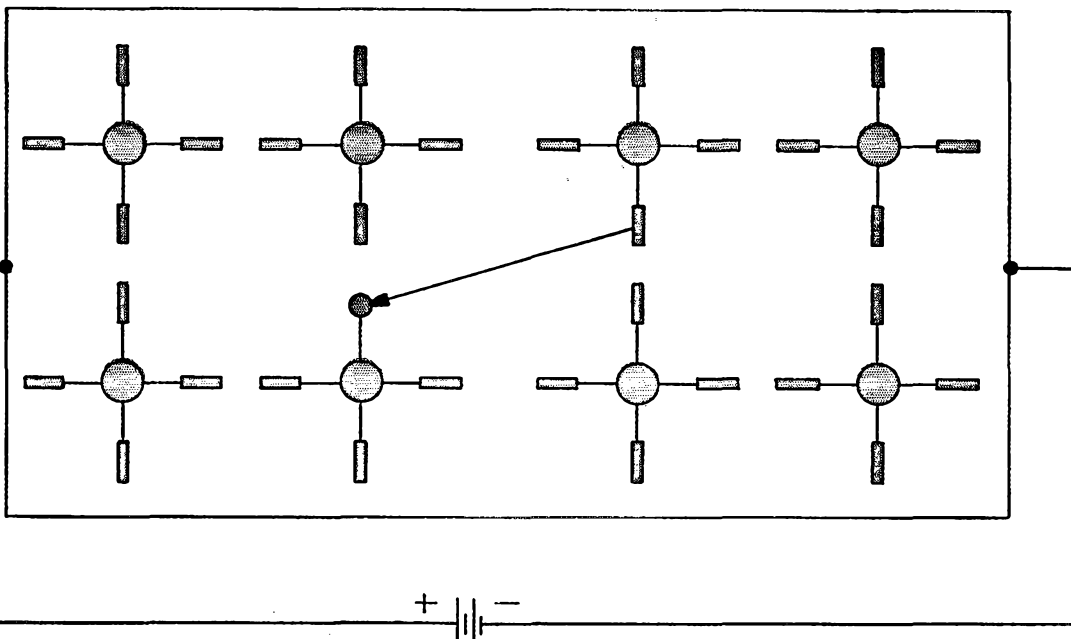


Fig. 2-4—Under influence of electrical potential, electrons in the crystal tend to flow toward the positive plate of battery.

Now I am sure that there are among our readers some pretty strong skeptics. The very idea of taking an admitted "nothing," calling it a very important "something," and then saying that its motion constitutes an electric current is, indeed, quite far fetched. The concept of holes is, however, based on actual fact. It is the basis for understanding transistors, and is so presented in all transistor textbooks. The first of these books, indeed, and probably one of the most profound, uses the word in its title: "Electrons and Holes in Semiconductors." It was published in 1950 (just two years after the first transistor made its appearance) and was written by Dr. William Shockley, one of the three people credited with the discovery of the transistor.

In Part 3 we shall consider the motion of these electrons and holes as they apply to the semiconductor diode, or rectifier. We shall see that such a diode is simply a combination of two pieces of germanium — the first containing p-type impurities, and the second containing n-type impurities. The motion of the electrons and holes in these two pieces, under the influence of an electrical potential, provides rectifier action.

Questions:

1. If, in a piece of germanium, a single atom of the material is replaced with an atom of arsenic, what is the resultant "type" germanium?
2. If, in the above example, the atom which is added is aluminum, what is the result?
3. An impurity with five electrons in its outer orbit, when added to germanium, is called what?
4. Match the following words in threes: donor, acceptor, arsenic, aluminum, p-type, n-type.
5. Is it acceptable to speak of the hole as a "thing"?
6. Does a hole have what amounts to negative charge?

Answers:

1. N-type germanium
2. P-type germanium
3. A "donor" impurity
4. Donor, arsenic, n-type; acceptor, aluminum, p-type
5. Yes. Holes may be said to "flow" just as electrons do, but in the opposite direction.
6. No. It may be considered to have a positive charge, since electrons have a negative charge.

QST



December 1944

... The cover this month shows Carol Witte W9WWP, acting communications manager of ARRL, proudly displaying a service flag showing that over 25,000 amateurs are engaged in serving their country in the armed forces.

... K. B. Warner's thoughts are directed toward the future use of frequencies above 100 Mc. Already the government and many laboratories are exploring these frequencies. He predicts the eventual practical use of frequencies in the tens of thousands of megacycles. He does not, however, see these microwaves as displacing the kind of radio wave amateurs have enjoyed on 80, 40, etc.

... QST needs assistance in the editorial department and wants amateurs with technical and editorial experience to contact the Editor.

... The cathode follower is discussed by Capt. William H. Minor, SC, W9DSN. It is an isolation circuit and an impedance matching device. There is some math involved, of course, but it is not too bad. Cathode followers are a little new but will see more and more applications as frequencies go higher and higher.

... In an article of Video-Amplifier Design, Charles H. Merritt, W6OMH gets down to the real meat of the wide-band amplifier, discusses its uses and tells how to design a practical working circuit. — W1ANA.



December 1919

... We are on the air again, all right, but many hams are finding that it takes time to get things going what with new antennas, new gear, etc. One hears lots of CQs with not many takers. Some traffic lanes are already open. There is some confusion in identifying nationality between Canadian and American 2nd district calls, since they are the same. The League suggests that the Canadians use "v" and that we use "de" between calls.

... One of the first mentions of the use of a "throttle" condenser for the control of regeneration is made in an article on short wave regenerators by Don F. Alexander, W1BK. This one covers from 150 to 700 meters.

... "Matty," R. H. G. Mathews tells how to tune up a spark transmitter in an article on Transmitter Resonance. (Many old timers well remember 9ZN). It will take quite a while before all spark stations disappear.

... The Grebe CR4 makes its appearance, as does the Benwood gap and a \$5 wavemeter by Amrad; also a small motor-generator for vacuum tube work.

... John M. Clayton (now K1AJ) describes a simply-made variometer. More comprehensively, Lou Pácent begins a series on "Wavemeter Construction and Operation." — W1ANA.

Strays

Feedback

We wonder how many of you who read "50 Years Ago" for October 1919 were surprised to find out that Thordarson condensers were "glass plate with bakelite as dielectric." Sorry about that. The plates were brass not glass. Incidentally these condensers were capable of withstanding 45,000 volts without a puncture. (Thanks to sharp-eyed W3CU — my hoo-boo — W1ANA.)

In the repeater article in QST for October 1969, page 14, Fig. 2A the box which says "Up Channel Xmtr" should have been labelled "Up Channel Receiver," as consideration of the diagram will show. Also, WA6ESA deserves the credit for the photos used in the story.

— — —

The labels on the connectors in Fig. 1 of the "Recent Equipment" write-up on the Comdel DW 1550 wattmeter, October 1959 QST, were inadvertently reversed. Change INPUT to OUTPUT and vice versa.

Modernizing a Classic 1296-MHz Converter

Simplification Through Solid-State Design

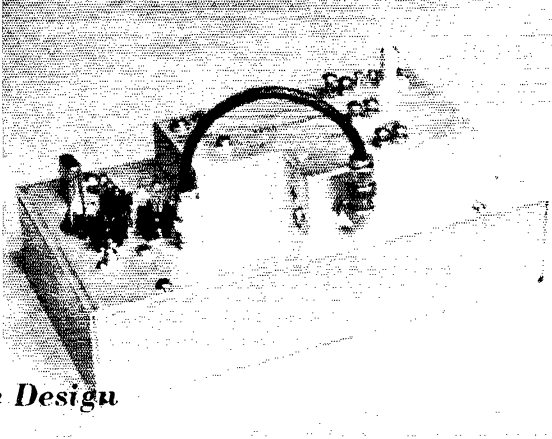
BY D. W. NELSON,* WB2EGZ

THE next challenge for the experimenting amateur uhf enthusiast, after conquering the 420-MHz band, is crystal control on 1296 MHz. Growing interest in this lowest amateur microwave band, 1215 to 1300 MHz, prompted some up-dating of the converter which appeared originally in *QST* for September, 1962, and in both editions of the ARRL *VHF Manual*.¹ By replacing the vacuum-tube oscillator-multiplier chain with one having only solid-state stages, and using more modern components, it is hoped that the converter approach to 1296-MHz reception will be made more attractive and practicable.

The original design of the converter by W6GGV, K6UQH and others has proven to be excellent. No changes were made in the basic trough-line aperture-coupling system. The 144-MHz output, for working into a low-noise 2-meter converter, also remains unchanged. The overall noise figure of the system, with 2-meter i-f output from the converter, is quite satisfactory, provided a good low-noise converter is used following the 1296-MHz mixer.

Noise and Gain, Again

Most of us are familiar with the effect on noise figure, when a preamplifier is used ahead of the first mixer in a v.h.f. or uhf converter; i.e., the noise figure of the preamplifier is dominant. This is true only because the preamplifier has gain, which diminishes the effect of noise generated in the remainder of the receiving system. The more gain in the preamp, the less will be the effect of noise in the following stages. When the con-



If this picture looks vaguely familiar to uhf-minded readers, it is because WB2EGZ used a popular 1296-MHz converter design by W6GGV as the basis for his all-solid-state version. The oscillator-multiplier chain using transistors, visible at the left, is the principal innovation. The crystal mixer and aperture-coupled final multiplier and injection filter are in the "penthouse" portion.

verter has no preamplifier, the mixer stage design becomes important in the overall noise figure of the receiving system. When a diode mixer is used, as in this converter, we are concerned with the noise of the diode. Because it has a gain of less than one, it adds its noise to the noise of the i-f amplifier system which follows. This system should, therefore, have the lowest possible noise figure.

For the crystal mixer diode, the 1N21 series is recommended. The suffix letter gives some indication of the mixer performance to be expected. The noise figure will be lowest and the conversion loss the least with the 1N21F or 1N21G. As mentioned in the *VHF Manual*, it is necessary to adjust the mixer tap on the 144-MHz coil (L_9 in Fig. 2) to obtain best results with any mixer diode. A difference can be observed with a change of as little as one-eighth of a turn in tap position. The tuning capacitor, C_7 , should also be adjusted for minimum noise figure (maximum signal-to-noise ratio) as the tap position on L_9 is changed. The effect is easily discernible by ear, when listening to a low-level signal, either on an antenna or from a signal generator.

The Oscillator-Multiplier Chain

Our prime claim to innovation is the replacement of tubes in the injection stages with a solid-state injection source. In addition to being less bulky, this part of the system requires only one unregulated voltage, between 12 and 15 volts dc. The stages also work on 9 volts, but hard starting of the oscillator suggests that the bias on the oscillator transistor should be changed for that voltage.

An RCA 2N5187, Q_1 , is used for the 57.6-MHz crystal oscillator. An RCA 40519, Q_2 , doubles to

*9 Green Ridge Road, Ashland, New Jersey 08034.
†Meyer, "A Crystal-Controlled 1296-Mc. Converter," September, 1962, *QST*, page 11. Also *The Radio Amateur's V.H.F. Manual*, Chapter 10, any edition.

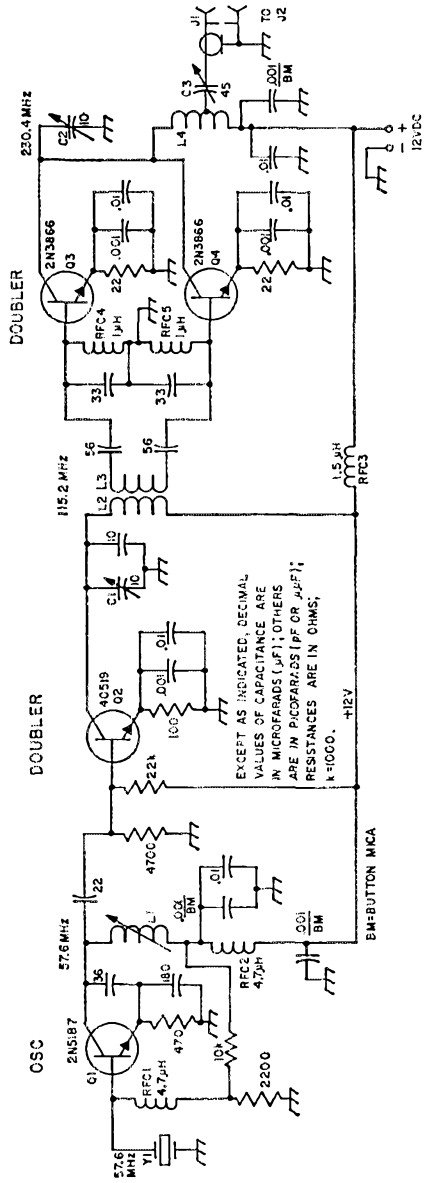


Fig. 1—Schematic diagram and parts information for the oscillator, front-end mixer-multiplier stages of the 1296-MHz converter, external to the front-end mixer-multiplier assembly. Feed-through capacitors (Erie Filtercon) may be used in place of the button-micas shown. Use heat sinks on Q₂, Q₃, and Q₄.

- C₁, C₂—10-pF cylindrical glass trimmer.
- C₃—45-pF ceramic trimmer.
- J₁—BNC fitting.
- L₁—0.162 to 0.264-μH, slug-tuned, (Miller 20A227RB).
- L₂—4 turns No. 16 enam., 1/4-inch ID, spaced wire diam.
- L₃—3 turns No. 16 enam., 1/4-inch ID, interwound with L₂.
- L₄—2 turns 1/8 by 1/2-inch copper strip, 1/4-inch ID, 1/2 inch long. Top 1/2 turn from collector end.
- RFC₁, RFC₂—Single-layer r.f. choke, 4.7 μH.
- RFC₃—Single-layer r.f. choke, 1.5 μH.
- RFC₄, RFC₅—Single-layer r.f. choke, 1 μH.

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

115.2 MHz, then two RCA 2N3866's operate as a push-push doubler to 230.4 MHz. Their output is fed to a diode quintupler, CR₁ in Fig. 2, within the first trough line. Final injection to the mixer, CR₂, is on 1152 MHz. In the tube version of the converter the 230-MHz output from last tube stage was sufficient to light a No. 47 pilot lamp to half brightness; this feat is still possible with 24 volts on the transistors, but it was found to be unnecessary. A resistor in parallel with the multiplier diode, R₁ in Fig. 2, causes dc bias to be developed across the diode, allowing more efficient multiplier operation. More on diode biasing will be given in the alignment procedure.

Biasing has a second advantage; choosing a good but inexpensive diode is not so much of a chore, because differences in diodes can be compensated for by changing bias resistors. Suitable diodes include the 1N82, 1N914, 1N916, 1N771B and DR-303.

Mechanical Features

While the original construction of the trough lines was followed closely, small changes were made. W6CGV spoke favorably of the probe-type coupling from the antenna to the first trough line. In this version of the converter, a 3/16 by 1-inch piece of copper is connected to the antenna connector in such a way that an adjusting screw can be used to vary the position of the probe with respect to the tuned line. This adjusting screw can be of nylon, or it can be a metal screw with an insulating nut on the end bearing against the probe.

By using a miniature jack for monitoring crystal current, it was possible to eliminate the outboard arrangement of the original converter. The fine and coarse tuning adjustments might be replaced by single brass slugs, used to vary capacitance from the lines to ground. WB2IOE was successful using this technique.

Some Thoughts on Adjustment

Dipping the v.h.f. tuned circuits near the frequency of interest is always a good start. This may be difficult with transistors, as their low impedance greatly reduces the Q of associated circuits. This problem may be overcome by removing the transistors in the circuits to be dipped, temporarily. Once you are satisfied that the circuits will tune, insert the transistors one at a time, and retune each stage for maximum output. The 230-MHz output should be connected to the diode multiplier, or some other load. Using the dip meter in the diode position is an excellent way to check the tuning of the stages. You won't be able to light a No. 47 bulb very brightly with the 230-MHz output. The position of the ceramic output-coupling capacitor, C₃, is not the same for best match to a lamp as it is for the diode multiplier.

Tuning of the trough lines is described well in the *VHF Manual*. The only difference here is the selection of a value for the diode-biasing resistor. There are considerable differences in various mixer and multiplier diodes, but proper adjust-

This bottom view of the injection stages shows mainly that the shortest possible leads were used. The power connector is at the lower center, with the crystal socket to the right. The socket for Q1 is just above center, with L₁ next to the left. Then comes the socket for Q₂, and the self-supporting coils L₂ and L₃, with C₁ directly underneath. Sockets for Q₃ and Q₄ are barely visible under their associated components. C₂ and C₃ show at the upper left. The ribbon inductor L₃ is at the lower left.

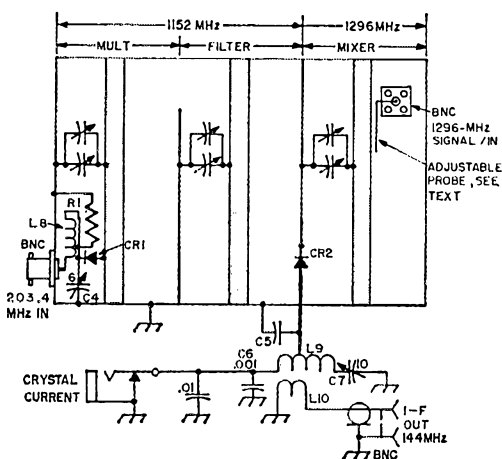
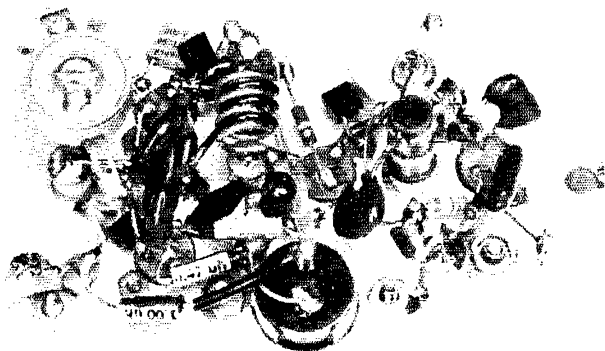


Fig. 2—Principal details of the diode multiplier, filter and mixer stages. Components labeled but not described below are similar to the original design by W6GGV. CR₁—Multiplier diode. See text. CR₂—Mixer diode, 1N21F or G recommended. R₁—Multiplier diode bias resistor. See text.

ment of the system can easily compensate, and any good mixer crystal can be driven to 1 mA or more of crystal current if this much is desired.

Choosing a proper bias resistor value is largely a matter of experiment. It was not necessary to bias for greatest output in the author's converter, as adequate crystal current was readily obtainable, and optimum noise figure will occur with crystal current in the range of 0.2 to 1 mA, depending on the mixer diode. A good starting value for R₁ would be 27 kΩ with changes made in 50-percent steps. A value of 82 kΩ worked well with the germanium DR-303. A silicon 1N914 required 5 kΩ. For the multiplier diodes and resistors tried, mixer diode current increased with increasing multiplier bias resistance.

Word To The Wise

The components used in the oscillator-multiplier chain were selected on a cost-versus-performance basis. Other combinations were tried with varying results. It is possible to excite the first doubler stage into a regenerative condition when other types of transistors are used, resulting in multiple outputs which in turn allow reception of a signal in several places in a narrow band. Although the condition may sometimes be caused with incorrect tuning of the multipliers, the use of the specified transistors is recommended.

Only the tenacious succeed on 1296, so be prepared to stick with the project. When the converter is working properly you will have the basis for further improvements, and will be well on the way to an effective 1296-MHz station.

QST

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• *Beginner and Novice*

Some Common Questions and Their Answers

BY LEWIS G. McCOY,* WHICP

IN answering mail, we find that some questions keep popping up. Possibly one of the following has bothered you.

"My SWR bridge shows more reflected reading than forward reading. What gives?"

Of course it is impossible to have more power coming back from the antenna than is going out, regardless of what the meter tells you. The most common type of reflectometer or SWR bridge used by amateurs is a frequency-sensitive device. The lower you go in frequency, the less sensitive it is. For example, in the Monimatch, using a 1-mA (full scale) meter, it requires about 100 watts of power through the bridge to get full-scale deflection at 80 meters. However, only about 1 or 2 watts will provide full-scale deflection on 2 meters. An 80-meter signal that is free of harmonics or parasitics going through the Monimatch should always show more forward than reflected power. However, if some higher-frequency energy such as a vhf parasitic is present, the readings obtained from the Monimatch can be completely unreliable.

If your transmitting setup is such that you get a greater reflected reading than forward, it would be a good idea to check the equipment for strong harmonics or a parasitic.¹

"I know my antenna has a 50-ohm impedance but for the life of me, I can't get an SWR reading of less than 2 to 1 on my SWR bridge in 50-ohm line. What's wrong?"

If you read the answer to the previous question you should have a good clue to the solution to this problem. If the antenna impedance is 50 ohms and the feed line characteristic impedance is 50 ohms, then the SWR has to be 1 to 1. However, let's again assume we are on 80 meters and using our 50-ohm-impedance antenna. Here is the point

* Novice Editor

¹ Parallel currents on the transmission line, combined with insufficient shielding of the SWR indicator, can also be responsible for apparently more power coming back than is going out. In less drastic cases, the result of this combination of two different modes of transmission is simply to reduce the accuracy to the point where the SWR readings are quite unreliable. — Editor.

Included in this batch of questions and answers are a couple that should raise some eyebrows. Maybe it is time that some of the eyebrows should be raised.

to keep in mind: the antenna impedance *won't* be 50 ohms on any of the other bands. Then if the rig has harmonic energy coming out, the harmonics don't see a 50-ohm load; they see some other value. Our frequency sensitive bridge is going to act up accordingly.² If we were to put a filter in the line before the SWR bridge to stop any harmonics, our SWR would read 1 to 1.

If we use a good 50-ohm dummy load for checking out the rig, the SWR bridge won't show the presence of harmonics simply because a good dummy load is 50 ohms at *all* the frequencies we are likely to generate in an hf rig. But an antenna is *not* a dummy load (or at least it shouldn't be!).

"I notice you call for using 50-ohm cable, but RG-8/U is 52 ohms; can I use the 52-ohm cable?"

As the saying goes, many newcomers get "up tight" if they cannot get the *exact* type or number specified. However, it is common to "round off" numbers, particularly when talking about coaxial cable. For example, we refer to "70-ohm" cable when actually none of the commonly used types are 70 ohms. They may be 72, 73 or 75 ohms but for the sake of convenience, we group them all under 70 ohms.

The answer to the question is yes, you can use any of the cables that are close to the specified value. It isn't that critical.

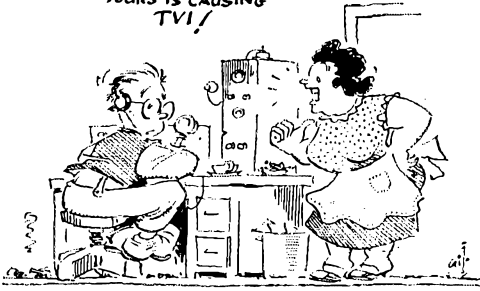
Also, in talking about cable impedances and checking SWR, some amateurs almost have a fetish about having an exact 1 to 1 SWR. What many hams don't realize is just how unrealistic this can be. For example, the manufacturer's tolerances in the manufacture of coaxial cables can be as much as plus or minus 5%. This means that a section of *nominally* 52.5-ohm impedance cable *could* be as high as 55 ohms and as low as 50 ohms. This alone should make it clear that the "perfect match" may not be so perfect after all!

"I notice that you specify most of your equipment design for 115 volts ac. Locally, we have 120 volts as a normal line voltage. Is there a standard for line voltage?"

Good question. We checked with the local power company and got some interesting information. The power company abides by the rules set down by the Connecticut Public Utilities Commission. Our local engineer said their standard on line voltage was 120/240 and told us that this was generally the standard throughout

² Footnote 1 applies here, too. — Editor.

THAT "FLAGPOLE" OF
YOURS IS CAUSING
TVI!



the country, but the tolerances would depend on various PUCs. The PUC in this area requires the electric company to hold the line voltage to plus 5% and minus 3% for commercial and residential services, and plus or minus 10% for industrial users.

The so-called "standard" line voltage has gradually crept up over the years. At one time it was as low as 110 volts, then went to 115 volts, and now appears to be 120 volts. A look through the catalogs on power transformers generally shows the transformers to be rated "from 110 to 120 volts primary" indicating there is plenty of leeway in the design and use of the transformers. Again, like the coax cable in the previous question, the line voltage designation on a circuit diagram is not critical to the exact volt.

"Other hams have warned me not to use a vertical antenna because I will get more TVI and Hi Fi interference. Is vertical worse than horizontal as far as interference is concerned?"

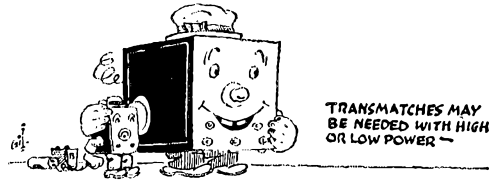
No, it isn't; they are both the same. This may come as a shock to some hams, but there really isn't any difference as far as the two types of radiation and interference are concerned. To put it another way, in the strong r.f. field around an amateur station, (or any radio station, for that matter), there is so much r.f. radiated, regardless of horizontal or vertical radiation, that the TV or hi-fi equipment wiring and antennas are almost certain to pick up r.f. energy. Whether or not the equipment can handle this r.f. energy without having interference is another story. But what is important as far as the ham is concerned is that vertical or horizontal radiation doesn't make any significant difference in such a strong r.f. field. You'll hear the argument that vertical radiation will be picked up by the TV antenna feed line, because the feed line is vertical (although the entire line rarely avoids bends!). However, what is overlooked is that the TV antenna is horizontal, so what difference does it make? Little or none, is the answer.

"I want to use an 80-meter dipole fed with coax. How severe will my TVI, SWR, etc., be?"

The type of antenna used and the SWR on the feed line have no predictable relationship with the amount of TVI that is produced! There are two basic types of television inter-

ference: fundamental overloading of the TV set by a strong rf field, and harmonics from the amateur station that fall in the TV channel. In the case of fundamental overloading the most certain cure for the TVI is *at* the TV set. Briefly, a strong fundamental signal comes into the TV set via the TV antenna, and the front end of the TV set overloads because it cannot handle the strong signal. The first stage in the TV set generates harmonics of the strong signal, feeding these harmonics through the set to result in TVI. The usual cure for this type of interference is the installation of a high-pass filter in the set to discriminate against the strong amateur fundamental signal. In the other case, harmonics are generated by the amateur transmitter, radiated by the antenna system, and then come into the TV set on the same channel as the set is tuned to. This type of interference can only be treated at the amateur transmitter. The usual cure is tight shielding of the transmitter and the installation of a low-pass filter at the output of the transmitter.

The answer to the question should be obvious at this point. If the rig is shielded and a low-pass filter is used in the feed line, it doesn't make a bit of difference in harmonic interference what type of antenna is used or what the SWR is. There are no harmonics coming out of the rig; therefore, there are none radiated no matter what the antenna system is.



"A local ham tells me that on higher power, if the transmitter has a pi network, no transmatch is needed. Is this true?"

It depends a great deal on the design of the pi network whether or not a transmatch is required, *regardless of the power level*. In the first place, many amplifiers are designed to work into a 50-ohm load with little or no provision being made to handle a load that varies much from 50 ohms. If a 50-ohm load must be provided for the amplifier, and a wide range of frequencies is going to be covered with an antenna, a transmatch is almost certainly required if the amplifier is to be loaded and operated properly. A good example would be an 80-meter dipole, cut for the middle of the band, say 3750 kHz, and complete 80-meter coverage were desired. The mismatch on either end of the band might be so bad (probably over 5 to 1) that it would be impossible to load and tune the amplifier at all frequencies in the band. In such a case, a transmatch would be a "must."

It should also be pointed out that in addition to providing a match between the antenna system

and the rig, the transmatch will provide other features. If the antenna changeover relay is placed so that the transmatch is in the line when the receiver is used, the transmatch will provide additional selectivity for reception. One serious problem facing many amateurs who work 80 meters is caused by nearby broadcast stations. The BC stations overload the front end of the communications receiver, causing severe cross modulation with amateur signals. The transmatch, with its additional selectivity, eliminates this problem. Also, because of its selectivity, the transmatch will reduce or eliminate any undesired harmonics coming from the transmitter.

In relation to the question, the important point is that the amount of transmitting power makes no difference. Depending on the circumstances, a transmatch may be needed.

"The manufacturer of my balun warns that a transmatch should not be installed when the balun is used because the breakdown voltage of the balun may be exceeded. It seems to me that something doesn't make sense here."

You are absolutely right, something doesn't make sense. Let's again use an example: Assume we have an 80-meter dipole, cut for 3750 kHz, fed with 50-ohm cable and a balun at the feed point. The SWR at the resonant frequency is 1 to 1 and rises to 5 to 1 at either end of the band. The one point here that keeps confusing amateurs is the SWR. The SWR is established by the impedance of the antenna and the characteristic impedance of the line. We cannot change the impedance of the line; it is fixed. The only thing that can change is the antenna impedance. As we QSY up or down the band the impedance changes and of course, so does the SWR. There is *nothing* we can do at the transmitter end of the line to change the SWR, and this includes "pruning" the line or using a transmatch.

All the transmatch will do is serve as a matching network between the length of 50-ohm line from the rig to the transmatch and the input impedance of the mismatched line on the antenna side of the transmatch. This in turn means that adding the transmatch to the setup does not change the SWR as seen through the balun, which is at the antenna. However — and this is the important point — adding the transmatch does let you tune and load your amplifier and thereby put more power into the line and of course through the balun to the antenna. Here is the clincher: The balun is designed to handle a certain voltage and current, and if either is exceeded, the balun can break down. The SWR on a line is the ratio of the maximum voltage to minimum voltage at any point on the line and the lower the SWR, the lower the maximum voltage; similarly with current. The answer to the problem, to put it bluntly, is that the balun manufacturer should provide a maximum figure of voltage and current for his product, which can be in terms of SWR for a given power rating. When this is done, the user has nobody but

himself to blame if the balun burns out . . . but don't blame it on the use of a transmatch in the line!

"I recently bought a standing-wave-ratio bridge, and after connecting it to my equipment, I found that I had an SWR of 1.3 to 1. What could be wrong and what should I do about it?"

There is nothing wrong and nothing you need to do about it. An SWR bridge shows two things when placed in the transmission line to the antenna. It shows the standing-wave ratio on the line and also serves as a relative output indicator. It is very difficult to put *exact* numbers on SWR as to what is a good ratio and what is a bad one. The reason is that there are so many different factors that must be considered. Coaxial transmission lines have smaller losses the lower you go in frequency. As you go higher in frequency, and particularly above 10 meters, losses in coaxial lines can become a very important factor in the overall efficiency of your transmitter (and receiver). The higher the SWR, the more the losses increase in these types of lines. However, a mismatch of say 3 to 1 on 80, 40, or 20 meters would not show any measurable difference from a matched condition, at a distant receiver. The losses are just not large enough. On the other hand, a mismatch of 3 to 1 on 2 meters could make an appreciable difference in signal strength.

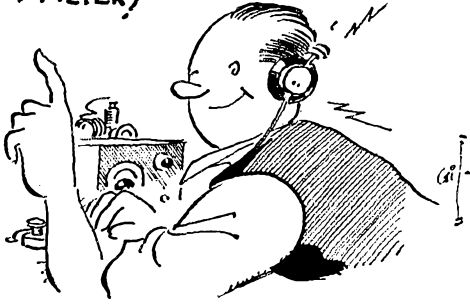
It is strongly recommended that the newcomer to ham radio study the chapter on transmission lines in *The A.R.R.L. Antenna Book*. Losses in transmission lines and standing wave ratio are treated in great detail and the reader will gain a better understanding of SWR versus frequency, and so forth. However, if you never have an SWR of larger than 1.3 to 1, as the question stated, you'll never have to worry about the problem.

"What is an S unit? Its value? Why only nine S units?"

This is a question that bothers a lot of newcomers (and old-timers, for that matter). Many years ago a scale was set up whereby you could give another amateur station a report as to his readability, signal strength, and the tone of signal (applying to cw), and this was called the RST system. As receiver design improved, there came a point when S meters were installed to provide the user with a visual indication of the received signal strength. And, of course, the stronger the signal received, the higher the meter read. In the original RST system, the highest report you could give another station was S9, which meant "extremely strong signal." The early receivers with S meters had the meters calibrated from 0 to S9 with S9 being the top of the scale. What a single S unit was depended on the particular receiver, and even this varied from band to band because of the difference of conversion gain in the receiver for different bands.

After World War II, there was some talk among receiver manufacturers on having a cer-

**EVERYBODY
IS "S9" ON
MY METER!**



tain microvolt standard for an S unit and the figure, or figures, discussed at that time was 50 or 100 μ V to equal S9. However, nothing was decided and as of this day, there is no standard for either S9 or an S unit. They vary with different receivers (and still vary in a given receiver from band to band).

To get down to brass tacks, the S unit is meaningless as applied to a received station. However, the meter can be useful in comparing two or more received signals, but merely on a relative basis. Some amateurs have calibrated their "S" meters in microvolts for a given band, or frequency within a band, and thereby get more meaningful information on received signals.

Maybe we shouldn't preach at this point, but many amateurs give inflated reports simply because they want the other guy's QSL card. Ask yourself this question: "Am I really that strong or is the guy giving me a "snow" job?" Do you want an honest report from the station you are working?

The *only* thing you can do to your equipment to stop the interference is to shut down the station! That of course, would be ridiculous and we don't recommend it. However, there is nothing you can do to your transmitter or antenna system to get rid of the interference because the fault is entirely in the Hi Fi equipment. In a strong rf field, such as would come from your fundamental signal, the wiring of the Hi Fi gear picks up your signal and turns it into audio through rectification.

One method of reducing or eliminating the interference is to bypass the speaker leads of the Hi-Fi equipment where the speaker leads leave the chassis. Installing a 0.02- or 0.03- μ F disk-ceramic capacitor between each speaker lead and chassis will be a big help. Also, a good earth ground on the Hi-Fi chassis will sometimes help. It should be pointed out to the Hi-Fi owner that none of the steps mentioned above will have *any* effect on the frequency response or performance of the unit. We had one stubborn case in our own home. The Hi-Fi unit was a solid-state setup, Japanese made, that used several printed-circuit boards, all mounted on a metal chassis. We found that one of the boards was not grounded to the main chassis, and the installation of a ground connection between the two, plus the speaker-lead bypassing, completely cleared up the interference on all bands.

The interference can be cleared up, but as it is with TVI, many of the faults are in the Hi-Fi gear. Treatment of such cases requires the same tact that should be used in dealing with TVI. As diplomatically as possible, point out to the Hi-Fi owner that his equipment needs the speaker bypassing. However, we don't recommend that amateurs get involved in "fixing" neighbors' TV or Hi-Fi gear except to the extent of advising the serviceman who does the work why the bypassing is required. QST



Here's one that is getting to be more and more frequent:

"I have had several complaints of causing Hi Fi interference. It doesn't seem to make much difference what band I'm on, I just come in on all of them loud and clear. I have tried all kinds of grounds on my equipment but nothing I do seems to help. Please don't tell me that the hi-fi owners must do something to their equipment. There must be something I can do to my equipment in my shack to stop the problem!"

Strays

Ever Take a Boy Fishing?

If you didn't, why not? Remember your first trip? Somebody took you. That first nibble was quite a thrill.

Apply this thought to ham radio. Who started you? I'll bet you fondly remember him. Recall your first contact? Great, wasn't it? Have you started anybody lately? Why not? Aspirants are all around. You have a license; you, therefore, qualify as a helping hand, a sponsor. This is a hobby for all ages, male or female. Young people particularly want help. This can be a start for their life's work, pave their way in the armed forces and help satisfy that restlessness in most people that an absorbing hobby can fulfill. Invite those kids in. Let them listen. Show them the cheap way. Remember, you built your first. Go to the aids — *Handbook*, etc. It's easy.

It's up to you. You have the ball. What are you going to do? Punt?

No, take a boy hamming. It'll make you feel swell. — W3KKN (President, "Pack Rats")

MOSFETs for Tubes

Substitutions in the Old Receiver

BY ALBERT D. HELFRICK,* K2BLA

ANY enterprising amateur can create his own hybrid or complete solid-state receiver for a bargain price with metal-oxide field effect-transistors (MOSFETs). The feature of MOSFETs that sets them aside from regular bipolar transistors is the similarity of their characteristics to vacuum tubes. It is this similarity that allows one to make almost direct substitution of MOSFETs for vacuum tubes.

Unlike bipolar transistors, MOSFETs are voltage-controlled devices, hence they have a high-impedance input. For example, the dc input resistance of a MOSFET can be greater than 10^{15} ohms. Although the input resistance at high frequencies is quite a bit less, it is considerably higher than that of bipolar devices. Very good power gains can be obtained for excellent sensitivity.

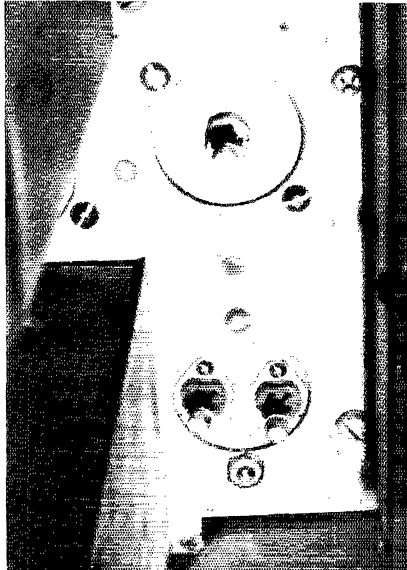
Most important, field-effect transistors have low noise figures because they are majority-carrier devices. The noise in bipolar devices is mainly due to recombination of minority carriers in the base. Also because operation does not depend on minority carriers, MOSFETs are less sensitive to temperature than bipolars.

The following are a few pointers for converting one or all the stages of a vacuum tube receiver to MOSFETs:

Start with a working receiver. (It is not necessary that the receiver be up to factory specs, but it is most helpful to make sure the receiver works properly in its original form before beginning the conversion.)

The first step is to obtain a low-voltage supply for the MOSFET circuits, since few receivers have a suitable supply. The best method is

* 70-A Linn Drive, Verona, N. J. 07044



Mounting the transistors is easy if metal plates are substituted for the original tube sockets. The tube socket area readily will accommodate all the transistor sockets necessary for replacing the tube in question.

simply to construct a half-wave rectifier with one good-sized filter capacitor, using the existing heater winding on the power transformer. Be sure that one side of the heater supply is connected to ground — if it is not, it would be best to build a separate supply. Heater supplies at 6.3 volts rms will supply about 9 volts with a half-wave rectifier and a large filter. Twelve-volt heater lines will supply twice that value. The supply should be capable of providing about 3 mA for each MOSFET circuit installed. There is no danger of overloading the heater windings because, as each tube is removed to make way for a MOSFET, the reduction in filament current is at least 150 mA, which is more than a whole MOSFET receiver!

In order to gain the most from each stage, the rf, mixer, local-oscillator, and i-f stages should be modified in that order, thus allowing one to stop the conversion when one desires.

RF Amplifiers

Fig. 1 shows a typical rf or i-f amplifier, simplified by eliminating band-switching or band-spread circuits. Locate the B+ feeder (point X) and disconnect B+ from the rf stage. It may be advantageous to disconnect the screen supply for safety's sake.

Usually, the values of the source bypass capacitor and source bias resistor are far from critical except perhaps in the mixer where correct

Once it was the fashion to pep up an old receiver with newer and better tube types. Now it's FETs, with promise of even better performance. Here are some suggestions from K2BLA, who has done just exactly this to modernize an old Super-Pro.

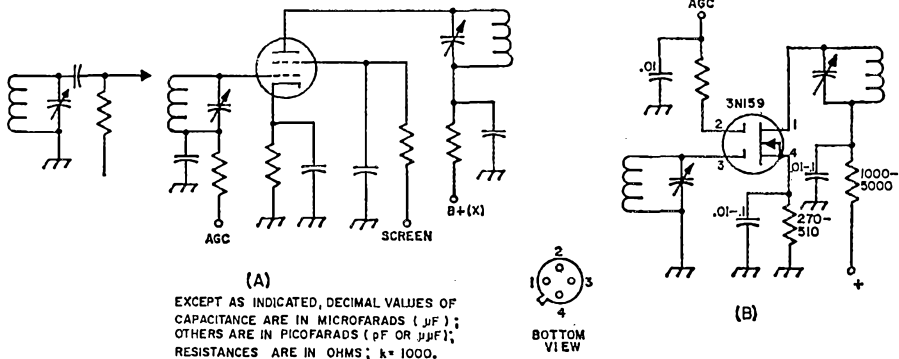


Fig. 1—A—Typical rf or i-f basic amplifier circuit used in many communications receivers. Switching details etc., have been omitted as they are not affected by MOSFET substitution.
 B—Substituting a MOSFET is relatively simple: the drain corresponds to the tube plate, gate to grid and source to cathode. A modification of the overall agc circuit may be needed since the agc voltage should go from +1 or +1.5 volts with no signal to about zero volts at maximum signal. One way to get the positive voltage is to insert a 1.5-volt dry cell in series with the main agc bus.

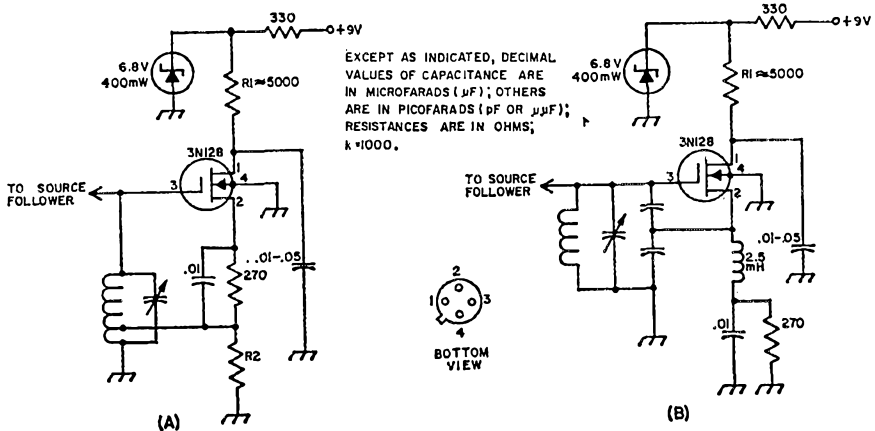


Fig. 2—Hartley and Colpitts MOSFET oscillators. The values of R_1 and R_2 are chosen to adjust the rf voltage to safe limits, as explained in the text.

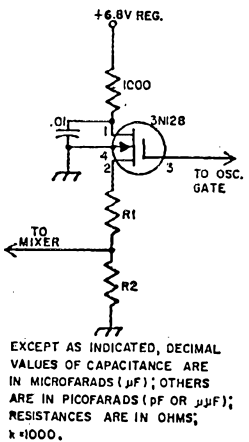


Fig. 3—Source follower for coupling oscillator to mixer. The sum of R_1 and R_2 should be of the order of 1000 ohms; adjust the ratio of R_2 to the total resistance so that the rf voltage fed to the mixer is about 2 volts peak to peak.

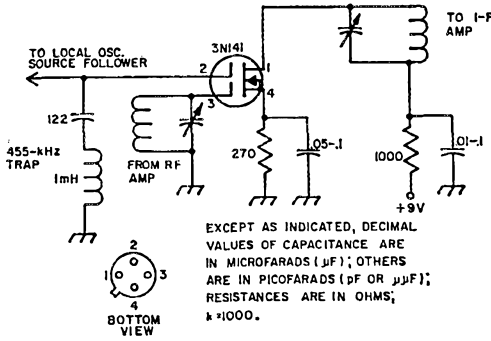


Fig. 4—Dual-gate MOSFET mixer circuit, with signal and oscillator voltages fed to separate gates.

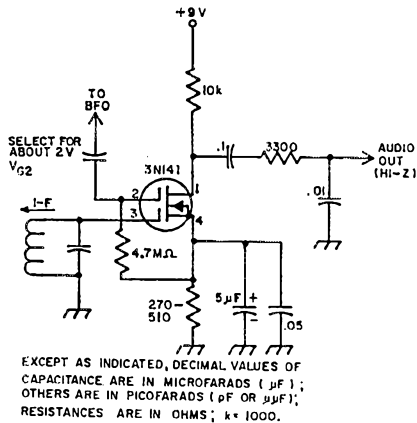


Fig. 5—The product detector closely resembles the mixer circuit, except that the beat-frequency output is in the audio instead of the i-f range.

bias is necessary for reduced spurious responses. The original cathode bias resistor may be a close value, and if so it's a safe bet that the bypass capacitor is large enough. The plate decoupling resistor will most likely be too large, but it is a simple matter to shunt another resistor across it. For dual-gate devices, a dry cell can be used to supply 1.5 volts for gate No. 2. This will allow simple transistor-for-tube substitution with only B+ change to evaluate the performance.

Single-gate devices have considerable drain-to-gate capacitance and they must be neutralized; however, the dual gate devices have much less drain-to-gate capacitance and may be operated unneutralized. Remember, MOSFETs are extremely high-impedance devices, so if self-oscillations occur check lead placement, then neutralize.

It is necessary to have some reliable signal source at a constant amplitude to check for improvement in sensitivity and as a signal for experimenting with parts values. Be sure not to exceed current and voltage ratings of the devices while experimenting with parts values.

This simple tube-to-MOSFET change should provide a working circuit the first time, and with little circuit change, it should bring an improvement in sensitivity, image rejection and improved overload characteristics.

Local Oscillator and Mixer

Receiver improvement from a MOSFET mixer is marked. If the receiver has a pentagrid converter it is necessary to replace it with an oscillator-mixer type converter (there is no FET equivalent of a pentagrid mixer tube).

Most receivers use either Hartley or Colpitts oscillators. Fig. 2 shows two MOSFET oscillator circuits. Determine what kind of tuned circuit the receiver has, and then which oscillator circuit is best suited.

One word of caution here: The MOSFET transistors used by the author were rated at 30 volts maximum peak-to-peak gate voltage, and the peak-to-peak gate voltage using the original tapped coil was greater than 40 volts. When constructing the oscillator circuit, set the receiver oscillator to its lowest frequency and use an oscilloscope to determine the peak-to-peak voltage at the gate terminal. Be sure to use a high-impedance probe and an oscilloscope with sufficient band-width. A good quality VTVM could measure the rms value of the gate voltage. Assuming the waveform to be sinusoidal, multiply by 2.8 to determine the peak-to-peak voltage. If the gate voltage is excessive, increase the source resistance and, if necessary, add R^2 .

To minimize oscillator pulling and to attenuate the large voltage from the oscillator, a source follower is recommended (Fig. 3). Try to limit the peak-to-peak voltage to the mixer to 0.75 to 1 volt. Larger injection voltages will cause spurious responses. Also, the dc voltage across the source resistor should be about 0.1 to 0.4 volt.

The dual-gate MOSFET mixer is one of the best mixers available. With proper operating conditions, it offers good cross modulation attenuation, dynamic range, and practical immunity from spurious responses. Fig. 4 shows a typical mixer circuit. Notice that the divider of the source follower (Fig. 3) is connected directly to the second gate of the mixer. This supplies the necessary positive bias to the second gate of the mixer. Remember, high-impedance, high-frequency circuits require short, rigid leads for stability.

Other Circuits

Intermediate-frequency amplifiers may be converted in the same manner. It is advisable to use dual-gate devices wherever possible. The second gate is used for agc control, and the more stages under agc the more effective the action. The low feedback capacitance usually allows unneutralized operation.

The MOSFET product detector, being a mixer, like the mixer offers excellent results.

(Continued on page 98)

Table I	
Stage	Type
*Rf amp. I and II	3N159
Mixer	3N141
Hf osc. and source foll.	3N128
*I-f I and II	3N159
I-f III	3N128
Product Det.	3N141
BFO	3N128
Agc amp.	3N128
Calibrator	3N128
Audio amp.	Integrated circuit
Power output	2N301 (bipolar)
S-meter differential amp.	Junction FETs
3N128 — Single gate type	
3N141, 3N159 — Dual gate types	
* Agc controlled stage.	

A Phone Patch for the Collins S Line

Using a simple resistive bridge circuit,

plus notes on patch operation

BY DOUGLAS A. BLAKESLEE,* W1K1K

ALTHOUGH the phone patch shown in the photographs was intended to be used with the popular Collins S/Line equipment directly, the same circuitry will work well with all current amateur equipment. Two such units were constructed, one being used with the author's 75S1/32S1, and the other by W1HJZ with a B & W 6100 transmitter and Hallicrafters SX101 receiver. Excellent results have been obtained in both installations.

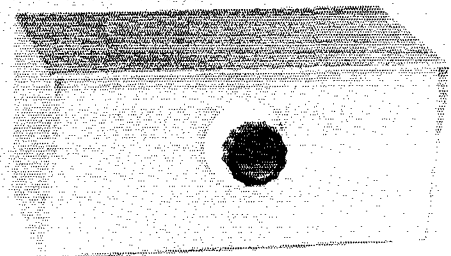
Design

The phone patch is based on a simple resistance bridge, which has been used by Collins in their commercial designs and in some hardware for the space program. This bridge circuit provides isolation between the transmitter and receiver, while connecting both to the telephone lines. An attenuator is provided between the bridge circuit and the telephone line to reduce the output level of the patch and to provide a fairly constant impedance for the bridge to "look into." Rf filtering is used to prevent trouble with pickup on the telephone line, a problem that shows up all too often in stations running the legal limit. An attenuator is also used on the receiver input so that the receiver gain does not have to be reset when switching from speaker to patch operation.

A heterodyne at about 2600 Hz can produce accidental disconnect on long-distance calls, as the telephone company uses in-band signalling on this frequency for control purposes. The chances are perhaps slight in normal ssb operation that you will have a heterodyne on just the right frequency, but it is possible. The Collins receivers will provide some attenuation of 2600 Hz, as this is down the slope of the receiver's mechanical filter, but the exact amount of attenuation will depend on the slope of the particular filter used and the BFO crystal frequency.

As both of these factors can change with aging, a trap was added to the patch to insure compliance with telephone company tariff requirements. A surplus 88-mH toroid coil is used with two paper capacitors to resonate at about 2600 Hz. If an audio generator and handful of capacitors are available, C_3 and C_4 can be selected to give the best notch at the desired frequency.

*Assistant Technical Editor, QST



Normally, the attenuation of the receiver's filter plus the trap is more than necessary, so the adjustment of the trap need not be critical.

Construction

The patch is constructed in an LMB Minibox (W-2C). All small components are mounted on a piece of Vectorbord. A little thought should be used in the layout so that the circuit "flows" from input to output. A miniature version was tried, but it did not exhibit the excellent isolation of the larger unit, probably because of coupling between the closely packed components. The transformers are mounted with their cores at an angle — when mounted side by side there was some coupling between them. Shielded transformers might be a good idea, but their prices are staggering. The jacks and plugs used can be any of the popular types — use whatever you have as a shack standard.

Adjustment is also simple. Plug the patch into the telephone company's coupler. Call a friend and ask him to leave his phone off the hook while you make a few adjustments. Connect an audio oscillator to the receiver input, J_3 , and an oscilloscope to the transmitter output jack, J_2 . Turn the patch on and adjust the balance control, R_1 , for the minimum pattern height on the oscilloscope. If the pattern goes to zero, increase the audio oscillator gain and adjust R_1 until you are sure you have the best null. If no test equipment is available, you can make a fair null adjustment by connecting your shack receiver to the receiver input jack, tuning in a loud, steady carrier (or the receiver's calibrator) and connecting a pair of high-impedance headphones to the transmitter output jack. Listen on the headphones and adjust control R_1 for minimum signal.

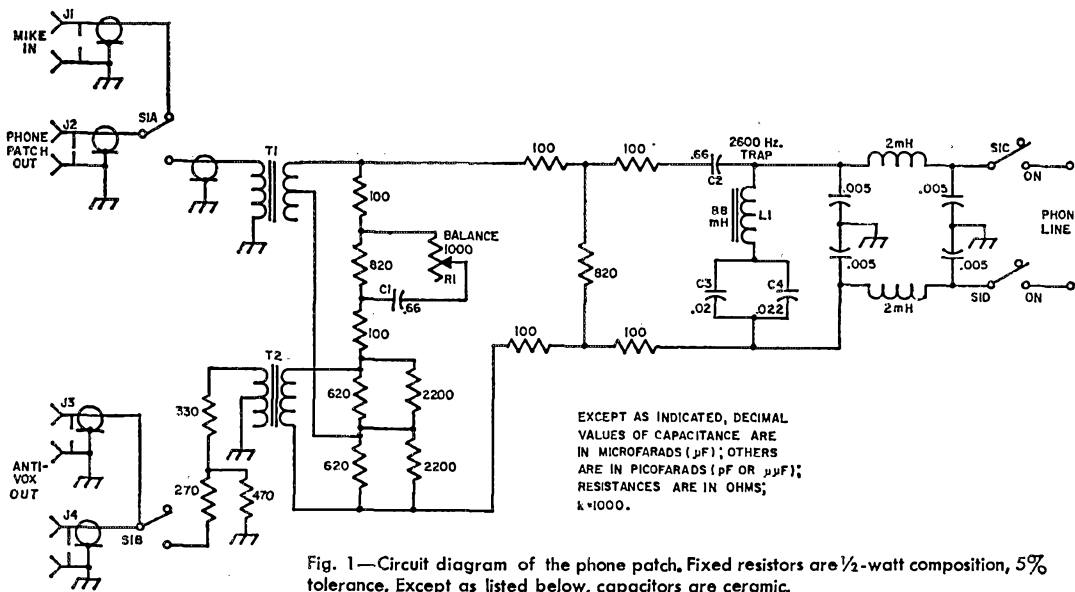


Fig. 1—Circuit diagram of the phone patch. Fixed resistors are 1/2-watt composition, 5% tolerance. Except as listed below, capacitors are ceramic.

- C₁, C₂—200-volt paper, each formed by connecting 0.22 μF units in parallel.
- C₃, C₄—Paper; see text.
- J₁-J₄ inc.—Phono jacks.
- L₁—88 mH toroid, telephone surplus (see Ham-Ads).

- R₁—Linear control.
- S₁—Rotary, 4 poles, 2 positions.
- T₁, T₂—Audio, 1500-ohm primary, 500-ohm c.t. secondary (Stancor TA-28).

The easiest way to monitor patches is with your own telephone, so leave your phone off the hook while making the null adjustment. Slight improvements may be possible in the null by adjusting C₁ to balance with your particular phone line. This patch has been tried in several locations, but little operational improvement was actually obtained by playing with C₁.

The actual isolation obtained between transmitter and receiver is about 50/dB, which is about all you can use, as the signal to noise

ratio is not much better than this on the average telephone call.

Operation

The operation of a phone patch is affected by many nontechnical factors, some of which are learned the hard way in practical use.

Normally, when requested to make a patch, the operator will place a long-distance station-to-station (or person-to-person) collect call. Unless you live in a downtown metropolitan area,

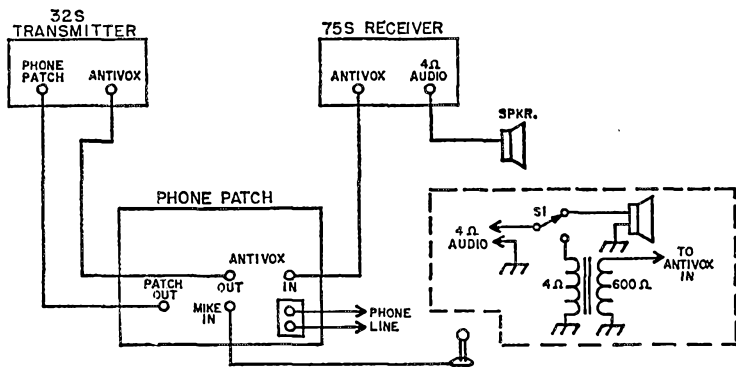
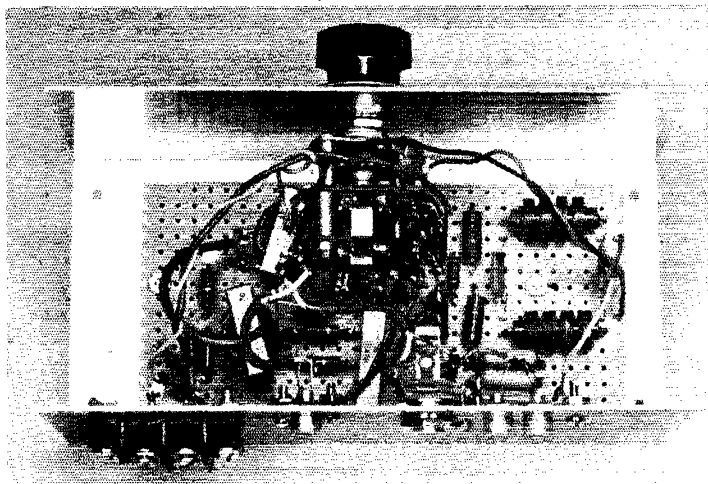


Fig. 2—Phone patch-S/Lline interconnections. With this equipment the load change on the receiver's speaker output makes it unnecessary to disconnect the speaker when the patch is switched in. With other receivers it may be desirable to include an extra switch section on S₁ to provide 600-ohm audio (through a transformer) from the receiver while disconnecting the speaker. A suitable circuit is shown in the dotted enclosure; T₁ is a 4-ohm primary, 600-ohm secondary audio transformer.

The patch is assembled on perforated board inside a $3\frac{3}{8} \times 7 \times 3\frac{1}{2}$ -inch box. Jacks and connector block are on the rear wall (bottom in this view). The 2600-Hz trap shown in Fig. 1 was installed after this photograph was taken.



you seldom make local phone patches. The person answering the phone should be briefed on what is happening. The conversation can take place only one way at a time, which is a difficult concept for many people to grasp, so take it slow. Also, get the person's name for your log — it's your transmitter they are going to use, and FCC regulations require you to log the name of anyone permitted to speak over your microphone.

Flip the patch on, and you're off and running. Monitor the conversations closely — again, it's your transmitter and license. People say the strangest things! Shortly after completing the unit, the author ran a series of patches for a Navy ship at sea. One was from a seaman to his girl friend, who promptly started to reminisce about their last days together. All of a sudden, WOW! — we had to make a dive for the off switch. Shaken, we could only hope no FCC monitoring station was listening. The main point is that people will say very colorful things that by regulation cannot be allowed on the air, so keep a hand on the switch.

VOX or PTT switching can be another problem area. The unit has sufficient isolation to work well with VOX circuits. However, telephone calls, especially long distance calls, arrive at widely different levels, and almost all phone patches are taking place over considerable distances, on channels that are seldom free of QRM for long. These factors add up to push-to-talk operation by the phone patcher. VOX is tricky at best (and often unusable) on a channel with some QRM, connected into a telephone circuit that often has occasional strange noises. For proper control and best patch operation, we recommend PTT operation.

One final point to remember is that a phone patch is a textbook example of third-party traffic, and thus can only be run to countries allowing such traffic. Keep a list of such countries handy, as requests will occasionally be received

from stations in countries with which third-party traffic is prohibited.

Phone patching can be a useful public service and means a lot to the persons involved, as received cards and letters will indicate. The phone company benefits, too, as was shown on a patch from another sea-bound sailor to his wife. The wife answered by saying that she was glad to hear from him again, but unless he had got a raise to stop calling — it was running some \$20 per call on her phone bill!

But don't overdo it. A phone patch from Miami to New York on Sunday has no place on the air, not when you can call direct for a dollar or less. A patch under these circumstances is not a public service; rather, it's a public nuisance.

QST

Strays

FLASH — Good news from Amsat: NASA has agreed to launch Australis-Oscar 5 as a secondary payload on the Tiros-M mission which should be launched within the next few months. An article on A-O 5 experiments appears on page 54 of this issue; listen to WIAW bulletins for further information on the launch.

— . . . —

February 28, 1970, marks the second "Operation's Day" for WA2DNR, club station of the Colonie Central High School Radio Club. This enthusiastic young club will operate from 1300 GMT Feb. 28 until 0100 GMT Feb. 29, manning the Novice bands on 3725, 7175 and 21,141 kHz. General class contacts will take place near the middle of each phone and cw band. Two-meter operation is also anticipated. A new QSL will commemorate contacts on Operation's Day, 1970.

A simple antenna system that takes advantage of the increased electrical height of a given length of conductor as the wavelength is decreased. Matching is effected by a line section in conjunction with lumped-circuit reactance compensation.

A Triband Vertical Antenna

Three-Band Matching Without Traps

BY FRANK A. REGIER,* OD5CG

SEVERAL varieties of vertical antennas are in use by hams. The most common is the quarter-wave vertical, which radiates well and is easily matched to a coax feed line, but has the weakness that it is a single-band antenna. Methods of adapting a vertical for multiband operation include the use of traps, loading coils, and elements of different length fed in parallel. The antenna system to be described here was arrived at by treating separately the problems of designing the antenna and of designing the matching system.

The antenna design was easy. A height of 22 feet is optimum for a vertical antenna for 10, 15 and 20, and several commercial verticals are of this height. It corresponds to about five-eighths wavelength on 10 meters. Greater height results in reduced low-angle radiation on 10, besides being more difficult to erect. A 22-foot vertical gives better low-angle radiation than a quarter-wave vertical on all three bands and is especially good on 10 meters.

My antenna consists of 22 feet of 300-ohm Twin Lead, with both conductors tied together, held about an inch from a bamboo pole by means of small blocks of insulating material spaced every two feet or so along the pole and held in place with plastic electrical tape. The pole is guyed with nylon fishing line, and the antenna is operated against a ground plane of four quarter-wave radials for each band. The use of Twin Lead rather than a single wire simulates a thicker conductor and reduces the im-

* American University of Beirut, Beirut, Lebanon.

Table I

Approximate Impedances at Base of 22-Foot Ground-Plane Vertical Antenna

Frequency	Resistance	Reactance
14.250 MHz	100 ohms	+ 200 ohms
21.375 MHz	1200 "	- 500 "
28.500 MHz	60 "	- 220 "

Table II

Impedances at Input End of 27.8-Foot Matching Section of 300-Ohm Twin-Lead Terminated by the Impedances Listed in Table I

Frequency	Resistance	Reactance
14.250 MHz	93 ohms	+ 177 ohms
21.375 MHz	63 "	0 "
28.500 MHz	75 "	- 282 "

pedance, making the antenna easier to match. Even so, the antenna impedances are vastly different on the three bands. The presumed values of impedance are listed in Table I. These values are taken from published data¹ and assume a cylindrical antenna of specific radius operated against a perfect ground. My antenna is not cylindrical, and it operates against a wire ground plane, so that the impedances listed must be considered approximate only. The results obtained indicate that they are at least fairly close.

If the three antenna matching impedances are normalized to 300 ohms and plotted on a Smith chart, it can be seen that it is possible to obtain a reasonably good match to a coax line on any of the three bands by using an appropriate length of 300-ohm line as a matching section connected between the antenna and the coax line. What is not possible is to find a single length of line that will provide suitable matching on all three bands.

It turns out, however, that a 27.8-foot section of 300-ohm line having the 0.82 velocity factor which is usual for Twin Lead has interesting characteristics. Such a section of line, connected to an antenna having the impedances listed in Table I, has the input impedances listed in Table II. This combination of antenna and matching section is shown in Fig. 1.

¹ Jordan, E. C., *Electromagnetic Waves and Radiating Systems*, Figures 13-12 and 13, pp. 482-3; 1950, Prentice-Hall, Inc., New York.

It will be noted, first of all, that this combination may be used as it stands on 15 meters and fed with any usual coax. What is even more interesting, however, is that the input resistance is near 75 ohms on all three bands, though on 10 and 20 there is also considerable reactance. If a reactance unit could be made which had just the correct value of reactance to cancel out the input reactance of the matching section on all three bands, the unit could be connected in series with the matching-section input and the system fed with 75-ohm coax on all three bands.

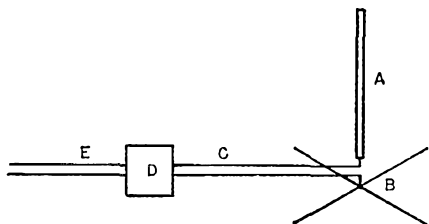


Fig. 1—The triband vertical antenna system.

- A—Vertical radiator, 22 ft of 300-ohm Twin Lead with conductors in parallel.
- B—Four radials, each consisting of $\frac{1}{4}$ wavelength of wire, for each band (12 wires in all).
- C—Matching section, 27.8 ft of 300-ohm Twin-Lead.
- D—Reactance unit; see Fig. 2.
- E—75-ohm coax to transmitter, any length.

Reactance Units

Can such a unit be made? Certainly! It's not hard at all. It consists of a simple 7-turn coil and two trimmer capacitors and is shown in Fig. 2. The trimmers are most easily adjusted with the aid of a grid-dip meter before the reactance unit is installed. C_1 should be set so that L_1C_1 resonates at 35.85 MHz, and C_2 can be subsequently adjusted by temporarily connecting it in parallel with L_1C_1 and varying it until the combination resonates at 21.37 MHz.

With the reactance unit adjusted as described, my antenna when first assembled showed SWRs of 2.1, 1.4, and 1.5 on 10, 15, and 20 meters respectively. Connecting the unit into the feed system apparently increased its shunt capacitance somewhat, for a small reduction in the value of C_1 changed the SWR readings to 1.3, 1.5, and 1.4. These values could probably have been improved still more by further adjustment of C_1 and C_2 , but it was not considered worth the trouble. If it is undertaken it should be borne in mind that the adjustments interact, but that C_1 has its greatest effect on 10 meters and C_2 on 20 meters. In any case it is not possible to obtain a perfect 1-to-1 match with this antenna system.

An SWR of 2, however, which can easily be bettered on all three bands, is within the loading

capability of almost any transmitter and causes an *additional* loss over a perfectly-matched line of less than half a dB even when the transmission line is very long. Since such a change in signal strength is undetectable, an SWR of 2 is in practice as good as an SWR of 1, as far as losses are concerned.

A Few Notes

A few observations are in order. The matching section has a fairly high SWR (between 4 to 1 and 8 to 1), and it should be spaced well clear of metal objects and should not have sharp bends. TV standoffs are useful here. It is important that the same side of the matching section be connected to the coax shield and to the ground-plane. If such a thing were available, 300-ohm coax would probably be preferred for the matching section, but for medium power (180 watts PEP) TV-type Twin Lead for the matching section and receiving-type trimmers in the reactance unit have proved satisfactory. The parallel circuit L_1C_1 does not operate at its resonant frequency, and thus high circulating currents are not encountered. High power might necessitate heavier components. The reactance unit needs protection from the weather and can be built into a small plastic box and sealed with plastic electrical tape.

Although the antenna is matched at three widely separated frequencies, it is not matched at intermediate frequencies and is thus not a broad-band antenna in the usual sense. Nevertheless, it is broad enough for normal ham use. The SWR remains below 2 to 1 over the entire 15- and 20-meter bands, and also between 28.3 and 29.4 MHz on 10.

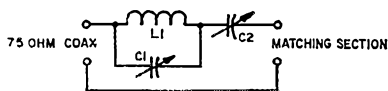
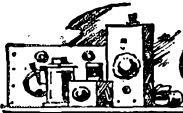


Fig. 2—Reactance-unit circuit.

- L_1 —0.86 μ H; 7 turns No. 16 (or heavier), 1 inch dia, 1 inch winding length.
- C_1 —30-pF air trimmer set to 23.1 pF.
- C_2 —100-pF air trimmer set to 41.7 pF.

All SWRs mentioned in this article have been measured at the transmitter and are thus probably a little optimistic. Transmission-line losses are not known, but the line is not long (about 40 ft), and it is doubtful that the SWRs at the reactance unit are much higher than those measured at the transmitter.

This antenna is no match for a quad or a Yagi, but it has provided numerous transatlantic QSOs on all three bands. Because of its effectiveness, convenience, and the cheapness and availability of everything used in its construction, it should appeal to many hams. Q57



An Inexpensive IC Breadboard for Flat Packs

BY JULIUS M. J. MADEY,* K2KGJ/W6FAW

INEXPENSIVE integrated circuits, which can be obtained from several surplus outlets, are frequently encased in 10- and 14-lead flat packages. Those in TO-90 and TO-91 cases have five flat ribbon leads emerging from each of two opposite sides, and those in TO-85, TO-86 and TO-88 cases have seven leads emerging from each of two opposite sides. Unfortunately, the cost advantage of using these surplus flat packs can be offset if one is forced to use commercially-available sockets, such as the ones shown in Fig. 1. Commercial sockets for flat packs may do when only one or two sockets are required for device testing, but they are too bulky and expensive for other than very simple circuits. Of course, the packages can be hand soldered to a printed circuit board or they can be installed in a perforated circuit board with point-to-point wiring, as is shown in Fig. 2. However, these two methods have a considerable disadvantage when replacement or interchange of ICs is required.

After thinking about the problem for some time, I fortunately recalled a supply of subminiature tube sockets I had pressed into service for mounting some older transistors, such as the 2N33 and 2N43, which have in-line leads. Upon checking the sockets, I found that the flat-pack-lead spacing of 0.05 inch between centers matched, either by chance or design, the pin

spacing of 5- and 7-pin subminiature tubes having in-line leads. With this knowledge I proceeded to construct an inexpensive breadboard for my surplus flat packs.

Fig. 3 shows a partially constructed breadboard for flat packs. Two Cinch-Jones type 2H7 7-contact sockets are used for each 14-lead flat pack. Two sockets of the same type can be used for each 10-lead device or, where economy is important, two of the less expensive Cinch-Jones type 2H5 5-contact sockets can be employed. Pattern-H Vectorbord, which has 0.062-inch holes on a 0.1-inch grid, is used for the base.

As shown in Fig. 4, begin construction of the breadboard by bending over the socket leads and offsetting them so that they will conveniently fit in the holes in the base. Then insert the leads in the base and bend them over to secure the sockets. Next, wire the underside of the breadboard according to the requirements of your circuit. Fig. 5 shows the bottom view of a breadboard whose ground and power leads have been soldered in place.

For trouble-free operation of your breadboard, a few precautions should be taken. Older sockets may have brittle leads which won't stand much bending, so take it easy. Since flat-pack leads are easily bent and may buckle if socket-insertion pressure is too great, it is advisable to exercise the socket fingers with a piece of No. 24 wire before any flat packs are inserted. The 2H5 and 2H7 sockets will last for many insertions, but they are not meant for severe-duty testing, and they are not as convenient as commercial test sockets when many units must be handled quickly.

At about 37 cents each for the 2H7 sockets and 21 cents each for the 2H5 sockets — less on the surplus market — socket mounting of flat-pack integrated circuits is no longer a luxury.

* 225 Laurel Drive, Fairfax, California 94930.

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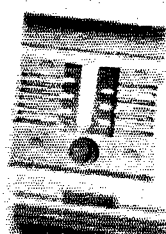
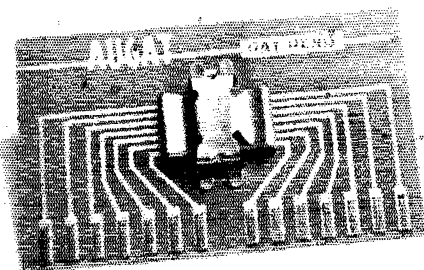


Fig. 1—Two examples of commercial flat-pack sockets. The socket on the right mounts in another special socket.

QST for

Fig. 2—Several flat packs mounted on M-pattern Micro-Vectorboard™. Interconnections are made with No. 24 wire.

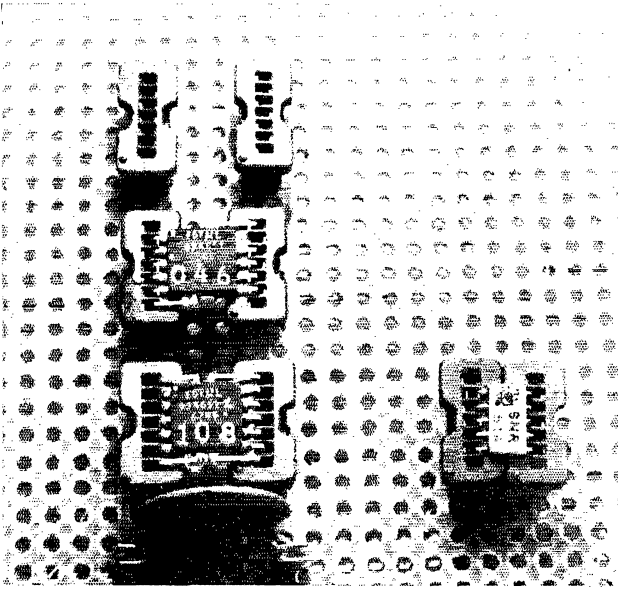
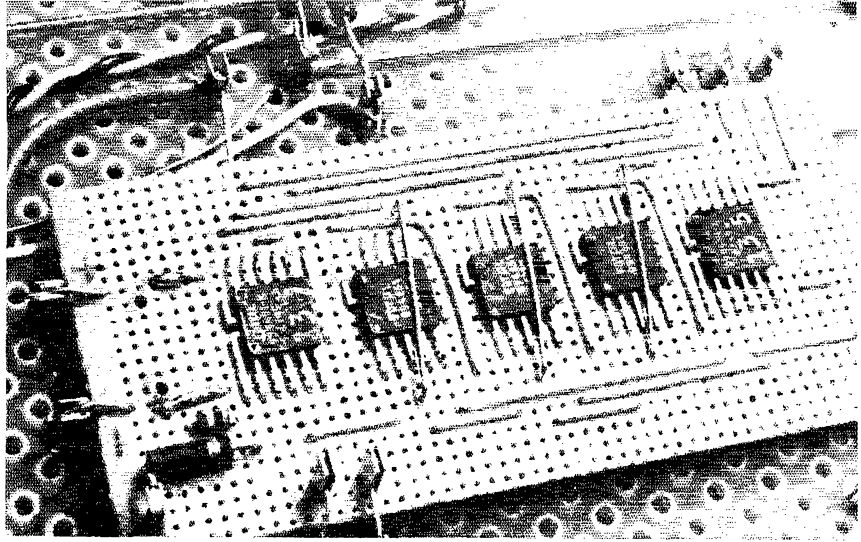


Fig. 3—Socket spacing on the breadboard may be varied to suit the flat-pack size. The object in the lower center is a power-bus-bypass capacitor.

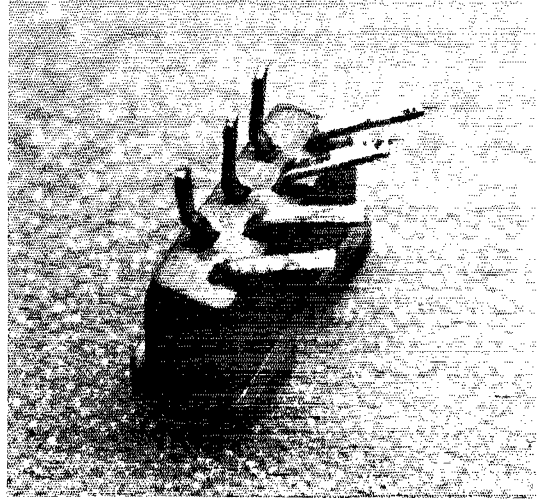
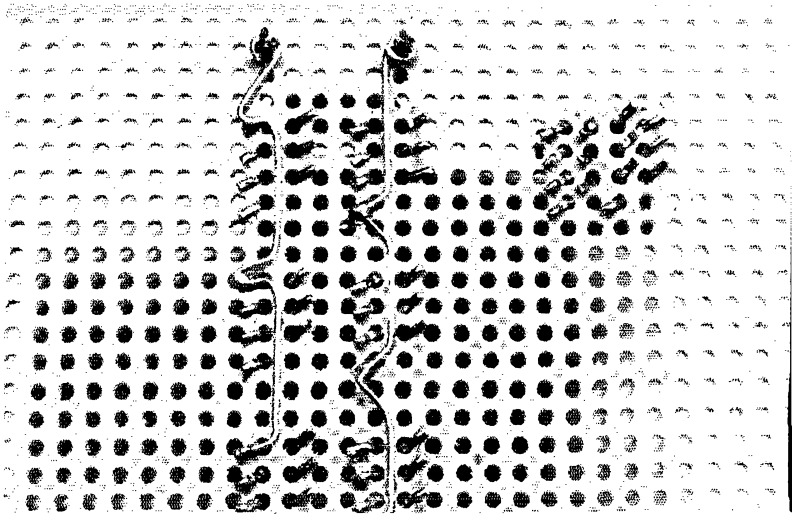


Fig. 4—Socket leads were first bent over, then up, resulting in the offset shown on the left-hand leads.

Fig. 5—Underside view of the breadboard showing the socket pins bent over to secure the sockets to the Vectorboard. The power leads, which use No. 22 wire, terminate in Vector push-in terminals.



Sideband from a Suitcase

BY EDWARD A. GRIBI, JR.,* WB6IZF

As I write this, I've just put the rig in rental car number 17 in the last 12 months. In the same period I've operated portable out of countless motels in five different states and Mexico. I've evolved a system of operation that assures maximum operating efficiency with a minimum of weight and bulk so that I can travel by commercial aircraft and still be operating mobile within 30 minutes after I rent a car at the airport. In the process I've enjoyed continuous reliable communications with the gang on 7255 whether in Wyoming or Bensenada. My technique fits my own equipment and needs, but perhaps some of my tips will help others who may operate in different environments.

My minimum equipment, for mobile operation only, is as follows:

SBE-33 transceiver and mike.

Matching dc inverter with battery clips on dc leads and 6-prong jack on ac cord.

Extension power cord (15-foot) with 6-prong plug and power plug to match transceiver.

Vhf-type deck mount to fit over lip of trunk with about 15 feet of coax and connector.

2-foot mobile extension mast.

High-Q mobile resonator for the appropriate band or bands and matching capacitors with clip leads.

About 40 feet of $\frac{1}{4}$ -inch nylon cord.

Metal piece, $2\frac{1}{2} \times 1 \times \frac{1}{8}$ inch, drilled with one hole to fit over threaded portion of extension mast and two holes for nylon cord.

Tools: screwdriver, wrenches to assemble resonator and deck mount.

Extra hook-up wire to hang inverter and make loops for nylon guys.

Quarter-inch foam padding to cover rig.

Sturdy suitcase large enough to hold everything except 5-foot sturdy mailing tube for whips (possible improvement in the near future — substituting collapsible whips for the long tips so that I don't have to pack that mailing tube).

The first problem is selection of the right kind of car. The most important requirement is a clear rear deck and a trunk lid with no obstruc-

tions on the forward end. It should be fairly level, but I've used cars with decks slanted up to 15 degrees. Most standard passenger cars are suitable, and I've used eight different models myself. In some cars I can simply lay the inverter on a flat spot near the battery, but on others I have to use wire to hold it in place. I've found that a loop of heavy wire is quite sufficient to hang it to some convenient projection that will hold it relatively clear of surrounding objects. The clips go to the appropriate battery posts and the 6-prong plug heads toward the rear to mate with the extension power cord. In some cars I've been able to snake the power cord through the cowl, but in most cases I've run the cord out the back end of the hood and in through the door at its front. I've never had any problem because of opening and closing the door on the cord.

The antenna system is essentially a deck-mounted mast guyed in four directions. The hardest part of the whole installation is scraping paint off the inside of the trunk lid so that the mount makes firm contact with bare body metal. This mount should be placed squarely in the middle of the forward end of the trunk lid. A couple of loops of wire are secured under each rear corner of the trunk lid and allowed to extend outside after the trunk is closed. Then the 2-foot mast is installed, the metal piece placed on top of the mast, and two long guys are strung in through the rear window on each side and secured to the clothes-hanger hooks. Two short guys lead to the rear and are secured to the loops of wire sticking out of the trunk. The resonator is then screwed on to the top of the mast. Adjustment of these guys is the second hardest part of the job and requires some patience and continuing attention. I've found that if I can get the guys secured just tightly enough so that the mast does not move when the weather is humid or rainy, then the guys will draw up drum tight when the weather is drier. The coax lead also goes in through the rear window to a convenient operating position.

I trimmed my Long John whip to 7250 as per the manufacturer's directions for the first rental

*229 Vivian St., King City, California 93930.

Here are some wrinkles on a different way to go mobile.

car. I've found that this has worked perfectly on all rental cars to date, large or small, with only slight variations in the resonant frequency. The same is true for the 15- and 20-meter resonators, but the 75-meter whip varies 10 to 20 kHz between different vehicles. Therefore, a VSWR bridge and an extra chunk of coax is a vital item when I anticipate 75-meter operation in different cars.

Ignition noise has been a minor problem in rare cases. I traded one car in because of noise, but most rental cars are new and free of noise. I've found that some cars build up noise after going through dust or mud. A few squirts of contact cleaner in the alternator will often clean this up. Under marginal conditions I find that a set of headphones makes the difference between copy and no copy. I use a lightweight pair of stereo earphones.

If I'm traveling continuously by car and staying in different motels every night I pack my ac power cord and a 50-foot length of coax. This works out very satisfactorily for short-term and short-range portable operation, particularly if I can park in the clear. The only real problem is that some motels have very tight-fitting metal doors that can really mash the coax.

When I anticipate more than three or four days at the same location, I add the following to my kit:

- 200 feet or so of "indoor" antenna wire (Belden 8014).

- A few feet of insulated hookup wire (solid preferred).

- 200 feet or so of nylon cord, about $\frac{1}{16}$ inch.

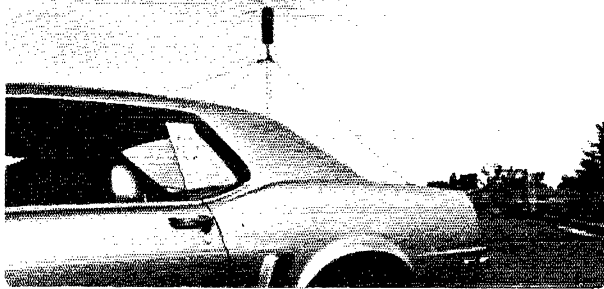
- Several plastic cable clamps (good insulators).

- Several 3-ounce or heavier fishing weights.

- VSWR bridge and two short coax chunks with connectors.

- LC antenna tuner (mine is a WRL Mini-matcher).

I've tried a number of configurations when portable, including dipoles, loaded-whip verticals,



A guyed 2-foot mast supports the mobile antenna on the trunk of a rented car.

and folded-monopole verticals, but the end-fed random wire is far and away the easiest to erect and to use. I haven't found a motel yet where I couldn't snake some hookup wire outside by a fairly direct route through a window, air conditioner, or even a door. Then with my trusty string and weights (using the David and Goliath sling method) I get one or more lines over the highest nearby tree, light standard, or part of a building. Then it becomes a simple matter to get a fairly long high wire strung out. I've found that it takes about 70 to 80 feet of wire in the clear to get me a near 1 to 1 SWR on 75. Important things to avoid are sharp bends, knots, or proximity to ground potential near the transmitter end. The wire should get as high as possible before making any bends, but then a right-angle bend is permissible so long as it is still relatively close to the transmitter end. The wire should run fairly straight for half a wavelength but a 20- to 30-degree bend at about the quarter-wave point doesn't seem to hurt things if a high center suspension point is used. In fact, it may start acting like a half of a rhombic at shorter wavelengths!

Sometimes it's difficult to achieve a low VSWR with the tuner. In nearly every case I've found that by realigning the wire near the transmitter end so that it runs straighter and gets higher and in the clear more quickly, the VSWR can be brought down within acceptable limits. The wire is thin and can be easily broken by hand, but the few breaks I've had were nearly all caused by such menaces as garbage trucks. When it breaks I strip the insulation (with my teeth) and tie it back together, putting the knot on the wire portion rather than the insulated portion. My present wire has 5 or 6 of these knots in it and has been holding together for many weeks. Incidentally, one of my most effective portable antennas was a fairly low one in Fresno where the far end of it went across the swimming pool at about 10 feet elevation.

The results have been well worth the effort expended. As an example, a short time ago I rented a car in Riverton, Wyoming, at 9:30 in the morning. By 10 I was able to call in to West Coast Amateur Radio Service control on 7255 for a radio check and was given a Q5 in Southern California with crummy band conditions. Last year mobile in Idaho I was calling control in

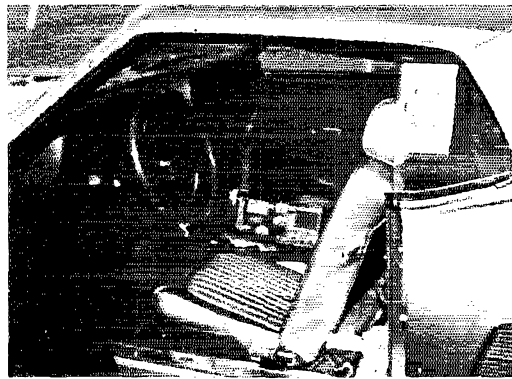


The deck mount is centered at the forward edge of the trunk lid. Ground connection is made to the underside of the lid just inside the edge. Note the coax feed running off to the right to reach the gear through a window.

California in the early evening when a New York station called me — I was very happy to confirm Twin Falls County for him. Operations on 75 meters have been equally successful so long as I operate the longer distances during hours of darkness. I've never had any real problems yet while mobile in remote areas, but twice in Idaho potential problems came up that caused me to use the priority double break on 7255. In both cases I was instantly recognized and control and relay stations watched over me until I could report that the problems were solved. Either one of those instances were situations where, if the problem had worsened, hours of walking or riding would have been required to obtain help if the trusty old squawk box hadn't been blaring away on the seat beside me.

The boss just said I might be any place between New Hampshire or Wyoming in the next few months, so I'll see you on ECARS, 7255; MWARS, 7258; or WCARS, 7255!

QST



Each installation is an individual problem, although there are similarities in all. In this case, the SB-33 is nestled between bucket seats.

NEW BOOKS

Radio Communication Handbook, Published by the Radio Society of Great Britain, 35 Doughty Street, London W.C. 1, 7 × 10 inches, \$32 pages, including index. Hard back edition \$11.95, from Comtec, Amherst, N. H. 03031.

The RSGB's *Radio Communication Handbook* has been around since 1938, but it was recently rewritten cover to cover, greatly expanded, and reissued as the Fourth Edition. By any measure, it is a hefty book, with over 800 pages devoted to radio theory and techniques.

The first three chapters cover radio principles and the theory of valves (known as tubes on this side of the ocean) and semiconductors. The chapter on solid state covers transistors, SCRs, tunnel and varicap diodes, but has no mention of integrated circuits. This section is quite readable, with rules of thumb and hints for builders interwoven in the text, plus plenty of circuit examples. The diagram symbols used are not always the same as the American standard, but the diagrams are easily understood, anyway.

About 300 pages are devoted to transmitters and receivers for hf, vhf, and uhf. Extensive information is provided on each construction project, which should help the beginner get a project working with a minimum of difficulty. Drawings of metal parts and hole location diagrams are included for many items. The designs reflect current practice, using both tubes and transistors. The vhf buffs will enjoy looking over the 432-MHz PBT converter, the 432-MHz antenna-mounted preamp, and the 1296-MHz converter designs. The transistor transmitter described for the British 70-MHz band could easily be constructed for our 6-meter band. The collection of circuits and construction pieces are the favorites that have appeared in past years in the RSGB's monthly publication, the *Bulletin*. Many of these projects have been very popular and widely duplicated outside this country.

The chapters on modulation systems, keying, and break-in go over these subject areas in a good deal of detail. The a-m modulators shown may be difficult to duplicate here, as they are based on the English Woden modulation transformers. There is one design that the hardy constructor could try, however, a 45-watt solid-state modulator which has instructions for winding the driver and modulation transformers yourself.

The chapter on frequency modulation that appeared in the Third Edition has been replaced with a chapter on teletype. Fm receives only passing mention, which may indicate a trend there that is quite the opposite of what is

happening in this country. A complete mechanical description with drawings is given on a typical British teletype machine, the Creed Model 7. The RTTY receiving techniques presented are different from current practice here, so it will be interesting reading for the teletype enthusiast.

Over 100 pages are filled with single-sideband information, including several major construction projects. This section has excellent coverage on the various ssb filter systems and the "third method" of sideband generation. The Collins spurious response charts are reprinted in this section — they can be a help when figuring heterodyning schemes. G2DAF's patented linear amplifier circuit, tetrodes operated grid-driven at zero bias with screen voltage developed by rectifying a portion of the drive signal, is described in detail. This circuit might be usable for those who have drive problems with 4-1000As when they are operated in grounded grid.

Other construction projects include G2DAF's multiband transmitter and receiver, a transistorized ssb transceiver covering 160 to 10 meters with VOX and cv capabilities built in, and a high-performance receiver by G3PDM using no r.f. stage, single conversion, a phase-locked frequency synthesis system for high oscillator stability, and a pre-i noise blanker. The schematic diagrams of these and other major items are on fold-out pages so that the entire diagram can be shown on a single sheet.

The chapter on propagation introduces the section covering feed lines and antennas. Information is given on the British beacon transmissions on the 28-, 144-, and 432-MHz bands, and new modes of communication by satellite and moon reflection are discussed. Several of the popular English ham antennas, such as the Bird Cage, G4ZU Mini-beam, skeleton slot and a 1296-MHz parabolic reflector, are described with construction details.

Other chapters cover measurements, interference, power supplies, noise, and station layout.

Mobile operation has always been very popular in G land, so all phases of the subject are covered in depth. A number of mobile transmitters and receivers are introduced, as well as de-to-de power supplies and mobile antennas. Two rather ingenious little ideas shown in the mobile chapter are a method of insulating a rear-view mirror to be used as a field strength meter and a halter an operator wears to hold his mike while driving, leaving both hands free.

The book is well arranged and has a good index, so it serves well as a basic reference text. Unfortunately, no data is included on the popular types of British tubes and transistors. Most of the tubes used in the construction projects have U.S. equivalents available, but transistor substitution may prove a headache for the would-be builder.

— WTKLK

This high-voltage power supply is designed for use with linear amplifiers that are capable of operating at legal maximum input power levels. Typically, this supply can be used with amplifiers which use two 3-500Z tubes, a single 4-1000A or 3-1000Z, or any tube or combination thereof which calls for 3000 volts dc at up to 700 mA. Examples of such amplifiers can be found in The Radio Amateur's Handbook. The supply can be operated from either 115- or 230-volt ac mains.

A Power Supply For That Big Linear Amplifier

BY CARL SMITH,* WIETU, AND DOUG DeMAW,** WICER

THOUGH this power supply can be operated from the 115-volt line, it is recommended that the 230-volt mains be used in the interest of best regulation. The circuit breakers shown in Fig. 1 can be eliminated if the equipment is to be operated from mains which have their own circuit breakers or fuses.

"Computer-grade" filter capacitors are used throughout this circuit. Each capacitor is bridged by a 25,000-ohm 20-watt resistor. Each resistor serves as a part of the bleeder string, while at the same time functioning as a voltage equalizer for its respective capacitor. The idling current of most linear amplifiers further bleeds the power supply when the equipment is turned on. A panel meter, M_1 , is set to read 0 to 5000 volts, and should be observed for a zero reading before working on the power supply. *The supply should be disconnected from the mains before removing the protective covers from it.*

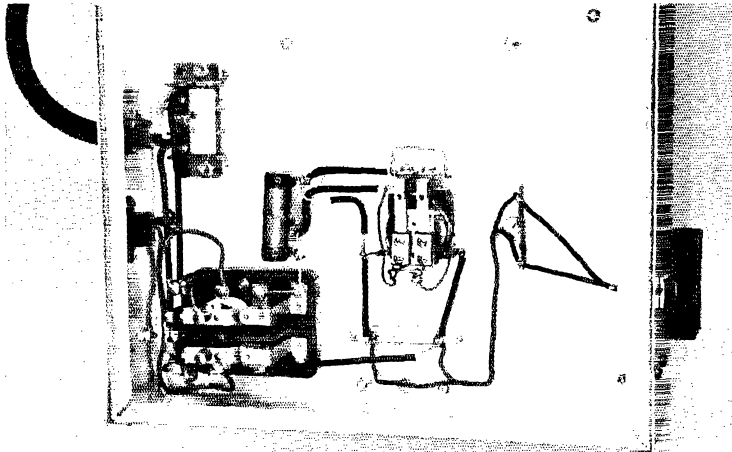
Because solid-state silicon rectifiers are used in this supply, some form of protection from transients and peak current had to be included,

therefore, each diode is bridged by a 0.01- μ F capacitor and a 470,000-ohm one-half watt resistor. A relay, K_2 , and a series resistor are connected in the primary leg of the supply to offer surge protection to the rectifier diodes while the capacitor bank charges. The resistor, R_1 , lowers the primary voltage to T_1 until the capacitors are nearly charged. Then, K_2 energizes and shorts out R_1 to permit full primary voltage. Assembly Z_1 is a Thyrector diode which limits spikes that may appear on the primary line, thus offering transient protection to the rectifier diodes. For 230-volt operation it is necessary to use two Thyrectors as shown in the alternate primary circuit of Fig. 1.

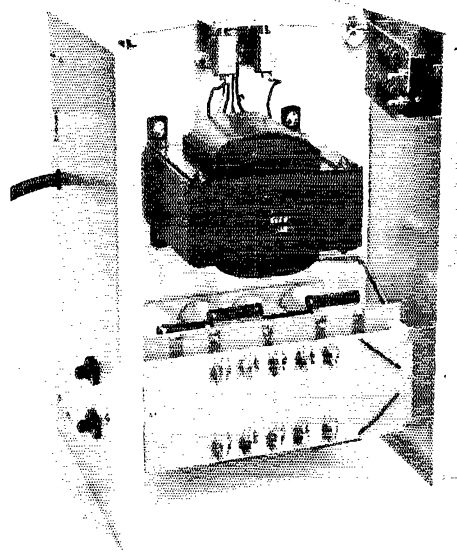
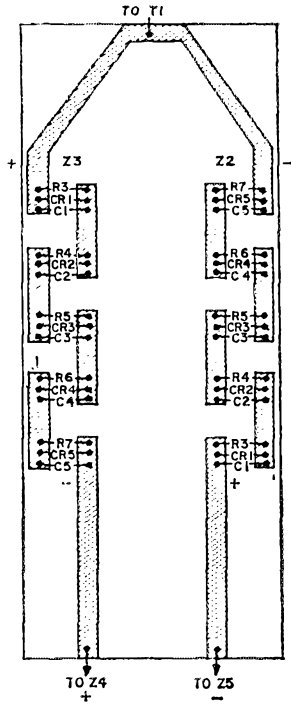
Metering of the high-voltage output line is necessary to comply with FCC regulations. A 0 to 500-microampere meter is used to read the voltage directly off the 3000-volt bus. A string of ten 1-megohm, 1-watt resistors are connected in series between the 3000-volt line and M_1 to provide the 0 to 5000 volt reading needed.¹ Needless to say, the combined value of the resistors

¹ Do not use a single 10-megohm resistor for the metering circuit. The number used are necessary to insure against arc-over across the bodies of resistors.

* Assistant Circulation Manager.
** Assistant Technical Editor.



Bottom view of one corner of the power supply chassis. The photo shows how the relays, Thyrector, and remote-operate plug are mounted. Primary wiring should be No. 12 or heavier to insure against voltage drop in that part of the circuit.



Top view of the assembled power supply, cover removed. The circuit breakers are mounted on an L-bracket at the left of the chassis. Their reset buttons are accessible from outside the shield cover. Lips are formed on the side and tops of the front and rear panels to facilitate mounting the screen cover. Alternatively, angle bracket stock can be used in place of the lips.

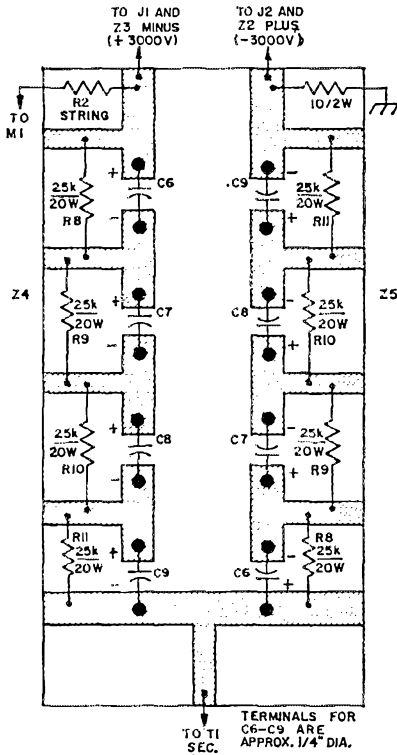


Fig. 2—Layouts for the circuit boards used at Z₂ through Z₅. To assure good insulating properties high-quality glass-epoxy board should be used.

should be as close to 10 megohms as possible to assure accuracy. A well calibrated ohmmeter can be used for selecting the resistors, or if an impedance bridge is available it might be used to provide better accuracy when selecting the resistors.

Construction

A standard 12 × 17 × 3-inch aluminum chassis is used for the foundation of this unit. The front and back panels of the supply are fashioned from sheet aluminum, and are 10 inches high and 17 inches wide. The top and sides of the completed power supply are enclosed by means of a single sheet of perforated aluminum which is held in place by No. 6 sheet-metal screws. Casters can be mounted to the bottom cover of the supply, if desired, to facilitate easy moving of the unit when required.

The filter capacitors are bolted to a sheet of glass epoxy circuit board which is 5 inches wide and 10 inches long. The pattern of the copper foil is given in Fig. 2. The capacitors are held in place on the board by means of their terminal screws. The diode board, also shown in Fig. 2, is attached to the capacitor board by means of three 1-inch steatite insulators. The circuit-board "sandwich" is then supported from the walls of the cabinet by three aluminum L-brackets (see photo). The tops of the filter capacitors rest on a sheet of 1/8-inch thick Plexiglas which is bolted to the main chassis, thus providing insulation between the chassis and the aluminum cases of the capacitors.

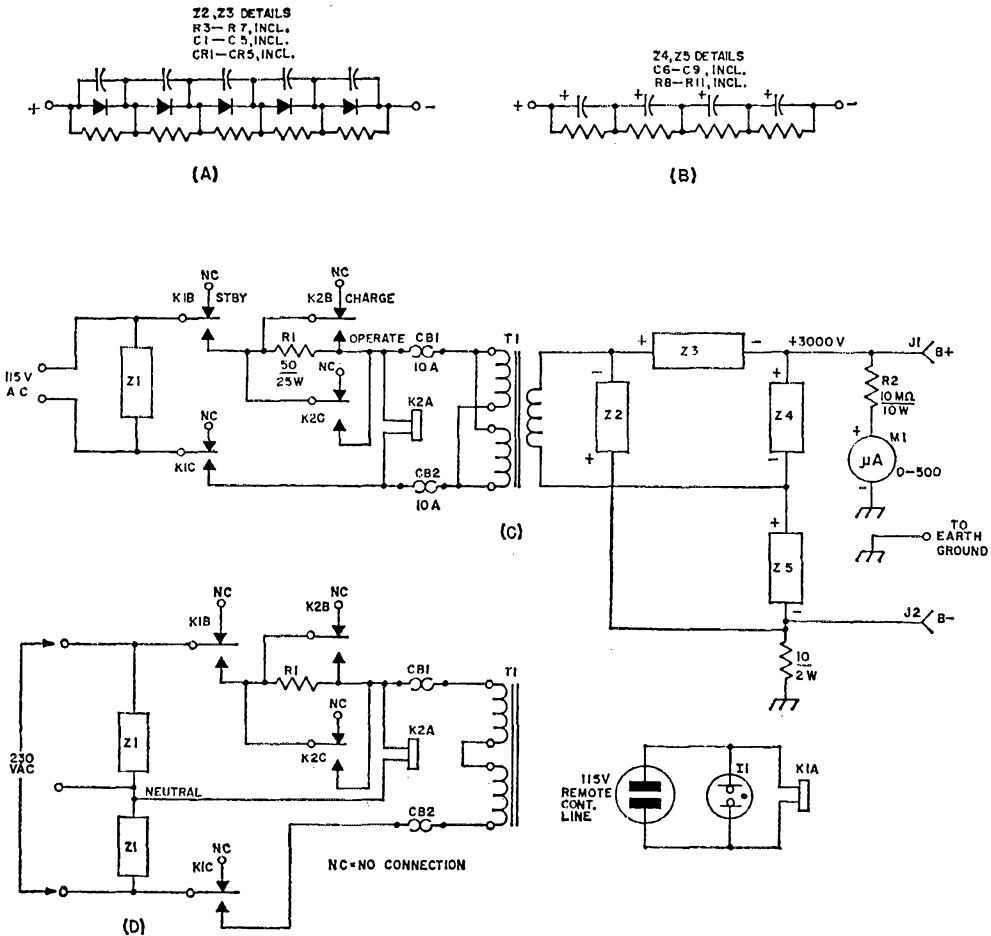


Fig. 1—Schematic diagram of the 3000-volt power supply. Capacitors used in assemblies Z₂ and Z₃ are 1000-volt disk ceramic. The resistors in the two assemblies are 1/2-watt composition. Polarized capacitors are electrolytic.

C₁-C₅, incl.—0.01- μ f disk.

C₆-C₉, incl.—240- μ f, 450-V electrolytic (Mallory CG241-T450D1).

CB₁-CB₂—10-A circuit breaker (Wood Electric 125-210-101 or equiv.).

CR₁-CR₅, incl.—Silicon rectifier diode 1000 PRV, 2A, or greater.

I₁—115-volt ac neon panel lamp.

J₁, J₂—High-voltage chassis connector (James Millen 37001).

K₁—Dpst 115-volt ac relay, 25-A contacts (Potter Brumfield PR11AY suitable. Two terminals unused.)

K₂—Dpst 115-volt ac relay, both sections in parallel (Guardian 200-2 with 200-115A field coil). Contacts rated at 8 A.

M₁—0-500- μ A panel meter (Simpson 1227 suitable).

R₁, R₂—For text reference.

R₃, R₇, incl.—470,000-ohm, 1/2-watt resistor.

R₈, R₁₁, incl.—25,000-ohm, 20-watt resistor.

T₁—Dual 115-V primary, 1100-V secondary, 600 VA (Berkshire BTC-6181. Berkshire Transformer Corp., Kent, Conn.).

Z₁—Thyrector-diode assembly (G.E. No. 20SP4B4).

Z₂, Z₅, incl.—See drawings in this figure and in Fig. 2.

In Conclusion

This power supply has seen daily use during the past year at W1ETU, and no repairs have been necessary. If constructed as shown, there should be no corona buildup and discharge in the high-voltage section of the supply, even in humid regions of the USA.

A 10-ohm resistor is connected between the bottom resistor of the bleeder string and chassis ground. This provides a metering point for reading the amplifier plate current. An external voltmeter reads the voltage drop across the 10-ohm resistor to determine the current drawn.

QST

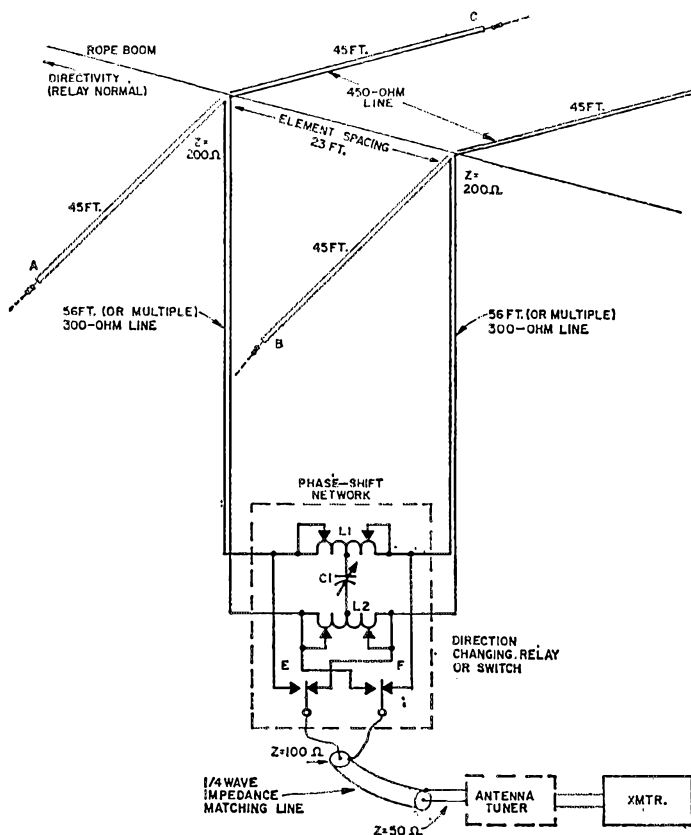


Fig. 1—Reversible array of two folded $\frac{3}{4}$ -wave "inverted-V" elements driven 90 degrees out of phase. Dimensions shown are for a frequency of 7250 kHz. Although designed primarily for the 7-MHz. band, the antenna has been used successfully as a nondirectional on other bands. The antenna tuner indicated by dashed lines is required only if a different element spacing is used, or for multiband operation. Impedance levels are discussed in the text. C_1 —250-pF variable capacitor, minimum plate spacing approx. 0.05 inch. L_1, L_2 —15 turns No. 8 aluminum or copper wire, $2\frac{1}{2}$ -inch inside diameter, turns spaced diameter of wire. Alternative: 18 turns No. 14, 2-inch diameter, 8 turns per inch

The Band Divider

Simple Phased Array for 7 MHz

THE Band Divider beam (Fig. 1) is a phased array made up of two inverted-vee, three-quarter-wave folded dipoles, spaced 20 to 25 feet apart, and fed 90 degrees out of phase through a phase-shift network. The design is an adaptation of a simple unidirectional beam using half-wave elements and a phasing line that has been described in *The ARRL Antenna Book* for over twenty years.¹ Only the details have been changed to take advantage of available material, more efficient radiators, and the incorporation of an adjustable phasing network that assures maximum performance and when adjusted properly is capable of a front-to-back ratio of 25 dB or better.

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The three-quarter-wave dipole differs from the conventional half-wave dipole in that the return center is open, as shown in Fig. 2, the wire not forming a closed loop. This type of radiator was used in a compact Lazy H antenna described by Kraus many years ago.² The three-quarter-wave folded dipole has a feed-point impedance of 450 ohms, and shows a slight gain over a half-wave dipole. Fig. 2 shows the instantaneous current directions, the current distribution on the individual conductors, and the total current distribution.³ Because of its mode of operation and the inherent loading effect of the folded configuration, the radiator is physically

¹ *ARRL Antenna Book*, 11th edition, p. 213.

² *Radio*, October 1939.

³ Kraus, *Antennas*, p. 417, McGraw-Hill Book Company, New York, N. Y. 10036.

Although designed as a unidirectional array for the 7-MHz band, this antenna has been found to work well as a nondirectional antenna for other high-frequency bands. An asset in 40-meter operation is its ability to knock down the strength of interfering signals that so often hamper effective DX work on this band.

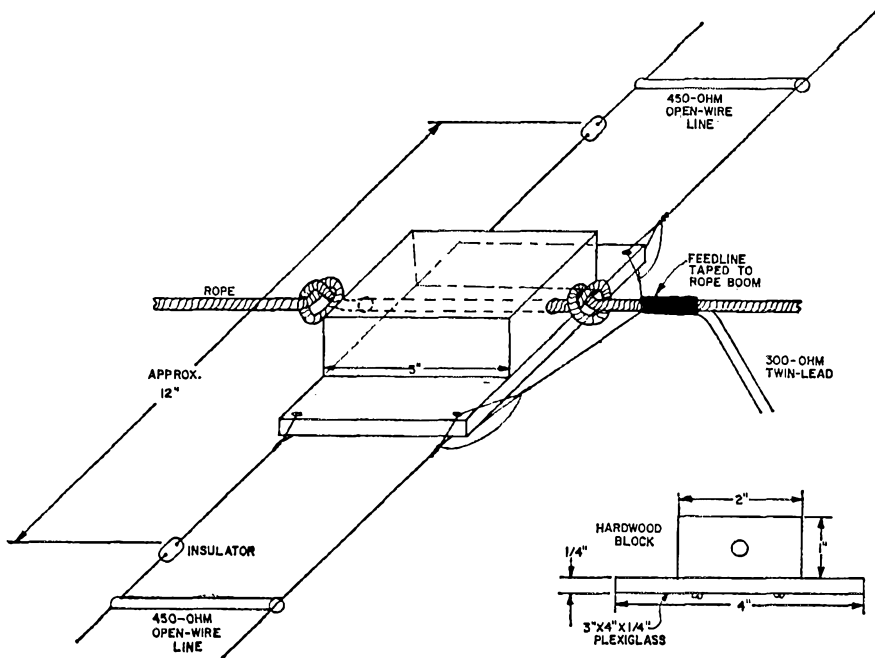


Fig. 3—Suggested method of fastening element centers to a rope "boom." The rope is threaded through the hole in the wood block. A knot tied in the rope on each side of the block holds the block in place. The end of the 300-ohm Twin Lead is taped to the rope. There is a separation of about 12 inches between the ends of the wire on the open side of the folded dipole (the side opposite the feed point).

Beam Antenna

BY WILLIAM E. ZAVICK,* W6TYG AND RAY HOFFMAN,** W4TDI

shorter than three-quarters wavelength. The length in feet is equal to

$$\frac{655}{f \text{ (MHz)}}$$

The use of a phase-shift network in place of the delay line commonly employed in this type of array permits adjustment of the phasing to obtain maximum strength from a desired signal (co-existent with maximum transmitted signal), or to obtain maximum rejection of an undesired signal. A change of 180 degrees in directivity may be obtained by switching the transmitter line from one side of the phasing network to the other. Transmission is in the direction of the antenna element being fed through the network. With the connections shown in Fig. 1, transmission is in the direction of the arrow.

Matching System

As mentioned earlier, the feed-point impedance of a three-quarter-wave dipole is 150 ohms. However, when two such elements are used in an

array, mutual impedance and coupling cause the feed-point impedance to vary with the element spacing. When the spacing is 23 feet, and the elements properly phased, this impedance will be on the order of 200 ohms.

In Fig. 1, the two feed lines are made of foam-insulated 300-ohm TV line. Since the lines are cut to a length of an electrical half wavelength (or a multiple thereof), the antenna impedance (200 ohms) is repeated at the input end of each line.

By the proper selection of LC ratio, the phasing network will have the electrical characteristics of a 200-ohm 90-degree delay line, so its insertion in one line or the other does not change the impedance level.

Paralleling the two lines results in an input impedance of 100 ohms at point B; or point F in Fig. 1. A quarter-wave section of 72-ohm coaxial line is then used as a matching transformer to bring the impedance down to 50 ohms. The matching section can be fed directly by the transmitter, or any required length of 50-ohm line can be added to reach the transmitter.

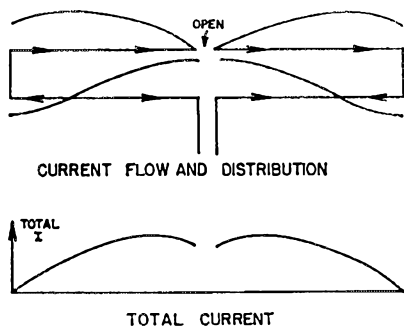


Fig. 2—Current flow and distribution on a $\frac{3}{4}$ -wave folded dipole.¹

If space limitations, or interfering trees or other objects, make an element spacing of 23 feet unfeasible, the network will provide the required phase shift for other spacings from a minimum of 15 feet to a maximum of 34 feet. However, an element spacing other than 23 feet will alter the feed-point impedance of the elements. As a result, the impedance at points E and F will no longer be 100 ohms. In such a case, an antenna tuner can be used between the direction-changing relay and a 50-ohm line to obtain a 50-ohm termination for the transmitter.

Construction

Construction of the antenna is quite simple, and the job should be easily done in a weekend. Two 100-foot rolls of 450-ohm open-wire (fret) line, about 115 feet (or some multiple of this length) of 300-ohm Twin-Lead, and necessary insulators and rope as required, should be assembled. For greater strength, the 450-ohm line can be replaced by a pair of No. 14 or No. 16 wires spaced 2 to 8 inches (not critical), using light-weight insulating spacers.

For 7250 kHz, each dipole is made up of two 45-foot sections of 450-ohm line, as indicated in Fig. 1. Fig. 3 suggests a method of supporting the element feed points from a rope "boom." The free ends of the dipoles should be brought to supports that will keep the elements parallel, and the included angles at the center not less than 90 degrees. (Horizontal elements are preferable if adequate supports are available.) As the angle at the center increases, the resonant frequency will also increase.

After the antenna has been pulled up into the air, each side of the array should be checked for resonance, using a noise bridge or grid-dip meter at the input end of one 300-ohm line, while the input of the other 300-ohm line is shorted. If the feed lines are made initially a few feet too long, they may be tuned by cutting off short pieces until the resonant point is at the desired frequency (7250 kHz for the 7-MHz phone band). This assures good electrical balance, and compensates for slight differences in element length and V angle.

After connecting the feed lines to the phasing network, the elements should be checked for phasing. The coax line to the antenna tuner or transmitter should be disconnected at the relay or change-over switch. Two adjacent dipole ends (A and B, or C and D in Fig. 1) should be lowered temporarily to a point where an ohmmeter can be connected between them. If the phasing is correct, the ohmmeter should show continuity. If an open circuit is indicated, one of the feed-line connections should be transposed at the network. This shift should result in an indication of continuity.

Adjustment

The phasing adjustment can be made on a signal from a station known to be in line with the "boom" and at least 800 miles distant. Switch the antenna to the direction of the station, and adjust the coil shorting taps equally, a turn at a time, adjusting the capacitor for maximum signal at each setting, until the best tap position is found. Switching the antenna to the opposite direction should cause a noticeable drop in signal strength. If further adjustment of the network results in an improvement in the rejection, compare this new setting with the first one, and choose a compromise setting. Of course, either of the first two settings may be used, if one has a preference between maximum forward gain and maximum rejection at the rear. Usually, the two settings will be essentially the same. However, it may quite often be found, after the taps have been set, that adjustment of the capacitor alone on a particular interfering signal may increase the rejection.

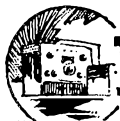
Although height is a factor when using this antenna, as it is with all antennas, good results should be obtained with the center as low as 35 feet, and the ends close to ground. Two of these antennas have been in use by the authors for some time. The one at W6TYG is up less than 40 feet, while the one at W4TDI is 65 feet at the center, and 45 feet at the ends. Both have performed remarkably well, in respect to reduction in QRM as well as improvement in signal strength in the desired direction. During the winter season, several cross-country contacts were made during daylight hours.

Other Bands

Although the antenna is designed specifically for use in the 7-MHz band, curiosity led to trial on other bands, at W4TDI, with the results tabulated below. The s.w.r. values mentioned refer to the quarter-wave coax matching section. A T network was used between this matching section and the transmitter to arrive at a 50-ohm load for the latter.

75 Meters: SWR about 4 to 1 over the range of 3800 to 3850 kHz. Tuning very critical, requiring readjustment of the T network for changes as small as 10 kHz. The antenna exhibited a small front/back ratio. Several West Coast stations were contacted. Later on, the phase-shift network was removed, the conductors

(Continued on page 73)



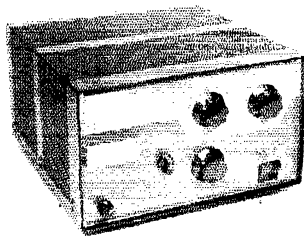
Recent Equipment



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

Drake L-4B Linear Amplifier

THE R. L. Drake Company is now marketing a new linear amplifier, the L-4B, which is an improved version of their L-4. The improvements include the use of different tubes that provide a total of 200 more watts of plate dissipation, a built-in directional wattmeter, and a vernier drive for the plate tuning control. The L-4B, which is capable of 2000 watts PEP input on ssb and 1000 watts input on a-m, cw and RTTY, is designed to be used with the Drake TR-3 and TR-4 transceivers and the T-4, T-4X and T-4XB transmitters, and the amplifier matches this equipment in appearance. However, any sideband exciter that will provide 100 watts PEP output can be used to drive the L-4B to full input on ssb, and any a-m, cw or RTTY rig that will furnish 75 watts output can be employed to drive the L-4B to full input in these modes. Although the L-4B, as supplied, covers the ham bands from 80 through 10 meters, the amplifier will operate on any frequency in the 3.5- to 30-MHz range if the appropriate internal adjustment has been made to the proper input circuit in the amplifier. This means that the amplifier can be used for MARS operation, for example.

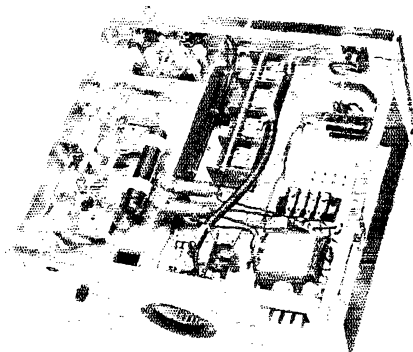


Amplification in the L-4B is accomplished by two 3-500Z zero-bias triodes connected in parallel and operated in Class B grounded-grid. Because these two tubes have a total plate-dissipation rating of 1000 watts, they have a much greater capacity for surviving operator abuse than the tubes in a sweep-tube linear amplifier, where tube life usually depends on the operator's strict observance of a specified duty cycle and tune-up procedure. The 3-500Zs are cooled by a 1550-rpm squirrel-cage blower that is quieter than any blower we have ever seen in a piece of radio apparatus.

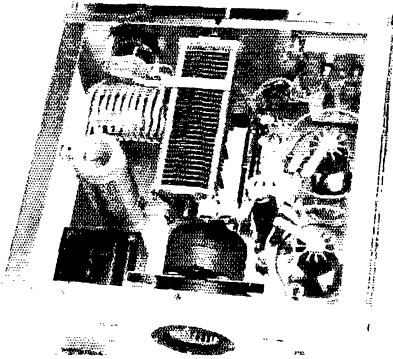
Five hand-switched broadly-tuned pi networks, one for each band, are used to feed drive to the cathodes of the amplifier tubes. These circuits transform the cathode impedance to 50 ohms, minimize drive requirements and reduce intermodulation distortion. A bifilar-wound rf choke in the filament leads keeps the cathodes above ground for rf.

The use of a tuned input circuit is not the only means taken by Drake to decrease intermodulation products. Negative feedback is provided by grounding each grid with a smaller-than-normal bypass capacitance. With a total of 600 pF between each grid and ground, the grids are about 80 ohms above ground on 3.5 MHz and 9 ohms above ground at 30 MHz. Rf chokes in the grid leads provide the necessary dc paths to ground.

To reduce the chances for vhf oscillations to develop, parasitic suppressors are included in the plate leads. The output circuit, a pi network, is designed for non-reactive loads between 25 and 100 ohms. As shown in the top-view photograph, the pi inductor consists of a large air-wound coil and a coil wound on a heavy ceramic form. The total inductance of both coils is used on 80 meters, all of the air-wound coil and a portion of the other inductor are used on 40, the total inductance of the air-wound coil alone is used on 20, and portions of the air-wound coil are used on 15 and 10. A 1750-pF, four-section variable and a 700-pF fixed capacitor provide a maximum



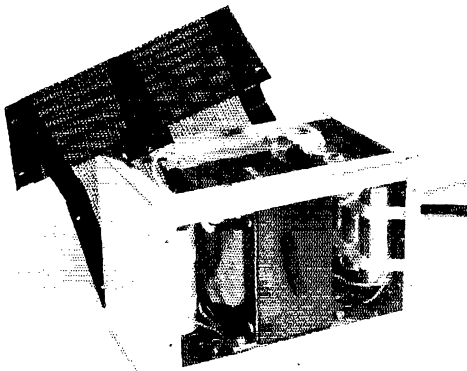
Bottom view of the L-4B. The tuned input circuits are at the upper left, and the amplifier-tube sockets and bifilar-wound filament choke are at the lower left. In the center compartment are the loading capacitor, the send-receive relay, and several of the components of the directional wattmeter. The bottom of the 3-500Z filament transformer can be seen at the lower right.



Top view of the amplifier. The filament transformer is at the lower left and the output circuit components are at the upper left. A rectangular aluminum cover at the upper right shields the unit's two meters.

loading capacitance of about 2450 pF on 80 meters. The band switch reduces this maximum to approximately 1750 pF on 40 meters, 1310 pF on 20, 875 pF on 15, and 435 pF on 10. An rf choke across the loading capacitor prevents high voltage from appearing on the feed line if a short occurs in either of the plate coupling capacitors.

To prevent modulation peaks from driving the amplifier out of the linear region, an a/c circuit is included in the L-4B. A sample of rf is taken from a capacitive voltage divider in the cathode circuit of the amplifier tubes and fed to a reverse-biased diode. When the level of rf at the diode is greater than the bias voltage, the diode conducts, thereby providing a negative control voltage for reducing the gain of the exciter. The connection to the exciter is made via a phono jack on the rear of the L-4B. A potentiometer is provided on the front panel so that the bias level



Back view of the L-4PS power supply with the cover partially removed. Ventilation holes in the top and bottom of the chassis and the perforated cover help to cool off the unit by permitting air to freely flow around the power-supply components.

of the diode can be set for proper control of the gain of the particular exciter used with the amplifier.

Switching from receive to transmit in the L-4B is accomplished by using exciter relay contacts to ground one side of the coil of a three-pole, two-position relay. A connector for this arrangement is located on the rear panel of the L-4B. During receive the output circuit of the exciter is connected to the antenna, and +120 volts of bias is applied to the cathodes of the amplifier tubes. By cutting off the 3-500Zs during receiving periods, this bias eliminates diode noise and heat-producing idling current. During transmit the output of the exciter is fed to the input circuit of the amplifier, the output of the amplifier is fed the antenna, and cutoff bias is removed from the cathodes of the final amplifier tubes. A front-panel-mounted relay switch is incorporated in the L-4B so that the user can adjust his exciter or make contacts with it without disconnecting the rig from the amplifier.

Two front-panel meters are included in the L-4B. One meter provides the operator with a 0- to 1-ampere range for measuring plate current. The second meter, in conjunction with a five-position switch, allows the operator to monitor plate voltage, grid current, forward power and reflected power. The three power positions of the switch offer ranges of 0 to 3000 watts forward power, 0 to 300 watts forward power, and 0 to 300 watts reflected power. Circuitry of the directional wattmeter is similar to that described by Bruene¹ several years ago in *QST*. Since the rf portion of the wattmeter is always in the line, the wattmeter can be used to tune up the exciter independently of the amplifier.

To prevent excessive voltage drop in the filament line, the filament transformer for the 3-500Zs is included in the amplifier cabinet. The rest of the power supply, except for the circuit used to supply the coil voltage for the send-receive relay, is contained in a separate package, the L-4PS. By not housing the 32-pound amplifier and its 43-pound power supply in the same package, Drake has taken away some of the business from doctors who specialize in mending hams who develop hernias.

The high-voltage power supply employs a single husky plate transformer in a voltage-doubling circuit. Voltage rectification is handled by fourteen 600-PIV, 1-ampere, controlled-avalanche semiconductor diodes that do not require supplementary components for transient-voltage protection. Eight 200- μ F electrolytics connected in series provide an effective output capacitance of 25 μ F. The +120 volts of bias required to cut off the amplifier tubes is obtained from a tap on a resistive voltage divider across the output. Depending on whether all or half of the center-tapped primary is used, the unloaded high-voltage output of the supply is either 1900 or 2600 volts. A switch on the front

¹ Bruene, "An Inside Picture of Directional Wattmeters," *QST*, April, 1959.

panel of the amplifier establishes which voltage is applied to the plates of the 3-500Zs. The lower voltage is used for tune-up, cw and RTTY, and the higher voltage is used for a-m and ssb.

The filament transformer in the amplifier and the plate transformer in the power supply are designed so that a line voltage of either 230 or 115 volts can be used by making appropriate jumper connections to the transformer primaries. A 6-foot 3-conductor line cord and a 5-foot interconnecting power cable permit the amplifier to be conveniently located away from the power supply.

As can be seen from a look at the photographs, both the amplifier and the power supply are well-constructed mechanically and electrically. Large heat-dissipating plate caps, and parasitic chokes employing heavy metal straps, help to carry heat away from the tubes. Metal straps are also used to provide low-loss connections to the tube filaments. The output inductors appear to be of sufficient size to stand continuous use without any noticeable deterioration (there aren't any plastic forms to melt). Large knobs on the band switch and the plate tuning and loading controls, in addition to a 4½:1 vernier drive on the plate tuning control, make it a pleasure to tune the amplifier.

Safety has not been forgotten in the L-4B or its power supply. Indicator lamps on the front panel of the amplifier tell when the power supply is operating and when the high voltage is set at 2600 volts. Two circuit breakers in the power supply protect the equipment from overloads, and a small resistor in the high-voltage line protects the diodes in the power supply from short circuits. The cover of the amplifier is so fashioned that it cannot be removed without disconnecting the main power supply cable from the amplifier. Once the cover is removed, the interlock shown in Fig. 1 comes into play. When the cover is in place, two metal contacts associated with the plate current meter are kept apart by the bottom end of a phenolic rod, and a

Drake L-4B Linear Amplifier

Height: 7⁷/₈ inches.
Width: 13¹⁵/₁₆ inches.
Depth: 14⁵/₁₆ inches.
Weight: 32 pounds.

L-4PS Power Supply

Height: 7⁷/₈ inches.
Width: 6³/₄ inches.
Depth: 11 inches.
Weight: 43 pounds.

Power Requirements: 230 volts ac, 15 amperes or 115 volts ac, 30 amperes.

Price class: \$750 including power supply.
Manufacturer: R. L. Drake Company,
540 Richard Street, Miamisburg, Ohio
45342.

grounded metal spring is kept away from a metal lug on the high-voltage connector by a washer clamped to the rod. When the cover is removed, the spring shorts the high-voltage lead to ground, and the two metal contacts close, thereby protecting the plate current meter by shunting any power supply current around it.

Operation of the L-4B is easy. On cw and RTTY it is only necessary to adjust the amplifier plate tuning and loading capacitors and the exciter drive until maximum output is obtained for 1000 watts input. If the line voltage is either nominal value (230 or 115 volts), the plate voltage will drop from 1900 volts at no load to about 1760 volts at a full load of about 565 mA. For ssb operation the amplifier is initially tuned at the lower plate voltage by adjusting the amplifier plate tuning and loading capacitors and the exciter drive until maximum output is obtained for an input of 1000 watts and a grid current of 220 mA. Then the high voltage is switched to the 2600-volt position, the amplifier tuning is left as is, and the exciter is adjusted until voice peaks kick the amplifier plate current meter to no more than about 400 mA. At full load the ssb plate voltage will drop to about 2400 volts, if the line voltage is either nominal value.

The L-4B instruction manual contains the amplifier specifications, installation instructions, the tuning procedure, operation details, a theory section, service data, alignment instructions, and large schematics of the amplifier and power supply. An SWR calculator, in the form of a nomogram on a 3 by 5¼-inch plastic card, is included with the manual. This permits the user of the L-4B to calculate the SWR of the feed line by referring to the forward and reflected power readings of the amplifier wattmeter.

Tests of an L-4B in the ARRL lab showed that the amplifier easily met all the manufacturer's specifications with one exception: No matter how we tuned the amplifier, the second harmonic was never attenuated from the funda-

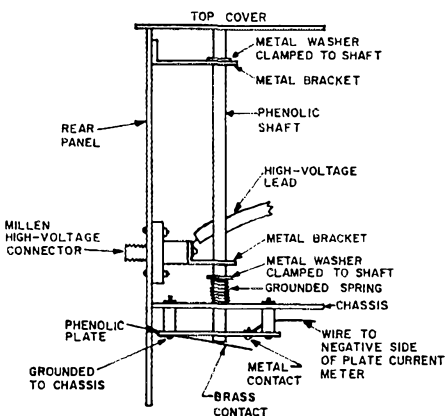


Fig. 1—A sketch of the interlock used in the L-4B. See the text for details.

(Continued on page 65)



Hints and Kinks

For the Experimenter



DIRECTION FINDER

THE modified globe shown in Fig. 1 provides a convenient means for determining which direction to point a beam so that a healthy signal may be dumped into a distant location. Although the globe is small enough to fit on the operating table, it is sufficiently large to be easily used by a man who needs to wear bifocals. With some help from the junk box, the direction finder can be built for less than two dollars.

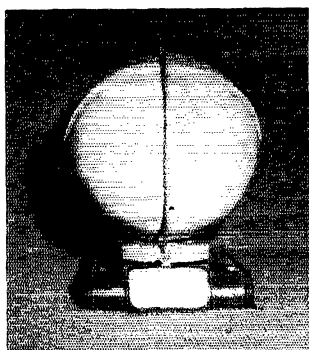


Fig. 1—W2LOF's homemade direction finder.

Obtain a seven-inch globe — mine cost only \$1.79 — from a stationery store. Drill through your QTH on the globe a hole large enough to pass the head of a 6-32 screw and the shank of a screw-holding screwdriver. Using the longitude and latitude scales on the globe, locate the antipode of your QTH and drill at this point a hole large enough to pass a 6-32 screw. Obtain the cover of a circular metal container, such as the one used to house "Scotch" electrical tape, and drill through its center a hole for a 6-32 screw. Cut a piece of white paper so that its width equals the height of the cover, and its length equals the circumference of the cover. Divide the paper into 36 equal spaces and mark the spaces in 10-degree increments from zero to 360 degrees. Then, turn down the open end of the cover and glue the calibrated scale to the circumference. Referring to Fig. 2, thread a 6-32 screw, 1 1/4 inches or longer, through the QTH hole and into the opposite hole. Over the screw place a shakeproof washer, the calibrated cover, another shakeproof washer, a 6-32 nut, a 1/2-inch spacer, and a large flat washer.

Next, for the base obtain or assemble a plastic or wooden structure of sufficient size to support the globe — I used a plastic base from a calendar — and drill through its center a hole for a 6-32

screw. Then, using a large flat washer and two 6-32 nuts, attach the globe-and-scale assembly to the base. Bend a large diameter wire to a slightly larger radius than the globe and, as shown in the photograph, anchor one end of the wire to the base. Plug a rubber grommet into the QTH hole and insert the other end of the wire into it.

It's easy to calibrate the device. First, turn the globe so that the North Pole is under the wire. Then, while holding the globe in this position, rotate the calibrated cover until the zero-degree calibration mark is also under the wire. Finally, tighten the nut nearest the globe so that the globe and cover are securely attached to each other.

To use the direction finder, locate on the globe the spot you wish to contact, place this location under the wire, read the degree indication under the wire, and turn your beam to this setting. — David M. Ruggles, W2LOF

TOWER SAFETY

IF you are using polyethylene rope to raise and lower your tilt-over tower, make sure that the rope has not deteriorated to an unsafe state. A change in the color of the material and a fuzziness indicate that the fibers have started to break down.

I had my tower installed for three years when the polyethylene rope broke while the tower was in the down position with the antenna about nine feet above the ground. It cost me one broken element and a new rope (steel with a plastic coating). I feel lucky that the rope did not break while I was lowering the tower. — Ed Whyatt, W8EOB

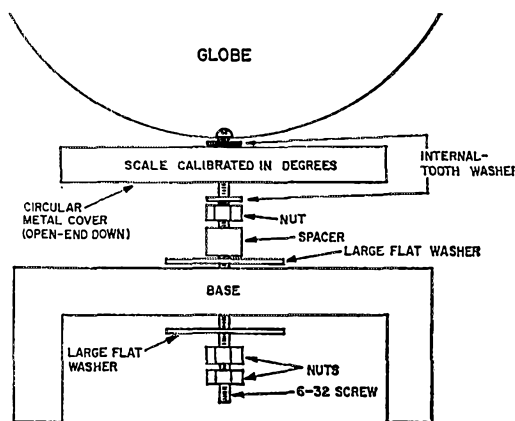


Fig. 2—Details of the assembly of the modified globe to a calibrated scale, and a base.

REPLACEMENT FOR SELF-TAPPING SCREWS

WHEN self-tapping screws are used to hold in place a chassis cover that is frequently removed, the holes eventually become enlarged, thus making it impossible to tighten the screws. Here is one solution to the problem: At each point where a fastener is to be located, drill through the chassis a hole whose diameter is somewhat smaller than that of a 6-32 machine screw. Thread the holes by turning a 6-32 machine screw in each hole or by using a 6-32 tap. Next, being careful not to strip the newly-formed threads, insert and firmly tighten a screw in each hole. Then, as shown in Fig. 3, set the cover over the machine screws and secure it with 6-32 nuts. — *From W9NFO's OVS report*

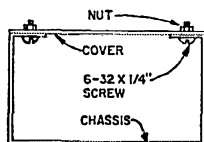


Fig. 3—W9NFO's method of attaching a cover plate to a chassis. Each machine screw is held in place by a threaded hole in the chassis lip.

ANTENNA RAISING

SEVERAL articles have appeared describing methods of putting a line for an antenna support over a tall tree. Archery is a favorite method, and one ham described a king-sized slingshot that he used.

When a task must be performed, I believe it is best to use available skills and equipment. I'm not an archer and my skill at shooting with a slingshot has decayed over the years. However, I am a tennis player, although not a good one.

A length of cord, a tennis ball and a racket can be used to put a length of line over a tree that is up to forty feet high. Do not puncture the ball to fasten the cord; instead, make two wraps at right angles to one another and tightly tie the cord. Using a force similar to that used on the first serve against a weak opponent, hit the ball with an underhand stroke similar to that used for a lob. I put my line over a tall tree on the third try. — *R. W. Jones, KH6AD*

HEATH HP-13

I had trouble with the 30-ampere circuit breaker in my Heath HP-13 when using this dc supply to operate a Heath HW-22 transceiver in my car. Regardless of whether I was receiving or transmitting, the circuit breaker frequently opened. Having to wait 25 seconds for the circuit breaker to close after each opening was frustrating and led to lost contacts.

On page 11 of the HP-13 instruction manual, the builder is directed to place a connecting lug (for the 30-ampere circuit breaker) between a No. 10 flat fiber washer and a 10-32 nut. This had been done in my unit. However, on close inspection one could see that the lug had

burned the fiber washer and left its imprint. Apparently, poor or insufficient contact at the joint caused excessive heat which in turn caused the circuit breaker to open.

By simply adding another washer and a 10-32 nut and by placing the lug between the two nuts, I now have sufficient metal to avoid overheating the circuit breaker at this junction. Once again I can roll along at 65 mph and make hour-long contacts without the circuit breaker acting up. — *The Rev. Charles T. Pohle, W1AIE*

CAPACITOR SAFETY

I incorporated the best features of several *QST* articles in the design and construction of a high-voltage power supply for a kilowatt linear amplifier. However, because of some experience with the mechanical damage that can be caused by the failure of an electrolytic capacitor, I was alert to a safety construction detail, which hasn't always been taken advantage of in *QST*, concerning the installation of computer-grade electrolytic capacitors.

Because the present generation of computer-grade capacitors can pack a large amount of energy in a small space, capacitor manufacturers have gone to the expense of including in their products safety vents to reduce the possibility of an explosion in the event of capacitor failure. However, in certain *QST* articles, the builders defeated the purpose of the capacitor safety plugs by covering the individual computer-grade capacitors with a sheet of plastic (Plexiglas).

For safety, either leave uncovered the top of each computer-grade capacitor or, as is shown in Fig. 4, cover the capacitors with a sheet of plastic that has vent holes drilled above the capacitor safety vents. I feel that the practice of covering an electrolytic capacitor with sheet plastic that doesn't have relief holes is like blocking the safety valve of a boiler. — *Philip C. Shera, WB2ZQH*



Fig. 4—A view of WB2ZQH's partially constructed power supply illustrating the practice of providing relief holes for the safety vents of computer-grade capacitors.

Technical Correspondence

DUAL CONTROL REQUIRED FOR DUAL MONIMATCH METER INDICATOR

Technical Editor, QST:

For thirteen years I have followed the development of the Monimatch, since it appeared in October 1956 QST. I found the Mark II indispensable in over ten years of mobile use.

For my home station I have used the Mark I, II, III, and now the Varimatcher described in May 1966 QST. On this model I included two meters, for reading forward and reflected power at the same time. One small problem developed. No dual control was available for the sensitivity adjustment, so I decided it was not necessary in the first place. Having used Monimatches for over twelve years, I could tell that this one, after completion, was not working as it should, compared to other models (I have seven of them). The reflected readings were low. It was some time before I concluded that a single control would not work properly with two meters.

Reference the article in October 1969 QST,¹ it seems the single control, R_3 in Fig. 2A of that article, will not work, either. When M_1 is at or near full scale while checking SWR, there is a voltage at the top of R_3 which must be overcome before M_2 can move upscale. M_2 is prevented from reading the correct reflected power. A dual control that tracks reasonably accurately will eliminate this error, allowing each meter to read its own voltage without interference from the other.²

Now, with a dual control in my Varimatcher, I find a two-meter indicator a great help in tuning my TR-4. — Russell McCabe, W6G1P, 1130 Rancho Dr., Napa, Calif. 94558.

CRYSTAL-CONTROLLED FREQUENCIES BY HETERODYNING

Technical Editor, QST:

The heterodyne principle has been used to help obtain accurate low or medium frequencies for measurements or for checking the accuracy of variable frequency oscillators. Our box of surplus high-frequency crystals is often searched to find a combination of two crystals which, while oscillating and properly coupled, will provide the desired sum or difference frequency.

Recently, the need for a 250-kHz signal was met by operating one transistor oscillator with a surplus crystal at 8650 kHz and another transistor oscillator with a crystal at 8400 kHz. Of course, another pair at 6100 and 5850 kHz, respectively, coupled to the circuit under measurement, could be used. Use of this "dodge" is particularly helpful where it is difficult to obtain crystals of the required frequency from dealers' shelves. — Stacy W. Norman, W4SN, 1656 Brandywine Dr., Charlottesville, Va. 22901.

¹ McCoy, "An Etched-Circuit Monimatch For Checking Your Antenna System," QST, October, 1969.

² Editor's note: Mr. McCabe's analysis is correct; the dual control was erroneously omitted from the schematic in the earlier article. A suitable control for that circuit is a Mallory CCU2531 or equiv.

TRIBAND DELTA-LOOP BEAM

Technical Editor, QST:

Recently I built a triband delta-loop beam, which has undergone almost two months of successful tests. The basic ideas for this antenna came from the pages of QST, and I feel that I should, therefore, share its success with you. Fig. 1 contains constructional details.

Basically, this antenna is the 15-meter delta loop described by W1ICP in QST for January 1969,³ but I have added tuning traps at the top corners in accord with the principles enunciated by VK2AOU in March 1969 QST.⁴

The antenna is fed by one transmission line through three gamma matches, and the SWR is less than 1.8 across the entire 20-, 15-, and 10-meter bands. SWRs at resonances are 1.2 at 14.25 MHz, 1.4 at 21.3 MHz, and 1.2 at 28.6 MHz. The boom is 33 feet above ground.

Reports have been excellent on all bands, with front-to-back and front-to-side ratios very good on 10 and 15 meters. The reflector tuning on 20 meters is not quite perfect, and the front-to-back ratio on this band is not as good as it could be. However, WB6IKU, with whom I have weekly schedules, reports that the 20-meter signal is much improved over that with the replaced 3-element minibeam used as an end-fire array. Also, I have worked through several severe pile-ups on 20 meters, which I am quite sure could not have been done with the minibeam and my 160 "barefoot" watts.

This antenna has withstood several severe storms and partially passed the test of tornado-like winds of 90 to 110 mph. (Half of each loop was lost, but the other halves stayed up, and the boom-to-mast bracket remained unbent. This bracket consists of three 1/8-inch steel plates in parallel.)

I intend to replace the 1-inch part of the loops with heavier-walled tubing before winter, as the present material is salvaged from the booms of TV antennas, and this is what broke in the high wind. I will also retune the reflector trap for 20 meters at that time. — Robert E. Grossmann, WA0UDJ, Artas, S. Dak. 57423.

SIX-METER DELTA-LOOP BEAM WORKS DX

Technical Editor, QST:

After obtaining my Technician-Class ticket in February, 1968, I was most anxious to go on the air, but with an XYL that just doesn't understand what I see in ham radio, it was not an easy task.

Finally I picked up an HA-460 transceiver. Next problem: antenna! After buying the transceiver, the XYL couldn't understand why it didn't come equipped with an antenna for "all that money." So, rather than start a war, I decided to build my own antenna . . . would you believe an end-fire array on six meters? It worked, but it left a lot to be desired. I used it for about four months, but during the first band opening of the year I tried to work DX with no go! When I heard mobile stations with five watts into halo antennas working DX, I drew the line. I was going to have a good antenna, or else!

I dug out my old QSTs and the 1968 Handbook and started doing some figuring. Then I ran across the January 1969 issue of QST, and the delta loop

³ McCoy, "The Delta Loop Beam On 15," QST, January, 1969.

⁴ Ruckert, "A Triband One-Loop Cubical Quad Element," QST, March, 1969. Also see Technical Correspondence, "More on the Triband One-Loop Quad Element," QST, May, 1969.

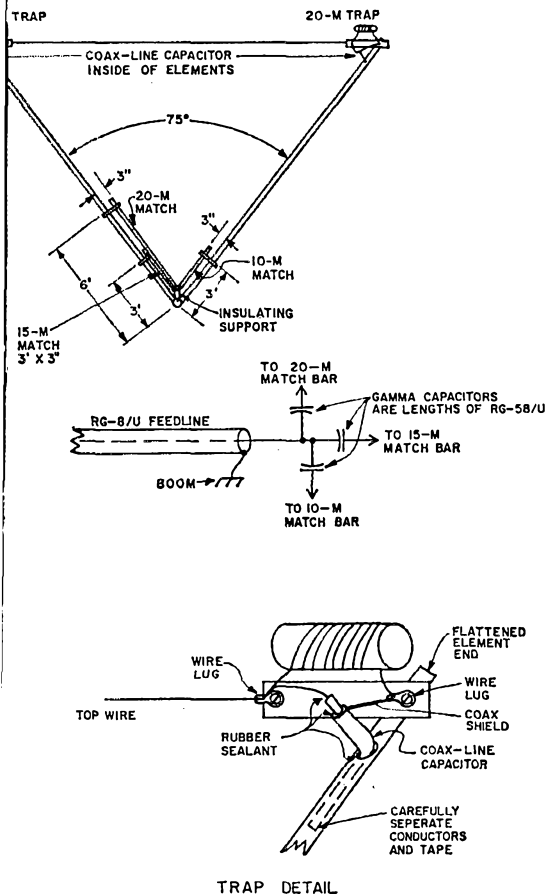


Fig. 1—Construction details for the triband delta-loop beam. Boom and element dimensions are the same as those given on page 31, January 1969 *QST*. Traps are used in both the driven element and the reflector, as shown in the single sketch at left. Traps for the driven element are tuned to 15 MHz for 20-meter operation, and to 28.8 MHz for 10 meters. Reflector traps should be tuned 3 percent lower in frequency. Traps should be removed from the antenna for tuning, as they are difficult to tune when connected.

Trap coils are wound of No. 12 copper wire spaced with plastic-coated fly-fishing line. They are wound on plastic golf-club separator tubes 1¼-inch dia, and are sprayed with plastic lacquer. The 20-meter coil is 7 turns, 10-meter coil is 4 turns. Trap capacitors are made by using the capacitance between the inner and outer conductors of a length of coaxial transmission line. RG-58/U is suitable for low and medium powers, but RG-8/U should be used for about 250 watts and above.

Gamma-match bars are ¾-inch aluminum tubing; the 20-meter bar has an insulating support at its center. Gamma capacitors are RG-58/U, similar to the trap capacitors. Connect center conductor of feed-line to shield of gamma capacitor, and connect center conductor of gamma capacitor to matching bar. Gamma-capacitor lines are taped along the boom, with the "far-end" conductors carefully separated and taped.

The matches were tuned with a variable capacitor to find the approximate capacitance values, and the coaxial-line capacitor was then slowly clipped until the lowest SWR for the associated frequency was obtained.

ANOTHER HEATER-ELEMENT SOURCE FOR CRYSTAL OVENS

Technical Editor, QST:

I read Mr. Little's Technical Correspondence letter in September 1969 *QST* about W3QY's Precise Crystal Oven⁵ with interest, since I had also been searching for substitute materials for use on a regulator control panel with 120 V ac output.

I found a device at Western Auto called a water-pipe-heater tape for \$2.35. It is non-automatic, type THB-6, a parallel tape, and consumes 42 watts at 120 V ac. I use this tape around a one-pound coffee can (about six turns), one inch of Styrofoam, the mercury regulator outside the tape, with the whole covered with about one inch of Kraft tube-packing material, and 3.21 μ F of capacitance in series. The regulated temperature inside a two-inch inner vessel holds steady at 102.3°F (39°C) with mercury contact at 105°F. No heat-dissipating dropping resistors are required by using reactive components.

The phase angle on this circuit is -67.7 degrees, dissipative power in the tape is 6.1 watts (needed for the larger oven), reactive power in the capacitor is 14.9 var, and the circulating reactive energy is only 0.039 joules (if my math is correct!). The dissipated power may be controlled by varying the size of the capacitor, which should be a good grade of paper-oil, and not electrolytic. I believe a smoother version of this very makeshift oven and tape would do a good job on a one-kHz octal-mounted crystal. — Charles E. Hedrick, W4W0, 722 21st St. S., Arlington, Va. 22202.

⁸ Pearson, "An Inexpensive Precise Crystal Oven," *QST*, July, 1969.

struck my fancy.^{6,7} Using the frequency figures in the article, I came up with what I thought were pretty good figures for a 3-element delta loop for six meters. (When an article was printed later, I found each of my dimensions to be nearly identical — within one inch of the published figures in all cases.⁷)

I went down to the hardware store and bought all the supplies I needed for under \$10.00 and my project got underway. Ten hours later I came up with a pretty impressive looking 3-element delta-loop antenna for six meters. Even the XYL was impressed! Although the thing doesn't look very sturdy, it has already been through lightning storms with winds up to 60 mph with no damage. As for performance, I can say that I now work DX (I have St. Louis, Mo., confirmed). My antenna is only eight feet off the ground because I'm still experimenting with it, and it has large oak trees all around and a 4160-V power line almost directly over it. I still get S-9 reports from Moline, Ill. So time and money for a delta-loop antenna can't be beat. — Allyn R. Kinnamon, W4SJJG, 1001 Marrows Rd., Newark, Del. 19711.

⁵ Habig, "The HRH Delta-Loop Beam," *QST*, January, 1969.

⁶ McCoy, "The Delta Loop Beam On 15," *QST*, January, 1969.

⁷ McCoy and Dean, "A Three-Element Delta Loop Beam For 6 Meters," *QST*, September, 1969.

Proposed Experiments With Australis-Oscar 5

Interested in doing advanced experimentation with Australis-Oscar 5? Here are some ideas on what to do.

BY JAN A. KING,* K8VTR/3

WHILE acquiring the ability to track a satellite is an important and interesting amateur activity, it is far from being the main objective of the Australis-Oscar 5 spacecraft. AO-5 is a telemetry satellite and as such is capable of reporting information to observers about itself and more importantly about the environment around it. Australis-Oscar is now an official NASA experiment and as such Amsat has been requested to publish an experiment report for NASA based on results from the satellite. Project Australis and Amsat need telemetry reports from every amateur listening to the satellite. More important to each amateur, Australis-Oscar represents an excellent opportunity to acquire new information about ionospheric propagation in the 10-meter region as well as a chance to participate actively in the space program. I will suggest a few experiments here but, this is only an outline of what might be done with the satellite. Use your imagination.

Listening for the 10-meter Beacon. When first acquiring the satellite, generally listen for the 2-meter beacon before attempting to hear the 10-meter beacon. Decode channel 1 of the telemetry. This will tell you if the 10-meter beacon is in the on condition. A current measurement of 50 to 60 mA (during the first month of operation) indicates that the 29.45 MHz beacon is turned on. If, however, a current measurement of 25 to 30 mA is measured then you can be sure that it has been commanded off. It is currently expected that the 10-meter beacon will transmit only on weekends in order to conserve battery power. However, this schedule may be modified once the satellite is on orbit and information on its performance can be obtained.

Temperature Record. Keep an accurate record of the temperature channels (5 and 7) during each part of a pass. Try to record data during passes other than the overhead pass which will occur at your location around 1500 hours local time every day. This data will be useful to Amsat and other groups interested in building future satellites since it will help us verify our thermal design of the satellite and others like it. Some of the most interesting temperature information may be obtained by the hardy amateur who can listen to the north-to-south pass that will occur around 0300 local time each morning. At this time the satellite will be going through a dark period and should indicate somewhat colder temperatures. Another useful measurement is

* Australis-Oscar 5 Project Manager, Amsat, P. O. Box 27, Washington, D. C. 20044.

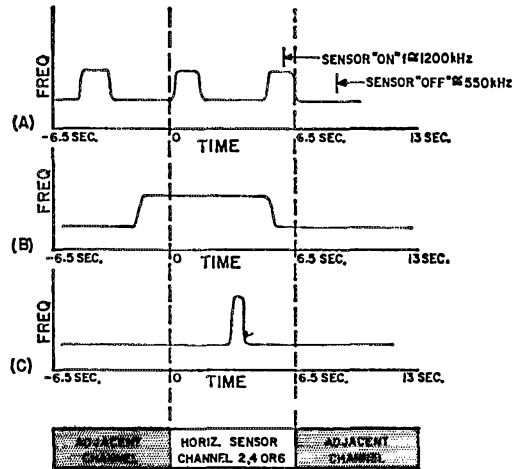


Fig. 1—*a*) Frequency vs. time output of a typical earth sensor when the rotation period of the satellite is less than the sensor sampling period. *b*) Sensor output when rotation period is greater than the sampling period. Note, however, that the on-off transition has occurred during the sampling period. *c*) Predicted sensor behavior as it sweeps across the solar or lunar disk.

the difference in temperature between the inside of the spacecraft and the skin ($T_{INT}-T_{SKIN}$). This measurement is an evaluation of the effectiveness of the insulating layers between the skin and the package.

Horizon Sensors. The three earth horizon sensors are mounted on perpendicular faces at one corner of the spacecraft. Their outputs are channels 2, 4, and 6 of the telemetry sequence. The alignment of the sensors with respect to the antennas is as follows: X-axis sensor — parallel to 2-meter antenna. Y-axis sensor — perpendicular to both the 10-meter and 2-meter antennas. Z-axis sensor — parallel to 10-meter antenna.

When one of these sensors is not viewing the earth, a near-square wave with a frequency between 510 and 640 Hz will be emitted while the sensor channel is being monitored. If the attitude of the satellite then changes such that the sensor views a portion of the earth, a higher frequency, probably around 1000 to 1200 Hz, will be measured. It is difficult to estimate what the exact frequency value for the sensor will be since it was not possible to simulate such a condition in the lab. It will be interesting to find what this on condition will be. Measure this value for each axis and add it to your telemetry report form. If the spin rate about a given axis is high enough, one or two of the sensors may

have an *on* time shorter than the duration of the sampling period. If this is the case then some care must be taken not to confuse the *on-off* and *off-on* transitions with a telemetry channel change. It will be more likely that the spin rate will be slow with a spin about the Z axis of approximately 4 rpm. Even at this rate occasional transitions will occur from the sensors during a sampling period. Try to work out a scheme for determining the attitude of the satellite using this telemetry data.

Occasionally a short transition on one of the sensors may occur as it sweeps across the sun or the moon. This information will be very useful in pinpointing the attitude of Australis-Oscar 5 at a given instant. Note the time and the particular sensor and attempt to estimate the frequency during the *on* condition. Also try to determine whether the 10-meter and 2-meter signals are in a null or a peak at that time. Report this information along with other telemetry data. If you are so inclined it would be interesting to compute the exact attitude of the spacecraft yourself assuming something about the position of one of the other sensors from previous readings. It will be a good exercise in solid geometry. Attempt to correlate the satellite's attitude with the signal strength of the two beacons. Is the polarization of the transmitted signal preserved? Take into account the polarization of your antennas.

The sensors may also be used to determine the effect of the magnetic attitude stabilization system. Over a period of several days note the spin rate of the X axis. This spin rate should be noted to decrease as the X axis spin is retarded by the geomagnetic field.

The Propagation Experiment. The 10-meter beacon (29.45 MHz) is potentially Australis-Oscar 5's most important source of new information, both to amateurs and to the scientific community. It also requires a greater amount of sophistication on the part of the amateur than the other experiments. To fully participate it will be necessary to track and receive both beacons simultaneously. It will also be helpful if both signals can be recorded on magnetic tape or chart paper with an accurate account of the necessary times and orbital information (including orbit number). First, using your preferred orbital information² calculate the time when you expect to acquire the satellite. Be listening several minutes beforehand, particularly for the 10-meter signal. Note the time difference between acquisition of the two beacons as accurately as possible. As the pass is nearing completion again record the time difference between the loss of the two signals. Note any anomalous behavior of either signal. Using the 2-meter signal as a reference try to time correlate the 10-meter signal to it. Try to make corrections for any antenna pointing error you may

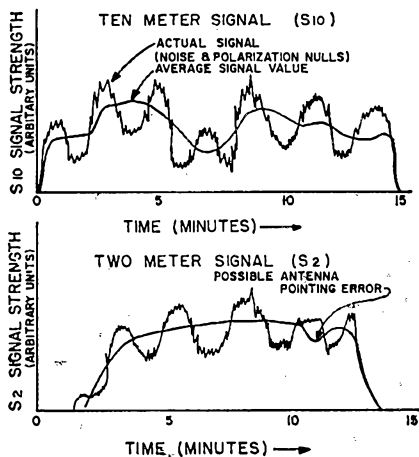


Fig. 2—*a*) Hypothetical 10-meter signal during an entire pass over your station. Make an attempt to "average out" noise and polarization effects during the pass. *b*) The 2-meter signal hypothesized during the same pass and averaged in a similar manner. Note that S_2 is acquired later and is lost sooner than the 10-meter signal. Try to obtain values for S_{10}/S_2 for the averaged signals for several times during the pass.

have had with either antenna. You should expect to see nulls in the signals caused by the polarization change of the satellite with respect to your antenna. These should occur at regular intervals in time. How does this information compare to the earth horizon sensor information? Try to average out these nulls in your correlation process. An interesting number to be reported would be:

$$\frac{S_{10}}{S_2} = \frac{10\text{-meter signal strength (linear units)}}{2\text{-meter signal strength (linear units)}}$$

(Both signals should be taken with respect to the same unit. The unit may be arbitrary.)

Data should be taken for as many points during a pass as possible. Compare your results with similar passes on previous days. Is there a correlation between S_{10}/S_2 and the amateur activity on the 10-meter band at the time of the pass? Are there long periods when S_{10}/S_2 is particularly large or small? If so, do they occur on consecutive days during a comparable orbit?

In addition to this experiment try listening for the 10-meter signal during periods when it would not normally be heard, particularly when it is on the exact opposite side of the earth from your location. Any reports of such *antipodal* reception should be well documented and a full report should be sent to Project Australis or Amsat.

These are some of the experiments that have been suggested to us here at Amsat. There are others that might be tried. Please remember, your participation with the Oscar satellite is essential to the continuation of an amateur satellite program.

QST

² See QST for October, 1969, pg. 54. Note: Amateurs interested in tracking Australis-Oscar 5 should review the QST article series beginning in the July issue.

Navassa Revisited



Approaching Navassa from the south.

BY J. ROBERT ESHLEMAN,* W4QCW

IN August of 1954, W4VZQ, WN4HBC and myself put Navassa Island on the air for the first time post war. The island had been represented briefly by K4NI of Navassa Light in the 1920s. Our efforts resulted in some 1300 QSOs, but due to low sunspot activity the results were disappointing. In 1957 another group of teenagers visited the island and made several hundred QSOs during an eight-hour stay. The last legitimate DXpedition to Navassa took place in 1958. In the early 60s the U.S. Coast Guard abruptly altered its policy of permitting amateur visits to the islands. As the years passed Navassa became rarer and rarer until a recent survey by the Geoff Watts DX news sheet listed Navassa as the most wanted country — ahead of Albania and Iraq!

In 1964, a former dental schoolmate, Ernie Hendry, K4CAH, began to make a concerted effort to persuade the Coast Guard to reverse their position. Two years later Frank Harris, WA4HTR, and myself joined in the effort. An unauthorized DXpedition to Navassa that same year only served to strengthen the Coast Guard's resolve to continue to deny permission for visits to the island. The return of Barry Goldwater to the Senate last year renewed hopes that the rigid position of the Coast Guard would be modified. The splendid cooperation of the Coast Guard in making the Heard Island, VKØWR, operation possible also raised hopes of a policy change.

Whatever the reason, the persistent efforts of Ernie, K4CAH, Herb, W4KET, and Lou,

*3716 Drakeshire Rd., Richmond, Va. 23234.

W4PJG, were rewarded when Commander H. C. Wyatt sent Ernie a letter in late May informing him that as of June 22, 1969, permission would be granted for small groups to visit Navassa.

Ed Roller, K4IA, was dispatched to Kingston, Jamaica, to arrange a charter and to carry one of the three beams we would need. A 60-foot twin diesel belonging to Hill's Deepsea Fishery Ltd. was chartered for a five-day period beginning June 21.

Planning

With less than four weeks until our scheduled departure and with the members of the group separated by as much as a thousand miles, planning such a major trip was a big task. Two factors eased this situation greatly. The group kept nightly schedules on 3830 and 7205. Secondly, a group of amateurs in Kingston headed by Chuck Brydges, W4WXZ, were making arrangements for customs and local transport. They also secured most of the food, drink, gasoline and camping gear which our party of twelve would require. By this time ten amateurs, K4CAH, K4FU, K4IA, KV4FZ, W4DQS, W4KET, W4PJG, W4QCW, W4USQ, WA4HTR, and two biologists were committed to make the trip.

On Saturday morning, June 21, nine members of the group and nearly one-half ton of material were assembled at the PAA counter in Miami. Thanks to some previous arrangements made by the Florida gang with PAA, we were only charged eighty dollars in excess baggage. "Never was so much carried by so many for so little!"

Between January and March this year, W4QCW knocked off more than the necessary 500 contacts to become first holder of the new 5BDXCC award — and then topped it off by joining a DXpedition. Here's the story of K4IA/KC4.

At Kingston we were met by Chuck Brydges, W4WXZ, communications officer at the American Embassy, and a contingent of Jamaican amateurs, 6Y5s CB, JR and LA. By the time we had finished our complimentary glass of tropical punch, Chuck had moved our mountain of equipment through customs without a hitch. Minutes later a small motorcade headed for Lloyd's (6Y5LA) place. We changed into our "island" clothes and then split up; several shopping for last-minute items including fresh food and the rest of us going down to Pier Zero to load our gear and supplies aboard the *Miss Jekyll*. She was a 60-foot single diesel fishing boat. The twin-diesel vessel we originally chartered had been captured by the Colombians the preceding week. The significance of the substitution of a single diesel vessel for a twin diesel didn't dawn on most of us until the following morning. Although it appeared that sleeping space would be at a premium for the seven crew members and our party of twelve, there was plenty of extra space in the ship's hold. This extra space was filled with crushed ice, a luxury few DXpeditions of this type experience. With the loading operation finished we all headed uptown for something to eat and to do a little souvenir shopping, leaving Tom and Gene, the University of Florida biologists, aboard to guard our gear.

When we returned at 2200 GMT expecting to sail within an hour, Tom greeted us with a long face. During our absence a minor Jamaican immigration official had visited the boat and learned of our trip. He informed Tom that the *Miss Jekyll* was not licensed to carry passengers and we did not have work permits enabling us to go as crew members; therefore, the trip was off. Up until this point everything had gone so smoothly that I could hardly believe I was actually on a DXpedition. Problems just like this had delayed the first Navassa DXpedition for eleven days.

Ernie and Chuck left immediately to try to clear the obstacle. When they still hadn't returned thirty minutes later, Herb, KV4FZ, gave

Dale, W4DQS, five-to-one odds that we wouldn't make the trip. Clearly, this was the low point of the trip. A few minutes later Ernie and Chuck were back with good news; everything had been smoothed over. Instead of leaving, immediately the captain delayed us another hour until two more crew members were rounded up. Finally, at 2400 GMT Saturday evening we got underway. This should put us within sight of Navassa by sunrise and there by 1100 or 1200 GMT, even if things went slower than expected.

Under Way

When I could still see Jamaican coast six hours underway I began to suspect our arrival time would be somewhat later than expected. By this time about a third of the group was afflicted with seasickness. We were bucking both the wind and the current and progress was antagonizingly slow. The seas were running about ten feet at this point and I knew from past experience a landing at unprotected Lulu Bay would be impossible unless the seas calmed down appreciably. By 1500 we still had not made landfall and the captain decided his estimates of wind and currents were wrong. We changed our course from east to north and churned along for three more hours before Navassa was spotted straight ahead. Fortunately, the swells were only running three to four feet as we cast anchor about 200 yards from the landing. Dale and I, the two Navassa veterans, were accorded the dubious honor of being the first to be sent ashore aboard a very dilapidated looking twelve-foot runabout. About twenty trips were required to transfer our party of twelve plus several tons of supplies ashore. Each of us had to scramble up a wire rope ladder suspended from a catwalk thirty feet above the water. All of our precious equipment and supplies were handlined up to the catwalk by three Jamaicans with unbelievable stamina. Working without gloves in temperatures around 100°, these sturdy fellows brought up every single package without a mishap. Unloading operations lasted from 1930 until after 0100 GMT with



At left, W4P1G (1.) and W4USQ operating the phone positions while at the right, W4KET (1.) and K4IA hold down the c.w. positions.

Ernie in the true tradition of a captain the last one to leave ship and come ashore.

Herb, W4KET, Dale and I had the multiband vertical up and the first station on the air in just over an hour. We opened up on 7205 at 2040 GMT with 6Y5LA followed by WA4WIP our QSL manager. As more fellows came ashore we were able to get two more antennas up, a forty meter inverted vee and a triband three element beam. This gave us three stations for the first night's operation.

When the pile-ups subsided a bit by mid-morning Monday, the two cw stations and their antennas were moved about 100 yards to a spot overlooking Lulu Bay. This eliminated about 95 percent of our interference problem especially when we were using cw and ssb on the same band. Antennas at the cw station consisted of a 3-el triband beam on a 25-foot mast, a multiband vertical and a 600-foot long wire across Lulu Bay. At the ssb station we had another 3-element tribander at 25 feet, a 2-element tribander at 25-feet, and separate inverted vees for 40 and 75. With a few exceptions, the cw stations were manned by Ed, K4IA, Hank, K4FU, Dale, W4DQS, and Herb, W4KET. The ssb stations were manned by Ernie, K4CAH, Lou, W4PJJ, Bob, W4USQ, and Frank, WA4HTR. Herb, KV4FZ, and I were designated as multimode operators and put in time at both locations.

Monday afternoon the USCG *Hollyhock* pulled into Lulu Bay and sent a party ashore. Although our beer supply was dwindling rapidly, Ernie decided to offer cold beer to every crew member who came ashore with the hope that this would assure Coast Guard cooperation for future DXpeditions to Navassa. Later that evening a grateful crew sent us two gallons of chocolate ice cream.

In many respects Monday was our big day. We had a four-hour, ten-meter opening to the States which produced hundreds of QSOs. Herb, KV4FZ, made the first 160-meter QSOs ever recorded from Navassa, and the 80-meter stations were solidly activated, Sunday night 80



We entrusted our lives to this little boat without realizing that the transom was practically rotted out! The little runabout fell apart as we loaded her aboard ship for the trip home.

cw was tried briefly with the vertical but was given up due to our extremely poor signal. On 75-meter ssb I was able to hit QSO rates as high as 40 per hour with a barefoot transceiver and an inverted vee with the apex at only 20 feet. Numerous west coast stations, as well as ON4UN and GI3OQR, were worked on 75. Our only serious mishap occurred Monday afternoon when Ernie slipped and fell into a rocky crevice while erecting a forty-meter antenna. Fortunately, our medical kit contained some pain killers and muscle relaxants and we were able to make our patient reasonably comfortable. A well-equipped medical kit saved the DXpedition from possible cancellation after less than 24 hours operation.

Tuesday morning the captain of the *Hollyhock* and several crew members came ashore to finish the maintenance on the lighthouse. Ernie, Lou and I were permitted to climb the lighthouse with several members of the crew. Unfortunately there was no possibility of using this magnificent 140-foot mast as an antenna support. There is over one-half mile of steep rugged terrain between the landing and the lighthouse and besides permission could not be obtained for its use. The CG men departed around mid-morning. Three hours later I was surprised to see the *Hollyhock* sailing back and forth along the south side of the island. At 1900 GMT a telegram was delivered to Ernie from the 7th District CG in Miami and he was requested to accompany the crew back to the *Hollyhock*. Without our knowledge several of the Jamaicans had captured some goats and taken them aboard the *Miss Jekyll*. The Jamaicans were required to give up their hard-earned prize. We felt sorry for the poor Jamaicans and we were also concerned that the incident might mar the excellent amateur-Coast Guard relations which had existed up to this point.

Tuesday night was very productive on all bands with the exception of ten meters, but Wednesday morning found us begging for contacts. Ten meters was flat and fifteen was not much better. Ernie polled the group on their wishes for a departure time. Should we tear down Wednesday afternoon and aim to get underway by dusk or should we tear down early Thursday morning hoping to make Kingston before midnight? The temptation of a soft bed and some good food was too much — the vote was eight to two in favor of leaving.

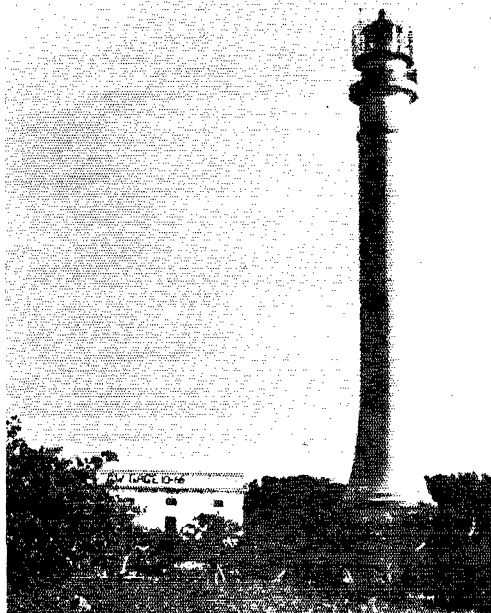
The really hard work of reloading was once again handled by the Jamaicans, who handlined all our equipment and supplies from the catwalk to the runabout thirty feet below. Ernie kept the last station on 15-meter ssb until 2000, when it too had to be dismantled. Four hours later we hauled anchor and headed for Kingston. The return trip took only thirteen hours. Apparently Jamaica is a slightly easier target than Navassa! The climax to the whole affair took place in a little Chinese restaurant in Kingston Thursday night where the K4IA/KC4 gang plus W4WXZ, 6Y5DW, 6Y5JR, 6Y5LA and 6Y5SR drank numerous toasts and consumed mountains of food.

Having been on several previous DXpeditions and having knowledge of numerous other operations, I frankly wondered at the outset how ten fellows could make such a trip and return as friends. Surely someone would hog the stations or be generally obnoxious. Certainly we did experience minor tensions and disagreements, but the fact that Ernie, K4CAH, had been clearly designated as the leader of the group prevented any of these incidents from becoming major blowups. Future multioperator DXpeditions would do well to make note of this fact.

The 11,162 QSOs made in under 72 hours operation must certainly be a record for a DXpedition of such short duration, if not for all DXpeditions. The tremendous demand for QSOs on bands other than 20 meters can be at least partly attributed to interest in the new 5BDXCC award. Once again the savvy of the average DXer was demonstrated. QSO rates of 100-150/hour were not uncommon. Directional calls were honored and no difficulty was experienced in keeping schedules with hometown stations.

In closing I would especially like to thank Herb Reaves, W4KET, and Frank Harris, WA4HTR, for assistance in the preparation of this story.

QST



The Navassa lighthouse was built in 1915.

K4NI Navassa Island—1928

BY RUSSELL DUNAJA,* W3BBF

IN January 1928 the Radiomarine Corp. of America called me and offered me a job as Radio Operator aboard the SS *Catherine* of the Bull Insular Line in San Juan, P.R. The ship carried passengers and freight between San Juan, Santo Domingo, and St. Thomas, Fredrickstad and Christianstad in the Virgin Islands. I was taken to Puerto Rico as passenger on one of the Bull Insular line freighters, and passage was guaranteed back to the U.S.A. On arrival at San Juan, P.R. I found that I was 2nd Operator and A. J. Croner was First Operator.

After about four months on the inter-island run, we both got tired of it and noticing on the bulletin board at the San Juan Post Office openings as Radio Operators and Lighthouse Keepers at Navassa Island, 9th US Lighthouse District, we both applied, passed the examination and were shipped to Navassa Island aboard the Lighthouse Tender *Acacia*. Before I left, I had one of the radio operators on one of the freight ships buy me a 32-20 Savage rifle and 1000 rounds of ammunition and I sent home for my 12-gauge double-barrel shot gun and 22 cal. rifle, as there were wild goats and wild pigeons and doves on the island. I also brought along my experimental radio gear that I was testing on

board the *Catherine* (mostly superregenerative receivers).

On arrival, we were hoisted out of the cargo boat in a cargo sling and found the island was in two levels. The first level was about 25 feet above the sea and a narrow-gauge railway ran to the next level and the push cars were pulled up the steep incline by a winch and steel cable and a Bull Dog gas engine. The next level ran to the dwelling and lighthouse. I guess the length of the railway was about 2½ to 3 miles.

The island was mostly limestone rock with the holes filled with guano which in the 1800s was shipped as fertilizer to Baltimore in sailboats. There were thousands of booby birds nesting in the trees. The island was covered with wild palm and wild fig trees and also a poisonous tree similar to sumac. Near the lighthouse were several papaya trees with delicious fruit and also wild limes. There were also wild peppers which were hot enough to burn your insides out. Of course, we had to try out our rifles and shot several wild goats and pigeons. The goats were stuffed with garlic to kill the wild taste and roasted and didn't taste too bad. There was a boat with supplies at the island every three months and we ordered our supplies to last six months. Most of the food was dried fruit and vegetables also canned food and smoked meats

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The Author (1928)

as we had no refrigeration. The fishing also was very good and we caught red snappers, small baracudas, and several other tropical fish. I also caught land crabs at night when they came out of their holes to eat grass. These were put in a box for several days and fed potato peelings to get rid of the grass taste. They were boiled in salt water and didn't taste bad. At night the crabs would crawl into the house and had to be swept out in the morning.

A. J. Croner left after a few months as he caught a rash similar to poison ivy. Two other Puerto Rican-keepers were on the island with me and one of them had some chickens. After the feed was gone, the chickens had to eat cockroaches (about 1½" long) and scorpions and other bugs. (No more chicken for me!) The power supply here was a 110 Vdc Delco plant with storage batteries and also a Bull Dog gas engine belted to a 4 kW 110 Vdc generator. The transmitter was a 2 kW Navy Standard quenched spark set with a 500-cycle motor generator. The antenna was a "L" type flat top 4-wire from the 160-foot lighthouse tower to a 60-foot telephone pole. The receiver was a Navy Standard with 2 stages of audio. The frequencies were 355 kc. and 500 kc. and with heavy static NAW Guantanamo Bay, Cuba, could not be worked. Our call was WWEA and later WSZ.

About this time the UX 222 screen grid tube came out and one was ordered. A tin cracker box with a hinged top was used and a shield partition was soldered in. The coils were wound on old tube bases. The detector was a UV 199 with the UX 222 rf Stage. This was hooked up to the two-stage audio amplifier. All kinds of SW broadcast

stations were picked up so the coils were trimmed to 14 Mc band and stations all over the world were heard. The next thing was get permission to put up the amateur station and the call K4NI was received. An 852 was ordered and also a Cardwell 500 μ F transmitting condenser. With plenty of 3/8-inch copper tubing on hand a high-C Hartley coil was wound. A 12V storage battery was used for the filament and a 3000-volt tap was taken off the spark transformer (Spare transformer). The antenna was an 80-meter Zepp from the top of the tower to a 60-foot telephone pole. The spreaders for the feeders were wood boiled in beeswax. The power was 500 cycles ac but due to the high-C circuit the wave was not too broad. Hundreds of amateurs all over the world were worked and a schedule was kept with NKF at Washington, D. C. Tests with NKF were run and wavelength was lowered until we were on 13 meters which was as low as the transmitter would go (capacitor all the way out). Later, tests with an SM station was tried and it was possible to work him with only a 45V "B" battery for plate supply. That changed me to dc and I sent home for my surplus aircraft dynamotor (1500V, 233mA), which was belted to the big MG set and I went on the air with pure dc.

I had to keep light watch every third night and this gave me plenty of time to operate. Also I had to take weather observations and send them to NAW Guantanamo Bay on 355 kc spark (about 90 miles away). I had a postcard size Kodak with me and took a lot of pictures of the island. The QSL card was a picture of the Lighthouse with the call K4NI on it, but I soon ran out of cards and a lot of stations didn't get QSLs.

The light was kerosene gas with gas mantles and was turned by weights which had to be wound up about twice a night. The groceries came from the commissary at Guantanamo Bay and it cost us about 10 to 15 dollars a month to live. The water supply was rain water which was caught in a cistern. We received our mail every three months when the supply boat arrived. I was to stay on the island 9 months and then get 3 months leave with pay, but as a new automatic light was installed using acetelene gas I was asked to stay 18 months with 6 months leave with pay. So in 1929 K4NI was dismantled. The 2-kW spark was surveyed by the Navy and dumped overboard. The 500-cycle MG set and the Delco plant were removed from the island. We were taken back to San Juan, P.R.

We were the last lighthouse keepers on Navassa Island, as the light was now entirely automatic. After a few weeks in Puerto Rico I took passage to Baltimore, Md. and later got transferred to Lightships 5th Lighthouse District Baltimore, Md. as Radio Operator. I wish to thank the hundreds of amateur radio operators that made the stay on the island a pleasure and also am sorry I could not QSL 100%. It was a lonely life with only 3 of us on this island only about 8 miles square. Without amateur radio I would not have stayed.

QST

Chart to Win

BY JOHN G. TROSTER, *W6ISQ

"HEY . . . how ya do in the sweepstakes?"
"Boy, I really had a great time, Charlie."

"Yeah? What score?"
"Worked every minute."
"What score?"

"I tell ya Charlie, I made a set a graphs and charts that would make a mathematical fella jealous."

"Makin' charts? You was supposed to be makin' QSOs. How many you work?"

"Listen, Charlie. Before the contest, I read all the old articles in the mags by all them high-scoring fellas who wrote about how to win contests. You know W4KFC, KH6IJ, W9IOP . . . all them fellas."

"So how high did ya score?"

"Well, I tell ya. I began a few days before the contest with WWV. Every few hours graphing field strength propagation conditions and number of sun spots and barometric pressure and temperature, and all them requisite things."

"What did that tell ya?"

"Don't be such a lid, Charlie. Ya gotta have a good set of charts to tell ya about propagation and that stuff if you're gonna win contests. And once the contest starts, ya gotta keep checking the bands to see how conditions is progressing. F'rinstance. Just because I'm working on 15 meters, don't mean I shouldn't be on ten meters, because maybe that is the best band for the optimum number of QSOs into the geographic center of density of hams in the contest."

"Whaaaaaa?"

"So about every five minutes, I tune back and forth and chart how the ones and twos is coming through on 15 as compared to ten. Then I got a idea of what band I should be on to work say Vermont . . . or KP4 . . . 'er sumpin else."

"Say what contest was you in, old man?"

"Then besides that, naturally I have to be sure my QSO rate stays high on that band. So I keep a graph of how many QSOs I'm having every five minutes . . . or hour . . . ahhh . . ."

"How many QSOs did you have every hour . . . any hour?"

"Then I keep check on how many a them section multipliers I work."

"How many did ya work?"

"I must of had a real strong signal 'cause it took me a hour and a half to work KH6IJ."

"That figures."

"Yeah, Nose says he works the weak sigs first 'cause he knows he can always work the strong ones after the weak ones fade out . . . ahhhh . . . I think that's what he said . . . sooooo, I must of been one of the strongest sigs . . ."

"So you worked KH6. How many other sections ya get?"



"Then, of course, I gotta be thinkin' all the time about how many hours am I gonna operate before I take my five-minute time-off and walk around the house and relax a bit . . . like W9IOP says."

"Yeah, I took a five-minute break every hour last sweepstakes and IOP beat me. I think it was a trick."

"Yeah, I had trouble with that five-minute walk too, Charlie. Ahhhhh . . . seems there was a little ahhhh . . . get-together . . . errrr . . . party going on next door and by the time I got back on the air after my five-minute marathon over the fence and through the neighborhood I was back to signing W6IVK again for a couple hours . . . just like old times. That five-minute break stuff is out next year."

"So what was your score?"

"Welll, lessee . . . left my adding machine at the office . . . but it was a total of right about . . . ahhhh . . . say Charlie, did we have a QSO in the contest?"

"Yeah . . . Sunday night."

"Oh good . . . add another . . . makes it a total of ahhhh . . . roughly right about . . . ahhh . . . approximately 765."

"765 QSOs?"

"Points"

"Ya mean a total of 765 points?"

"Well, like I say, that's only approximate."

"You ran up all that big score working from them charts you made?"

"Aw yeah, Charlie. Them charts really turned the trick."

"I recommend you write W6CUF . . . that Contest Advisor Chairman fella . . . and ask him to make up a contest for fellas who make the best chart."

* 82 Belbrook Way, Atherton, Cal. 94025

(Continued on page 65)

CONTEST PERIODS

Starts	Phone	Ends	Starts	CW	Ends
Feb. 7, 0001 GMT		Feb. 8, 2359 GMT	Feb. 21, 0001 GMT		Feb. 22, 2359 GMT
Mar. 7, 0001 GMT		Mar. 8, 2359 GMT	Mar. 21, 0001 GMT		Mar. 22, 2359 GMT

36th ARRL International DX Competition Announcement

In the interest of making this year's DX Test even bigger and better than the record-breaking 1969 turnout, the following formula is proposed.

Submit all logs, regardless of score. If you participate in the contest at all your log is of great interest and worthy of listing.

Be sure to comment on conditions in your area, unusual occurrences, exceptional QSOs etc. and above all don't forget to send along good action shots of your operation, QTH, antennas or what-have-you. Remember, *you* make the contest, *we* just report your efforts.

With the advent of 5-Band WAS and an effective starting date of January 1, 1970; all those DX stations and in particular the multi-op groups will want to be in there digging on all bands for this attractive award. W/Ks, let's encourage this activity by making those harder states available to the DX station.

And don't forget 5-Band DXCC — what better way to pick up those needed countries quickly.

We'd like to call on each and every one of you reading this announcement to encourage your DX or W/K VE/VO friends to participate. Give them the dates in the event they may not see this announcement and remind them in your QSOs just beforehand, lest they might forget.

Let's make the 1970 DX Test truly a memorable one!

As far as reporting goes, here's how: W/K and VE/VO stations send signal report and state or province to DX; DX stations send signal report plus a 3-digit number indicating power input. (E.g.: CT2AT DE W7GVA 579 Nevada BK. W7GVA R 559200 DE CT2AT K.) Compute your score (see rules following) and send your entry to ARRL Communications Dept., 225 Main St., Newington, Conn. 06111 U.S.A. These entries must be received **no later than April 10, 1970**; and remember, checkoff sheets **MUST** be attached.

The FCC has set forth some guidelines as to which forms of identification of an amateur station will be acceptable for short QSOs such as DX and contest exchanges.

Examples of acceptable end-of-exchange transmissions of less than 30 seconds are:

- "DX1DX de W6XYZ 589 CAL BK"
- "DX1DX W6XYZ 589 CAL K"
- "DX1DX 589 CAL de W6XYZ K"
- "DX1DX 589 CAL W6XYZ K"
- "589 CAL DX1DX K"

DX Restrictions

U. S. amateurs licensees are warned that international communications are limited by the following notifications of foreign countries made to the ITU under the provisions in Article 41 of the Geneva (1959) conference.

Cambodia and Viet Nam forbid radio communication between their amateur stations and those of other countries. U. S. amateurs should not work XU XV 3W8 or Canadian amateurs may not communicate with Cambodia, Laos, Viet Nam and Jordan. Prefixes to be avoided are JY XU XV XW8 and 3W8.

For telephony, the voice equivalent of the foregoing examples may be used, substituting "this is" or "from" for "de", etc.

We'll be in there fighting, will you?

Rules

- 1) *Eligibility:* Amateurs operating fixed amateur stations in any and all parts of the world are invited to participate.
- 2) *Object:* Amateurs in the 48 continental United States and Canada will try to work as many amateur stations in other parts of the world as possible under the rules and during the contest periods.

Sample log sheet

Log sheets, summary sheets and DX checkoff sheets are now available from your ARRL Headquarters. **Unless first-class postage is included with your request, log sheets will be sent by third-class mail.**

23rd VHF Sweepstakes—January 10-11

WITH the Christmas rush over and the New Year 1970 just beginning, what better way to spend an enjoyable weekend than in the annual VHF Sweepstakes. Beginning at 2 P.M. Saturday and continuing to midnight Sunday your local time (a 34-hour period), VHFers throughout the USA, Canada and elsewhere will be manning their stations, eagerly awaiting those elusive band openings to bring them that new state or section.

To calculate your score, take the sum of your QSO points (at 2 points per complete two-way exchange) and multiply by total ARRL sections worked plus ten. Be sure to send in your logs, regardless of score plus comments on conditions, unusual occurrences or what-have-you to us no later than February 6, 1970. Don't forget some good action shots of your station activity, antennas, etc.

Send now for log forms: each sheet has space for 80 contacts plus a section checkoff list and a summary. (Let us know how many you want.)

ARRL-affiliated clubs, and clubs awaiting approval of affiliation, are eligible to compete for an engraved gavel (see Rule #7). Club secretaries note: your entry letter must be received here at Hq. by March 6.

Awards will be mailed in early Spring following publication of results.

There's no bigger thrill than working a new state in the World Above 50 MHz. Give it a try, you'll see just what I mean!

C U January 10!

Rules

1) *Eligibility:* Amateur operators in any ARRL section (see page 6) operating at home, or mobile or portable under one call, on or above 50 MHz, are invited to take part, Yukon-N.W.T. (VES) counts as a separate multiplier.

2) *Object:* Participants will attempt to contact as many other stations in as many ARRL sections as possible.

3) *Contest Periods:* The contest starts at 2:00 P.M. your local time, Saturday, Jan. 10, 1970 and ends at midnight, Sunday, Jan. 11, 1970. Contacts between stations in different time zones can be counted only when the contest period is in progress in both of the zones concerned.

4) *Exchanges:* Contest exchanges, including all data shown in the sample, must be transmitted and receipted for as a basis for each scored point.

5) *Scoring:* (a) Contacts count one point when the required exchange information has been received and acknowledged, a second point when exchange has been completed in both directions. A section counts only once for multiplier credit regardless of band.

(b) Foreign entries: All contacts with foreign countries (such as Mexico and the Bahamas) count for score. All foreign countries are grouped together as one, and a section multiplier of no more than one may be claimed for contacts with all foreign stations contacted. Foreign stations may only work stations in ARRL sections for contest credit. Foreign stations will give their country name in the exchange.

(c) Final score is obtained by multiplying total contact points by the sum of different ARRL sections worked (the number in each of which at least one SS point has been credited) plus 10.

6) *Conditions for Valid Contact:* (a) Repeat contacts on other bands confirmed by completed exchanges of up to two points per band may be counted for each different station worked. (Example: K3IPM works WA2FGK on 50 and 144 MHz for complete exchanges of 2 points on each band: 2×2 gives 4 points but only one section multiplier.)

(b) Cross-band work may not be counted.

(c) Portable or mobile station operation under one call, from one location only, is permitted.

(d) A transmitter used to contact one or more stations may not be used subsequently under any other call during the contest (with the exception of family stations, where more than one call is assigned to one location by FCC/DOC).

(e) Contacts with aircraft mobiles cannot be counted for section multipliers.

(f) Contacts made by retransmitting either or both stations do not count for contest purposes.

While no minimum distance is specified for contacts, equipment in use should be capable of real communications (i.e., able to communicate over at least a mile).

7) *Awards:* Entries will be classified as single- or multi-operator, a single-operator station being defined as one manned by an amateur who neither receives nor gives assistance to any person during the contest period. Certificates will be awarded in each ARRL section to the top-scoring amateur in the single-operator classification. In addition, a certificate will be awarded to the top Novice in each ARRL section where at least three such licenses submit valid contest logs. Multioperator work will be grouped separately in the official report of results in QST.

When three or more individual affiliated club members complete and submit logs naming the club with which they are identified, an ARRL certificate will be issued to the leading club member. A letter must be received from the club's secretary itemizing participating members and approximate claimed scores. When fewer than three individual logs are received, there will be no club award or club mention.

A gavel with an engraved band will be offered the affiliated club whose secretary submits the greatest aggregate score, provided such scores are confirmed by receipt at ARRL Hq. of the individual contest logs from such members. Only the score of a bona fide member, operating a station in local club territory, may be included in club entries. Claims from federations, radio club councils, or other combinations of radio clubs, will not be accepted, nor can special memberships granted for contest purposes be recognized.

8) *Conditions of Entry:* Each entrant agrees to be bound

EXPLANATION OF VHF SS CONTEST EXCHANGES

Send Like a Standard Msg. Preamble, the NR		Call	CK	Place	Time	Date
Exchanges	Contest numbers 1, 2, 3, etc., a new NR for each station worked	Send your own call	CK (Readability and strength or RST of station worked)	Your ARRL section	Send GMT time of transmitting this NR	Send date of QSO
Sample	NR 1	WA1IQJ	59	CONN	1905	JAN 10

by the provisions of this announcement, the regulations of his licensing authority, and the decisions of the ARRL Award Committee.

9) *Reporting*: Reports must be postmarked no later than February 6, 1970 to be considered for awards.

Log sheets are now available from your ARRL Hq. Unless first-class postage is included with your request, log sheets will be sent by third-class mail. To aid us in getting these forms to you as quickly as possible, please be sure to include with each request a self-addressed and stamped legal-size envelope containing: your full name, call and mailing address complete with Zip code. We suggest a minimum of 12c postage attached. This will assure your receiving 5 log-sheets, enough for 400 contacts. Using this as a guideline you can adjust the postage according to your needs.

QST

Recent Equipment

(Continued from page 49)

mental by as much as the rated 45 dB. Since this figure suggested better performance than we had previously seen with pi network output circuits, we called the manufacturer to determine how he made his measurements. A test by Drake of their spectrum analyzer showed that there was leakage around the pickup probe. New measurements made with the test equipment after the gear was put in order resulted in attenuation figures that agreed with ours — the second harmonic was down about 35 dB. Drake's prompt attention to this matter showed the manufacturer's concern for keeping their manual as accurate as possible.

Intermodulation tests showed that third- and fifth-order products (those undesired signals that cause interference to adjacent channels) were down far in excess of the manufacturer's specification of 33 dB below PEP. Third-order products were found to be about 40 dB below PEP and fifth-order products were down about 46 dB below PEP.

Power measurements showed that for 1000 watts input the amplifier put out about 700 watts on cw, and for 2000 watts PEP input the amplifier put out about 700 watts PEP on ssb (with a two-tone test signal). These power figures were arrived at by following Drake's tune-up procedure as described earlier. In the case of ssb, this procedure results in an exceptionally clean signal. Although well over 1000 watts PEP output can be obtained from the L-4B on ssb by tuning for maximum output at the higher plate voltage, the small decibel increase in output power doesn't seem to justify the possibly-large increase in the level of the distortion products.

At this strong-signal location, the L-4B caused no TVI on the local channels. In a simulated weak-signal test on Channel 6, there was some indication that in fringe areas there could be some interference. Since the only metal-to-metal contact the painted cover of the L-4B makes with the chassis is at six screw holes on the side of the unit, rf does leak out of the cabinet. This makes the use of a low-pass filter relatively ineffective. However, a check with the manufacturer established that Drake has had very few TVI complaints with this amplifier or its predecessor, the L-4. — *W1YDS*

Chart to Win

(Continued from page 61)

"Well, actually, with all the experience I got making these graphs in the sweepstakes, I decided to write a article called "Chart to Win." It'll be ready for publication just in time to help fellas win in the DX contest."

"Lessee . . . you're in the Northern California DX Club ain't ya?"

"Yeah, Charlie. I was thinking I'd read my article over the Club's two-meter CATS net or give copies to all our members so's we'd be sure to beat the Southern California DX Club again this year."

"I got a better idea. If ya really want to win, don't show *nothin'* to *nobody* in Northern California. Instead, why don't you send a free set of your charts to *everybody* in the Southern California Club?"

QST

DX Competition Announcement

(Continued from page 63)

operator phone and to the high-scoring single-operator cw entrants in each country, in Alaska, Hawaii, and in each of the continental U.S. and Canadian ARRL sections (see page 6, QST) from which valid entries are received. In addition, a certificate will be awarded to the high-scoring multiple-operator station in each section or country from which three or more valid multiple-operator entries are received.

b) A suitable certificate will be awarded to the operator making the highest single-operator phone score in each ARRL-affiliated club, provided the club secretary submits a listing of a minimum of three phone entries by members of the club and that these scores are confirmed by receipt at ARRL of the individual contest logs from such members. The highest-single operator cw scorer in each club will be awarded a certificate under the same conditions. Only a bona fide resident member, operating a station (his or another club member's) in local club territory, may compete for club certificates. Secretary's letter must be received by June 12, 1970.

c) A personalized plaque will be awarded to the highest-single-operator DX phone and cw station (non-W/VE) in Africa, Asia, Europe, North America, Oceania and South America.

d) ARRL will award a gavel to the affiliated club submitting the greatest aggregate phone and cw score by its members, whether single- or multiple-operator entries, provided such scores are confirmed by receipt at ARRL of the individual contest logs from such members. Only scores of bona fide resident members, operating a station (his or another club member's) in local club territory, may be included in club totals.

12) *Judges*: All entries will be passed upon the ARRL Awards Committee, whose decisions will be final. The Committee will void or adjust entries as its interpretation of these rules may require.

13) *Disqualifications*: Each participant agrees to observe the contest rules as well as all regulations established for amateur radio in his country. Violation of any regulation as confirmed by a single FCC citation or advisory notice or two ARRL-accredited Official Observer reports, may constitute grounds for disqualifications. Some examples of practices which can result in disqualification: off-frequency (out-of-band) operation, harmonics, spurious emissions, low tone reports in logs, key clicks splatter, excessive sidebands. U.S. stations working banned countries, interfering with channels handling amateur emergency communication.

QST

AMATEUR RADIO PUBLIC SERVICE
NTS RACES AREC
In the Public Interest, Convenience, Necessity NRH

CONDUCTED BY GEORGE HART,* WINJM

How Far Can We Simulate?

January is the month of the Simulated Emergency Test. All set for it? It is a most important exercise, in that it is at once both a public demonstration of our capability and potential and a test by means of which we may point up our own shortcomings and strive to correct them in the future. Detailed announcement will be in next month's *QST* and leadership officials in ARPSC, as well as all RACES radio officers on our mailing list, will receive a bulletin setting forth principles.

For the moment it seems propitious to try to set the mood for the exercise and to talk about some of its evolution, chronology and philosophy down through the years.

First of all, let's make it plain that the SET is strictly an ARRL-sponsored exercise. True, all public service nets and independent facilities are welcomed and are urged to take part. True, the Red Cross, always one of our most important to-be-served agencies, is an integral part of the exercise and always has been — so much so that in the past many have thought it was a Red Cross sponsored exercise. More recently, civil defense has "got into the act." Other government agencies, national, state and local, have from time to time been involved. Nevertheless, the original purpose was to test the ARRL's sponsored facility, first known as the ARRL Emergency Corps (AEC), then as the Amateur Radio Emergency Corps (when the AEC became the Atomic Energy Commission) and today as the Amateur Radio Public Service Corps embracing AREC, NTS (National Traffic System) and, by interpretation, the Radio Ama-

*Communications Manager, ARRL.

teur Civil Emergency Service, the latter strictly government-sponsored. The first SET was held in October, 1947, and was a resounding success. The following year it burgeoned into a nationwide activity "bigger than the Field Day," and has been going strong ever since, with ups and downs the same as any activity.

Unlike the Field Day to which it often has been compared, the SET is not a contest. The object is not to "win" in a competitive sense of the word. If an AREC group "beats" anybody or anything, last year's score is the basis of comparison, and this is the principal purpose of the scoring system — to do better than you did last year and to roll up a higher national total number of points than the previous year.

Throughout the years, the SET has been criticized from both ends. Criticism from both ends is usually a good sign, because it indicates a middle-of-the-road course. On the one end were those who criticized it because there was too much planning, and how can you simulate an emergency if everything is planned ahead of time? On the other end were those who criticized it because there wasn't enough advance notice, and how can you get a decent turnout if you don't let your people know in advance that they'll be needed on a certain weekend, and during what periods of time? Well, counters Extreme No. 1, suppose it were a real emergency, how would you do it then? It's *not* a real emergency, rebuts Extreme No. 2, it's only a test; if it were a real emergency, they'd come out, lose sleep, disrupt or interrupt any previous plans, go "all out" to serve — but you can't expect them to forego a planned weekend without notice in order to take part in a test.

This brings us to the title question — how far can you simulate? If you think a little, the answer is fairly obvious. You can simulate all kinds of physical conditions if you use enough imagination and go to enough trouble. What you can't simulate are the emotions of the participants. Even the most skillful simulation, although it may instill enthusiasm and excitement, cannot evoke fear or compassion or the kind of devotion and dedication that go along



WA7HQE (l.) presents the Inland Empire Radio Amateur of the Year Award to Erwin Schuler, W7BFI, at the Northwest Weather Net Banquet.

with them. This is where simulation falls far short of the real thing. This is the reason why, in a real emergency, amateurs eager to participate will materialize "out of the woodwork" while in a simulation only the "regulars" will show and other amateurs may even deplore the QRM to their routine operating.

In a poll conducted among CD appointees some months ago, the voting was overwhelmingly in favor of conducting an "unannounced SET." The thinking appeared to be that such an exercise would much more closely simulate the real thing than the existing procedure in which the SET was announced as much as six months ahead of time, a bulletin issued six weeks or so beforehand with complete details on which nets would be operating on what frequencies at what time, who would be where to collect traffic for the Red Cross, for civil defense, for ARRL, and so on. What's more, it would be a whale of a lot more fun.

The matter was given a lot of careful consideration. How would it work? Assume, for example, that no mention is made of the matter as the month when the SET is usually held approaches. Suddenly, at 10 A.M. on a Saturday during the month, WIAW takes the air with a special bulletin, precedence "test EMERGENCY," announcing that as of that time a simulated nationwide emergency has occurred, all AREC, NTS and RACES groups and nets are activated, each to conduct simulated emergency tests by under going specified procedures. What would happen?

Well, in the first place, there would probably be a great deal of confusion, the amount depending on how good a basic emergency plan existed in the local group. In the second place, a great many of the participants would not be in a position to respond immediately, some not at all, and the total participation would take a decided drop.

What difference does this make, you might ask, if it more accurately simulates the real thing? But does it? The call to take part in a simulation is not the same as the call for the genuine article. Suppose, for example, a particular amateur is one of the mainstays of a particular AREC organization, but on the weekend in question he happens to be occupied with his daughter's wedding? Would he drop everything and run if the EC called and said they were having a surprise emergency test? Would *you*? Probably not. But if the call were for a real emergency of a dire nature, what then? Chances are good that you *would* forego the wedding and that you would be forgiven for doing so.

Yes, there is a limit to the amount of simulation that can take place, and a completely "unannounced" SET just isn't practical. It would decimate participation and in a negative way be no closer to the real thing than a planned SET.

The fact remains that most emergencies are not predictable. How, then, can we make the



T/Sgt. Orville L. Baney, 27th Communications Squadron, is shown handling one of more than 4000 phone patches he handled through squadron station KG6ALY in eight months from Andersen AFB, Guam. (USAF photo)

SET a more useful emergency-preparedness exercise? Perhaps the answer lies not in the existence of planning, but in the nature of planning and in its extent for this particular exercise. Planning that is applicable to *any* emergency, even though aimed at good results in the SET, is all to the good if it is kept in effect the year-around. Thus, this kind of planning is not lost and can be thought of as general emergency preparedness. As for extent of planning, perhaps this can be restricted to announcement only of the weekend on which the SET will take place (so that all the "regulars" can plan to take part) without any specific assignment of functions by the EC, RO or net manager other than those that are part of the *general* emergency plan for that particular group.

These and other ideas have been discussed among dedicated amateur public service groups during the past few months. One intriguing suggestion is that the simulation could be made much more realistic by assuming that an emergency such as a hurricane has hit a certain part of the country, amateurs in the affected area being plunged into primarily roles while the rest of our public service "plant" rallies in support. The locale of the simulated emergency could be shifted from year to year so amateurs in all parts of the country could get a crack at being the center of attention, or "regional" SETs could be held more often than annually — say quarterly. Is not our public service mission worth this much attention? The big disadvantage: An awful lot of work in preparation of a realistic "scenario" of hypothetical conditions on which to base operations — a script which would have to be kept secret until the release date. Might be fun, tho, eh?

Fellers and gals, the 1970 SET is scheduled for January 24-25. How about letting your EC, your RO or your net manager know, *now*, that you'll be available to take part *then*, and how about *starting* to take part immediately so you'll know what you're doing when the time comes? — WINJM



Harley B. Hicks, WAØMZW, SEC Minnesota, was presented the Department of the Army Outstanding Civilian Service Award by Colonel Charles I. McGinnis, District Engineer, Army Corps of Engineers, St. Paul. The award, second highest that may be awarded to a civilian, was given to WAØMZW for his efforts in coordinating communications during the Minnesota spring flooding (see Sept., 1969, QST, p. 70).

who notified the police. VE2DIT called the hospital and relayed instructions to VE2RR in the car. Police met the car at a toll gate and rushed the child to the hospital in an ambulance where, because of the advance notice given them by amateur radio, doctors were able to save the child's life. — VE2ALE, SEC Quebec.

VE2DM, while on his way to work on September 16, discovered an accident at Pointe Claire, Quebec. Using the VE2RM and VE2MT repeaters, VE2DIT was contacted. Police and medical assistance were summoned to the accident scene. — VE2ALE, SEC Quebec.

Public Service Diary

At 1807Z on August 9, Cincinnati area amateurs began what started as a routine weather watch at the request of the Red Cross. By 2230 there were heavy winds in some of the outlying suburbs. W8OUU took control of the Queen City Emergency Net. At 2302 word was received from the Hamilton County Communications Center that a tornado had destroyed a motel in Reading, Ohio, a large tent in Madeira had blown down and that many people were involved.

Using six-meter f.m. WA8YRE and WA8CKB were sent to Reading where they provided communication for the Red Cross, police and a railroad company. WA8SOT, upon hearing of the tornado strikes, mobilized to the Wyoming Medical Center where he learned the telephone service had been interrupted and relief aid was needed. He radioed a list of area physicians to WA8GRR, who, using the telephone, had several doctors enroute to the center in a few minutes. Using six-meter a.m., WA8s JEN PBW and ZPS established a communications link among the Red Cross Chapter House and the shelters located near the damaged areas.

The amateurs remained on duty until 0430 the following morning, with several QCEN members also manning the Red Cross Communications Center on August 10 and 11. — WA8COA.

VE2PW and VE2RR received a telephone call on September 1, from a friend, whose infant granddaughter was unconscious and having convulsions. The woman was unable to contact the family doctor but the Montreal Children's Hospital advised that the baby should be rushed to the hospital for immediate treatment.

When VE2RR picked up the child and family, she also called VE2BPF, via the VE2MT repeater,

On September 29 two sixteen-year-old hunters were reported missing in the rugged bush of the Spruce River Road area near Fort William, Ontario. Radio communications for a search conducted by the Lakeland Search & Rescue Unit were provided by VE3s AJ AYZ ECR EEW and GOK. The search was called off the following day, however, when the two youths walked out after having spent the night in the woods. — VE3AYZ.

Detroit area AREC members provided communications, on June 17-19 and 24-26, for a Girl Scout day camp. A net control and at least one mobile or portable unit at each of the two camp sites were employed using 2-meter f.m. Since there was no telephone service at either of the park locations, amateurs were on standby in case some emergency arose. Nine different amateurs participated, but fortunately, no emergencies occurred. — W8BEZ, EC Wayne County, Mich.

Six times during June and July, Minneapolis and St. Paul, Minn., amateurs took part in weather watches when severe weather had been forecast by the Weather Bureau. The twenty-eight participants, under the leadership of WØMRL, KØGYO and WAØs DWM LIS MNE MTN OEJ UWL, used the facilities of the Minnesota Six-meter Traffic Net. Luckily, in none of the six watches reported did any severe weather develop. — WAØDWM, VHF EC Minneapolis, Minn.

WA6TJK recruited members of the San Diego 2-meter ARPSC Net to furnish communications for the Masters Track and Field Meet on July 6. Check points were set up every five miles along the 26-mile marathon course with a net control at the start and finish line. Two mobile units were used to keep a tab on the progress of the runners between check points. The race, in which all participants were 40 years of age or older, began at 1345Z. Amateurs remained on duty until the last of the 48 competitors finished at 1930. — WA6KHN, SEC San Diego.

At the Salt Lake City Rocky Mountain Division Convention in July, Director WØBWJ (r.) presented PICON awards to (l. to r.) WA7GTU, WØFA and K7NQX.



The Electron Benders ARC of Tulsa, Okla., helps the local Red Cross chapter in manning its three disaster vehicles. Here, left to right, WA5BXX, K5GPV, K5OOV and WA5IVS administer aid to an unidentified victim. There are seven disaster teams manning the disaster wagons round the clock and at least one amateur is on each team. The trucks are equipped with 2-meter fm gear linked to the Tulsa repeater. The Electron Benders club station, W5OK, is housed in the penthouse of the Red Cross Chapter House where the club also holds its meetings.



A drill, simulating electrical storms, high winds, heavy rains and local flooding, was held July 23 in Allegheny and Westmoreland Counties, Pa. The purpose of the test was to acquaint AREC members with proper emergency procedures.

Mobile stations were assigned areas in which transmission and reception abilities were checked and fixed stations were given a list of questions to answer concerning the simulated emergency conditions. More than forty amateurs took part, several of them as both mobile and fixed stations. K3SMB and W3OFI NCSed on ten meters while K3FGQ and K3CHD maintained liaison to six and two meters respectively. — *K3SMB, EC Allegheny County, Pa.*

The Central Michigan ARC, for the third consecutive year, provided communications for the Spartan Water Ski Tournament on August 9 and 10. The tourney was held on the Grand River at Lansing.

Using ten handi-talkies and one base station on 2 meter f.m. all operating points, located in pick-up boats, at the judging stand, starting docks and ranging points, had reliable communications. Seventeen amateurs, including the Lansing civil defense director, W8KZY, took part in the exercise. — *W8LAY.*

New highs for 1969 were set during the month of August in both SEC reports received, 45, and in amateurs participating in AREC, 16,141. This is two more sections and nearly 600 more AREC members reported than in August, 1968. Amazingly enough, this year's August report is nearly identical to that of August, 1967, so the long term improvement has been just about nil. Sections reporting during August: Ala, Alta, Ariz, Ark, BC, Colo, Conn, EFla, EMass, EPa, Ga, Ind, Iowa, Kans, Ky, LA, Mar, Mo, Mont, Nebr, Nev, NMex, NLI, NNJ, NTex, Ohio, Okla, Ont, Org, Oreg, Que, SDgo, SF, SCV, Sask, SDak, SNJ, STex, Tenn, Utah, Va, WFla, WNY, and WPa.

Now, gang, don't let this one pretty good month go to your heads. Keep those reports coming in!

Traffic Talk

It is gratifying to note the wide use of ARL texts in traffic being handled these days. About one message in four has an ARL text somewhere in it.

What, you don't know what an ARL text is? It's a message text number used in place of a written out text to save time, particularly useful in mass originations such as at exhibit stations or in handling military morale traffic. In fact, MARS also uses the ARL list, sometimes using the indicator MTX instead of ARL.

If someone throws a message at you containing the check ARL 7 (for example), this indicates that

the text contains an ARL text number. The 7 does *not* stand for the text number; it is the actual word count of the message as sent. That is, if the text as sent is ARL THREE X WILL BE HOME SOON, the message check should be ARL 7.

Now supposing you don't know what ARL THREE stands for; that is, you don't have a copy of the ARL list. No matter if you are relaying to another relaying station; just pass the message to the next station as received. If you are delivering, however, it's a different matter. You have to know what ARL THREE stands for. If you have the ARL list, it's easy. If not (write and ask us for a copy of CD Form 3, or look in the back of your ARL log book), then you have to get the station sending you the message to give you the complete text, which in this example would be AM PERFECTLY ALL RIGHT. DON'T WORRY. WILL BE HOME SOON and the check would be 12 (*without* the ARL). Note in transmitting the message that periods and other punctuation, if used, are counted in the check. Periods are sent as X, or as X-ray on voice, as STOP, or sometimes as PD. Commas, question marks (QUERY), other punctuation are *spelled out* for clarity. We usually avoid using punctuation in message texts if we can.

The ARL list changes from time. A few years ago it was gone over carefully and a number of texts eliminated because they were duplicating and the meaning could just as well be expressed by another text number — that is, the same thing was said in different words, an unnecessary duplication. Also, some one or two word texts were eliminated (because it's just as short to use the words as to spell out the ARL number). *Brevity* is the aim, not secrecy. Subsequently, one of the ARL lists contained a "key" in case the ARL number used was not on someone's list.

About the same time, we got together with the MARS chiefs and adopted a set of new ARL numbers to be used in military-morale traffic. MARS used them as MTX texts until our next printing of the ARL list, then used ARL in place of MTX. (Occasionally you will still find someone using MTX, don't let it confuse you, they are the same as ARL.) The current ARL list (CD Form 3) contains all these.

It is important to note that *no ARL numbers have been reassigned to a different meaning.* If an ARL text was eliminated, so was its number — forever! If you receive a message with an ARL text and the text number is listed on your CD-3 sheet, you can



Ohio SCM W8ETU (L) and SEC W8OUU discuss plans for "redistricting" the Ohio AREC plan at the Findlay Hamfest on Sept. 7. The new plan calls for 24 ECs, each to be in charge of three to five counties, while the old plan required an EC in each of Ohio's 88 counties. (Photo by WA8COA/WA9FEW)

be sure that it's the correct text, whether your sheet is an old one or a new one. If it's *not* listed, then ask the transmitting operator to spell it out for you. You may not need to know it, but if someone asks you (such as the guy you send it to!), you *should* know.

Now for a little chronology. Prior to Sept. 1, 1966, there were 62 ARL texts on CD Form 3. On that date, a new list came out containing 56 numbers; 18 of the old texts (and numbers) were eliminated and 12 new numbers and texts adopted. The deletions were made because of duplication or lack of usefulness, and the additions included standard usages for such things as new jobs, retirement, birth congratulations, vacations and acknowledgements. Up until recently, a newer ARL list contained 69 texts, including the military (MTX) additions. The latest list adds a new number (EIGHTY TWO) to take care of "get well" wishes, so now we are up to 70. Frequently we get suggestions for new numbers; if any of these are adopted, it will soon be necessary to eliminate more of the old numbers to make room for all on the sheet. There are still some near-duplicates that can be combined.

Use the ARL numbers, gang! That's what they're for, and the more we use them the more their use will be popularized. And don't forget — *never* use numerals in transmitting an ARL message text number. *Always* spell it out. — WINJM.

National Traffic System. The fourth meeting of the Eastern Area Staff of NTS took place on Sept. 20-21 at a place called Newington, Conn., in the conference room at ARRL Headquarters. Conference were W4UQ (chairman and member-at-large), W1EFW (1RN), W2FR (2RN), K3MVO (3RN), W4SHJ (4RN), W8CHT (8RN), K2KIR (EAN), W3EML (TCC), W2ZVW (at large), W8RYP (at large) and, as observers or guests, all or part-time, WIBJG, WA1HSN, W1YYM, WA9HHH and WINJM. The staff was in official session for approximately ten hours during the weekend. The agenda contained 14 items and the conference started bravely to observe the prescribed agenda, but soon broke down as additional matters came up and some of the agenda items were disposed of. A complete tape of the proceedings was recorded. Here are some of the highlights of a most significant and noteworthy meeting.

1) ECN Manager VE3BZB was not able to attend, sent his regrets and at the same time submitted his resignation. Concurrently, K3MVO (who was present) submitted his resignation as 3RN manager, as did W2ZVW as a member-at-large.

The Staff made recommendations for replacement of the former two, which are now being acted upon, and the latter was replaced (effective as of the end of the meeting) on the spot by WIBJG.

2) The Simulated Emergency Test was discussed in considerable detail, resulting in several recommendations, one of which was for an "unplanned" SET as against the proposition of an "unannounced" SET. While none of the managers was committed to "unplanning," it was the understanding that in 1970 the SET, as far as NTS-Eastern is concerned, would operate pretty much on a catch-as-catch-can basis, with participants nevertheless being notified ahead of time when they would probably be needed.

3) Emergency activation of NTS came in for quite a bit of discussion, resulting in a recommendation that manager "activation" frequencies be set up on 80, 40 and 20 meters to enable NTS net managers to confer on the necessity for emergency activation under given circumstances. This recommendation will be passed along to the other staffs.

4) As always, the value of NTS statistics was an agenda item and several proposals for working out more meaningful statistics for NTS were made.

5) Precedences. One of the members had previously distributed a proposal recommending deletion of the P2 prefix, because of confusion between the "2" and the number of messages when reporting in (e.g., a station might report in with three messages with precedence P2, so he would say "P2 3" and NCS might mistake it for "P23," meaning that the station had 23 messages of P precedence). Much discussion on this detail, and it was finally recommended that the P2 designation be changed to Q to avoid this difficulty while at the same time preserving alphabetical sequence in the precedence designations.

6) The customary session of grumbling about "daylight saving" time took place and nearly everybody agreed that it was the invention of the devil but nothing much could be done about it.

7) RM and PAM appointment qualifications were discussed and it was agreed that SCMs needed more education on making such appointments.

8) NTS certification was discussed and some proposals for a new, higher type of NTS certification based almost entirely on performance (rather than attendance) were kicked around. One version called for such "merit" certificates at each level, another called for a particular kind of certificate with tough requirements.

9) It was noted that NTS has no systematic provisions for foreign traffic routing. Discussion on this point was resolved simply by agreeing to route such traffic via 3RN as long as the individual outlet in that region is available.

10) This brought up the problem of APO/FPO traffic, especially that going to Southeast Asia. Much of this traffic, being routed via various MARS channels, is being dead-ended because of overload, and efforts to systematize its handling have been all but fruitless so far. The emphasis on MARS has been on phone patching. After considerable discussion, the only recommendation made was that

the communications manager continue his efforts to resolve the problem.

11) The communications manager and Chairman W4UQ reported on progress (nil) in NIAC — the National Industry Advisory Committee — the Amateur Radio Subcommittee of which is trying to come up with a national amateur radio emergency plan. At the moment, the status seems to be quo.

12) Incentive in NTS was the next subject on the agenda. One such incentive would be the super-certificate proposals mentioned above. Another recommended is more pushing of the A-1 Operator Club. A third is the publication of a periodic NTS bulletin somewhat similar in format to the CD or ARPSC Bulletin, but edited in the field.

In a separate commentary on the EAS meeting, 8RN Manager W8CHT says "In reality, what we do at the meetings in the way of concerted action is secondary. Resulting actions preceded by thoughtful consideration of the individual members operating within their own spheres is what really counts. The interchange of ideas, discussions of mutual problems and discussions on NTS as a whole causes the sawdust between our ears to get warm. From this we personally gain a better perspective of NTS as a whole and thereby can chart a more effective course of action for building ARPSC. To put it in a nutshell, EAS is primarily a source of ideas and a sounding board for ideas on how we can operate more effectively within NTS." Even if nothing else were to happen, sez Hank, this would make the meetings worthwhile.

September reports: W2FR reports that he has issued 2RN certificates to W2s HYM MTA QC RUF, K2s JBX KIR, WA2CAL and WB2NSV, all for the second consecutive year. Howie also reports traffic at an uninspiring low in September, not quite as stellar as June, but a close second. K3MVO, who sent 3RN certificates to W3KUN and WA3IPU, also reports traffic down. W8CHT says that since FCC has decided not to implement part two of incentive licensing as far as the c.w. bands are concerned, maybe 8RN will move back to 3530. (That should ease some of the congestion between 3636 and 3645; what with three region nets and several section nets in that nine kHz., bet SET would really be fun! — WA9HHH) W9HRY says 9RN had the second worst September in fifteen years. W8LGG has also had second thoughts about TEN's QSY to 3600 now that FCC has made the future known; TEN is remaining on 3545. K2KIR reports a not-too-common occurrence for EAN; K2KTK has taken over the Thursday night NCS slot formerly held by W2ZVW who has gone to New Mexico. CAN certificates have gone to W4SQQ, W4Bs HUS KPE, W9NXG, WA9QKP and WA0s RVR TOD, reports manager WA9RAK.

Net	Seasons	Traffic	Rate	Average	Representation (%)
EAN	30	1420	1.248	47.3	96.1
CAN	30	880	.854	29.3	100.0
PAN	30	1309	1.082	43.6	100.0
1RN	60	542	.349	9.0	92.1
2RN	60	444	.684	7.4	98.0
3RN	60	413	.429	6.9	97.1
4RN	40	250	.298	6.2	58.8
RN5	60	488	.353	8.1	86.9
RN6	60	1032	.659	17.2	100.0
RN7	56	400	.416	7.1	37.5
8RN	60	447	.326	7.5	90.0
9RN	59	387	.369	6.6	90.8
TEN	60	497	.514	3.2	70.2
ECN	53	110	.269	2.1	82.2
TWN	37	172	.196	4.6	41.7
Sections	1915	10081		5.3	
TCC Eastern	119 ²	768			
TCC Central	90 ²	606			
TCC Pacific	119 ²	1098			
Summary	2670	20847	EAN	11.0	—
Record	2866	27764	1,309	15.4	—

¹Section and Local nets reporting (57): OSSB, BN

(Ohio); PVTEN, NJSN (N.J.); BUN (Utah); FCATN, KTN, KYN (Ky.); SON (S.C.); CCN (Colo.); WSN, NTN, WARTS (Wash.); FMTN, VEN, GN, FPTN, QFN, TPTN (Fla.); MDCTN (Md.-D.C.); BEN, WIN, WSSN, WBSN (Wisc.); QMN, WSSB (Mich.); ILN (Ill.); CPN, CN (Conn.); EPA, PTTN, EPAEPTN (Pa.); RISPIN (R.I.); QIN (Ind.); NCN (Cal.); NCNE, NCNL (N.C.); NYS (N.Y.); GSN (Ga.); MSPN, MJN, MSN (Minn.); WMN (Mass.); OLZ (Okla.); VN, VSN (Va.); West Que. VHF, OQN (Ont.-Que.); MTN (Man.); TN (Tenn.); AENB, AEND, AENH, AENR, AENT (Ala.); TEX (Tex.); QKS (Kans.).

TCC functions, not counted as net sessions. Transcontinental Corps. W3EML says W4SQQ has earned a TCC-Eastern certificate. W7DZX says TCC Pacific had an increase in failures because of misunderstandings about skeds.

September reports:

Area	Fund-tions	% Successful	Traffic	Out-of-Net Traffic
Eastern	119	91.7	1970	768
Central	90	95.5	1236	606
Pacific	119	90.8	2196	1068
Summary	328	92.3	5392	2442

The TCC Roster: Eastern Area (W3EML, Dir.) — W1s BJG NJM YKQ, K1ESG, W2s FR GKZ PU QC, K2s KIR RYH, W4s BHN BLV CAL UWA, W3EML, K3MVO, W4s NLC SQQ UQ, K4KNP, W8CHT, K8KMQ, W4s OCG POS. Central Area (W8LXC, Dir.) — W4OGG, K4AT, W5MI, W9s CXY VAY, W4s BWY RAK VZM, W0s HI INH LCX ZHN, K0AEM, W40s IAW MLE RVR. Pacific Area (W7DZX, Dir.) — W6s BGF BNX EOT IPC IPW VNQ VZT, K6DYX, W4s BRG LFA ROF, WB6HVA, W7s GHT KZ, WA7CLF, K0JSP.

Independent Net Reports:


Net	Seasons	Check-ins	Traffic
7290	42	1698	988
North East Traffic	30	379	265
20 Meter ISSB	21	399	4645
QTC	15	91	30
North American SSB	26	535	221
Eastern U.S.	30	91	67
Clearing House	26	352	208
Mike Farad E & T	26	296	179
Hit & Bounce	30	341	330
All Service	4	58	20

QST

Strays

Feedback

In the ARRL DX Competition results write-up in October QST, the captions on page 78 should be reversed; the Southern California DX Club CW Award should go to K6NA; the Central Michigan ARC score should read 3,539,134; the approximate d.c. power input listed for KV4FZ should read AB; and PJ2VD should be listed under South America making him Continental Champion.

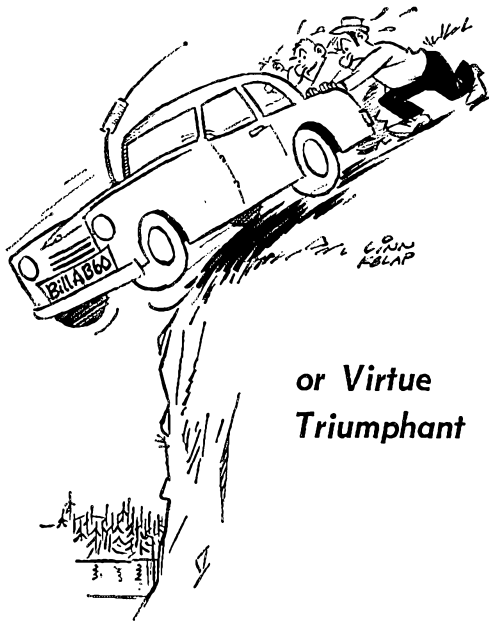


SBDXCC NEWS

- Nr. 1 W4QCW
- Nr. 2 DL7AA
- Nr. 3 W1EVT
- Nr. 4 W8GZ
- Nr. 5 W8BT

The Sacramento License Plate Debacle

BY HUGH CASSIDY,* WA6AUD AND
J. A. DOC GMELIN,** W6ZRJ



or Virtue
Triumphant

In early July the amateur radio operators in California were astounded to learn that there was legislation in the California Legislature which would, when enacted, result in at least a 2000% increase in the cost of call-sign license plates over the normal life of the plates. Assembly Bill AB60 introduced by Assemblyman Wakefield of Huntington Park called for an initial charge of \$20.00 when the plates were issued, \$10.00 each year when the vehicle was reregistered and \$20.00 when the ownership of the vehicle was transferred.

Initially the legislation was introduced by Assemblyman Wakefield on the behalf of a Citizen Band group in his district which call themselves the "Trail Blazers" and was intended to provide call-sign plates for the CBers. The Department of Motor Vehicles put an estimate of \$40,000.00 as the cost to implement the program for the CBers. An amendment was added to the original bill to include the amateur call-sign plate holders to help offset the cost of the program, the amateur in effect being taxed to benefit the CB group.

The inclusion of this amendment was noted by June Moore, WB6CIE, whose employment entails review of all legislation before the California Legislature. WB6CIE immediately passed the information onto Hugh Cassidy, WA6AUD, the SCM of the San Francisco Section.

WA6AUD immediately prepared an issue of the San Francisco Section *COURIER* and mailed it to all appointees within the San Francisco Section as well as to affiliated ARRL Clubs within the Pacific Division and to the SCMs in the Southwestern Division in Southern California. Every attempt was

* 77 Coleman Drive, San Rafael, California 94901

** 10835 Willowbrook Way, Cupertino, California 95014

made to get the information before the amateurs in California over the July 4th week-end. The information on the legislation was passed over various communication channels including club bulletins, the WESCARS, Mission Trail Net, Northern California Net, Southern California Net, Golden Bear Net and others. The startled amateurs in California responded by writing and telegraphing their representatives in Sacramento opposing this legislation.

At this time it was found that the measure had already cleared the California Assembly, passing by a vote of 47 to 16. It had been sent on to the State Senate for action there.

With the alert on, the amateurs in the State Capitol kept close watch and Armond Noble, WB6AUH, learned that the bill was due to come before the Senate Transportation Committee on July 16th. WB6AUH notified John Minke, WA6JDT, SCM of the Sacramento Valley Section who passed the information immediately to WA6AUD.

This information was learned on July 15th the day before the hearing. Consultation with the Pacific Division Director was held by WA6AUD and the Pacific Division Director, Doc Gmelin, W6ZRJ, in turn consulted with John Griggs, W6KW, in the Southwestern Division.

Because of the short notice, it was not possible for either Director to get to Sacramento in time for the Committee Hearing and authority was given to WA6AUD to speak for both ARRL Divisions in opposition to the bill.

On July 16th WA6AUD met with WA6JDT prior to the Committee hearing and they were also joined by Ross Stevens, W6FRE, of the Sacramento RAMS Radio Club and Marcia Rast, K6DLL and Cyril Cochrane, WB6KZN of the North Hills Radio Club.

Prior to the opening of the Committee hearing, Assemblyman Wakefield, there on behalf of his own legislation, discussed the matter with the amateurs. All the amateurs expressed their indignation over the measure and their objection to the inclusion of the charges for the amateur call plates. Assemblyman Wakefield attempted to compromise with the amateurs, suggesting possibly a \$5.00 initial charge and \$5.00 each year thereafter. This was rejected completely and the Assemblyman was advised that only the present charge of \$3.00 for the initial plates, and no other charges, would be acceptable. Assemblyman Wakefield then said that he would strike all references to the amateur call plates from the legislation.

When the measure was before the Senate Transportation Committee, Assemblyman Wakefield

Last month "Happenings" reported that Ohio call letter license plate fees had been raised by the legislature, with little or no discussion among amateurs while the bill was going through. In California, a proposal to raise amateur fees was tacked onto a bill to allow call letter plates to CBers — a clear case of adding injury to insult! Here is an account of how the good guys (wearing white ham-type hats) cut off the bad guys (10-4!) at the pass.

asked that that portion of the bill referring to amateur call plates be eliminated and the Transportation Committee did that. An attempt to have a CB representative address the Transportation Committee was rebuffed and the Transportation Committee moved onto other work.

With this action, any possible threat to the amateur license plates in California appears to have been eliminated for this session. It did seem apparent that the legislators had been strongly affected by the letters and telegrams sent to them in the ten days since the amateurs first learned of this legislation.

Credit must be given to June Moore, WB6CIE, who first blew the whistle on this legislation and to Armond Noble, WB6AUH, who watched for action on it in Sacramento. Also, the Sacramento area amateurs, Ross Stevens, W6FRE, Marcia Rast, K6DLL and Cyril Cochrane, WB6KZN, who voluntarily showed up at the Committee Hearing along with the Sacramento Valley SCM John Minke, WA6JDT and Hugh Cassidy, WA6AUD, SCM of the San Francisco Section who through the San Francisco Section COURIER spread the word throughout California and who was the ARRL spokesman for the hearing. Certainly credit must be given to all the traffic and emergency nets and the radio clubs who reacted to this legislation by writing to their legislators. Less than two weeks elapsed from the time the story was broken in the COURIER until the Senate Transportation Committee took action to eliminate any reference to amateur call-sign plates from the legislation. Certainly the value of concerted action on the part of radio amateurs was clearly demonstrated in this matter.

QST

The Band Divider Beam Antenna

(Continued from page 48)

in each feed line were connected together, and the two shorted lines were fed 180 degrees out of phase from an antenna tuner. This eliminated the critical tuning, and the system worked quite well otherwise. Further experiment along this line is planned for the future.

20 Meters: The SWR was less than 1.6 to 1 without a matching network. The direction switch worked backwards, but otherwise the antenna worked about as well as it did on 40. The front-to-back ratio was estimated to be about 20 dB. Several VKs were worked with ease.

10 and 15 Meters: The SWR on 10 was 3 or 4 to 1, and about 8 to 1 on 15. When a matching network was used and adjusted for 50 ohms, the antenna worked well on both bands, although the radiated pattern appeared to be essentially nondirectional. All continents were worked on both bands with good reports.

In summary, the Band Divider antenna gives outstanding performance on its design frequency, and good performance on the other high-frequency bands. Its front-to-back ratio may be used to cut down the signals from short-wave broadcast stations (and jammers) and thus make more of the 7-MHz band usable. It may also be used to reduce QRM from a strong local. It is, without a doubt, the most effective and versatile antenna that the authors have played with in many years of wire stringing.

QST

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 4 1/4 by 9 1/2 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, WN1¹— 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, Bailey Hill Rd., Malvern, Pennsylvania 19355.

W4, K4— H. L. Parrish, K4HXF, RFD 5, Box 804, Hickory, North Carolina 28601.

WA4, WB4, WN4— J. R. Baker, W4LR, 1402 Orange St., Melbourne Beach, Florida 32951.

W5, K5, WA5, WN5— Hurley O. Saxon, K5QVH, P.O. Box 31367, El Paso, Texas 79931.

W6, K6, WA6, WB6, WN6— No. California DX Club, Box 11, Los Altos, California 94022.

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 60126.

W0, K0, WA0, WN0— Des Moines Radio Amateur Association, P.O. Box 88, Des Moines, Iowa 50301.

KP4— Alicia Rodriguez, KP4CL, P.O. Box 1061, San Juan, P.R. 00902.

KZ5— Gloria M. Spears, KZ5GS, Box 407, Balboa, Canal Zone.

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.

VE1— L. J. Fader, VE1FQ, P.O. Box #63, Halifax, N.S.

VE2— John Ravenscroft, VE2NV, 353 Thorncrest Ave., Montreal 780, Quebec.

VE3— R. H. Buckley, VE3UVV, 20 Almont Road, Downview, Ontario.

VE4— D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg 9, Manitoba.

VE5¹— A. Lloyd Jones, VE5JI, 2328 Grant Rd., Regina, 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.

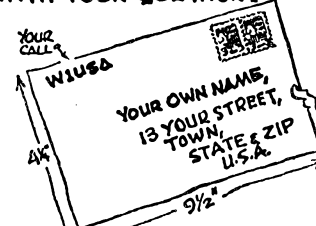
VO1— Ernest Ash, VO1AA, P.O. Box 6, St. John's Newf.

VO2— Goose Bay Amateur Radio Club, P.O. Box 232, Goose Bay, Labrador.

SWL— Leroy Waite, 39 Hannum St., Ballston Spa, New York 12020.

¹ These bureaus prefer 6 x 8 inch or #50 manila envelopes.

IS YOURS ON FILE WITH YOUR QSL MGR?



Happenings of the Month

CANADIANS GET TRIAL RULES FOR REPEATERS

At the request of ARRL Canadian Division Director Noel B. Eaton, VE3CJ; a presentation by the Canadian Amateur Radio Federation; and in line with forum discussions at the Ontario

convention last summer, the Canadian Department of Communications has released provisional rules for the operation of repeaters in the amateur service, with permanent rules to follow in a year or so. The text below is quoted from a letter to Director Eaton:

As a result of a review of policy with regard to the operation of repeaters in the amateur experimental service it has been decided, as an interim measure, to permit the development of such systems on a trial basis with the object of developing a firm policy within one year.

In the circumstances, we are now prepared to give favourable consideration to applications requesting permission to establish and operate repeater stations, including facilities for point-to-point linking of such stations on the following basis:

1. Applications for amateur automatic repeaters will be considered on a case-by-case basis, as in the past.
2. The licensee of the automatic repeater will be responsible for the technical operation of the station, including control over access by any amateur station or by a restricted group.
3. The licensee of the automatic repeater will be responsible for the maintenance of a *technical log* showing malfunctions, servicing, on-the-air tests etc.
4. All emissions from the automatic repeater on 144-148 MHz (or on 50-54 MHz) are to be identified by a keyed transmission of the stations call sign at reduced amplitude, at intervals not exceeding one minute. (This will identify emissions from repeaters as distinct from normal mobile or fixed stations using these bands).
5. Point-to-point circuits between repeaters shall use the frequency bands 220-225 MHz, 420-450 MHz or higher amateur bands. (This will restrict repeaters to the original intent of using the 50-54 MHz and 144-148 MHz bands to extend the local coverage only).

6. Point-to-point circuits between repeaters (above 220 MHz) need not be identified by tone coding. (This will avoid problems of call signs being repeated by other stations in the system).

7. The licensee of the automatic repeater shall provide means to automatically disable *any* transmitter (regardless of frequency) where on-the-air time exceeds three minutes, and re-activation by physical or remote control means shall be by the licensee only. (This will ensure that the licensee retains *technical* control of the station's operation).

The conditions outlined above represent a considerable relaxation of policy previously applied to repeaters. However, the requirement that all emissions from the repeater on 50-54 MHz or 144-148 MHz shall be identified by a keyed tone (para 2. 4 above refers) is an additional requirement. Existing automatic repeaters used to extend local coverage on 50-54 MHz or 144-148 MHz may be identified by this means, or they may continue to use the old method where the amateur station controlling the repeater uses his call sign followed by the call sign of the repeater station. However, if a licensee of a repeater applies for authority to use point-to-point linking, then he will be required to comply with the conditions outlined in paragraph 2 above.

This interim policy has been forwarded to our Regional and Field offices for their guidance, and a letter similar to this is being sent to the Canadian Amateur Radio Federation.

W. J. WILSON,
Director, Telecommunications
Regulation Branch.

NO DUAL HOLDING, NOVICE AND TECHNICIAN

In an order released December 18, 1968, the Federal Communications Commission made examateurs newly eligible for another Novice license, provided the license had been expired for a year or more.

At the same time, the Commission ended effective January 24, 1969 the dual holding of Novice and Technician Class licenses. Now a Novice qualifying for Technician loses his Technician

Class license.

FCC recently has been returning Technician applications by Novices, to be sure they understand this new rule. If you're a Novice going for Technician in full knowledge of the situation, you may be able to save some time in processing by attaching a note which says, "I understand that if my application for Technician is granted, my Novice will be cancelled."

[EDITOR'S NOTE: Thanks to WA1DJC for calling the warning note to ARRL's attention.]



Any way you slice it, 50 years is a loooong time. That's how long John P. Hyde, W4BCS, of Nokesville, Virginia, has been a member of ARRL. Here, Roanoke Director Vic Clark, W4KFC (right) presents the ARRL 50 Year Member pin, one of only 18 issued so far.

ARRL COMMENTS ON SPACE DOCKET

In response to the Fifth Notice of Inquiry in Docket 18294, preparation of the United States for the World Administrative Radio Conference on Space and Radio Astronomy slated for June 1971, the League has commented as follows:

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20554

In the Matter of

An Inquiry relating to preparation for a World Administrative Radio Conference of the International Telecommunication Union on matters pertaining to the radio astronomy and space services

DOCKET NO.
18294

COMMENTS IN RESPONSE TO FIFTH NOTICE OF INQUIRY

The American Radio Relay League, Incorporated, is most appreciative of the consideration given to the Amateur Radio Service in the Fifth Notice of Inquiry (FCC 69-872) and fully supports the recommendation in Part II, Section II, Subsection b, of the Preliminary Views of the United States of America for the World Administrative Radio Conference for Space Telecommunications (Attachment 3 to the Fifth Notice of Inquiry), which is as follows:

b. Amateur Use

Footnote 284A to the Table of Frequency Allocations, which reads: "In the band 144-146 MHz, artificial satellites may be used by the amateur

service," is considered unduly restrictive in that it implies that such satellites may not be employed in other bands allocated to the amateur service. It is proposed to remove that implied limitation by deleting No. 284A and by modifying No. 78 to make it clear that space radio communication techniques may be used in the amateur service within the limitations imposed by the Table of Frequency Allocations (e.g., regional allocations, primary and secondary status).

Respectfully submitted

THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED

By ROBERT M. BOOTH, JR.
Its General Counsel

October 17, 1969

MINUTES OF EXECUTIVE COMMITTEE MEETING

No. 327

September 27, 1969

Pursuant to due notice, the Executive Committee of The American Radio Relay League, Inc., met at the Headquarters office of the League in Newington, Connecticut, at 10:00 A.M. September 27, 1969. Present: President Robert W. Denniston, W0DX, in the chair; First Vice President Wayland M. Groves, W5NW; Directors Victor C. Clark, W4KFC, Charles G. Compton, W0BUO, Harry J. Dannels, W2TUK, and Noel B. Eaton, VE3CJ; and General Manager John Huntoon, W1LVQ. Also present were General Counsel Robert M. Booth, Jr., W3PS, and Assistant General Manager Richard L. Baldwin, W1IKE.

The Committee proceeded to examine nominations in the director elections, with careful attention to the application of the eligibility rules concerning membership and freedom from commercial radio connections. The Committee made findings and ordered actions as detailed below, all by unanimous action.



Passing the torch—er, plaque. Kelly Berkley (right), 1968 Iosco Amateur Radio Club "Ham of the Year" presents the 1969 award to Arthur Clarkston, W8KSL at the Tawas, Michigan, hamfest. (Thanks, K8HKM, for the photo)



An outdoor meeting of the Friendship Amateur Radio Club provided an opportunity for club president Maynard R. Briggs, W3HWZ (right) and Atlantic Vice Director Harry A. McConaghy, W3EPC (center), to present the April Cover Plaque award to Daniel J. Healey, III, W3PG. The winning article was "An Examination of the Gamma Match."

ATLANTIC DIVISION

For Director:

Henry A. Blodgett, W3UTH/FRL; Gilbert L. Crossley, W3YA; George W. Hipplesley, Jr., K2KIR; Harry A. McConaghy, W3EPC; Paul D. Mercado, W3FBF; and John F. Wojtkiewicz, W3GJY; were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

For Vice Director:

Jesse Bieberman, W3KT; Allan R. Breiner, W3ZRQ; Harris J. Nadley, W3MQ; Harold C. Smith, WA2KND; and George S. Van Dyke, Jr., W3HK; were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

CANADIAN DIVISION

For Director:

Noel B. Eaton, VE3CJ, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the By-Laws, to be duly reelected as Director from the Canadian Division for the 1970-1971 term without membership balloting.

For Vice Director:

A. George Spencer, VE2MS, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the By-Laws, to be duly elected as Vice Director from the Canadian Division for the 1970-1971 term without membership balloting.

DAKOTA DIVISION

For Director:

Charles G. Compton, W0BUO, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the By-Laws, to be duly reelected as Director from the

Dakota Division for the 1970-1971 term without membership balloting.

For Vice Director:

John M. Maus, W0MBD, and Larry J. Shima, W0PAN, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

DELTA DIVISION

For Director:

Philip P. Spencer, W5LDH, was found lawfully nominated and eligible; but the Committee was in receipt of a communication from Mr. Spencer withdrawing his name as a candidate. Max Arnold, W4WHN; Myrlas B. Matthews, W5VAE; Harry A. Phillips, K4RCT; and Thomas H. Raymond, W5NJD; were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

For Vice Director:

Philip P. Spencer, W5LDH, was found lawfully nominated and eligible; but the Committee was in receipt of a communication from Mr. Spencer withdrawing his name as a candidate. A petition was found for Max Arnold, W4WHN, but under the provisions of By-Law 17 was declared void since he was already lawfully nominated as a director candidate. Franklin Cassen, W4WBK, and John H. Sanders, WB4ANZ, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

GREAT LAKES DIVISION

For Director:

Alban A. Michel, W8WC/W8SMQ; Leonard M. Nathanson, W8DQL; and Louise Rippe, W8HDB; were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

For Vice Director:

Louis A. Gerbert, W8NOH, was found lawfully nominated but ineligible because of lack of the required membership continuity. Walter S. Gibbemeyer, WA8PRR; James L. Russell, W8BU; Currin L. Skutt, W8FSZ/K8EPT; and Henry F. Zimmerman, K4FU; were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

MIDWEST DIVISION

For Director:

Sumner H. Foster, W0GQ, and C. W. Wade, W0INH, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

For Vice Director:

Ralph V. Anderson, K0NL, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the By-Laws, to be duly reelected as Vice Director from the Midwest Division for the 1970-1971 term without membership balloting.

PACIFIC DIVISION

For Director:

J. A. "Doc" Gmelin, W6ZRJ, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the By-Laws, to be duly reelected as director from the Pacific Division for the 1970-71 term without membership balloting.

For Vice Director:

Hugh Cassidy, WA6AUD, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the By-Laws, to be duly elected as Vice Director from the Pacific Division for the 1970-1971 term without membership balloting.

SOUTHEASTERN DIVISION

For Director:

Albert L. Hamel, K4SJH; Richard M. Jones, W4BTM; H. Dale Strieter, W4DQS; were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

For Vice Director:

Charles J. Bolvin, K4KQ, and Larry E. Price, W4DQD, were found lawfully nominated and eligible and their names ordered listed on ballots to be sent to Full Members of the Division.

The Committee was in recess for luncheon from 12:50 to 2:00 P.M.

On motion of Mr. Clark, unanimously VOTED that Messrs. Harry J. Dannals, Noel B. Eaton and David H. Houghton, with F. E. Handy and Richard L. Baldwin as alternates, are appointed a Committee of Tellers to count the ballots in the current elections.

On motion of Mr. Compton, affiliation was unanimously GRANTED to the following societies: Aloha DX Club, Kaunakakai, Hawaii; Arkansas Valley Amateur Radio Club, Russellville, Ark.; Barrington Amateur Radio Society (H.S.), Barrington, Ill.; Beloit Amateur Radio Club, Inc., Beloit, Wis.; Big Spring Amateur Radio Club, Big Spring, Tex.; The Carteret-Craven Amateur Radio Club, Newport, N. C.; Catholic Memorial High School Amateur Radio Club, West Roxbury, Mass.; Chattanooga Tri-State FM Assn., Ringgold, Ga.;



Thomas A. Benham, W3DD, founder and president of Science for the Blind, 221 Rock Hill Road, Bala Cynwyd, Pa. 19004, has been named, "Handicapped Pennsylvanian of the Year." Pennsylvania Governor Schaefer makes the award. Tom's organization distributes over 2000 tapes per month to the blind, including *Radio Digest*, which includes excerpts from QST.



"The Touchcoder II" by J. A. Bryant, W4UX, was judged best article in the July issue of QST by the ARRL Board, winning for its author the Cover Plaque Award. Presentation was at the Great Lakes Division Convention in Louisville, Kentucky, by Great Lakes Director Alban A. Michel, W8WC.

Cubic Amateur Radio Society, San Diego, Calif.; Dakota Feedbacks Radio Club, Grafton, No. Dak.; East Central Minnesota Radio Club, Braham, Minn.; Florida State University Industrial Arts Amateur Radio Club, Tallahassee, Fla.; Florissant Valley Community College Amateur Radio Club, Ferguson, Mo.; Georgia Southern Area Amateur Radio Club (college), Statesboro, Ga.; Goodyear Amateur Radio Club, Akron, Ohio; Hiawatha Amateur Wireless Keyers Society, Chicago, Ill.; Holland Area Radio Club, Holland, Mich.; James Caldwell High School Amateur Radio Club, West Caldwell, N. J.; Kodak Amateur Radio Club, Rochester, N. Y.; Lafayette College Amateur Radio Club, Easton, Penn.; Mankato State College Amateur Radio Club, Mankato, Minn.; Marlinton High School Amateur Radio Club, Alliance, Ohio; Mt. Vaca Radio Club, Rio Linda, Calif.; Patrick Henry Amateur Radio Club, Martinsville, Va.; Piqua Radio Club, Piqua, Ohio; Red River Radio Amateurs, Fargo, No. Dak.; St. Joseph High School Amateur Radio Club, Cleveland, Ohio; San Fernando Valley DX Club, Van Nuys, Calif.; Smoky Mountain Amateur Radio Club, Blount County, Tenn.; South Platte Amateur Radio Society (SPARS), Parkville, Mo.; South-Eastern Virginia Wireless Association, Norfolk, Va.; Space Center Amateur Radio Society (SCARS), Kennedy Space Center, Fla.; Twin City Hams, Monroe, La.; Waukegan VHF Society and Amateur Radio Club, Gurnee, Ill.; Webster Explorer Radio Post, Webster, N. Y.



Dale Covington, K4GSX, here receives the 1968 ARRL Technical Merit Award from Southeastern Division Director Charles J. Bolvin, K4KQ at the Georgia State Convention. The award recognized Dale's work in analyzing typical amateur antennas, much of which appeared in QST.

On motion of Mr. Dannals, unanimously VOTED to grant approval for the holding of a Hudson Division Convention at Tarrytown, N. Y., October 17-18, 1970; and to approve the already-scheduled Pacific Division Convention in Fresno, Calif., May 15-17, 1970, as a joint convention with the Southwestern Division.

On motion of Mr. Eaton, unanimously VOTED to confer Life Membership upon the following:

William David Adams, W9FNN
 David L. Anshus, WA0HRM
 R. S. Arroyo, W6OYL
 N. Addison Ball, W3UKO
 William L. Bartels, K1IYZ
 Richard M. Bean, K7MOC
 Craig V. Bledsoe, K4TXK
 Donald Rocco Bocast, W6TMT
 Harry H. Bowers, W2EWZ
 William Brazelton, W8IYW
 Ray W. Bryson, W7WEJ
 Siegbert D. O. Busch, K3LNE/DJ0CN
 Phillip Callison, WB6SUJ
 Edmund C. Casey, W8DWJ
 Malcolm Coburn, K1DKB
 Keith D. Collins, K1BTD
 Edward K. Conklin, K1HMU
 James W. Cronn, W2RDD
 T. Henry Dembinski, W5VAM
 Robert E. Desgranges, K8INO
 E. S. Dorsey, W3DHL
 James Doucas, WA1FZA
 David J. Drew, W7DPW
 Bernard Dubbs, WA2FSR
 Jim Ben Edens, Jr., K7QCA
 Clifton H. Falls, W8FAX/K8JIC
 Raphael Finkelstein, W8JIC
 Donald J. Geigner, K9HOQ
 Barry Goldwater, K7UGA
 Robert W. Goodale, K7YFJ
 Charles Grimes, II, WA5LFZ
 Ernest D. Guimares, Jr. WA1BFD
 William Lee Halleck, K1LMS
 Hugo W. Havet, Jr., K7ZLA
 David W. Jensen, W0RMV/W7DJZ
 George W. Jones, W1PLJ

Elza M. Lenn, W7SMB/W6E00
 Robert C. Lockwood, WA0DHU
 Oliver Maurice Lowery, W4MMK
 John Michael Marquess, K5VNV
 Herschel U. Martin, K4SCP
 David L. Mays, K8MYU
 Robert T. Miller, W6NJ
 Raymond K. Milligan, WA9ABI
 Kent A. Mitchell, W3WTO
 Frank C. Mullaney, W0LC
 Samuel C. McCluney, III, K0ECG
 Joseph E. McQueen, W3PCX
 Joseph F. O'Brien, K1LCQ
 Walter D. O'Neal, KL7EDY/WA6JHH
 James W. Parker, K1VII
 C. Norman Peacor, K1IJU
 Kenneth A. Piletic, W9ZMR
 Norman W. Pinney, Jr., W4EMP
 Richard Price, W3DBT
 Thomas H. Renfro, W7MVC
 William A. Riches, WA2DVU
 Donald Riebhoff, K7CBZ
 Vernon R. Robinson, W7GSP
 Richard D. Schisler, Jr., WB2RUM
 William R. Schneider, Jr., K2UYG
 Maurice J. Shumaker, W0HYB/K0VRL
 Richard Subin, K2EVW
 James W. Terry, K0JPG
 Harold P. Thomas, K9KZG
 James M. Tiefenthal, K8DVL
 Richard Jay Tygar, WB2TSB
 Joseph McAlpin Vann, W4JJP
 Gayle B. Wadsworth, K0RNZ
 Robert Paul Walsh, WA8MOA
 Albert J. Ward, W0IZF
 John D. Waser, WA4BTI
 Robert S. White, Jr., W2BBX
 Edward Wilson, K4UCQ
 Thomas E. Wulling, K9APS
 Marc Michael Zaharchuk, WA3CRM

The Committee examined proposals in the Fifth Notice of Inquiry issued by the Federal Communications Commission in preparatory work for the 1971 international conference on space communications, and expressed general approval of the intention to liberalize the ITU rules governing amateur space communications activities.

The Committee engaged in extensive discussion and study of proposals for wider distribution of the League's new film, "Ham's Wide World." On motion of Mr. Dannals unanimously VOTED that, based on the recommendation of the Public Relations Consultant, and with the concurrence of the Chairman of the Public Relations Committee, the General Manager is authorized to procure 50 more prints of the film primarily for television and high-school showings.

The Committee carefully examined the FCC Order of September 24, 1969 (RMs 1357, 1393, 1493) and extensively discussed its impact on the amateur radio service.

On motion of Mr. Groves, unanimously VOTED to respond in the affirmative to IARU Proposals 128 and 129 for the admission into membership of the Magyar Radioamator Szovetseg (Hungary) and the Trinidad and Tobago Amateur Radio Society.

There being no further business, the Committee adjourned, at 6:50 p.m.

Respectfully submitted:
 JOHN HUNTOON, W1LVQ
 Secretary



"Mr. Amateur Radio" himself is our topic for December, a ham whose name is probably recognized by more amateurs than any other ham who is still living — Francis Edward Handy, WIBDI Communications Manager of ARRL for 42 years (now retired), and our Honorary Vice President at present.

Ed was the author of the first *Radio Amateur's Handbook* back in 1926, just over a year after he came to work here. (The Handbook became a joint effort after the first few years, and more than 4,100,000 copies have been sold in 46 editions; still, it remains "Handy's Handy Handbook" in some circles!)

His main job of the working years was, of course, coordination, support and encouragement of all forms of organized amateur radio

operating — contests, civil defense and emergency work, traffic nets, awards, and so on. The clubs, the field organization of Section Communications Managers and their appointees, and the headquarters stations WIAW and W1INF were also in his bailiwick, until retirement at age 65 in January 1967.

FEH was first licensed as 1BDI at Augusta, Maine about 1920. Later, he ran up a record of good communication from 1XAH. He got a degree in electrical engineering from the University of Maine in 1924 and went to work for Westinghouse in Pittsburgh. Hiram Percy Maxim remembered his work as a crack operator, however, and when the League needed a replacement for Fred Schnell as Traffic Manager, Ed was tapped. (Fred, now W4CF, had gone off on a Navy cruise, to demonstrate the value of the short waves.)

Since his retirement, Ed has been more active than ever in all sorts of amateur radio work, 160-2 meters, am, fm, ssb, cw and RTTY. He's just swapped the secretary's job for that of the treasurer for 1969-1970 in the Connecticut Wireless Association. He's a regular check-in on Connecticut Net, 3640 kHz, Wednesday noons, Ed drops in for the weekly meeting at hq. of the Connecticut Amateur Repeater Organization (WA1LVI). And he participates in MARS activities just below 2 meters. His car license plates are our favorites, bearing in place of a number the letters ARRL!



New York — The Flatbush Radio Club will hold an auction on December 29 at 7:00 p.m. at 22 Webster Ave., Brooklyn, N. Y. For information and directions call Morty, K2BDQ at 212-763-3243

New York — The Communications Club of New Rochelle will hold their holiday dinner on December 5 at the New Rochelle Shore Club.

New York — The Westchester Amateur Radio Association dinner is scheduled for December 11, at the Steak Pub, Central Ave., Yonkers, N. Y.

DECEMBER							
1969							
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7	8	9	10	11	12	13	
14	15	16	17	18	19	20	
21	22	23	24	25	26	27	
28	29	30	31				



When President Johnson's term ended, he yielded the office to President Nixon. That's not news, and not related to ham radio, you say? Yessir — we're talking about Carl Johnson, WA8HSZ and Bob Nixon, W8IT, past president and president, respectively, of the Tri-State Amateur Radio Association, Huntington, West Virginia!

In reference to the FCC exam schedule, page 94 October *QST*, the new address of District 4 is Room 819, Federal Building, Baltimore, Maryland 21201.

COMING A.R.R.L. CONVENTIONS

January 17-18 — Southeastern Division, Miami, Florida.

May 15-17 — Pacific Southwestern Division, Fresno, Calif.

NOTE: Sponsors of large ham gatherings should check with League headquarters for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL for up to two years in advance.



Correspondence From Members -

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

OVERWHELMED BY CB

At the West Gulf Division Convention, George Hart spoke quite effectively on the matter of interface among MARS, RACES, AREC, radio amateurs as a whole, and users of the Citizens Radio Service. A prime point was the danger of amateur radio being overwhelmed by CBers by sheer force of numbers, both in the field of public service and in the use of radio frequency allocations now assigned to the Amateur Radio Service. This is a valid concern.

The one action that could head off such a catastrophe seems to be utterly taboo as a topic of conversation in radio amateur circles. This is the quite legal and wholly ethical course taken in many other countries: That of opening the amateur bands of 144 MHz and higher to operation by a class of amateur radio operator whose license examination does not include proficiency in the International Morse Code. This is legal under present treaty commitments.

Such an examination could have its theory portion based upon the present Novice examination, with, however, a more comprehensive examination on regulations and upon operating practices. It could be given by a committee of three persons representing amateur radio (by one holding a General, Advanced, or Extra Class license), a public official (Postmaster, Mayor, or other responsible person), and a Notary Public or other person qualified to administer binding oaths. This procedure would tend to prevent the new class of license from degenerating into a "Lazy Liars License," such as the current grades of "mail order" licenses.

By such means, amateur radio could profit by an influx of persons who otherwise would be operating within the Citizens Radio Service in a pseudo-amateur manner. The present practice of this illegal style of operation has caused the CB to be more accurately defined as the Criminal Band than as the Citizens Band. Who knows, perhaps many of these habitual criminals can be rescued from a life of crime and rehabilitated into decent, law-abiding radio amateurs? Isn't it worth consideration? — *Carl C. Drumeller, W5JJ, Oklahoma City, Oklahoma.*

CLATTER AND CHIRP

As a logger and Novice operator during the 1969 ARRL Field Day I heard many of the field stations on the air. After a while I began to wonder about this activity. I would estimate at least 50 percent of the stations I heard had clicks, clatter, chirp, squeal, splatter, over-modulation, and other undesirable characteristics. I can see how these problems could arise in an emergency setup, but I cannot see why they are left unnoticed. Some of these stations must care little about how their signals sound — they just want a good score! I thought Field Day had something to do with an exercise for an emergency, not just a lot of operating. — *John W. McLean, WN7LHG, Phoenix, Ariz.*

TECHS ON 6

Thanks from many, many stations in Michigan and myself for whatever part you played in preserving 50.1 MHz to 50.250 MHz phone privileges for the Technician. — *Dave Bostedor, K8WKZ, Jackson, Mich.*

Even though I hold an Advanced Class myself, I think that making the six-meter band available to the Technician Class years ago greatly aided the research and practical study of vhf phenomena, and that any restriction on this band can only hinder those who stand to contribute so much to the amateur's knowledge of the higher frequencies. — *Ernest W. Horne, WA1FXU, Everett, Mass.*

Thank you and FCC for the postponement of six-meter privileges. I am glad the band wasn't given to the Extra Class as I am sure the activity would have been next to none. — *Kenneth Birmingham, WB2IFC, Burlington, N. J.*

LANDLINE AWARD

I read in the latest issue of *Radio-Electronics* that the Bell Telephone Labs have a new telephone set for deaf people. Seems that instead of receiving voice, the signal activates a gadget that lets the person see the message in coded flashes of light. Or, they may opt to feel the code vibrations on a special pad. Included is a Morse key for sending . . .

I wonder if someone gets real proficient sending and receiving cw over the phone, can he use a bug? Will the phone company give code proficiency certificates? Will they have code practice daily?

What next? — *Thomas F. Carten, WA1DJC, Gloucester, Mass.*

PRIVILEGES WITH KNOWLEDGE

To all of you who are totally disgusted with ARRL over incentive licensing, I urge you to bear me out. As a Novice, you are entitled to only a very small portion of the amateur bands. This is because the Novice just has the very basics. Along with more knowledge comes more privileges. Finally, at Extra, all amateur privileges are conveyed to you. From basics and few privileges, to real knowledge and all privileges, and intermediate steps in between, with varying degrees of privileges, is not only the right thing to do but the natural way that licensing should be accomplished. — *Fred Roberts, WA1JVM, Sharon, Mass.*

To be a better coin collector, stamp collector or to be better in any other hobby, tests are not given to increase your skills. It is what a person puts into his hobby in time and energy that increases his skill. But you must remember it is a hobby for enjoyment — to get away from the pressures of day to day living. This is why people take up hobbies. Incentive licensing is a bad policy that the FCC has under-

taken. The enjoyment of a hobby comes from the pleasure and relaxation it gives you and once this enjoyment is lost the hobby becomes work. Instead of coming home from an 8-hour job, day after day, year after year, to relax at the rig, this person now has to get out his books to study for a higher class license. I admit that incentive licensing is a good idea but in reality it is destroying ham radio. Don't take something away from what the General Class license has, but add on to the Advanced and Extra Class license. Give them more frequencies by expanding the bands. — *Bill Bartolucci, WA2HVF, Albany, N. Y.*

[Editor's Note: But stamp-collecting doesn't use a publicly-owned resource; amateur radio does. The word "hobby" doesn't appear in any government definition of the amateur service. Additionally, our licenses, like those of all other radio services, must be issued in "the public interest, convenience or necessity."]

PART II

¶ FCC has spoken on Part 2 of Docket 15928. (See page 62, November *QST*.) Now I think it would be in the best interest of all concerned if we accept their decision and end all the bickering we have heard on the bands since this began.

I doubt if any of us are 100% pleased, after all, this is a complicated issue, but I believe the program will work FB. — *Bill Crafts, K4KJD, Athens, Alabama.*

¶ If higher-class licenses and special privileges are not worth it, then let's fight for only one class of license good for life — the Novice Class. Those that argue against the Extra must be for all persons having full privileges with only the Novice Class. Why have such a thing as the General Class? For the same reasons we have the Extra! — *A. M. Fox, W0MAI, Greeley, Colo.*

¶ In the October issue, K4GZT quotes W4GF quoting the Commission, Section 97.1, outlining the Basis and Purpose of the Amateur Radio Service, is said to "completely resolve the incentive licensing issue."

I have carefully re-read the statement attributed to W4GF, and also 97.1, and find nothing in either the statement or in the Section that specifically endorses incentive licensing; all five principles justifying the service have been, are, and can in the future be implemented without it.

Even if a department head, a full-fledged Commissioner or, indeed, the entire Commission, advanced an opinion that incentive licensing was the only way to justify continued allocation of frequencies to amateur radio (which they have not) the subject need not and should not end there. If the amateur fraternity felt otherwise it could and, hopefully, would effectively oppose this view.

Commission personnel have often expressed opinions concerning practices in the overall field of communications. Some of these opinions have been constructive, but not all have culminated in regulations. In some instances ineffective or inequitable rules have been changed. This is as it should be in our form of government. — *Bill MacDonald, K4WM, Homosassa, Florida.*

¶ I believe we need an organization and I would be happy to join one which had the welfare of the amateur at heart, but I do not wish to belong to one which exists for eggheads only. — *Henry T. Crissman, Jr., WA3CHB, Kittanning, Pa.*

¶ All the renewed discussion about incentive licensing finally prompted me to comment on it. If my fellow amateurs would stop complaining and start studying, they would advance themselves and ham radio in general. I was a Technician Class for twelve years. My code speed was at best nil. It took me about six weeks of copying W1AW nightly to get up to 13 wpm. It took incentive licensing to get me out of a twelve-year rut and up to an Advanced Class ticket. More labor and less oratory is the ticket to upgrading your ticket! — *Robert F. Nelson, Jr., K2QPN, Florence, N. J.*

¶ It is amazing to me that an organization like the ARRL, which is supposed to work for the benefit of the amateurs, would press for band restrictions such as those imposed on November 22nd. Come the first of the year, don't bother to inform me of my membership expiration, as I do not intend to continue with ARRL. — *Geo. E. Anscombe, WA1EYY, Quincy, Mass.*

¶ Unfortunately, ARRL is in the same boat as many well-established technical and fraternal organizations as far as declining or static membership is concerned. Our society is changing, and one of the manifestations of the new order is a definite tendency to avoid "joining." Any significant decrease in membership should not be interpreted as due to the ARRL role in incentive licensing *per se*. The few boneheads that have quit ARRL because of the program had little or nothing to contribute anyway. Let 'em go to eleven meters. We don't need them. — *C. Brian Kelly, W3YIK, Aldan, Pa.*

AMATEUR RADIO DYING?

¶ After 50 years a "ham" it is painful to me to see amateur radio dying. It is my belief that *QST* is largely responsible because of their obsession with DX DX DX and high power. The demise of ham radio started when the pages of *QST* became full of linear amplifiers. If anything will save our hobby it is vhf and QRP. Except for a group of brain-washed DXers, DX is dead. If you cannot work anywhere in the world with a kw., beam, and triple conversion receiver, you are no operator. So where is the incentive? You have ridden the DX wave for a long time since ham radio spanned the Atlantic. Now I think it is time to quit beating the DX theme to death. — *Bart M. Burtschaell, W6BCA, San Francisco, Ca.*

QST

NEW BOOKS

Fell's Guide to Operating Shortwave Radio, by Charles J. Vlahos, WN2ICV; published by Frederick Fell, Inc., 386 Park Avenue South, New York, N. Y. 10016. 177 pages, including Glossary, 5½ by 8½ inches, cloth board covers. Price, \$4.95.

Here's an enthusiastic, well-written book telling of the fun and glamor of radio — listening and transmitting — for the rank beginner of any age. Though not really a "how-to" book, it does have good suggestions on learning the code, a few questions somewhat like those you would find on a Novice exam, a section on selecting equipment and antennas, and a once-over-lightly on how radio works. It's a natural follow-up for those who've just seen the ARRL movie, "Ham's Wide World" or visited your ham shack. — *W1UED*

I.A.R.U. News



INTERNATIONAL AMATEUR RADIO UNION, THE GLOBAL FEDERATION OF NATIONAL NON-COMMERCIAL AMATEUR RADIO SOCIETIES FOR THE PROMOTION AND CO-ORDINATION OF TWO-WAY AMATEUR RADIO COMMUNICATION

COOK BI-CENTENARY

Marking the occasion of the 200th anniversary of the discovery of Australia by Captain Cook in the year 1770, the *Wireless Institute of Australia* is issuing a special award, the Cook Bi-Centenary award. 1970 is also the 60th anniversary of the *WIA*, national association of Australian radio amateurs since 1910.

Because of the special significance of 1970 to Australia, the special prefix AX is authorized for use by Australian amateurs (at the option of the operator) in place of VK.

Applicants for the Cook Bi-Centenary award must contact 50 different amateurs using the AX prefix during 1970. Applications, clearly marked "Cook Award," should include a list of stations worked (in order of call signs by call areas), date, GMT time, band, mode, and report. QSLs should not be submitted. Each application should be certified by two other licensed amateurs, and forwarded no later than December 31, 1971 to: Awards Manager, *WIA*, P.O. Box 67, East Melbourne, Victoria, Australia, 3002.

A Cook Bi-Centenary Award is also being offered by the *New Zealand Association of Radio Transmitters*; details appeared in last month's column.

NOTES

The *Amateur Radio Society of India* reports that VU2 amateurs were permitted optional use of the prefix VUØ during the month of October in celebration of the Gandhi Centenary year. We also have news that the prefix for Mauritius has been changed from VQ8 to 3B.

QSL BUREAUS OF THE WORLD

For delivery of your QSLs to foreign amateurs, simply mail cards to the bureau of the proper country as listed below. Cards for territories and possessions not listed separately may be mailed to the bureau in the parent country: *e.g.*, cards for VP8s go to *RSGB* in Great Britain, W, K, VE and VO stations only may send foreign cards for which no bureau is listed to *ARRL*. See "How's DX?" for QSL information on specific stations.

Algeria: ARA QSL Service, P.O. Box 2, Algier R.P.

Angola: LARA, P.O. Box 484, Luanda

Antarctica: KC4AA cards go to the Office of Antarctic Programs, National Science Foundation, Washington D. C. 20550 KC4US cards go to K1NAP, COMCBLANT, USN, CBCEN, Davisville, E. Greenwich, R. I. 02854

Argentina: RCA, Carlos Calvo, 1424, Buenos Aires, BA

Austral/French Antarctic Lands: via Malagasy Republic

Australia: VK1, VK2 QSL Bureau, WIA Box 1734, GPO Sydney, N.S.W. 2001; VK3 QSL Bureau, E. Trebilcock,



This is *Wireless Institute of Australia* president VK3KI (left) with *New Zealand Association of Radio Transmitters* regional vice-president ZL1AHZ at the 43rd NZART annual conference in Gisborne, New Zealand.

340 Gillies Street, Thornbury, Vic. 30710; VK4 QSL Bureau, H. Scholz, 95 Stephens St., Morningside, Brisbane, Qld., 4170; VK5, VK8, QSL Bureau, Mr. Geo. Luxon, VK5RX, 27 Belair Road, West Mitcham, S. Aust. 5062; VK6 QSL Bureau, Mr. J. Rumble, VK6RU, Box F319, GPO Perth, W.A. 6001; VK7 QSL Bureau, Mr. J. Batchelor, VK7JB, 39 Willowdene Avenue, Lower Sandy Bay, TAS.; VK9, VK6, Federal QSL Bureau, 23 Landale Street, Box Hill, 11 Victoria.

Austria: OSVSV, Box 999, Vienna 1/9

Azores: via Portugal

Bahama Islands: BARS, Box 6004, Nassau

Bahrain: (All MP4) Ian Cable, MP4BBW, P.O. Box 425, Awali

Barbados: ARSB, Highgate Signal Station, Flagstaff Road, St. Michael

Belgium: UBA, Postbox 634, Brussels 1

Bermuda: RSB, Box 275, Hamilton

Bolivia: UCB, Casilla 2111, La Paz

Brazil: LABRE, P.O. Box 2353-ZC OO, Rio de Janeiro/GB

Bulgaria: CRCB, Box 830, Sofia

Burundi: via Congo (9Q5) QSL Bureau

Canada: See page 73

Canal Zone: Gloria N. Spears, KZ5GS, Box 407, Balboa

Cape Verde Island: RCCV, CR4AA Praia, Sao Tiago

Ceylon: RSC, P.O. Box 907, Colombo

Chagos: via Mauritius

Chile: RCC, P.O. Box 13630, Santiago

Colombia: LCRA, P.O. Box 584, Bogota

Congo: (TN8) QSL Bureau, P.O. Box 2239, Brazzaville

Congo: (9Q5) UCAR, QSL Bureau, B.P. 3748, Elizabethville

Cook Island: ZK1 QSL Bureau, % Radio Station Rarotonga, Rarotonga

Costa Rica: RCCR, Box 2412, San Jose

Cuba: ANRAC QSL Bureau, P.O. Box 6996, Havana

Cyprus: CARs QSL Bureau, P.O. Box 216, Famagusta

Czechoslovakia: CAV, Box 69, Prague 1

Denmark: EDR QSL-Central, Harry Sorensen, OZ6HS,

Ingstrup-9480-Lokken

Dominican Republic: RCD, P.O. Box 1157, Santo Domingo

Ecuador: GRC, P.O. Box 5757, Guayaquil

El Salvador: CRAES, P.O. Box 517, San Salvador

Ethiopia: KSARC, ET3USA, APO, New York, N. Y. 09845

Faeroe Islands: OY-QSL Bureau, Sofus Rubeksen, OY3B

Udir Savartafossi, DK-3800 Torshavn

Fiji Islands: QSL Bureau, P.O. Box 184, Suva
Finland: SRA-L, Box 10306, Helsinki 10
Formosa: QSL Bureau, CRA, Box 2007, Keelung, Taiwan, Rep. of China
France: REF, Boite Postale 70, 75 Paris 12
French Oceania: RCO, P.O. Box 374, Papeete, Tahiti
Germany: (DL4 & DL5 only) DL4-DL5 QSL Bureau, 97th Signal Battalion, APO New York 09028
Germany: (Other than above) DARC, Box 86-03-20, D8 Munich 86
Ghana: GARS QSL Bureau, P.O. Box 3773, Accra
Gibraltar: RAF Amateur Radio Club, New Camp, RAF
Great Britain: (and British Commonwealth): RSGB QSL Bureau, G2MI, Bromley, Kent
Greece: RAAG, P.O. Box 564, Athens
Greece: (SV0s only): Signal Office, Hqtrs. JUSMAGG, APO, New York, N. Y. 09223
Greenland: via Denmark
Greenland: (U.S. Personnel) OX5A-E via MARS Director, XP1AA, 1983 Comm. Sq., APO New York 09023. OX4F-H via MARS Director, XP1AB, 2004 Comm. Sq. APO New York 09121
Guam: MARC, Box 445, Agana, USPO 96910
Guantanamo Bay: GARC, Box 12, FPO, New York, N. Y. 09593
Guatemala: CRAG, P.O. Box 115, Guatemala City
Haiti: RCH, Box 943, Port-au-Prince
Honduras: Jacobo Zelaya, Jr., HR1JZ, Bo. Buenos Aires, 13 Calle 505, Tegucigalpa, D. C.
Hong Kong: HARTS, P.O. Box 541
Hungary: HSRL, P.O. Box 214, Budapest 5
Iceland: IRA, Box 1058, Reykjavik
India: ARSI, QSL Bureau, P.O. Box 534, New Delhi 1
Iran: ARSI, APO New York, N. Y. 09205
Ireland: IRTS, QSL Bureau, 24 Wicklow St., Dublin 20124
Israel: IARC QSL Bureau, P.O. Box 65, Herzlia
Italy: ARL, Via Scarlatti, 31, 20124 Milan
Ivory Coast: ARAI, B.P. 20036, Abidjan
Jamaica: JARA, Red Cross Bldg., 76 Arnold Rd., Kingston 5
Japan: (JA only): JARL, Box 377, Tokyo Central
Japan: (KA only): FEARL-M, HQ 5AF, Box 1414 APO, San Francisco, Calif. 96525
Johnston Island: KJ6BZ, % MARS Stn., Det. 1, 1957 Comm. Gp., APO, San Francisco, Cal. 96305
Kenya: RSEA QSL Bureau, Box 30077, Nairobi
Korea: KARL, Central Box 162, Seoul
Korea: (HL9) HL QSL Bureau, Signal Section, USFK/EUSA, APO, San Francisco, Calif. 96301
Kuwait: Alhalf Nasir H. Khan, 9K2AN, P.O. Box 736, Kuwait, Persian Gulf
Laos: Houmphanh Saignasith, XW8AL, P.O.B. No. 46, Vientiane
Lebanon: RAL QSL Bureau, P.O. Box 1217, Beirut
Liberia: LRAA, Post Box, 1477, Monrovia
Libya: 5A QSL Service, Box 372, Tripoli
Liechtenstein: via Switzerland
Luxembourg: R. Schott, 35 rue Batty Weber Esch-Alzette
Macao: via Hong Kong
Madeira Island: via Portugal
Malagasy Republic (Madagascar): QSL Bureau, P.O. Box 587, Tananarive
Malawi: 7Q7RM, P.O. Box 472, Blantyre
Malaysia: QSL Manager, MARTS, Box 777, Kuala Lumpur
Malta: R. F. Galea, 9H1E, "Casa Galea," Railway Road, Birkirkara
Mariana Islands: see Guam
Marshall Islands: KX6 QSL Bureau, via KX6BU, Box 444, APO, San Francisco, Calif. 96555
Mauritius: Paul Caboche, VQ8AD, Box 467, Port Louis
Mexico: LMRE, P.O. Box 907, Mexico, D.F.
Midway Island: KM6BI, Box 14, FPO, San Francisco, Calif. 96614
Monaco: ARM QSL Bureau, Pierre Anderhalt, 3A2CN, 41 Bd du Jardin Exotique
Mongolia: JT1KAA, Box 639, Ulan Bator
Morocco: AAEM, P.O. Box 299 Rabat
Mozambique: LREM QSL Bureau, P.O. Box 812, Laurencio Marques
Netherlands: VERON, Postbox 400, Rotterdam
Netherlands Antilles: VERONA, P.O. Box 383, Willemstad, Curacao
New Zealand: NZART, P.O. Box 489, Wellington

Nicaragua: Mike Murciano YN1MO/W4, Box 902, Coral Gables, Florida, 33134, U.S.A.
Nigeria: NARS QSL Bureau P.O. Box 2873, Lagos
Northern Ireland: via Great Britain
Northern Rhodesia: see Zambia
(Continued on next page)

DX OPERATING NOTES

Reciprocal Operating

United States Reciprocal Operating Agreements currently exist *only* with: Argentina, Australia, Austria, Barbados, Belgium, Bolivia, Canada, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Finland, France, Germany, Guatemala, Guyana, Honduras, India, Indonesia, Ireland, Israel, Kuwait, Luxembourg, Monaco, Netherlands, Netherlands Antilles, New Zealand, Nicaragua, Norway, Panama, Paraguay, Peru, Portugal, Sierra Leone, Surinam, Sweden, Switzerland, Trinidad and Tobago, United Kingdom and Venezuela. Several other foreign countries grant FCC licensees amateur radio operating privileges on a courtesy basis; write headquarters for details.

Canada has reciprocity with: Bermuda, France, Germany, Israel, Luxembourg, the Netherlands, Nicaragua, Norway, Senegal, Switzerland, United Kingdom, U. S. and Venezuela.

Third-Party Restrictions

Messages and other communications — and then only if not important enough to justify use of the regular international communications facilities — may be handled by U.S. radio amateurs on behalf of third parties *only* with amateurs in the following countries: Argentina, Barbados (only U. S. stations/8P) Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Greenland (XP calls only), Haiti, Honduras, Israel, Liberia, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela. Permissible prefixes: CE CM CO CP CX EL HC HH HI HK HP HR LU OA PY TI VE VO W or K/8P XE XP YN YS YV ZP 4X and 4Z. Canadian hams may handle these same type third-party messages with amateurs in Bolivia, Chile, Costa Rica, El Salvador, Honduras, Israel, Mexico, Peru, U.S. and Venezuela. Permissible prefixes are: CE CP HR K OA TI W XE YS YV and 4Z.

DX Restrictions

U.S. amateur licensees are warned that international communications are limited by the following notifications of foreign countries made to the ITU under the provisions in Article 41 of the Geneva (1959) conference. Cambodia and Vietnam forbid radio communications between their amateur stations and such of other countries. U.S. amateurs should not work XU XV or 3W8. Canadian amateurs may not communicate with Cambodia, Laos, Thailand, Vietnam and Jordan. Prefixes to be avoided by Canadians are HS JY XU XV XW8 and 3W8.

Norway: NRRL, P.O. Box 898, Oslo Sentrum, Oslo 1
 Nyasaaland: see Malawi
 Okinawa: OARC, APO San Francisco, Calif. 96331
 Pakistan (East): Mohd, AP5CP, TARC, Dacca Signals, Dacca 6
 Pakistan (West): LARS, P.O. Box 65, Lahore
 Panama, Republic of: LPRA, P.O. Box 9A-175, Panama 9-A
 Papua: Via VK9 QSL Bureau
 Paraguay: RCP, P.O. Box 512, Asuncion
 Peru: RCP, Box 538, Lima
 Philippine Islands: PARA QSL Bureau, P.O. Box 4083, Manila
 Poland: PZK QSL Bureau, P.O. Box 320, Warsaw 1
 Portugal: REP, Rua de D. Pedro V., 7-4, Lisbon
 Puerto Rico: Alicia Rodriguez, P.O. Box 73, San Juan 00919
 Rhodesia: RSSL, P.O. Box 2377, Salisbury
 Roumania: CRC, P.O. Box 1395, Bucharest
 Rwanda: via Congo (9Q5) QSL Bureau
 Samoa (American): Utulei High School Amateur Radio Club, % Director, Pago Pago, Tituila, 96920
 Samoa (Western): Director of Post Office and Radio, Post Office, Apia
 Scotland: via Great Britain
 Senegal: Ch. Tenot, 6W8BF, P.O. Box 971, Dakar
 Sierra Leone: RSSL, P.O. Box 907, Freetown
 Singapore: QSL Manager, MARTS, P.O. Box 777
 South Africa: SARL, P.O. Box 3037, Cape Town

Spain: URE, P.O. Box 220, Madrid
 St. Vincent: QSL Bureau, P.O. Box 142, St. Vincent, West Indies
 Surinam: QSL Manager (PZ1AR), SARL, P.O. Box 240, Paramaribo
 Sweden: SSA, Fack, S-122 07 Enskede 7
 Switzerland: USKA, Sonnenrain 188, 6233 Bueron/LU
 Syria: TIR, P.O. Box 35, Damascus
 Tanzania: RSEA, P.O. Box 2387, Dar es Salaam
 Trinidad and Tobago: T&TARS, P.O. Box 1167, Port of Spain
 Uganda: RSEA QSL Bureau, P.O. Box 3433, Kampala
 United States: See page 73
 Uruguay: RCU, P.O. Box 37, Montevideo
 U.S.S.R.: CRC, Box 88, Moscow
 Vatican: HV1CN, Domenico Petti, Radio Station, Vatican City
 Venezuela: RCV, P.O. Box 2285, Caracas
 Virgin Islands: Graciano Belardo, KV4CF, P.O. Box 572, Christiansted, St. Croix, V.I. 00820
 Wake Island: KW6CGA, USCG Loran Station, Box 7, Wake Island 96930
 Wales: via Great Britain
 Yugoslavia: SRJ, P.O. Box 48, Belgrade
 Zambia: RSZ, P.O. Box 332, Kitwe

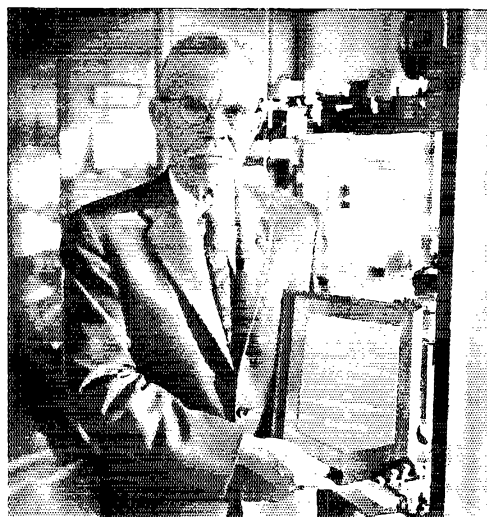
QST

Strays

"The Harry Engwicht Memorial Scholarship Fund" has been established in memory of Harry M. Engwicht, W6HC, professor of electrical engineering (1934-69) at San Jose State College, founder of the Santa Clara County ARA (1921), and Pacific Division Director of the ARRL (1956-1968). Donations to this fund will be held in trust by the Spartan Foundation and invested. The interest from the investment shall be used to supply scholarship funds to be awarded to one or more students each year, or as funds are available, through the Office for Financial Assistance upon the recommendation of the Scholarship Awards Committee of the Electrical Engineering Department at San Jose State College. This memorial scholarship will be awarded annually to an upper division electrical engineering student at San Jose State College by the Scholarship Awards Committee of the Electrical Engineering Department with one additional representative selected by the Santa Clara County ARA. To be eligible for consideration the student must have completed at least one semester of Junior level course work at San Jose State College with an average grade point of 2.8 or better on 4.0 scale and be a citizen of the U.S. In addition to high scholastic achievements, evidence of high moral standards, good citizenship, leadership qualities will be included as factors in the selection of the recipients. For those wishing to make private contributions, checks should be made payable to the Spartan Foundation and indicate that it is for the Harry Engwicht Memorial Scholarship Fund. Checks may be sent directly to San Jose, California 95114.

Amateur radio will be utilized aboard the Coast Guard ice-breaker *Edisto* on her 35th Polar operation which began November 1, 1969. The station will be signing the call WA9SBB until the ship reaches 60 degrees South, when the call sign will become KC4USQ. Most operation will be in the

20-meter band with occasional operating periods on 15 and 10 meters. The job of the *Edisto* is to open the sea lanes and escort shipping into and out of McMurdo, the principal U.S. facility in Antarctica.



Roland Bourne, W1ANA, Curator of the ARRL Museum, was awarded this handsome plaque for outstanding contributions in historical radio at the annual National Historical Conference of the Antique Wireless Association, held last October 3, 4, 5, at the New England Wireless Museum, East Greenwich, Rhode Island. He was named Amateur of the Year in the same citation. W1ANA is shown here standing near one of the bays in the ARRL Museum located at the Headquarters building in Newington Connecticut.



How's DX?

CONDUCTED BY ROD NEWKIRK, W9BRD

How:

Sure, a new decade really doesn't start till '71 but custom causes us to acknowledge now the passing of the sumptuous '60s. What years of DX prosperity! Good enough to see hf DX adventure, so recently the plaything of a fanatical few, beckon strongly anew to hamdom's masses. A browse through *QST*'s of the late 1950s drives home the fact that the '60s brought with them change a-plenty.

Heading the list by far is entrenchment of the single-sideband revolution. Where are those ear-splitting heterodynes of yesteryear? Carrier a-m still holds out in small pockets here and there, especially overseas, but the serious hf mike DXer has long gone ssb. . . . A flood of fine commercial equipment sees homebrew steadily sinking in the west. Factory transceivers with companion brute linears are the thing. Even homemade skywires are getting hard to find. . . . Electronic cw keyers proliferate while Lake Erie bug swings get rarer. Employment of the code mode grows hampered by widespread manufacture of receiving gear slotted essentially for broad voice passbands, transmitters without break-in facility. . . . Antennawise the quad seems to be taking DX command although Yagi fans keep adding elements, stacking bays and going higher with impressive results. Brooklyn Bridges in the sky! . . . A wonderful conversation piece, incentive licensing made a comeback and found the DX gang equal to its challenge. Do DX chasers have more built-in incentive to begin with? . . . Got back more kHz and watts on 160, too, which long-haul buffs already are putting to work in sensational style. . . . Propagation conditions? These evened out as they usually do over any ten-year hitch. The DX mob took the bad with the good in good grace. We entered the '60s on a sunspot downbeat and we head into the '70s apparently just over the crest of a delicious maximum. . . . DXpeditionary activity reached new peaks of frenzy. On-the-air swapping of news and rumors thereof became almost as exciting as working the rovers themselves. Great popularity oft begets controversy, and DXpeditioning drew its share of emotional (and promotional!) pros and cons. . . . Pile-up pressures helped bring about revision of FCC's regulations involving tail-ending but the

change is widely misinterpreted (see p. 113, October *QST*). We have habits to revise! . . . Countries scarcely represented on the ham bands ten years ago have joined the game, notably Indonesia and Turkey. Others, such as Albania, Burma, China and newer African autonomies, remain practically harmless. . . . Inter-country reciprocal-operating agreements brightened the DX picture with unusual calls. Somebody signing 4X4LO/W2 would have been laughed off the air just a few years ago. How did we ever get along without *this* for so long? Obviously a key aid to amateur radio's rendering that international good enumerated so clearly among FCC's basic Public Interest, Convenience or Necessity criteria. . . . TVI's menace was repelled but this bugaboo still cramps hf DX doings in some regions here and abroad. . . . Hf DX-ing's vitality even spilled over into vhf bands where many a 2-meter liaison net is populated by DX clubbers hollering "UM8FM calling CQ on 14,026, gang!". . . . ARRL's Five-Band DXCC and Five-Band WAS came along for the up-front lads to shoot at, just what seem needed to take some of the DX load off 20 and spread it around a bit. . . . Volunteer QSL agents zoomed into greater prominence with the accent on jargon like s.a.s.e., IRCs and GMT. ARRL QSL Bureau personnel and overseas counterparts somehow accomplished increasing tasks with traditional unsung reliability. . . . The DX facet's lively clubs and publications turned in a decade of DXceptional performance. You'll find many of them, some old and several new, regularly listed in these pages as unsolicited contributors of valuable data. . . . As for "How's" itself, we had our customary trouble trying to paint the action-packed DX picture within our normal space allotment. W1CJD's passing cost us dearly but Jeeves comes back for a curtain call now and then. . . .

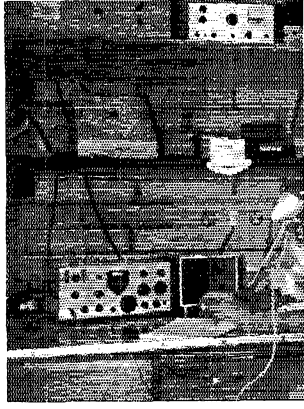
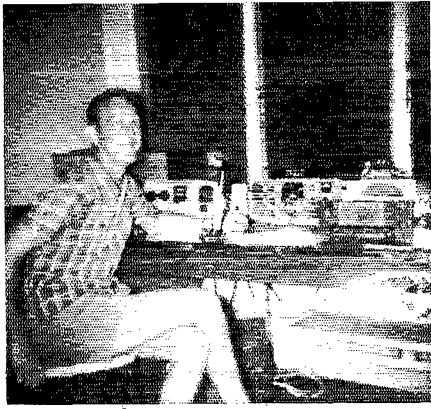
We could go on, but another jampacked mail-sack is at hand. Space, like time, is fleeting. Ah, the ebbing era saw many a pursuit and institu-

* 7862-B West Lawrence Ave., Chicago, Ill. 60656.

TU2BA's lagoon location at Abidjan goes well as your "QTH of the Month". Pierre, a favorite with the Stateside phone crowd, is one of the more active DXers among Ivory Coast Republic's several dozen amateurs. (Photo via W4FRU)

December 1969





VK8s CM, AV and KK, left to right, of Darwin Radio Club help activate the Northern Territory, Australia's rarest call area. VK8KK radiates from Alice Springs. Yes, Alice does have a restaurant. (Photos via W5ONL-VK8AF)

tion get thoroughly bogged down fussing about details, symbols, image projection, etc., while their very essences oozed away. Not so DX, whose essence of thrilling sport remains unscathed. Daddy Time, bring on that next decade!

What:

20 cw, where many call but fewer chosen, capably closes our '60s tours via your "How's" Bandwagon. Our guides are Ws IARR 1FK 1TAT 3HNK 3JZJ/5 3KNG 4YOK 5JPC 6BAB 6EAY 7BE 7EKB 8BQV 8IBX/2 8YGR 9BF 9GX 9LNQ, Ks 1LWI 1UHY 4TWJ 5MHG/6 6GAK 6TWT 8DHT 8PYD 8TRF 9SRR/2, WAs 1FHU 1JKZ 1KEX 2BHI 2FOS 2YWR 3GYT 4KZG 5PPZ 6JVD 9SQY 9ZCP, WBs 2DZZ 4GTI 6VVS 9BUV, VEs 3GHO 3GLG 7BST and good old IER who point out numerous interesting DX items. As usual, "KC8BY (10) 14" means that KC8BY was noted to be active near 14,010 kHz around 1400 Greenwich Mean Time. Let's start off with the beam over the pole toward

- ASIA** — APs 2LQ (48) 16, 5CP (26) 16, 5HQ (37) 22, A BVs 1A 2A (30) 12, EP2s BQ (44) 23, CB 11, HL9s KQ (70) 12, VX (42) 16, UZ (48) 12-13, HM5CL (60) 12, HSe 1 AM (10) 2, 2AAF, dozens of JAs including 4AQF 4DWC 4DWG 4ENG 4FQW 4GWW 4IP 4PZ 4XW 5BXJ 5FQ 5GS 5IT 9AVU 9BQE 9CAF 9CFS 9CWI 9ADY 9ASS 9AWF 9BBB, JI 9YAB (5) 12-13, JHIs AEP AGH AWT BCS DBI LPF JTIs AH (20) 14, KAA (56) 2, KAs 2HP 2LJ (44) 14, 2KS (55) 13, 2NY (25) 11, 7CW 13, KR8 6FT (28) 17, 6KQ (36) 13, 6MH 23, 6MI 6TA (23) 12, 6VX (30) 18, 8AG 8DE 8DK (25) 10-11, 8EA 10, MPAs BHV MBJ (40) 17, TCQ (25) 15, TGR (7) 22, OD5s GA (2) 2, LX (28) 8, TA2s AE (13) 22, E (25) 5, EM (19) 1, SC (19) 1, SK, UAs 9AL 9DO 9DZ 9ES 9FJ 9FV 9GE 9GW 9HG 9HL 9IB 9IL 9JS 9JY 9KAZ 9KDA 9KHB 9KHL 9KIL 9KOC 9KSA 9KUK 9KPW 9KXA 9OK 9OO 9OS 9PP 9RA 9TK 9UF 9VK 9VE 9BL 9BN 9CW 9EF 9EN 9FD 9FF 9GF 9IK 9KAE 9KDH 9KFG 9KJA 9KQU 9KSB 9KRH 9KYH 9KZB 9MO 9MX 9TD 9YE 9YT 9ZX, UDeS AM (38) 2, AR (4) 2, BV (21) 13, FA 1, UFs AM (10) 20, BD (54) 2, CQ (65) 1, CA CR (19) 21, DZ (26) 3, FN (41) 0, HS (25) 2-3, KAE 3, KAF 21, KPA (76) 0, LW (48) 19, UG6s AV (57) 1, EA 3, KAB (30) 14, LR (34) 3, UH8s AE AP (25) 14-15, AS (8) 4, AW (25) 23-0, CI (37) 1, CS (55) 2, DC 22, DK (35) 3-4, DL (6) 2, KAA (30) 12-13, KBC (20) 8, UH8s AG (60) 2, BI (23) 1, CB (72) 8, IK (17) 19, IM (26) 12, IZ (30) 2, KAB (39) 22, LL (59) 3, MA (50) 4, MV (22) 9, OJ (50) 15, UH8s AB (32) 8, AC (40) 15, AH (4) 1, AJ (31) 3, AQ (10) 2, AR (20) 15, AS BE KAA (19) 14, UL7s BB 1, BC (27) 16, BG (68) 7, BX (27) 1, CA (30) 2, FO GP (58) 3, GW (39) 1, HV (57) 1-2, JG (27) 18, JE (74) 4, KAA (36) 2, KAD KA KDW (30) 2-3, KFA (14) 6, KFD (10) 7, KLF (22) 8, LE (12) 1, LJ MC (45) 2, OA (30) 4, OE (28) 2, QF (10) 1-3, QG (20) 3, QQ (42) 11, TD XE (20) 3, YP, UM8s AO (81) 3, AP (26) 2-3, AV (75) 13, FM (20) 15, KAA (17) 13, UVs 9AT 9CU 9DB 9DO 9UT 9VK 9WB 9IB 9JD 9JW 9ED 9EI 9FF, UAs 9AI 9KDH 9OH 9SG 9VC 9V8 9WU 9YS 9AJ 9BJ 9BX 9FQ 9IF 9IH 9IP 9YV 9WV WLE 9LQ 9UF, VSs 6AA 12, 6AI (53) 14, 6AJ 9MB (28) 12, VU2s BEL (77) 13, DX (24) 17, JE JN (30) 1, KM (10) 14, KV (40) 17, LE (26) 0, NY (77) 12, OLK (43) 16-17, RM VZ (21) 0, WGZ (23) 16, ZR (40) 1, ZZ (15) 0, XW8s BP BC CR (40) 15-16, CS (40) 14, CZ (38) 17, EE (70) 7, YAs 1YB (2) 15, 2AR 2HWI (34) 12, ZC4CB (8) 15, 4J0FR (32) 4, 4S7s AB DA (55) 12, EA

- (61) 18-19, EC (45) 12, NG (24) 13, 4X4s CJ (27) 3, FU 4, JN 22, MU (20) 22, QA (70) 0, UF 1, WU (61) 23, YM 0, 4Z4AI (72) 0, 9M2s FK ON RT (15) 1, 9VIs KN (70) 13, PD (40) 11-12 and PM.

- AFRICA** — A2CAU (12) 12, CRs 4AE 6AI (24) 21, 6AL 6AR (40) 22, 6EI (43) 8, 6GO 6IK (20) 18, 6IV (74) 18, 6KB 6LK (57) 6, 6RD (21) 13, 7BC (30) 7, 7BN (40) 15, CT3s AD (24) 15, AS (15) 9, EAs 8AT (9) 7, 8BH (24) 21, 8BK (1) 2, 8EO (62) 8, 8FF 9AI (45) 7, 9AY (17), 9EJ 2-3, 9EL 14, ELs 2BE (36) 22, 2D (12) 0, 2Y (29) 23-2, 8RL (17) 22, ET3USA (13) 0, FB8s XX YY (20) 10-11, ZZ (50) 12-13, FL8HM (30) 14, FR7s ZF (23) 13, ZU (2) 16, ST2SA (60) 20, SUIIM (22) 23-0, TJIQQ (25) 0-23, VQs 8AA 8CF (55) 14, 8CFB (54) 13-14, 8CC 3, 8CD (30) 14, 8CI 13, 8CP 8CR (40) 13, 8CN (42) 3, 8RS (28) 13, 9B (40) 14, ZDs 5M 13, 5R 5X (43) 6-14, 8DB (10) 22, 8J (28) 0, ZEs 1BJ (7) 20, 1CB 6, 1CY (30) 20, 1DL (30) 13, 1DN 1JU 2KL 3JJ (39) 14, 3JO (30) 14, 4JS (31) 12, 5JJ 5, 5JW 8JV (30) 15, 8JW, many ZSs including 3AW (40) 16, 3MS, 3V8NC (26) 1, 5As 3TW (17) 20, 4TY (108) 0, 4H3s KJ LV 4, 5N2s AAJ (40) 4, AAX (80) 21, 5R8BP 13, 5Z4s KL (47) 1, LY (18) 21, MG (51) 15, 6WBXX (37) 8, 7X8AP (52) 17, 9G1HM (22) 8, 9J2s AB 22, CL MG MX (21) 5, VX (50) 18, XZ (40) 14-15, 9L1HC (85) 15, 9Q5s AF 3, YP (48) 0-1 and 9U5DL (82) 0.

- OCEANIA** — C21JW (38) 8, CR8AI (33) 14, DU1s BR 22, OR (62) 18, RTI (59) 15, VM (70) 9-10, FK8s AB (80) 6, BG (99) 9, BN (44) 11, FO8s AA (5) 7, AG (3) 7, AQ BA BJ BQ (5) 5, BV (72) 7, CG (53) 2, CS (41) 12, CW 7, K5MWZ/KH6 (19) 8, KC6s BY (10) 14, CT (37) 13, twenty KH6s including EDY (30) 3-4, KG6s AAY (7) 8, AKR (50) 6, AQI (52) 13, ARO (54) 12-13, KJ6s BZ (53) 9, CD (40) 4, KM6s BI (40) 6-7, CE (32) 13, CS (53) 12, DQ (90) 5, KS6s CG (10) 10, CP (50) 14, DE (80) 4-13, KW6GL (45) 7, KH6s DB 12, GD (35) 22, ninety-eight VKs including 8XA (75) 11, 9BA (93) 11, 9DH (8) 14, 9DK (13) 12, 9MJ (22) 9, 9NM (77) 12, 9RH (32) 10, 9MI (13) 13, VRs 10 (26) 10, 1Q (70) 9, 2BN (53) 8-9, 2CC (60), 2DK (48) 6, 2EK (44) 8, 6TC (46) 23, VS5AP (40) 11, YBs 1BC (57) 17, 9AAB (16) 12-13, 9AAF 9AB, 9Y8JM (40) 7, ZK1AA (79) 5, ZLs 1AFW 1AMO 1ASY 1BA 1BED 1CO 1GD 1LT 1TB 2AFZ 2ANX 2ASM 2AUX 2BCW 2BGY 2GH 2HY 2IL 2KM 2OM 2QM 2VF 2DK 3GQ 3ST 3UW 4BO 4GR 4HZ 4IB 4SZ and 5W1AR, some of those ZLs already signing Cook Bicentenary ZM prefixes, numerals and suffixes remaining the same.

- EUROPE** — CTs 1GD (9) 1, 1IQ (47) 2, 1MO 1TE (17) 1, 20, 1UM (57) 23-0, 1VB 1VX (12) 23, 2AC (10) 23, 2AK (16) 22, 2AO (42) 0, 2BO (40) 0, DMs 2BJJ 2BNL 2DNL 2DMO 3DML 3OML 3XI 4VLG 6MAO, EA 2D 2HW 3GN 3KI 4IR 5IC 5HT 5LS 6AM (18) 8, 6BB (27) 0, 6BH (75) 7, 6BX 7CA 7FI, EIs 5BW (5-10) 1, 5SV 6U 21-22, 8BR (66) 1, 9BV (40) 2, 9J (20) 0, 9Y (24) 23, twenty-seven F's including 2FD/FC (26) 10, 8TT/FC (5) 11, plenty of G-men GCs 2FMV (4) 22, 2LU 10, 3EML (9) 22, 3IEW 12, 3UGK (10) 23, GDs 3AIM 13, 3FBs (8) 23, 3KDB (43) 2, 8UW, GI3s JEX OJL RXJ SXG (65) 22, GMs 3AHJ 3KHG 3LWS 3TRI 3VJ 6NX, GwAs 3DRK 3IEM 3LDH 3NJW 3OKM 3SSK 3UMB 3UWC 3XJC 6YQ, forty-odd HAs including 1KVM 1MV ISQ 2R6 3GF 3KNA 3MJ 4KYB 4YB 6NI 7KPH 7KO 7PB 7PG 9KOV 9OA 9OE 9HR, thirty-eight HBs including 6GJ, HV1CN 1, ISIs AEG (67) 22, ATZ 0, BDO (11) 21, VEA ZEI (63) 4, ITs AGA (39) 21, AUT (39) 21, MNG (37) 22, PST (34) 0, ZGY (52) 23, JWAs 1CI (2) 10, 2QK 2BH (36) 14, 4EJ 5CI (30) 3, 6CI 6QL (75) 20, 7SG (30) 3-4, 7UH (75) 2, 8MI (18) 17, LAs 1OA 3SG 3X 5Q 6U 7LY 8AD, LG5LG (11) 1, LXIs 1A (51) 2, DM (72) 8, FT (27) 23, LZs 1KAA (27) 2, 1KKZ 1KRD 1KPG 1KZB 1KSu 1KWF 1VM (65) 4, 2DC 2EA 2DU 2HK 2KB 2KVB 2RDO 2KHN 2KHV 2KPD 2KSL 2KWR, OEs 2LEL 3GWB

(16) 22, 30LW 3WJW (11) 19, 4AW 4WBW (53) 4, 4WNW 5MEL (25), 5MJL (23) 5, 5PHL 5XLL (42), 6PN 7FW (29) 4, myriad OKs including 5KWA 5SNP 5TOL, lots of OMs including 6AA (38) 8, 6NF (18) 7, 6NI 15, a few dozen OMs including 6OS (13) 16, OXs 6BM (48) 3, 3UD (34) 0, 5AN (61) 21, 5BA 5, 5BG (52) 13, 5BL 3, OYs IR (46) 13, 2H (26) 23, 3B (28) 12, 4R (52) 21, 6FRA (17) 20, 9LV (23) 1, OZs in quantity, PAs (and PD3s) 9EB 0ABM 0AAC 0DN 0DV 0GD 0FY 0FRI 0JAL 0KHM 0KJN 0LOU 0NB 0NV 0RLS 0SLT 0TA 0TCA 0XM, PHL/mm (37) 3, RAEM (49) 6, SKs 5BE (44) 14, 6AB 9, 9WL (26) 5, 0BU (23) 22, SL8AS, seeds of 8Ms including ICQL (27) 21, 2ALT (12) 21, 2AXU (46) 22, 2COL (13) 21, 2EZE (13) 22, 2XA, seventy-six SPs (and 3Zs) in every Polish call area, SVs 1BZ 1CH (50) 19, 0DD 3, 0WN 0, 0WNN (54) 0, 0WOO (11) 19, 0WP, TAls KT 22, SK 1, T (18) 5, TFs 2WLR (80) 1, 2WLS (20) 22, 2WLW (26) 5-17, 3EA (11) 0, U5ARTEK (12) 0, UAs 1AU 1BQ 1CT 1DV 1DZ 1GF 1HZ 1IE 1IL 1KAG 1KAS 1KBA 1KWB 1KED (58) 19 of F.J.L., 1KAE7 (50) 23 of Antarctica, 1KMC 1KUM 1MV 1NA 1SW 1WJ 2AB (35) 16, 2CK (25) 3, 2DO 2EC (59) 14, 2DP 2KAW 22, 2KAP (75) 4, 3BR 3GO 3HD 3HF 3KA 3KQ 3KB 3KYW 3KWB 3MT 3QO 3RR 3UR 4AC 4IU 4KCI 4KHP 4KNT 4KWP 4PA 4QK 4SK 4SM 4UA 4WT 6AL 6FL 6FV 6FY 6GB 6JB 6KA 6KAX 6KOD 6LC 6LU 6MA, U5Bs EC 1F KAB KBE KCN KDS KEF KID KIR KX KKA KKO KST KVF KYC ML MN MV ND QA RR KS TH TZ TZ ZO, UC2s AI (47) 5, CW (44) 2, KAN KBC (26) 1-2, KBK (10) 5, KSB (21) 4, LV (40) 21, OZ (33) 3, TA WG WP (37) 5, XT (38) 21, UnIs AN BC (30) 3, BR (10) 4-5, CQ (37) 7, UO5s AP (51) 3, AR (52) 2, AW (11) 22, FP (27) 18, GQ 5-6, GS (72) 21, KBR (41) 3, PK (41) 3, SM, UPOLs numbers 16 (24) 13, and 17 (5) 11, UP2s AC (18) 3, BC (75) 3, BK (17) 3, BL (61) 4, BZ (53) 2, BP (31) 23, KBI KDA 6, KMU NX (28) 4, PA 6, PE (28) 19, UO2s AH (61) 2, CC 4, KCR KCT (24) 23, KUZ KFN (29) 22, MU (39) 21, PP (55) 5, PR, URs 1R 10 (25) 23, KAD (50) 1, KAH 12, KAY 4, KBO (32) 3, KBQ (21) 4, KCC LH 4-5, LO (35) 21, OK (35) 3, UT5s BP BY HF KOR KDP KKM LN LW LT SY VQ UV3s BC GM EZ FE QS, UWs ICX 1GB 3AF 3AJ 3IE 3KAG 3QZ 3RX 3ZW 3WJ 3ZQ 3ZV 4IK (57) 2, 6CD 6CK 6CY 6LA 6LC 6NA, UY5s AM CW HH HR LX 0B UI UYU XH XT ZM, WABLLX/OX (67), fifty-three YOs, even more YUs, ZBs BG (21), BO (10) 6, 3AOVC (30) 21, 4Us IITU (3) 23, 7ITY (40) 0, 9A1AM (26) 2, 9HIs AZ (68) 14, BB (42) 23 and BL (44) 23, plus a few logfiles of friendly 11 and DJ-DK-DL telegraphers.

SOUTH AMERICA — (Es 1AD 2CR 2DI 46) 4, 2LI 2PI 2PN (24) 23, 3CB 3LB 3ZW (10) 23, 3AD (14) 0, 4IA (4) 23, 3CF (54) 22, 9AF (13) 21, 9AT (40) 23, 6AD (40) 8-9, CPs 1BE 4AB 6FN (40) 3, GXs 1AAQ (83) 1, 1CO 1NE (46) 22, 2AAL (22) 1, 2FD (72) 0, 3BH 4CQ (7) 2, 4RG 8CD 2, 9BT (40) 0, FY7EU (45) 3, HCs 1HV 2GG (1) 3, 14, 2RT (19) 4, HKs 3AVK (80) 23, 3BFO (16) 12, 3HY (26) 3, 3RQ (40) 22, 4ALE 5BQW 6BOC (60) 23, 7BDA (10) 0, 7GM (53) 0, 7XI (17) 0, 7XX 0BBK, KC4s USC 2, USF 4, USM (31) 6, LUs 1AD 1BA 1BB 1CS 1ZF (35) 8, 2ACH 2DNQ 2EAT 2AFO 3ZA (51) 7, 4ECO 4OI 4QD 6AX 6DAZ 6DEKX 6HFD 6HU 7ACA 7AC 7DIY 7HAD 7WH 8DQ 8FBH 9DL 9FAZ, OA4s ACF (35) 3, ALF BR (48) 2, DX (5) 3, ED (5) 23, EK KF (23) 1, MS (30) 5, PF QN, PYs 1BQ 1BTX 1BUC 1YNA 1DBF 1DDY 1MCO 1PK 2ACT 2BKS 2BBO 2CJT 2CYE 2EFT 2HT 2SO 3AIP 3CCI 4AP 4BLR 4MF 5ASN 5V 5QE 5UG 6FI (86) 21, 7AB 7ANQ 7AOD 7AVS 7AHO 7SR 8FM (40) 22, PZs 1AP 0, 1AV (8) 23, 1DD 6AA (37) 21, YVs 1AD 1CW (15) 4, 2LL (11) 22, 4AU 10, 4BE (50) 0, 4ID 4MC 10, 4SO 5AFR 23, 5C1Y (50) 23, 5CKJ (10), 5CKR (72) 0, 5CU (65) 2, 5DEK 5JH 4, 6BE 2Z, 2Ps 2OG (32) 20, 3AL (56) 4, 5AW (76) 23, 5GS (52) 23, 5KA (53) 0, 9Y4s AA (35) 0, DC (39) 15, DS (27) 2 and LE (85) 12.

HEREABOUTS — GMs 2QN (20) 23, 2ZU 6HT (21) 3, H COs 2AV (8) 4-5, 2KG (19) 22, 2KW (6) 17, 2PY (17) 21-22, 6AH (7) 23, 8WT (40) 3-4, FG7s TE (36) 0, 7G WO 4, FP8s AP 22, CB CT (7) 21, CW (24) 17, HIs 3P 7JMP 8LC (35) 2, 8PN (20) 22, 8RV (10) 23-0, HPs BR 3, 1DR (15) 0, 1IE (8) 23, 1XHG 9FC/mm (22) 9, HRs 1KS (25) 21, 4DHS (62) 12, KG4s AI (50) 9, DS (10) 4, 1PT (64) 18-19, KLTs BXP CZ (80) 7, CCK (38) 6, 1D (50) 5, MF 8, KP4s ABD BEN BCL CRT DCH DDG DEJ DHV UW ZM, KV4s AA (80) 23, AM (20) 13, EU (57) 2, EY (30) 22-23, KZ5s BR IS (48) 12, JQ KD 7, RP (20) 23, SF (49) 22, PJs 1AA (40) 4, 2HT (33) 23-0, 2PS (16) 0, 2VD (13) 0, 7VL (30) 4, 7Gs 4SR (9) 23, 9EP, 9I2s AP (15) 23, DO LA (50) 3, VEs 7AZT/KL7 5, 8CR 8MD 8ZZ (8) 19, 0MD, VOs 1AF 1EM (85) 1, 1BD (25) 0, 2AP 0, VPs 2AF 3, 2AZ (27) 2, 2DAP 2GBR (15) 1, 2GLE (25) 3, 2GTL (45) 2, 2LD (52) 19-2, 2LE 2MQ 2VJ

2VP (39) 9, 5AA (30) 15, 5RR (35) 3, 5TH (45) 23, 7AA 7NA (30) 6, 7NF (12) 1, 8KF (67) 1, 8KV 1, 9BY (1) 11-13, 9AT (49), 9ED 9FW 9GD (20) 20, 9GI (1) 13, 9L, XEs 1CE 1DDM 1FFU 1H 1KD 1NE 1NF 1OF 1RM 1ITQ 1WS 2AAG 21 2OK 3BL (32) 18, 3RE (9) 7, YNIs CW (17) 2, HF 5, RTS 5-6, YS2RC (10) 4, ZF1AA (30) 13, 6Ys AO (49) 21, CM (15) 3, ET (40) 23, JB (22) 23, 8P6s AE AU (30) 1, BU (45) 2 and CJ.

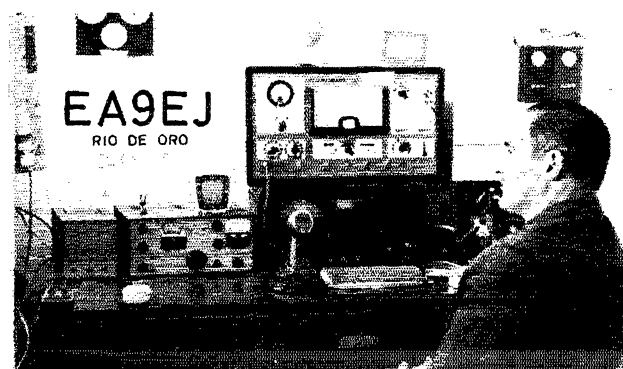
160 meters, where VKs commenced QSOing State-siders in August, has its usual double DX feature to pep up the coming months. Firstly there are the always popular and annual 1.8-MHz Transatlantic and World-Wide DX Tests, a series of activities promulgated by WIBB and friends since 1932. These sessions will be held this 1969-70 season on these mornings — November 30th, December 14th and 28th, January 11th, February 1st and 15th, 0500-0730 GMT. W/Ks are urged to call CQ DX Test for the first five minutes of the hour, listen the next five minutes, call again during the third 5-minute period, etc., until contacts are made. WIBB stresses, "Set your clocks accurately! Eastern U.S.A. stations will generally be found from 1800 to 1825 kHz, westerns from 1975 to 2000 kHz. Most Europeans will use 1825-1830 kHz, VKs like 1800-1860 kHz, and ZLs prefer 1875-1900 kHz, JAs are close to 1910 kHz, and other DX usually cluster between 1800 and 1830 kHz. Remember, these Tests are not meant to be 'contests'." Secondly, the third annual 160-meter Transpacific Tests occur at 1330-1600 GMT on November 29th, December 13th and 27th, January 10th and 31st, and February 14th with similar procedures. Top-band Pacific regulars and fresh Asia/Oceania DX talent will be on hand for the fun. Special JAt-sunset tests are also recommended at 0730-1000 GMT, same dates. WIBB continues to offer his services as clearing-house for 160-meter DX news from all points. Remember that commercials KPH, WNU and WGC, on 2045, 2048 and 2036 kHz respectively, are valuable conditions indicators for 1.8 MHz skip. Note: W/K/VE/VOs new to this band should ascertain what frequency segments and power maxima prevail at their locations. Pages 64-6, November QST, helps provide the picture. Load up those vertikals and long-wires, lads — let the QRM, QRN and QSB fall where it may!

Bandchecks are due soon for other ranges thanks to correspondence from (15 c.w.) Ws 1ARR 1DTY 3HNK 3JZJ/5 4LQC 4YOK 5BZK 7BE 7EKB 8BQV 8YGR 9BF, Ks 5MHG 6 8DHT, WAs 1FHU 1JKZ 2FOS 3GYT 3KSO 9SQY, WBs 2DZZ 2JAE 4KZG 4LAL 9BUV, WNs 2DRS 2PQF 2HPB 2JAM 4JYB 5YMV 5YMW 6JUJ 8DSE 0WOW, 1ER; (15 phone) Ws 1ARR 1VERK 2DY 3HNK 4YOK 6YRA 8YGR 9BF 9LNQ, K4TWJ, WAs 1FHU 2JHQ 1JKZ 2BHI 2FOS 6EQW 9SQY, WBs 2DZZ 4KZG; (40 c.w.) Ws 7BE 8YGR 9EY, Ks 2JWZ 8DHT, WAs 1FHU 1JKZ 2BHI 3GYT, WBs 4LAL 6VVS, VE3-CHO; (40 phone) Ws 3HNK 4YOK 8YGR, WA1JMR, WAs 1WISWX, Ks 6KA 8DHT, WAs FHU FNJ; (75 phone) WAs 1JMR 5IIS; (10 c.w.) Ws 1DTY 3JZJ/5 8YGR, Ks 5MHG 6 8DHT, WA1FHU, WB4s EPJ KZG; (10 phone) Ws 3HNK 8YGR 9LNQ, WAs 1FHU 4ZU 6EQW, WBs 2DZZ 4KZG; (20 phone) Ws 4YOK 8YGR 9LNQ, K4TWJ, WAs 1FHU 4ZU and WB4KZG. You northerners got your skyhooks battened and snugged for the long winter haul?

Where:

HEREABOUTS — Turks & Caicos calls VP5s AA AB BS CC CS GT HT JJ JK JV TH MW and WM were granted for use in '69. W1WQC (VP5AA-VP2VZ-KV4EM) points out that the colony's tickets all require revalidating on the first of each year. Veteran short-wave listener J. Morris of Ohio has a switch on our "DXCC-squared" pastime, a collection of s.w.l. cards from other listeners in more than 100 countries. While on the subject, ZD8RK QSL manager W9VNG wonders what to do about stacks of incoming s.w.l. reports. Well, beyond QSLs for QSOs (or s.w.l. reports from FCC!) we don't think radio amateurs are obligated to respond to unsolicited mail. We are delighted that so many hams do manage to take care of s.w.l. correspondence; what institution doesn't need friends? But keeping up with regular QSLs seems quite enough to expect of an active DXer with a big phone

EA9EJ keeps country hunters grabbin' for both mikes and keys with steady multiband output from Spanish Sahara. Justo's with the military establishment at El Aaiun. (Photo via W9DY)



signal. (As a ham-band listener in the '30s we soon came to realize this. When we switched to logging radiotelegraph weakies our verifications return percentage quadrupled.)
 "I'm no longer QSL manager for WB2NCS/VP9," announces WA5GFS-YN1GLB. "Gary's back home from the Navy. I still handle cards for VP5TH and T18PE, though, and I continue remitting QSLs for my YN1GLB operation on request. So far I've sent out more than six thousand of the latter."
 "Good background for a future DXpeditioner? WN3MQD is an international currency specialist.
 "DX QSLing logistics worry W3TV. Art's 5B-DXCC tally, 80 through 10 meters, is 37/100/100/100/84 countries worked, only 17/45/100/73/54 confirmed. "Of cards received almost all come via QSL managers or the ARRL Bureau. Very few come direct even when IRCs (International Reply Coupons) are supplied. "Ordinary" DX stations seem to have gone into post office eclipse along with the rarer types, and yet so many promise 100-per-cent QSL." Now that the ice-breaking phase of 5B-DXCC's gold rush is over perhaps things will improve somewhat. Softening propagation conditions also may soon help ease bone-crushing disparities in QSL supply-demand. Sunspot maxima always severely aggravate the imbalance.

W2SUC is scheduled to handle Grand Cayman QSLing for the current jaunt of W2s GGE PCJ and WB2-CKS. ZF1 call unknown at this writing.
 "QSLers of the Month" are nominated by "Howl" helpers Ws 1SWX 4YOK, Ks 4JC 8DTH 8TRF, WAs 1JKZ 1JMR 2HIU, WB4JXN and WN8DSF; Fs 5BK 4RS/FC, G30ZT, GC2LU, IS1AEW, K4IA, KP4C, KC6CT, OD5LX, SU1IM, TA2E, TI2DD, VK6SA, VP2AZ, WA6QGW/PX, YN1SV, ZE1CY, Z35FC, 3V8NC and 6Y5GB, plus QSL tenders Ks 4TJSJ 9BNF, WAs 4WIP 5LES and VE3ABG. Why? Unusually prompt pasteboards, that's why. Any quickie candidates out your way?
 "Halp! W9LNQ needs a tracer on 9M6MG. WA3HGV likewise on EP2BQ of '68. WB2JAE wonders about one VE9NEC, and WN5-YMW hunts a QSL elow re ZS3XQ. Any 'alp?
 WAs 1JMR 3JBN 5GFS, WB4MAT and WN2JNV (ex-W8NGH) volunteer services as QSL managers for overbusy boys at the DX end.

AFRICA — "Had to leave Morocco on quick notice," explains K4UNW. "I know there are many who have not received QSLs for my CN8FN QSOs. QSO data and s.a.s.e. (self-addressed stamped envelopes) to me will get the cards."
 "I'm no longer QSL manager for 9Q5SE," records W4RNC. "No logs and no communication with him for months."
 "More sad news from ZS6LW, ZS2MI QSL aide: "I still await logs from the operator who returned from Marion Island last April, so I can at present QSL only QSOs for which I was emcee. A previous operator informs me that prior logs were destroyed by fire, no duplicates available. I have arranged with our Department of Transport for the new ZS2MI, due active on 14-MHz a-m, to transmit logs weekly."
 "K2-BUI, heading for Chile, turns over ZS4JB QSL tending to WB9ALM.
 "W2MZV succeeds W4ECI as QSL agent for W4BPD's DXpeditionary wanderings.
 "W5QPX hears from ZS6ME that South Africans may annually receive two personal parcels duty free.
 "G. Watt's *D X News-Sheet* understands that Mauritius has inherited the 3B prefix block from Canada.

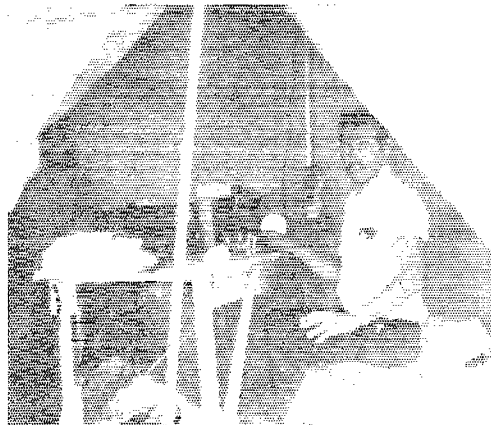
OCEANIA — "My QSL manager as of mid-August for all contacts outside North America is DL7FT," notifies KH6GGW. "I'm former BV1US and KR6UD." Pat signs W8QBW when home on leave.
 "D X News-Sheet says ZL2AFZ will take care of ZL3HV's Macquarie island QSLing when the latter puts his new VK0 call to work shortly. Or will it be an AX label? VKs, you know, can sign the AX prefix, and ZLs may employ their ZM tag in months ahead, suffixes unchanged.
 "QSLs for KH6NR/Kure should go to the home address, according to ARRL SCM KH6BZF, together with s.a.s.e., or s.a.e. plus pairs of IRCs. And Greenwich Mean Time or else!

W4VPD/KC4 did his part to put Navassa Island back on the air this summer. A tedious voyage from Jamaica, budding hurricane, landing difficulties, shorted coax, generator troubles and the illness of his son, second operator, didn't keep Enos from scoring some 1200 QSOs.

EUROPE — "My QSL managers for JW1CI starts U with his first QSO from Bear Island," writes LA9BL. "Due to late logs we're running a little behind. IRCs are necessary for direct reply."
 "WB9ALM relieves K2BUI as CT1LN's QSL tender.
 "Oh, gce — another prefix twitch. Finland's DXers sign OG once in a while, suffix as is.
 "GC5AET (DJ1QP) says he can do without s.a.e. but IRCs are musts. This year's GC5AET operation was from Guernsey. "Those still missing QSLs for 1968 Jersey isle GC5AET QSOs should try again to my DJ1QP address."
 "In case you've wondered, W2ECY tells W5QPX that East Germany, as a rule, doesn't accept book imports.
 "The new Athens 8Y0WO (W4CQI) does his own QSLing, notes W9DY. SV0VO contacts before mid-September may be confirmable through W2CTN.
 "8TRF finds that LZ2KBI operator Alex Bogdanov welcomes QSLs and correspondence via Box 5, Vidin, Bulgaria.
 "EL9B declares, "All of my W/K PA9IH contacts have been QSLd via the ARRL Bureau. Holland was fun!"
 "QSLs for HB6XY from North and South America should go via WA9HYS, others via DL8RH," directs DL4ER. "As for cards from the U.S.A. and Canada, we'll wait about four months for s.a.s.e. before we send out remaining QSLs via bureau. If s.a.s.e. arrives after we have cleared, another will not be sent unless after a period of time the card seems to have gone astray." QSLs for DL4ER QSOs, by the way, should go to WA9HYS or via the DL4/DL5 bureau.
 "PA9B? PA9s in disguise, suffixes unchanged. PA9BO tells ARRL Communications Manager WINJM that too many Statesiders still foist non-GMT QSL data on the overseas gang. "EDST" means nothing to a European, and it may mean no QSL for you.

ASIA — Visiting firemen keep CR9AK's coax warm and QSLing complicated. JA1AG helps confirm JA3AER's August output from Macao, VS6DR is shipping his own CR9AK cards via bureaus, and operator Fern's input should go via CT1BH.
 "India joined the prefix-jugglers with VU0 output in October. VU0KT, for example, was really VU2KT. Long Island DX Association's *Bulletin* has it that VU0s are reachable via Box 6588, Bombay.
 "I'm QSL manager for KR6JT as of October 1, 1969," affirms W3HNK.
 "Let's check the in-box for QTH specifics now, keeping in mind that each is necessarily neither accurate, complete nor "official" . . .

A2CAF, R. Short, P.O. Box 20, Gaberones, Botswana
 AP2AR, A. Rehman, B-111, Cooperstown, Lexington, Ky., 40508
 DL4PX, Co. A, 32nd Sig. NB, APO, New York, N.Y. 09757
 DM2BGW, C. Hanoldt, Meitzendorferstr. 35, Barleben, D.D.R.
 DU1BN, P.O. Box 370, Manila, P.I.
 DU1ZAE, VOA, APO, San Francisco, Calif., 96274
 EA6BP, Box 34, Palma de Mallorca, Balearic Is.
 FR7ZP, M. Turpin, P.O. Box 4, St. Clotilde, Reunion Is.
 HB6XYF (see text)
 HC2CG/1, R. Radloff, Box 244A, Quito, Ecuador (or to DL2CG)
 HS1DE, Box 275, Bangkok, Thailand
 IT6ETN, P.O. Box 366, Catania, Sicily, Italy
 JA7DBG/W2, M. Maruya, 149-01 Barclay av., Flushing, N.Y., 11355
 JW6ZK 7UH (via NRRL)
 KC6CS, M. Bennett, Peace Corps, Truk, E. Carolines, 96942
 KH6NR/Kure (to KH6NR)
 KR6JT (via W3HNK; see text)
 LU6ADU, M. Montenegro, Bugue Balizador, Ushuaia, Base Naval, Puerto Belgrano, Argentina
 MP4TDE, RAF, Sharjah, BFPO 84, GPO, London, England
 OD5DL, P.O. Box 1348, Beirut, Lebanon
 PJ2PS, Essowey 17, Curacao, N.A.



PY7AZS, Box 1043, Recife, Brazil
SV8WO, C. Pittelkau (W4CQI), c/o U.S. Embassy, APO, New York, N.Y., 09223
SV8WOO, U.S. Embassy, APO, New York, N.Y., 09223
TA1SY, S. Yetkin, P.O. Box 23, Bakirkoy, Istanbul, Turkey
TR8MG, P.O. Box 3135, Libreville, Gabon
VP1DW, Airport Camp, Belize, Br. Honduras
VP1JP, J. Pinkerton, Box 415, Belize, Br. Honduras
VP2GBC, B. Crane, P.O., Eldon, Mo., 65026
VP2VI, Box 75, Tortola, Br. V.I.
VQ8s GFB RS (via VQ8AD)
VR4EL, S. Cotton, P.O. Box c-22, Honiara, Solomon Is.
WA7KPH/mm, C. Witt, USS *Chukawan*, FPO, New York, N.Y., 09501
YB6IAB, via MARTS, P.O. Box 777, Singapore
YN2JS, J. Saenz, Box 75, Granada City, Nicaragua
YV6JJ, P.O. Box 73, Puerto Ordaz, Venezuela
ZD3K, P.O. Box 504, Bathurst, Gambia
ZS1UD, U. Dehning, 35 Bellevue st., Kloof Nek, Cape Town, S. Afr.
ZS2MI (via ZS6LW; see text)
ex-ZS8L-ZS9D-TP8AR (to ZS1UD)
3V8AL, F. Powell, AID, U.S. Embassy, Tunis, Tunisia
4X4CZ, J. Davis (K3KCS), c/o Motorola Israel, 16 Kremenetzky st., Tel-Aviv, Israel
6O1KM, K. McCainy, Box 948, Mogadiscio, Somalia
6W8GE, Box 4035, Dakar, Senegal
9J2XZ, via D. McCarthy, WA9PRE/2, 5 Pennypacker dr., Willingboro, N.J., 08046

C31BY (to G3OKQ)
C31CJ (to F1XXM)
C31CN (to F8VQ)
ex-CN8FN (see text)
CT1LN (via WB9ALM)
DL4ER (to WA9HYS)
ex-EP2CB (to WA6GZZ)
F2VT/FK8 (via REF)
F8QJ/FC (to J1K1SN)
F08CB (via F9LE)
GB2ZET (to GM3WHT)
GC3LDH (to GW3LDR)
GC5AET (see text)
HB9AMG (via W3BWZ)
HL9UZ (to WA2FRW)

HL9VQ (via WB6KBB)
JW1GI (via LA9BL)
K7DCC/VK0 (via K2BPP)
KH6QW (see text)
LX2CQ (to DK1YK)
LZ2KB1 (see text)
MD (via I1MKN)
MP4TCN (to G3UUN)
OG1VR (see text)
ON8GT (to DK1YK)
PA9IH (to EL9B)

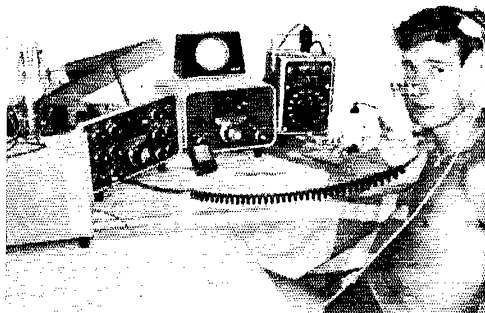
QTH donors this trip: Ws 1F8Y ISWX 4FZI 4RNC 4YOK 5QPX 9DY 9EY 9LNQ, Ks 2BUI 3KCS 4TWJ 6KA 8DHT, WAs 1FHU 1JKZ 2FOS 2HIU 3JBN 4CZM 5GFS 7KPH, W4s EPJ JXN, DJ1QP, G3XHX, XE1J, Columbus Amateur Radio Association *CARAScope* (W8ZCQ), DARC's *D X-MB* (DL3RK), *D X News-Sheet* (G. Watts, 62 Bellmore rd., Norwich, Nor.72 T., England), Far East Auxiliary Radio League (M) *News* (KA2LL), Florida DX Club *D X Report* (W4BRB), International Short Wave League *Monitor* (A. Miller, 62 Wardway Ln., Selly Oak, Birmingham 20, England), Long Island DX Association *D X Bulletin* (W2GKZ), Newark News Radio Club *Bulletin* (J. Heien, 3822 Marshall ct., Bellwood, Ill., 60104), North Eastern DX Association *D X Bulletin* (K1IMP), Northern California DX Club *D Xer* (Box 608, Menlo Park, Calif., 94025), Southern California DX Club *Bulletin* (WA6GLD), UBA's *On the Air* (ONs 4AD 5VA), Utah DX Association *Bulletin* (K7DEQ), VERON's *D Xpress* (PA0s FX LOU TO VDV WWP) and West Coast DX *Bulletin* (WA6AUD). Any items of possible help to the gang in your ledger lately? K!

Whence:

OCEANIA — K7DCC/VK0, 14,260 or 14,325 kHz at 0500 GMT, aims an S-line kW with 3-element rotary our way from antarctic Mawson station. Dave and K2BPP triangulate satellites down there. KX6DC on Roi Namur, operated by K3NCB, WA3s LTY NFS and WB2XP, schedules W8PEY/1 on 14,325 kHz at 1100 GMT, and 28,610 kHz at 2200 almost daily. Should be plenty of action on 14,260-14,270 kHz at 0400-1000 GMT, January 3rd, when the Pacific DX Net throws an open-house QSO party with awards for potent participation. Fast s.a.s.e. to chairman KH6GLU should secure sufficient details for you to enjoy the fun. W3HNK finds Papua's VK9BS readily available 0900-0945 GMT, Fridays, on 14,285 kHz. VK6SP/m puts solid 20-meter voice signals into W4YOK with his 300-watt mobile. "I'm active on 10 through 80," writes KH-6

GQW (W0QBW), "especially in contests. My 28-MHz cw operation seems to draw the most enthusiastic response from the mainland gang." Pat has 225 countries accumulated from Hawaii this year.

ASIA — "VU2BEO (K4BEO) expects to be on 40 and 80 A this winter," warns W3BWZ. "He's ex-W7CD-HB9-AMG and will be in New Delhi for at least two years with a TR-4, 2B and TA-33. Doyle's first VU2 QSOs were on 20 c.w., good signals here at 0000-0230 GMT. WA4SPE's recent global tour produced handshakes with JA6BYY, JH1QYU, VU2s BX OLK, YAs 1YB 2HWI 5RG and 9N1MM. Confirmed QSOs with five KRAs may put you in line for the Okinawa Award issued by Okinawa Amateur Radio Club, APO, San Francisco, Calif., 96331. "Being EP2CB was a great experience for a newly licensed ham," comments WA6GZZ, leaving Iran for California. "Hope I'll enjoy operating from the home station as much." Bet Chuck will notice some difference. "Great DX fun during my five years as KR6UD," recounts KH6GQW (W0QBW). "Made a multitude of friends while collecting 270 countries." Purely by chance K2QBW worked UA0YT at 0119 GMT, October 12, 1969, after working Vlad one year earlier to the minute, on 14,006 and 14,009 kHz. JA7DBG/W2 urges consultation with JA7UU concerning a Sendai-city certification available to those who can prove contact with the necessary JA7s since 1952.



3V8AA, the DXpeditionary work of F2QQ and friends, gave an August encore with this spread. Thanks to the efforts of Dick and other travelers, Tunisia's rarity steadily declines. (Photo via W1CWV)

HEREABOUTS — "I'm on the air almost daily with 180-through-10-meter capability," remarks KG4AL. "My normal operating times cause me to concentrate on the three lower bands, 8sb and cw. Recent correspondence indicates a widespread desire for 3.5-MHz contacts so I plan to spend additional time on 80 and 75. Watch for KG4AL on week ends, 3700-3850 kHz at 0400-0500 GMT. 6Y5JR closes down for return to G3XHX about now. Navy's USS *Chukawan*, signing WA7KPH/mm, has a fair batch of hams aboard: K7ROP, WAs 1KAU 5VTF 7KPH 0ZNC, W4s 4KQB 6JBN 8EYW 9BOP and 9CEZ. The lads thank Ws 2NA 2ZO 3ADO, WA4IQS and other landlubbers for valuable traffic assistance around 14,313 kHz. Veteran "How's" helper W7BE reports his son-in-law on the air as WN7NKS in Idaho, another ham family a-growing. QSOs with two FG7s, two FP8s, two FY7s and one FS7 or FM7 since January 1, 1966, may qualify you for Diploma of the French Americas. Check with certifier VE2AFC for complete details. Attic dipoles are good enough for WAC, 42 countries and 49 states at WB21WH. Doc's TR-4 helps. "You don't need power on 10 cw but a beam and good receiver are musts for consistent long DX," advises WB4EPJ. WN5YMW finds his location just perfect for massive bombardment by the east and west coasts when 15 opens for DX. W8NGH of 1935-'38 makes a DX comeback as WN2JNV. Any other DX-oriented "retreads" out there in Novieland? K4JC nailed GY5GB on five bands in thirty minutes, 10 through 80. "First time I've encountered solid signals from the same DX station on five different bands in so short a period." "I have the only Ecuador station GRV on five cw bands," declares HC2CG/1, also available on sideband. "After a few months in CE6-Iland I'll become permanent resident priest on Easter island," discloses K2BUL. Always room for another CE0, Fr. David!

The World Above 50 Mc.

1215-1300 2300-2450 3300-3500 5650-5925 10,000-10,500 21,000-22,000 35,000-40,000

CONDUCTED BY BILL SMITH,* KØCER

ON THE ULTRA HIGHS

CONDUCTED BY E. F. TILTON,* W1HDF

WITH so many interesting things waiting to be done, vhf men are not overly concerned with looking backward, ordinarily. Our emphasis is more on what's ahead, for tomorrow, or next year. But with this section of *QST* marking its 30th anniversary in December, perhaps its originator may be permitted a quick look back, this once.

As *QST* for December, 1939, was being prepared, the great war in Europe was just getting underway. With available DX to be worked on lower frequencies dwindling, there was rising interest in "the ultrahighs," as all frequencies above 30 Mc. were then known. (Mr. Editor, can we please use that nice simple term, *Megacycles*, just this one last time?) Our bands were 56 to 60 Mc., 112 to 116 Mc. and 224 to 230 Mc. All frequencies above 300 Mc. were unassigned. Anybody could use any frequency above 300 Mc., but there was no rush to move into this great unknown!

We were concerned mainly with the 5-meter band, where we were completing our first year under new FCC Regulations that made crystal control or its equivalent in stability mandatory below 60 Mc. Being able to go to selective receivers at last, now that unstable modulated-oscillator transmitters were banished, we were making rapid strides in weak-signal communication. DX horizons were widening accordingly. W9ZJB, Kansas City, Mo., had stirred the imaginations of 5-meter men by working all U.S. call areas, earlier in the year. W3BZJ, Glenside, Pa., worked 7 of the 9 in a single evening. W1KLJ and W1HDQ had worked W8CIR, Aliquippa, Pa., nearly 400 miles distant, without skip propagation being in evidence.

Stabilization on 5 brought an unexpected dividend, as hundreds of simple-gear adherents moved to the next higher band. We proudly reported 150-mile work on 112 Mc. by W9WYX/9, Pike's Peak, Colo., and W9VTK/7, near Cheyenne, Wyo. The former call, now WØWYX, is still heard regularly in the Denver area, its holder and licensee of the Squaw Mountain 2-meter fm repeater being the same Bob Swanlund.

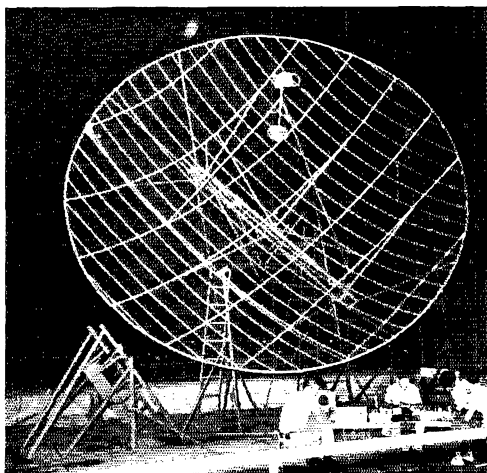
The lone technical item in our first edition of "On The Ultrahighs," the name of the column

*Send reports and correspondence to Bill Smith KØCER, ARRL, 225 Main St., Newington, Conn. 06111.

until after World War II terminology forced a change, was a description of triode doublers used at W1HDF and W1HDQ to generate stable 112-Mc. signals. Before long these rigs were modified for fm, providing an early demonstration of the worth of that mode.

Still higher in frequency, George Bailey, W1KH, reported interest in 224-Mc. communication building in the Boston area. George (later to become president of ARRL and executive secretary of IRE) was covering up to 18 miles regularly on 1¼ meters.

Hardy enthusiasts who were pioneering the bands above 30 Mc. in the 1930s would have found the story that has been told in these pages in the 30 years since all but unbelievable, had they been given an opportunity to read that story in advance, back then. It is quite a story; one that amateur radio should not allow the rest of the world to forget. We were first in the world above 50 Mc., and for some years we were the only users. A very considerable part of what is known about these frequencies was turned up by hams, working on frequencies that were thought by others to be all but useless for any practical purpose. Yet today, as we end our third decade, we see our bands under tremendous pressure from services that we never dreamed of, in that simpler era.



This 21-foot parabola is the work of the Sekisen Radio Club, in Japan.

It is fortunate for us that the story was told, month by month as it unfolded, in the pages of *QST*. It is equally important that it be told in the future. To tell it properly requires one constant ingredient: the willingness of amateurs who are doing the good work to report it in detail, so that we can put it into the record for all to see. Bill Smith, your present conductor, needs the cooperation of all of you today, even more than I needed it in the 1940s and 50s. With it, he can tell the expanding story of the world above 50 Mc. in the 1970s. With all our new tools, that will be quite a story, too — and we'd better have it on the record! — *W1HDK*

Carrier-Operated Relay for VHF Repeaters

One of the important accessories in a vhf repeater is the carrier-operated relay. Several circuits have been published for this device, but most of them either use exotic components or are designed for application to specific equipment. The COR described here can be used with any transmitter-receiver combination, tube-type, solid-state, or even a self-contained portable.

First, let us understand that, in its simplest form, a repeater is nothing more than a transceiver, with its receiver portion equipped to turn on the transmitter when a signal is received, and then feed the audio from the receiver into the transmitter. So, all we need for a basic repeater is a device that will operate the push-to-talk relay of the transmitter from a signal picked up by the receiver. There will be other problems involving power supplies, antennas and isolation of the transmitter and receiver, but they need not be discussed here.

To design and install the COR, the first step is to locate the transmitter PTT relay, and disconnect any portions of it that disable the receiver during the transmitting periods. Measure the dc resistance of the PTT relay coil, and from Ohm's Law determine the current it will draw with 12 volts applied. Use the result to determine the power rating of transistor Q_3 .

Next locate the point in the receiver for connection of the COR input (the open end of R_1 in Fig. 1). There must be an appreciable audio voltage swing, so the squelch circuit or the first limiter will be good spots to hook on. Check the voltage swing during the cycle from no signal to readable signal, and note whether the voltage goes positive or negative. If it is positive, use npn transistors as shown; if negative, use pnp, and reverse the COR voltage leads. If the voltage at the take-off point is too high, as it may be in many tube-type receivers, use a voltage-dividing network to bring it down to 6 to 8 volts.

Practically any transistors suitable for 12-volt or higher service will work in the circuit. Universal replacements such the RCA SK series and Motorola HEP types are fine. Just be sure that the dissipation of Q_3 is adequate to handle the relay current. The parts can be assembled in almost any manner, as layout is not critical in any way. A $4 \times 2\frac{1}{4} \times 2\frac{1}{4}$ -inch Minibox, with a small perforated circuit board mounted in it, will do nicely. Use a heat sink on Q_3 , if the dissipation requires it.

To adjust the circuit, connect the 12 volts dc, hook the input into the receiver, and connect the PTT relay in the collector circuit of Q_3 . Tune in a weak but readable signal, and adjust R_2 until the relay just closes. The relay will open when the signal goes off. If adjustment of the control is too critical,

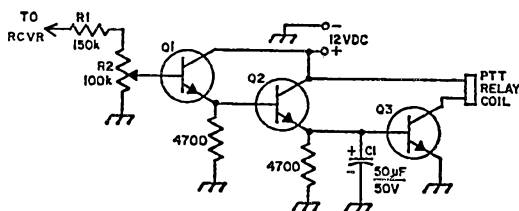


Fig. 1—Solid-state carrier-operated relay system described by WA0UZO. Values of R_1 and C_1 may be adjusted to suit various situations in which the COR may be used. See text. Q_1 , Q_2 and Q_3 are universal-replacement transistors. Dissipation rating of Q_3 should be sufficient to handle the relay coil current.

use a lower value for R_1 . The capacitor C_1 provides a delay in drop-out of the relay, and prevents it from chattering on a weak or fluttering signal. If more delay is needed, increase the value of C_1 .

I wish to acknowledge the assistance of Richard A. Ray, W0QHI, in the design of the COR. In fact, I might as well "fess up" and admit that my first attempt worked, but overloaded the receiver and was unreliable. I took the "scientific way" out by going to Richard with a pocketfull of parts, and he rebuilt the COR to its present form. — *Robert D. Shriner, WA0UZO, P.O. Box 969, Pueblo, Colorado 81002.*

FM Activity in the Western Florida Section

If you're intending to run 2-meter fm in your car in Florida this winter, the following information from Frank Butler, SCM, Western Florida Section, may be of interest. There is extensive use of 146.94, with the approximate number of stations in various cities as follows: Pensacola 10, Milton 2, Crestview 3, Fort Walton Beach and Eglin AFB 30, Defuniak Springs 2, Chipley 2, Marianna 4, Cypress 2, Panama City 4, Port St. Joe 5, Apalachicola 1, We-wahitchka 1, Tallahassee 5.

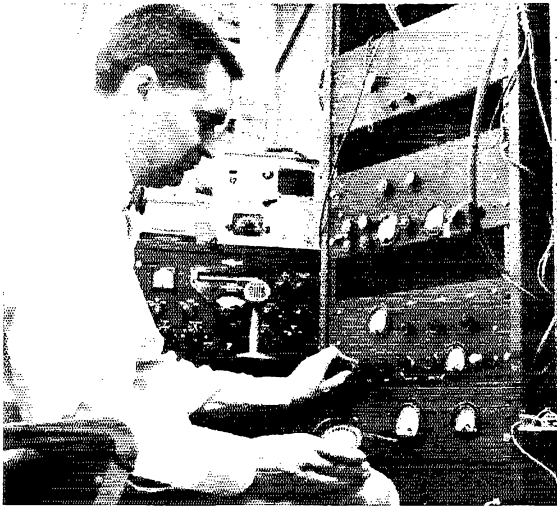
Repeaters in Chipley (W4IKB), Fort Walton Beach (WB4KLT), and Pensacola (W4UC), all have 146.34 input. WB4KLT uses 1800-Hz tone-burst keying. W4UC uses 2200-Hz keying. W4IKB uses squelch-burst keying (3) and 146.94 output. The other two have 146.76 MHz out. W4GGU has an authorization for Panama City, and should be operational on 34-76 soon.

Elsewhere, there are 34-76 repeaters in Miami, Tampa, Melbourne and Jacksonville. All are "open" repeaters, and welcome visiting mobiles. Simplex use of 146.94 is also invited.

John T. Chambers, W6NLZ, 1920-1969

VHF enthusiasts everywhere were saddened by the passing of John Chambers, W6NLZ, on October 5, 1969. He had collapsed at his desk at TRW, Inc. a few days before, was rushed to the hospital, and found to have an inoperable brain tumor. Thus quickly, and relatively painlessly, The World Above 50 Mc. lost one of its most successful practitioners.

If he had done nothing else in life, John Chambers would have made the vhf hall of fame for his historic 2540-mile 144-MHz QSO with KH6UK, July 8, 1957. The undersigned heard of this great event within minutes, by long-distance telephone from the Chambers household. Perhaps only one who had devoted most of his hamming time to working, or trying to work, vhf DX could fully appreciate



John T. Chambers, W6NLZ, and part of his experimenter-style station, as it appeared in 1960.

the significance of this achievement, details of which were reported in the lead paragraphs of this column in the September, 1957, issue of *QST*. The story will be retold as long as hams talk of vhf milestones.

W6NLZ and KH6UK had a notion that they just might span the California-to-Hawaii path on 144 MHz, and they set out to see if it could be done in October, 1956. After nine months, with an average of six tests weekly, they were still trying, without success. First there was always a quick check on 14.095-MHz cw, then a tape run by KH6UK on 144-MHz cw, while W6NLZ listened. After all this, only a special brand of optimism could have made W6NLZ enthusiastic over the prospects for the night of July 8. But John had seen the grayish-brown inversion layer over the curving California coastline that evening, as he made his way up to his home on the Palos Verdes Escarpment, some 900 feet above the Pacific. Reliable weather information indicated that this inversion had been building in extent and intensity for several days. What happened on the 9:30 P.M. schedule is history.¹

W6NLZ and KH6UK could have stopped right there, and their niche in amateur radio history would have been secure, but they went on to turn the trick on 220 MHz, June 22, 1959, two years later. Once again, we had an almost breathless lead story for the vhf column.²

No point in stopping here, either — how about 432? This also took a little time, but on July 20, 1960, the still-used schedule formula paid off in a cross-band 432-to-14-MHz QSO.³

If there was ever an "all-band" ham station, it was W6NLZ. John maintained capability on the hf bands, and a major use of them was for cw skeds with vhf DX enthusiasts. He was an ardent 50-MHz DX operator, holder of special 50-Mc. WAS No. 60, the tenth of 24 holders of 50-Mc. WAC, an early user of ssb in vhf communication, and a tireless worker in many projects for exploitation of

¹ "World Above 50 Mc.," *QST*, Sept. 1957, p. 63. Tape excerpts from this and later QSOs are available for use by ARRL-affiliated radio clubs as program material. Write for Training Aids list, Communications Dept., ARRL.

² "World Above 50 Mc.," *QST*, August, 1959, p. 68.

³ "World Above 50 Mc.," *QST*, Sept. 1960, p. 78.

the higher bands. His enthusiasm for any propagation challenge shone through in a *QST* article on ionospheric scatter.⁴ He was a frequent contributor of news and ideas for the *QST* vhf column, over many years.

W6NLZ and KH6UK were given the 1960 Edison Award jointly, for outstanding amateur radio public service, a "first" on two counts: technical achievement and joint work. That their work was, indeed, a public service, was emphasized by FCC Commissioner Frederick W. Ford, who called it "the most important amateur radio accomplishment of 1960," in a presentation address at the awards dinner in Washington.⁵

W6NLZ is survived by his wife Maureen, W6-NTC, and 12-year-old son, Glen. — *W1HDQ*

Author's Remarks

I am disappointed with the lack of log returns from the October activity nights. Only three logs were turned in and none were from you fellows who have been pushing for single-band activity nights. But we'll stick with the idea for awhile and see if the response improves.

Those persons wishing to contact me direct may by writing to 3900 East 24th Street, Sioux Falls, South Dakota 57104. My telephone number is 305-336-9301. Or if you wish, the material may be sent to Headquarters from where it is forwarded at regular intervals.

Finally this note, each month we receive a few reports that are not signed and are without identification. This month there were more than usual and several of them would have made interesting reading if we could have identified the sender. About those boxes, again. Only U.S. call areas count and when you initially apply for listing, please submit a list of the stations worked, their state and note the best DX. More than a half-dozen requests for listings were received after the September and October tropo sessions that could not be processed, simply because the requesting station didn't give enough information.

OVS and Operating News

50-MHz transequatorial scatter began early this season. The first opening between North and South America came the evening of September 19. Involved were the Southwestern United States, Mexico, Argentina, Chile and Peru. In the U.S., the opening apparently began with *E*s to the Mexico City area and then developed into a *TE* affair with CE3QG, LU3DCA, LU6EAM, LU8AHW, and OA4C putting good *TE* signals into Texas, Oklahoma and Nevada. The opening lasted some 4 hours. Thanks to W5WAX, K5WVX, WA5RBI, K7ICW and LU6EAM for their reports.

W6ABN reports hearing ZK1AA's beacon October 3 between 0155 and 0245 GMT. An *E* opening was underway at the same time from Southern California to Texas. On October 10, the ZK1AA beacon was again heard at 0055 GMT, and beginning about 0145, ZK1AA worked W6ABN and K6QEH. Following those two contacts ZK1AA called several CQs but got no takers.

In Miami, WB4BND reports a *F2* backscatter opening when he and W4GDS worked W5SFW during the afternoon of September 25, and OA4C

⁴ Chambers, "After Sunspots, What?" *QST*, March, 1960, p. 66.

⁵ "Edison Award to W6NLZ and KH6UK," *QST*, April, 1961, p. 48.

2-METER STANDING

W1JSM...35	8	1400	W5DKQ...29	8	1150
K1ABR...34	8	1478	W5LO...27	8	1254
W1AZK...34	8	1412	W5HFV...27	10	1285
K1IHTV...33	8	1310	W5MCC...25	8	1430
K1WHT...31	8	1300	K51TK...18	6	1330
K1UGQ...30	8	1370	W6GDO...18	5	1326
K1WH8...29	8	1300	W8WSQ...15	4	1300
W1VTU...29	8	1296	K6HAA...14	4	1380
K1BHK...29	7	1275	W6NLZ...12	5	2540
W1EJH...27	7	1100	K6JYO...12	4	1240
W1HDQ...24	7	1040	K6HMS...11	4	1258
K1MTJ...20	7	1225	W7JRG...27	6	1320
W1MX...18	6	850	K7NII...24	5	1290
K1IXJ...18	6	800	K7ICW...16	4	1246
K1RJH...18	7	1480	W8PT...41	9	1260
W2NLY...37	8	1390	K84XU...38	8	1275
W2CXV...37	8	1360	K8DEO...31	8	1150
W2OHI...37	8	1320	W8IDU...27	8	1150
W2BLY...36	8	1150	W8NOH...26	8	1165
W2AZL...36	8	1380	WRTIU...24	8	1000
WA2PGK...33	8	1340	K8ZES...22	8	675
K2RTH...33	8	1215	W8VHG...13	6	465
W2CR8...26	8	1270	K9SGD...42	9	1300
WA2EMB...23	8	1335	WA9DOT...41	9	1303
W2CNS...23	8	1150	K9AAJ...41	9	1200
W2DWJ...21	6	860	W9AAG...39	9	1150
W2DNR...21	7	1200	W9YF...36	8	1050
WA2PMW...21	6	1100	W9IFA...33	8	1060
WB2YB...21	6	915	W9IFB...32	8	820
K2YCO...20	7	750	K9MQS...45	10	1590
W3RUE...36	8	1100	W9BFB...40	10	1340
W3KWH...35	8	1335	W9NXF...41	10	1389
W3KGP...32	8	1108	W9DQY...41	9	1300
W3BHG...27	8	1140	W9LFE...40	9	1100
K3CFA...25	8	1200	W9LER...36	9	1250
W3BDF...25	8	1100	W9EYE...35	9	1360
W4HB...25	8	1310	W9ENC...35	9	1360
K3OBU...21	7	930	W9LNC...28	8	1000
K3CFY...21	7	950	W9DRL...25	9	1295
W3TFA...20	8	1342	FSDO...1	1	5100
W3LHF...19	6	700	KH6UK...2	2	2540
WA3GPL...19	6	625	OH1NL...1	1	5850
W4HJQ...39	9	1150	VE1AUC...7	2	500
W4WNL...38	9	1250	VE2DFO...21	7	1340
W4HHK...38	9	1280	VE2BGJ...17	6	975
K4EJQ...37	8	1125	VE2IHW...11	5	800
K4IXC...36	8	1403	VE3E2C...33	8	1283
K4GL...36	8	1325	VE3ASD...31	8	1290
K4QIF...35	8	1225	VE3BQN...31	7	1250
W4CKB...29	8	1325	VE3AIB...29	8	1340
W4FJ...34	8	1150	VE3EYV...25	8	1100
W4VHH...34	8	1100	VE7BQH...6	2	1248
W4AWS...29	8	1350	VE3ATN...3	3	10417
W5UGO...43	10	1398			
W5RCL...42	9	1289			
W5WXZ...36	10	1450			
W5HFV...36	10	1285			
W5AJG...33	9	1360			

The figures after each call refer to states, call area and mileage of best DX. Revised November, 1969

noted the same aurora in neighboring Iowa. Jim also reports running scatter schedules with K8CLA/Ø. On the topic of scatter, one of the finest scatter signals I've heard in Sioux Falls, South Dakota comes from K5WVX, Oklahoma. Over the 500-mile path, he is almost solid copy at any time. VE6AHE reports working VE3CUA on September 15 after more than one year of scheduling. We would be interested in more reports concerning 50-MHz scatter schedules and contacts.

144-MHz tropospheric propagation was exceptionally interesting in September and October. There were several long-haul tropo sessions in Eastern USA with characteristics that set them apart from the customary fall periods of extended-range work. Enthusiasts in coastal areas expect good breaks during these months, but much of the best work done this year was over hilly or mountainous terrain, not normally conducive to development of stable weather patterns and tropo DX.

By call area, here's a sampling of the September 20-30 tropo session. In the Northeastern States, usually favored by fall tropo, W1FJH, Mass., worked W4VHH, South Carolina, over an 800-mile path, September 22. Dick also worked W3LHF, Pa., and W4NUS, North Carolina, while hearing VE1AFB off the back of his antenna. The next night, W1FJH worked VE1PL and VE1AFB, and heard stations as far south as Virginia. W1MX, also Mass., reports similar contacts, including W4VHH, W8AZLP, W. Va., and W4JCV, Va. K1RJH, Conn., contacted two South Carolina stations, K4GL and W4VHH, while W1VTU also worked W4VHH.

WB2YUQ worked into Ohio and VE1PL on September 23. K2LME says he worked both North and South Carolina to reach 24 states worked, and then had a contact with VE1PL. W2CURS said the September 22 opening extended from Nova Scotia to South Carolina. Doug worked a number of stations along the east coast including a 780-mile haul to W4VHH.

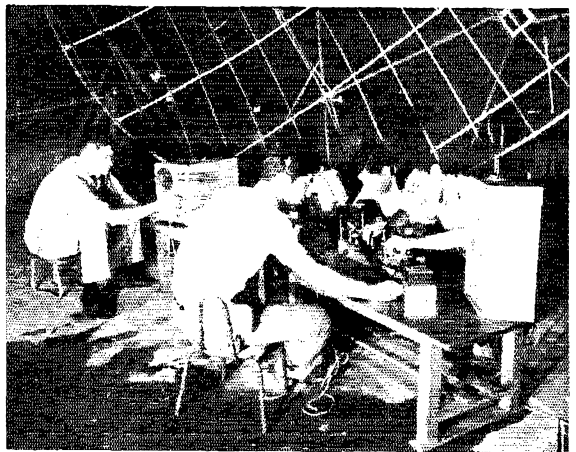
W3HB, operated by both Brownie and his son, W1JSM, had contacts with VE1PL and K4GL, plus numerous stations between those two points. Brownie now stands at 22 states worked. W3BHG, Delaware, worked VE1AFB plus the North and

on TE in the evening. Surely there have been similar openings since, but these were the only ones reported by deadline for this column.

Bill Boykin, HL9WI, writes from Korea that he is active just about 52 MHz. He has been working into Japan and Australia and is alert for openings to the United States and South America. His operating times are between 2100 and 2300 GMT. HL9WI's address is Bill Boykin, USA District Engineer, Far East, APO San Francisco 96301.

On Guam, K7HIX/KG6 remains active, working Australia and Japan often on 7E. Ken says JA6DHE is a regular reader of this column and that JA1RJU is an avid six-meter man. We would like to hear from our Japanese readers and have a picture or two.

Other 50-MHz reports include that of a September 29 aurora noted by WA1DFL. He worked numerous VEs, W2, 3, 8 and 9. WA1DPX caught the same aurora and adds Vermont to the list. On October 11, WB4BND, Miami, noted Es to all U.S. Call Districts except W6 and 7. The opening lasted four hours during the evening. W7ZOW and W7ZPS, husband and wife, have confirmed 50-MHz WAS, having been issued certificates numbers 87 and 88. After seven years searching for a North Dakota contact, WAØDWM, Minneapolis, worked K8CLA/Ø during the September 29 aurora. WØPFF



Members of the Sekisen Radio Club, near the array shown on page 90, include JA1s AKA, WYZ, DWJ, GKO, BMY and MSV.



One of several 220-MHz stations getting set for moonbounce tests is K2CBA, Petersburg, N. Y. This array, with 16 6-element Yagis, was built with the help of K2TMB.

South Carolina group. W3TFA picked two new states from the tropo, K4GL, South Carolina, and W1YTM, Maine.

K4GL, who provided first South Carolina contacts for many during the coastal inversion, lists nearly one dozen DX contacts as far north as Connecticut. W4VHH reports the session was "fair to good." I'll bet he thinks "excellent" when he finishes addressing all those QSL cards.

Aurora made an appearance on September 29. The opening began about dinner time and lasted for more than six hours. K1HTV, Conn., got his 33rd state, K4GOF, Kentucky. Rich also worked many W8s and 9s and several VEs. The boundaries of the opening from K1HTV appeared to be W9YYF, Ill., and K4QIF, Va. K9AQP/1, Mass., heard the buzz, but could find only New England and W2 stations to work. W1FJH, also Mass., says the aurora was very strong. Dick heard and worked stations as far west as Minnesota and south to Virginia and Kentucky. W1VTU, Conn., also worked K4GOF, Ky.

K2RTH worked the buzz and lists 102 different stations heard in 23 states! Bruce says he heard broken signals from W0EMS, Nebr., and K0AWU, N.D. Those paths are in excess of 1100 miles. W2CRS heard W0RLI, Minnesota, briefly but was not able to complete a contact. Doug did work K4GOF and W4FJ, Va.

W3HB worked three Canadians, VE2DFO, his first VE2, and VE3BIG. Brownie said he heard only stations to the north of Maryland.

K2LME lists 16 stations worked, from New Hampshire to North Carolina to Illinois.

K4GL, S.C., worked into New England, W2 and W8. W8ASYHN, Ohio, worked stations from New England to Wisconsin, while neighbor W8AXR worked his first VE2, plus New Hampshire and Maine.

In Colorado, W0MOX, heard several tenth call area stations on the aurora. He worked W0BJ and W0EMS, both Nebraska.

Tropo conditions between October 4 and 6 were excellent. Many long-haul contacts were made on

both 144 and 432. The conditions began the night of the first scheduled single-band activity night, October 4. Doug Allen, W2CNS, reports 23 contacts in 10 states, W9YYF, Illinois, was his best DX, 705 miles. Doug worked W9HLY, Indiana, on both 144 and 432, 575 miles.

Now by call area, some of the highlights of the three-day session. K1ABR, Rhode Island, worked K4YYJ and K4JQU, both North Carolina and W4ISS, Georgia, plus K4EJQ to give an indication of the geographical extent of the opening. The contact with W4ISS, who has 150 watts and a single 11-element Yagi, is over a 1000-mile path. Dick heard, but did not work, W4AWS in Florida, around 1400 miles! W1FJH, Mass., added two states by working W4ISS and K4EJQ, plus many others. Dick says W1MEH, Conn., worked W4AWS on October 6. W1EXZ contacted VE2s HW and DFO.

Dave K2LME, reports numerous contacts on October 5, including Ohio, Wisconsin and south to Alabama and Georgia. W2CNS worked W4LSQ, a 1020-mile New York to Alabama path, and W4EHM, 860 miles to Georgia. W4EHM runs 15 watts and a 7-element Yagi. WB2YQU picked up three new states, WA9SRW, Indiana, W4VHH and K4EJQ. K2CEH reached 26 worked by hooking W4VHH, and WA2PMW found 8s and 9s plentiful, plus his state number 21, K4EJQ.

K3CFY found October 4 productive. Roy worked 14 8s and 9s, while W3TFA was working a new state, W9BRN in Indiana.

In Florida, K4NTD worked W1MEH, Conn., and K2RTH, New York. W1MEH told K4NTD he had worked every state east of the Mississippi River except Mississippi during the three-day period.

VE2DFO worked the session for 14 states and 6 call areas. Don's best DX appears to have been W4VHH, 1000 miles. Thanks, Don, for your lengthy report. I just didn't have space to use as much as I'd like to.

In moonbounce (EME) news, PY2CSS writes from Brazil that he wishes to try EME schedules with stateside stations. He runs 1 kW and a 40-element Yagi array. Write to him: Sr. Ricardo Apra, P.O. Box 3159, Sao Paulo, Brazil.

Mike, K6MYC, and Ed, WA6MIA, have completed the 160-element EME collinear at Mike's new location. More on recent K6MYC EME activities next month.

220-MHz moonbounce continues to be explored, but has yet to give up the first EME contact. But that isn't far off. W1QXX is preparing for schedules with W1FZJ/KP4. They had a 144-MHz EME contact on September 2. K2CBA, see the picture elsewhere in this column, has finished a 96-element Yagi array for 220 EME. Jud is working with K2TMB. WB6NMT, who was to have begun schedules with KH6EEM, is now looking for someone else to schedule. KH6EEM's activities have been curtailed for the time.

Louis says the ARRL 220 and Up Directory is filled with stations who say they have equipment for these bands, but who do not. WIHDQ, who put the directory together, has noted the same problem. Ed says he will over-see the publication of another edition, if some measure of a guarantee of its accuracy may be made. Perhaps some prominent operators would be willing to assist in checking for accuracy in their respective geographical areas.

432-MHz DX has been excellent, there is no other way to describe conditions during the three-day period which began October 4. Three-watt triplers were all that were necessary for 600- to

700-mile contacts as a large, oval-high extended southwest from the New England states, with the front situated just west of the Allegheny Mountains. This was the DX line, and along it, WA1JTK, New Hampshire, worked a 715-mile path to K4EJQ, Tenn. WA1JTK has a measured three watts output, feeding a 4-bay array of Tilton Yagis. That contact with K4EJQ made 14 states worked by WA1JTK with his three-watt tripler.

Now, looking at other DX worked by call area, and in the States-Worked Boxes you'll see many changes since last month. K1HTV now leads the 1st call area. Rich added W8YIO, Mich., K4EJQ, Tenn., K8AXU, W. Va., and W4HJZ to reach 15 states, best DX of 615 miles.

K2ACQ strengthened his hold on 1st place in the 2nd call area — and also took over the number 1 spot nationally. Doug reached 23 states by working K4EJQ, Tenn., W4VQA, Ky., W4HJZ, N.C., and W4VHH, S.C., but he says the next 23 will be tougher. True, but 20 states looked difficult until W4FJ broke that barrier just a few months back. K2CBA joined the 20-worked club. Jud worked K4EJQ for number 20 and then reworked several old friends. Jud contacted 10 states the evening of October 5, the peak night of the three-day opening.

WA2EMB went to 18 by working K4EJQ (Bunky was busy!), October 4. He had previously worked five other new states during the summer. WA2EMB continues to schedule W4FJ, their contact total approaches 350. W2CNS stands at 14 states by working K4EJQ, W4FJ, W4HJZ, and W3UJG, Md. K2ARO enters the boxes with 9 states, all worked since September 13. He has a

September VHF QSO Party Results will appear in January, QST

40-watt tripler — and a 44-element Tilton array.

K3CFA, on October 5, worked VE3DKW and VE3DSE with 5 watts over a 200-mile mountainous path. His 5-watter is backed with a 168-element array! K4SUM, Va., worked the same VE3s, plus VE3BQN and a logpage full of state-side stations, 7 states on October 6 alone. K4SUM's total is now 15 worked.

K8REG and K8DEO continue to do battle. Both have 20 states worked, but K8REG has a mere 25 mile edge on the DX. His 20th was W4VHH, October 6. K8DEO's 20th was likewise W4VHH, worked the same evening. There are now 5 stations listed in the boxes with 20 or more states. W8HVX moved to 16 worked, Bill added K1HTV, Conn., and says the October opening was great, except for the east coast and radar QRM! Guess we're getting selective — or spoiled — the way conditions have been.

The September 20 to 23 period was also productive. The band was open from New England, west to Michigan and south to W4VHH in South Carolina. The latter path is more than 700 miles.

1296 MHz and Up finds a handful of experimenters hard at work. After more than one year of preparation, W3GKP is getting audible moon echoes on 2304 MHz. Bill says that tests between August 29 and October 1 produced echoes on 19 occasions. The echoes were usually heard 40 minutes or more on each test, and on one test, for 64 minutes. I doubt it will be long before Bill completes a 2300-MHz EME contact with someone, possibly W4HHK, for another amateur first.

K2GRI reports working W1AJR on 2304 MHz the evening of October 6. Power output at each station was about 15 watts. The cw signals exhibited some fading, but not as much as 432-MHz signals over the same path. This contact, of course, on the same evening of the excellent tropo conditions previously reported.

WA4HGN has moved from Tennessee to Muscle Shoals, Alabama. Paul, W4HHK, says he and Bill, WA4HGN, have already tried the 118-mile path between them on 2304 MHz and that they expect to make a contact soon.

K0VQM, searching for ways to extend microwave DX records, suggests that forward scatter from thunderstorms may produce 300-mile contacts. A similar technique has been used successfully on 432. He says television station weather radars operate near 5000 MHz, detecting thunderstorm activity up to 150 miles distance. The midwest and southeast, with their high occurrence of thunderstorms, could well be the areas to test his theory.

K2YCO reports an October 7 contact on 1296 MHz with VE3DKW. K2YCO runs 30 watts and 32-element screen-collinear. He is now planning an amplifier and larger antenna. W0EYE says W0BJ Nebraska, has expressed an interest in 1296. Don hopes to schedule W0BJ over the Boulder, Colorado to North Platte path, before long.

VHF Activity Nights In December

144 MHz — Dec. 6, 220 MHz — Dec. 13, 432 MHz. — Dec. 20; 6 p.m. Saturday to 2 a.m. Sunday. See QST, Sept., 1969, p. 84, for more details. And please, report promptly. QST

220- and 420-MHz. STANDING

<i>220 MHz.</i>					
W1HDQ...13	5	450	K2RIW...9	3	220
K1IX...12	4	600	W2SEU...6	4	220
K1BFA...10	3	225	W3RUE...14	7	585
K2CBA...17	5	1090	K3IUV...11	5	310
W2DWJ...15	5	740	W3UJG...9	4	400
K2DNR...13	5	600	W4FJ...20	7	995
W2BEU...12	5	325	K4QF...19	7	1085
K2RTH...12	4	600	K4SUM...15	5	462
W2CRS...10	4	440	K4EJQ...14	6	600
W3UJG...14	5	460	W4HJZ...9	4	560
W3RUE...10	5	480	W4VHH...9	3	750
K3IUV...10	4	310	K3NTD...9	2	835
			K4GL...6	2	
K4LXC...3	2	1090	W5RCI...19	6	880
K4GL...3	2	---	W5ORH...12	4	700
W5RCI...10	5	910	W5AJG...7	3	1010
W5AJG...3	2	1050	W5UKQ...6	2	590
W5LO...2	2	660	W5AWK...3	2	222
W6WSQ...4	4	945	W6DQJ...4	2	360
K7ICW...4	4	250	K7ICW...4	2	225
W7JRG...2	2	959	W7JRG...2	2	420
W8PT...11	6	660	K8REG...20	7	700
W0EYE...9	4	910	K8DEO...20	7	675
VE3AIB...7	4	450	W8HVX...16	7	660
			W8MNT...13	7	600
<i>420 MHz.</i>					
K1HTV...15	4	610	W8RQI...10	6	425
K3EAV/L...14	6	700	W8CVQ...10	6	400
K1BFA...12	5	645	W8VHF...8	6	625
WA1JTK...11	4	715	W8FWG...7	4	450
K1IIX...11	4	460	W9WCD...19	7	825
W1QVF...10	5	400	W9HUV...17	7	780
W1HDQ...10	3	250	W9AAG...14	5	800
K2ACQ...23	8	925	W9ANKT...12	6	560
K2CBA...8	8	2670	K9AAJ...12	5	425
WA2EMB...18	6	720	K9CNN...12	5	---
K2UYH...17	6	840	W9JIY...10	5	550
K2ACQ...16	8	925	W0DRL...18	6	1185
W2CFL...15	6	893	W0LER...8	3	709
W2CNS...14	6	525	W0EYE...7	2	703
W2BLV...14	6	500	VE2HW...4	3	750
W2DWJ...13	4	330	VE3DKW...12	7	940
K2YCO...10	6	675	VE3ZC...7	5	510
K2ARO...9	5	580	VE3AIB...5	4	450
WA2EUB...9	4	260			



YL news and views

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

That Distinctive Call

THE method is always the same no matter what type of certificate we are hunting, we dig in and under and over all the interference, and the little quirks of the ionosphere to find those elusive states, or continents until the last one is confirmed, and then? The search begins all over again because the thrill of certificate acquisition is always a new one with new rules and new calls to log. The women in amateur radio have just as hard a time locating YLs as the men in the quest for the YLRL sponsored certificates for only "Howdy Days" and YL AP have the exclusive label "For Women Only," on them, so how is it done? The easiest way is net participation for there are those unmistakable feminine voices that identify the calls. There are the major cross-country nets that meet weekly as well as the many on-the-air clubs, and local club sponsored nets. Almost every member is anxious to add a new contact to her list in her own hunt for awards, and who knows, that simple act of joining a net to acquire those vital contacts could well provide the regular members with some badly needed locality for a coveted piece of wall paper.

A lot of us like to earn them the "hard way" by working on a single-band only, or certain types of calls. This adds spice to the hunt and makes the certificate seem to show up in brighter colors. For a brand new type of certificate hunting, it might be interesting to hunt down those DX YL, and WAC YL, awards with 100% YL suffixes to the calls to make the letters mean what they say on that piece of paper. It's true there aren't quite enough of these calls, as listed in the *Callbook Magazine*, to acquire the necessary number for YLCC, but there are 62 of them around the world, located in 28 different countries, and all the continents. Probably there are more, but some countries list the owners of the call with a first initial instead of a name, then, too, there is the problem of language where we cannot be sure if the name is masculine or feminine.

In Central and South America we find CE3YL in Chile, in Brazil PY3, PY4, and PY5-YL. North America is represented by Canada's VE1, VE4, VE5, VE6, and VE7 all as women operators with a YL suffix.

In Europe, the West German Republic was the most generous in awarding YL as a feminine call

* YL Editor QST. Please send all news notes to WB7-BBO's home address; 1036 East Boston St., Aldadena, Calif. 91011.



Ivy Smythe, VE3EZI, 1970 YLRL president.

with DC6, DJ3, DJ5, DJ7, DJ8, DK1, DL1, DL3, DL6, DL7, DL8, and DL9. Denmark is next with OZ2, OZ3, OZ4, OZ6, OZ8, OZ9. Then France F2, F3, F4, F5, F9, and that F8YL that was once awarded to Mme. Schotte, France's first YL, now reassigned to Beatrice Taillantou. Norway lists LA3, LA7, and LA8 as YL calls, and Finland also has three with OH2, OH3, and OH5. In England, the second and third women to receive amateur licenses from the Post Office still hold their distinctive calls G2YL, and G6YL. The island of Sicily has the only Italian YL with the feminine touch to the call IT1YL. Yugoslavia's YU2YL, and Poland's SP5YL add to the European picture, while Austria lists OE2YL.

In Africa, Mauritania has 5T5YL, Niger 5U7YL, Senegal 6W8YL, Congo 9Q5YL, Rwanda 9X5YL, Angola CR6YL, and South Africa has assigned the call to two women ZS5, and ZS6YL.

Asia is represented with JA1YL in Japan, VU2YL of India; 4S7YL in Ceylon; 4X4YL in Israel; and 7P8YL in Lesotho.

To complete the 100% WAC-YL picture, Oceania has that feminine call in Australia with VK3, VK5, VK6, VK7.

Where does the United States enter the picture with all the many W, K, WA, and WB prefixes? We don't, that call has been assigned to radio clubs in educational institutions. But every four years it is possible to log that very rare suffix as

being the special call assigned to the YLRL International Convention.

Probably if the barrier of language, and the mystery of initials were overcome there would be more on the list. Certainly to be able to contact 62 YLs who do hold that very exclusive call would be worth attempting for that is a part of the eternal "newness" of amateur operation — the challenge of something that is just a little different.

Mark the Calendar

Check the gear, and make the shack tidy and ready, and be sure all the antennas are in shape because it is almost that time again. YL-OM contest is just around the corner — the dates for 1970 are:

Phone February 14, 15, 1970.

Cw February 28, March 1, 1970.

There may be some changes in the operating times so the full contest regulations will be published in January QST, "YL News and Views."

Powder Puff Derby — Plan Now

Carolyn Currens, W3GTC, who will again be chairman of the communications for the Powder Puff Derby for the twelfth year, is planning for the 1970 event which will be held from July 3, through July 6, 1970. This annual event will start from Monterey Beach, California, and terminate on the east coast. The termination point has not yet been decided.

Communications are vital to the women who participate, and Carolyn requests that any YLs who are located in the towns along the route contact her regarding the availability of their stations and themselves during the race. Since this is an event for women fliers only, it is only fitting that as many YLs as possible try to participate in the communications end. The present schedule lists the following cities along the route: Monterey Beach, Calif., Fresno, Calif., Las Vegas, Nevada, Page, Ariz., Farmington, New Mexico, (fly-by), Colorado Springs, Colorado, (must stop), Hutchison, Kansas, Springfield, Missouri, Dyersburg, Tennessee, (must stop), Bristol, Penna. (tentative).

Any YL whose location is in the above list who is interested in participation with the communications set up, please contact Carolyn Currens, W3GTC, 219 Beechwood Road, P.O. Box 523, Norristown, Pennsylvania, Zip 19044.



Penn Jersey YLs. Left to right back row: Pat WA3FDW, Mollie K3FYS, Harriet WA3ATQ, Rose Ellen WA2FGS, Dottie K3YPH, Edith WA3AAU. Front row: Jane K3ZDW, Carolyn W3GTC, Edna WA3NGU.

Meet the Club — Penn-Jersey YLs

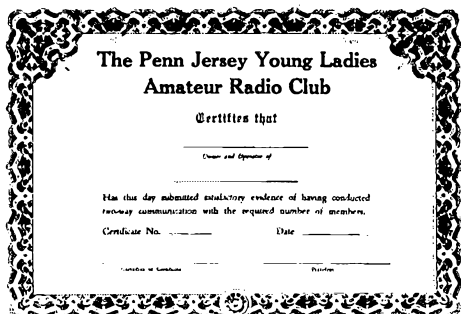
Curiosity is usually the underlying motive for most of our activities, and with the gals in Pennsylvania and New Jersey just who were the other licensed women operators in their area, and the desire to meet and know each other started the organization of this YL club on June 8, 1956. Eighteen YLs attended that first meeting at the home of W3VNN. W4VCB/3, now K3FGD, was the first president. Other officers were W3FTP, Treasurer, and W3SLF, Secretary.

Meetings are held the third Wednesday of each month at the home of one of the members, and all women are welcome to attend. Membership is open to all Women Amateur Radio Operators, as well as other women who are genuinely interested in radio.

Club activities include operation of K3UN during United Nations week, and very active participation in the annual Powder Puff Derby. W3GTC, a member of the club has been chairman of this event for the past 12 years. They also operate ARRL Field Day, which is almost 100% YL activity including putting up antennas. They operated using the club call WA3MOI from WA3ATQ's home in the Poconos this past year with four transmitters, using all bands including 6 meters and had excellent results.

The PJ-YL Net operates on 3.970 MHz each Tuesday at 10 P.M. eastern time, and all YLs are welcome to join the net.

The club certificate is awarded for having submitted proof of having worked five members of the club. W3GTC is certificate custodian. QST



Penn Jersey YL Certificate



HEADQUARTERS VISIT

The League Headquarters building is open to visitors Monday through Friday, 8:30 to 4:30 on a "drop-in" basis, and at other times by appointment. The headquarters is on Main Street (Conn. Route 176 and 176-A) about a mile north of the center of town, and about 3 miles west of Conn. 15-U. S. 5, the Wilbur Cross Highway. (For W1AW visiting hours, see the schedule on page 105).

MOSFETs for Tubes

(Continued from page 30)

Most old receivers have no product detector other than the usual diode-BFO combination. Although it may be desirable to include a more elaborate one, the necessity for a switch to change from the product detector to a diode may discourage this. However, if a diode detector is not desired — i.e. only ssb or cw reception is wanted — the product detector circuit in Fig. 5 gives excellent results.

Conclusion

MOSFETs can be used to replace any vacuum tube in a typical receiver except in the audio output and power supply. In addition to the circuits already discussed, recent editions of *The Radio Amateur's Handbook* contain other MOSFET circuits which may be used in a conversion.

The use of transistor sockets allows experimenting with different devices and makes for easy construction. Drill out the rivets on the tube sockets and make aluminum plates to cover the holes. One or two transistors can be mounted for each tube removed by this method.

A complete conversion of a twenty-year-old Super-Pro was made using the transistor lineup shown in Table I. The antique receiver cost \$30 and the 14 transistors required for the conversion cost about \$25. The total cost was about \$65, including the cost of a coat of paint. Certainly, for the price, few commercially available amateur receivers could compare with the sensitivity and selectivity of the converted Super-Pro (mechanical stability leaves something to be desired, but it poses no real problem).

For example, at 15 MHz the cw sensitivity, crystal filter off, is approximately $0.4 \mu\text{V}$ for a 10-dB signal-plus-noise to noise ratio; with the filter in its sharpest position, less than $0.2 \mu\text{V}$ for 20-dB $S + N/N$. Using a diode detector with a 400-Hz 30-percent-modulated signal for a-m reception, sensitivity for 20-dB $S + N/N$ is approximately $1.2 \mu\text{V}$ at 15 MHz and less than $2 \mu\text{V}$ at 8 MHz. Before conversion the sensitivity was of the order of $2 \mu\text{V}$ for 10- to 20-dB $S + N/N$.

[EDITOR'S NOTE: Extreme care should be used in handling MOSFETs, as the gate-to-channel insulation is easily punctured if the safe gate-to-source voltage is exceeded. Static charges or transient voltages often exceed the safe rating if the dc gate-source circuit is open, as in handling the transistor or inserting it in the socket. Before removing the metal ferrule that short-circuits the transistor leads, wrap a fine bare wire around the leads and ground the wire to the chassis. The leads may then safely be inserted in the socket, after which the shorting wire can be removed. Take similar precautions when removing the transistor from the socket. The power has to be off, of course, to avoid shorting the supply voltage.]

QST

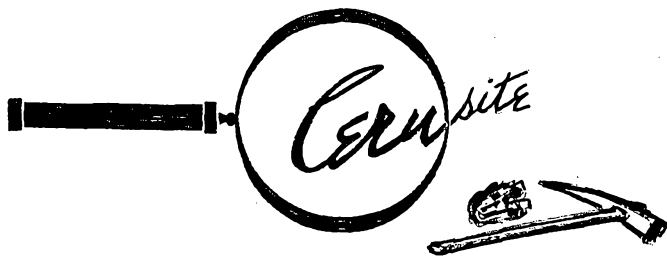
The station photograph shown on page 57 of October QST didn't belong to the author after all. It's his father's, WA6IVM. The address shown for the author is also incorrect. It should read Steve Eichman, WA6IVN, 5809 E. Northland Rd., Manteca, Calif. 95336.

Silent Keys

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

W1CCK, Lucien A. Dombrowk, Leominster, Mass.
W1EAB, Hollis Peters, Melrose, Mass.
W1HBY, LTJG, Philip E. Broeg, II, USN, Reading, Mass.
WA1KQWY, William J. MacPherson, Watertown, Mass.
ex-W1LIX, Albert B. Garcelon, S. Sutton, Mass.
W1SIV, George M. Patten, W. Somerville, Mass.
W2BZR, Douglas A. Smith, Chatham, N. J.
WB2FYB, Pamela E. Klyman, New Hartford, N. Y.
W2SXQ, Arie J. Zwart, Jr., Sparta, N. J.
W2TPV, Frank R. De Carlo, New York, N. Y.
W3GJA, Arthur W. Jenkins, Coatesville, Pa.
W3SIR, Harold C. Link, Pittsburgh, Pa.
W3SKD, Oliver B. Martin, Sr., Havre De Grace, Md.
K3VIB, Henderson Lynn, Glenmoore, Pa.
W3VV, Warren A. Somers, Derrick City, Pa.
W3WQP, Moritz Reisberg, Broomall, Pa.
WA4HXT, Harry W. Raymond, Plantation, Fla.
W4KNR, Raymond F. Beckwith, Clearwater, Fla.
WN4NVW, Bruce Malcolm, Clearwater, Fla.
W4ONC, Joseph E. Riplinger, Norfolk, Va.
W5GFN, Emmitt S. Malone, Sweetwater, Texas.
W5HQC, Warren M. Griffith, Jackson, Miss.
W5HZ, Ted R. Heyck, Houston, Texas.
W5KZJ, Henry Scarborough, Mont Belvieu, Texas.
W5MXQ, Aaron L. Powell, Metairie, La.
W5SFA, William W. Brewster, Breckenridge, Texas.
K5TON, Wilbur J. Koerner, Houston, Texas.
W5ZAM, George B. Stevenson, Victoria, Texas.
W6AWB, Edson S. Gowdy, Turlock, Calif.
W6CRY, Harold Houser, Chico, Calif.
K6DIJ, Merle W. Ellis, Yuba City, Calif.
W6FTT, Carl O. Boltz, Jr., Chula Vista, Calif.
W6IMM, Theodore P. Gilman, Oakland, Calif.
K6MIR, Robert Bucknam, Carmichael, Calif.
W6NLZ, John T. Chambers, Palos Verdes Estates, Calif.
WB6SMO, Capt. Clemens E. Spellman, USN Ret., San Diego, Calif.
W7EKZ, Clarence Porter, Tucson, Ariz.
W7UHL, Gene Hart, Baker, Ore.
WB8ANE, William W. Thorne, S. Lyon, Mich.
WA8CDN, Clarke S. Blair, Sr., Huntington, W. Va.
W8FTM, John S. Theil, Columbiana, Ohio.
W8FVU, A. W. Paull, Jr., Wheeling, W. Va.
W8KSR, Johnathan T. Hodgins, Dimondale, Mich.
W8LAB, Alfred B. Ray, Jr., Springfield, Ohio.
WA8LJN, J. Garland Robertson, Huntington, W. Va.
W8OIS, Gertrude E. Maxim, Brook Park, Ohio.
WA8TRX, Clarence M. Capehart, Canton, Ohio.
WA9FAK, James E. Davidson, Turtle Lake, Wisc.
W9IVU, Roland Hoover, Princeton, Ill.
W9EVT, Caroline Schisler, Colorado Springs, Colo.
W9JR, William Finlay, Estes Park, Colo.
K9JXQ, Philip Kraushaar, Colorado Springs, Colo.
W8LMM, Marion E. Boot, Des Moines, Iowa.
W9PV, William A. Hill, Emporia, Kansas.
W9QGW, Harlan C. Pringle, Cleburne, Texas.
W8SGK, Philip E. Padberg, Wichita, Kans.
VE6ABV, Joyce H. Miyagawa, Milk River, Alberta.
VE7APQ, W. Kenneth Butler, Saskatoon, Sask.
DJ1BJ, Heinz Odenbach, Irslingen, W. Germany.
I1RM, Vittorio E. Motto, Desenzano, Italy.
PA9FLX, L. H. Nyhof, Delef, Netherlands.
ZL1CA, Henry Jakeman, Oneroa, Waiheke Island, New Zealand.

Because of the need for accuracy in our "Silent Keys" listing, please send all notices to the ARRL and include both name and call of the deceased.



BY ROLAND B. BOURNE,* WIANA

THE setting for this account is "Duffy's Static Room," the headquarters for sea-going wireless operators employed by the Marconi Wireless Telegraph Company of America. Here the boys received their assignments, collected their meager pay and gathered together while in port to get the news. The year was 1913. Mr. Duffy had a private office and so did the dignified and slightly ascetic Mr. Edwards, the head man. Mr. Galbraith handled money matters.

In an adjoining room, Elmer E. Bucher had his private office and laboratory. I had become quite well acquainted with him and was allowed to look over his shoulder while he conducted some experiments. One thing I remember was a rig which had extension rods and knobs on the variable condensers. These rose about eighteen inches above the rig. The idea was to avoid body capacity effects while tuning.

This particular summer I was wireless operator aboard the palatial Yacht *Aloha* owned by Arthur Curtiss James. We were spending a good deal of time in New York and I had plenty of leisure hours. I had built a special receiver involving a Colby tuner and galena detector. This worked quite well, in fact better than the British Marconi tuner supplied. I had quite a variety of crystals to play with including a synthetic one made by the late Leland Swart, W2RBH.

So when, on this particular day, Mr. Bucher invited me into his office and said he had something to show me, I was all eyes and ears. He produced a crystal mounted in a massive holder, fitted with two long bolts and a fat padlock. The crystal resembled galena but it didn't look quite right. The cleavage was different, resembling silicon. The color, a dark lustrous gray, was the same as that of galena. "Why the padlock?" I asked. He replied, in effect, that this was a piece of cerussite, very rare and a real hot detector. Furthermore, he said, the Marconi company had the mineral rights to the only mine which produced it. They only issued it to their best traffic men. This let me out, since the number of messages I was handling that summer didn't average more than four or five a month! Mr. Bucher let it be known that, for a consideration of fifty dollars which he thought Mr. James could probably afford, he could arrange for me to have one. I didn't think I could promote it and began to wonder if there weren't a cheaper source.

I had never heard of cerussite before, but, being a little naive and eighteen years old from upstate New York, I had a lot to learn. Nevertheless, not knowing any better, I went out, got on the 3rd Avenue L and went up to eighteenth street where the house of Eimer and Ammend, wholesale chemists was located. A middle-aged man in a whitelinen duster and old cap from underneath which protruded a stubby pencil, looked up and said "Yes, sir? What I can I do for you?"

"Got any cerussite?"

"Sure, how much do you want?"

"How much is it?" I asked, thinking of that little black hunk worth fifty dollars.

"Seven cents a pound."

"Let me have five pounds, then." He then disappeared and shortly returned with a paper bag full of the stuff.

I could hardly wait until I got back on board *Aloha*. Then the blow fell. Upon opening the bag I soon discovered I had been tricked. Or so I thought! The stuff in the bag was very friable and was mostly dust! When I dumped it all out, however, I saw a couple of hunks about the size of a walnut. It was the same color as the small pieces -- a miserable dirty yellowish gray. The larger of two pieces. I cracked open with a steel belying pin and Lo and Behold! Inside was a dark gray nugget about the size of a hazelnut. I then broke open the other chunk but there was nothing inside.

In no time at all, with the help of the ship's carpenter, I had mounted up five crystals in little brass cups, using silver amalgam. Then came the test. All five were good, equally as good as or a little better than the best galena and apparently as stable as silicon, in the presence of a 1-kW spark.

Next morning I went back down town to show them to Mr. Bucher. He was fiddling with one when I walked in. I rolled them out on his desk and he picked one up, whipped a hand magnifier out of his drawer and "demanded" where I had gotten them. "No problem," I said, "Eimer and Ammend has them uptown for seven cents a pound." Without a word, he grabbed his derby hat, swept out of the office and headed uptown, only stopping long enough to get some kind of paper from Mr. Galbraith.

I didn't wait around for him to return. Several days later I heard the news. He had bought out their entire supply of cerussite -- but it was *all* dust, and there was not another piece (nugget)

*Curator, ARRL Museum.

(Continued on page 101)

Digital Personality

BY EDWARD L. RAUB, JR.,* WIRAN

OVER the years I've found an amazing number of individuals prominent in industry who were amateurs at one time. Many left the hobby when they ceased to find new friends and continuing challenge. That is not surprising when you consider the "807 mentality" evidenced in a classical QSO: "The rig here is . . . PSE QSL . . . 73 AR." This comes about naturally as a result of the learn-by-example process (remember the Novice Accent?) while we are distracted by the learning of Morse and procedure, and it is hearteningly avoided only by an interesting minority.

It is time that we took a clear-cut step to brighten the picture. The value of our contest communications is suspect when you try to equate the effort and capital expended with the paucity of information actually communicated! It is ludicrous. When every log entry is "5NN," everyone is a loser.

The great tragedy of amateur radio is that we, alone among the avocations, have the capacity to meet hundreds of different kinds of people, yet we succeed in making so few true friendships. The stumbling block is the introduction process. It does not probe deeply enough for us to discover what the other fellow is really like.

In an effort to remedy this, I would like to propose that ARRL Hq. introduce via the

* 207 Thames St., New London, Conn. 06320

medium of the ARRL DX Contest a new message format which actually communicates considerable desirable intelligence and which is not limited by language barrier. Please note that there is no loss from the present system (RST-STATE), only a gain.

A typical exchange might be: 9CT 3378

In our much-abused RST system, the R and T are superfluous. I write only the S in the log. Don't you? With judicious re-defining we could have an even more useful Signal reporting system with only one digit.

It might look like:

- S9 One of 2 or 3 loudest signals on band
- S8 Loud ("first-layer signal")
- S7 Outstanding signal from your area at this time. This might apply to a 559 VU2, too!
- S6 Good average signal, fully readable
- S5 Readable but with difficulty
- S4 Difficult to read (could mean RST 499)
- S3 Defective signal
- S2 Seriously defective signal
- S1 This is not a QSO. (Wish we had this one now!)

In daily use, an RST 579 would be sent as *S6*,—far faster and more meaningful report. Concise, efficient.

TABLE I

4-Digit Serial Chart

First Digit (Personal)	Second Digit (Industry)	Third Digit (Job area)	Fourth Digit (Other interests)
0 YL	0 Education	0 Retired	0 The Water
1 Single	1 Agriculture	1 Student	1 Music
2 Young married	2 Electronics	2 Service	2 The sky
3	3 Other sciences	3 Research	3 Sciences
4	4 Industry	4 Promotion	4 Philately
5 OM	5 Law	5 Management	5 Growing things
6 XYL	6 Medicine	6 Government	6 Literature
7 G'father	7 Government	7 Military	7 Travel
8 G'mother	8 Transportation	8 Production	8 The Great Outdoors
9 G'g'father	9 See Table II	9 Homemaking	9 (Team) sports

- Definitions must be broad. E.g., "growing things" covers ant colonies, African violets, and pet cheetahs.
- A fellow might well describe himself several ways and different descriptive serials in successive contacts.
- There is no rule which says his choice cannot be tongue-in-cheek. Note the "wild" combinations possible.
- Particularly notice that this scheme gives a description which only hints. It does not label a man a (-72-) post carrier but places him under government service. This includes the President of the United States. Hence, it piques the curiosity.
- If this were to catch on, I'll bet you'd shortly find serials printed on QSLs!
- Can you imagine the QRM if an 0912 turned up?!

TABLE II

Alternates for Third/Fourth Digits

- 01 Prizefighter
- 02 General Practitioner
- 03 Fireman
- 04 Auto mechanic
- 05 Gambler
- 06 Loan shark
- 07 Real estate promoter
- 08 Tribune
- 09 Miss America
- 10 Novelist
- 11 Banker
- 12 Oil tycoon
- 13 Mad scientist
- 14 Jeweler
- 15 Evangelist
- 16 Gold miner
- 17 Lama
- 18 (Etc. through 99)

Amateurs used to be noted for their resourcefulness in truncating messages. There hasn't been a widely adopted new abbreviation in years. Why not adopt Zip-code two-letter state abbreviations for uniformity and efficiency? The old-timers should have no difficulty in identifying MI in W8, as the call sign is a big hint. Further, I've always felt "put upon" in having to send C O N N when my competition just 17 miles east can send R I twice in the same baud count. Send CONN 1500 times in a week end, and the Rhode Islander has a real advantage.

Getting back to the exchange — 9CT 3378 —. The four-digit serial is where the fun lies. What do people like better than talking about their interests? Perhaps learning about others? The 4-digit serial would be designed to impart a veritable resumé to your QSOee, detailing age group, family status, job area, secondary avocation, and perhaps sense of humor.

After you have made up your "resumé" from the enclosed chart, if you were busily swapping numbers in a contest and OK1GT popped up, sending the same descriptive serial as yours, wouldn't you be darned interested to learn more about the man? I think so. This breaks the ice with a resounding crunch. What is more, I am certain that this format would quickly be adopted for day-to-day QSO use. It is so handy.

Please realize that this is only preliminary thinking. To be well accepted, the coding would have to be worked out carefully.¹ However, if you recognize the potential for getting past the 807-mentality block on a large scale, you see what it could do for amateur radio.

Here is an opportunity for ARRL to break some new ground at little expense, spice up the deadening monotony of the average QSO and put new interest into the very root of the hobby.

QST

¹ An excellent assignment for the Contest Advisory Committee.

Cerusite

(Continued from page 99)

of the real thing! How lucky can one get? Bucher never mentioned the incident, although he accepted one of my five for "test" purposes.

I incorporated one of them in my own receiver and it was just peachy. Ran rings around the old Type-D tuner and carborundum, needless to say. A little bias, about half a volt seemed to improve it, too. All in all, I believe it was the best crystal detector up until the day of modern diodes, such as the 1N34. Cerusite was extensively used by the U.S. Navy and other services.

It took me quite a long time to finally solve the mystery of its appearance inside a clunk of the common variety. Reading extensively, I found that frequently, cerusite changes into galena in the common form. But this was not galena. A drop of weak acid on cerusite reacts violently. No reaction on galena. Then why the blackish crystalline form of cerusite instead of the usual galena? It turns out that the type suitable for crystal detectors is a "pseudomorph" or false form. It is quite rare.

Anyone got a piece of cerusite? We need one for the ARRL Museum!

QST

 **Strays** 

160-Meter Maestros

A recent visit by K4CQN (ex-W2EQQ) indicated that a lot of you 160-meter buffs would be interested in a listing of those calls qualifying for 160-meter WAS over the years.

The very first one earning a 160-meter WAS was W4EEE on Feb. 12, 1937, followed in December of that year by W5GKZ. The calls in bold-face type indicate holders of a 50-state variety.

- 1937 **W4EE** W5GKZ, 1939 W4FNC W8RHZ, 1940 W3HXV W4DID W4EWP W5FUA W5IML W9BZT W9GGX W9ZGX, 1941 W2EQQ W2LPR W3HTJ W8UDP W8UUV W9HBR W9LPQ W9MRO W9NRN W9PRZ, 1946 W1LGZ, 1955 W2QHH W8GDQ W0KOK, 1958 W9NH, 1959 W0GBV, 1966 **W1BB**, 1967 **W2EQS** W0GDH, 1969 W3DPJ.

DO MEMBERS
OF YOUR HOUSEHOLD
KNOW HOW TO TURN
OFF THE POWER -
AND HOW TO APPLY
RESUSCITATION



Operating News

GEORGE HART, WINJM,
Communications Manager

ELLEN WHITE, WIYYM,
Deputy Comms. Mgr.

DXCC: ROBERT L. WHITE, WICW
Training Aids: GERALD PINARD

Administration: LILLIAN M. SALTER, WIZJE
Public Service: WILLIAM O. REICHERT, WA9HHH

CQ Rag Chew. In these days of high-speed, high-pressure contacts with some award, certificate or contest objective in mind, it often seems that the gentle art of rag-chewing is being forgotten in all the noise and trampling. WA6NPB, in a letter written some time ago, tells of an incident one night on 40 cw when he wanted to chew the rag with someone, so he sent out a "CQ RC" call. WA7GPF answered and wanted to know does RC by any chance mean you want to chew the rag, or is it a radio club? When WA6NPB affirmed that it meant the former, a pleasant 50-minute ragchew ensued.

One of the League's most popular certificates is the RCC certificate. RCC stands for "Rag Chewer's Club." The club is not exclusive (during 1968 over 10,000 "membership" certificates were issued by the headquarters) and requirements are simple. Just write to headquarters and report a ragchew with another amateur that lasted a half hour or more, and your certificate will be forthcoming. A real, honest-to-goodness friendly conversation between amateurs, not a half-hour exchange of message traffic or participation in a roundtable or net. You might call the RCC award an introduction to the fraternal side of amateur radio — and at the same time an introduction to ARRL service to amateurs, a sort of "basic award." If you don't already have one, hook up with some other ham on the air, engage him in friendly conversation for a half hour and let us know about it.

Bill (WA6NPB) seemed to feel that amateurs calling CQ should have some means of identify-

ing their purpose. On phone, you often hear them calling CQ "for a short contact," which usually means they want to check out their rig or something. CQ without any qualifications means "general call to any amateur," with the implication that you are interested simply in making a contact. Variations are CQ DX, CQ SS, CQ FD and a number of others all meaning, in effect, "Gimme a number, copy my number, then get outa my way." Why not some designator officially indicating that you want to have a friendly chat and are in no hurry? Bill suggests "CQ RC" on c.w. and of course this would come out "CQ Ragchew" on phone.

Good idea? How about if RCC members send CQ RC and sign RCC before the K on cw, and on phone "CQ Ragchew" and "I am a certified ragchewer" before standing by? Shall we get more of the fraternal feeling back into our on-the-air activities now that the annual "peace on earth, good will toward men" season is on us?

Morning Qualifying Run. Depending on exactly when you get this issue of *QST* (blame the PO, not the HQ!) you may or may not have missed a "first" — the first WIAW morning code proficiency qualifying run. It takes (took) place on Dec. 10 at the usual time and on the usual frequencies, see announcement, page 101, Nov. *QST*. If the response is as good as the response to the early morning code practice (never knew there were so many of you early birds!), we'll be doing this occasionally, perhaps on a quarterly basis. So even if you have a crack at it and flop miserably, let us know you were trying so we can

OPERATING EVENTS (Dates in GMT) ARRL-IARU-SCM-Affiliated Club-Operating Events

December	January	February
3 Qualifying Run, W6OWP	8 Qualifying Run, W6OWP	4 Qualifying Run, W6OWP
6-7 Connecticut Towns 7-11 QSO Party, p. 118 Nov.	10-11 VHF SS, p. 64	7-8 DX Competition phone, p. 62
6-8 Nevada QSO Party, p. 126 Nov.	14 Qualifying Run, WIAW	12 Qualifying Run, WIAW
10 Morning Qualifying Run, WIAW	17-18 Louisiana QSO Party	14 Frequency Measuring Test
16 Qualifying Run, WIAW	17-19 CD Party, cw*	14-15 YL/OM Contest, phone
21 Tennessee QSO Party, p. 120	21-25 1 Simulated Emergency Test	21-22 DX Competition cw, p. 62
	24-26 CD Party, phone*	28-Mar. 1 YL/OM Contest, cw
	Arkansas QSO Party	
	31-Feb. 2 OOTC QSO Party	
	*League officials and appointees, only	

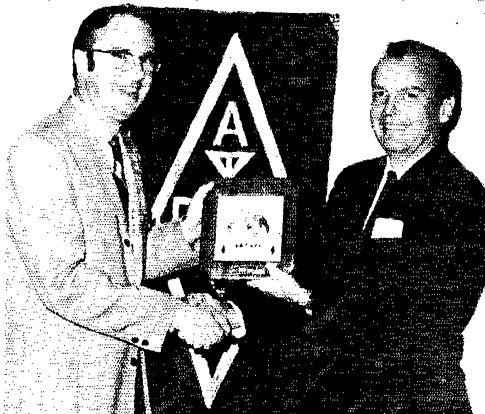
NOTE: Possible W6OWP Qualifying Run "alternate" (same schedule) is W6ZRJ.

judge how often such early-morning runs are worthwhile.

Ready for that 5BWAS? Yes, that's what we said, 5BWAS! It stands for "Five-Band Worked All States" and is a new award that will be issued by headquarters as soon as someone qualifies for it by submitting verification of contact with amateurs in 50 states on each of five amateur bands. The starting date is Jan. 1, 1970. Full rules are in Oct. '69 *QST*, page 51. Those of you who had fun getting that WAS award, and getting it endorsed for cw, phone, single bands or what-have-you (we'll endorse 'em for just about anything!) can now start over on each band and eventually wind up with that coveted plaque to hang on the wall alongside all your other certificates and your ARRL Life Member plaque and 5BDXCC plaque.

We have a sneaking suspicion that amateurs in Nevada, Utah, Vermont, R.I., Alaska and Hawaii are going to increase in popularity all of a sudden after Jan. 1!

Member Input to the CAC. The Contest Advisory Committee is the ARRL Board-of-Director-sponsored committee consisting of nine prominent contest-oriented amateurs, a director liaison and a headquarters liaison, to advise the Communications Manager on contest matters, especially rules. It has already made a number of recommendations, one of which was tried out last month in the annual Sweepstakes contest. A number of other matters are under consideration. These committee members were chosen because of their astuteness and participation in contests



5BDXCC Nr. 1

Thanks to W4PED and his trusty camera we're able to show the presentation of the very first 5BDXCC Award. On the left is the recipient Bob Eshleman, W4QCW being handed the award by another first-class DXer, League proxy W0DX. The scene is the Roanoke Division Convention, mid-October in Huntington, West Virginia.

and are capable of sound judgment in submitting these recommendations to headquarters, but they are not supermen and, as they would be among the first to admit, are capable of being wrong, especially when members interested in contests don't let them know which way the wind blows. We understand membership input has been infinitesimal and that more direct contact between committee members and contest participants is not only desired but required.

How about it, you contesters? Get in touch with your nearest CAC member, let him know how you feel on any matter concerning ARRL contests. Here, again, are the committee members: W1AX, K2CPR, W3GRF, W4BRB, W6CUF (Chmn.), W8DB, W9RQM, W0SDC, VE2NV. Director liaison, W4KFC. Headquarters liaison, W1YYM. Now we ask you, how could you dream up a better contest brain trust than that?

Staff Note. Just to keep up to date for posterity, let it be recorded that Bill Parkinson, K6OSO, joined the CD staff as a W1AW attendant in March, '69 and departed in Sept. '69. So long, Bill, and lots of luck. The job is once again "up for grabs," as the saying goes. What we need is an extra-class amateur, young, single, enthusiastic, well-versed technically, who likes to meet people (mostly other hams). The right man will be permitted to operate those big kilowatt rigs (imagine!).

Also, although it may be jumping the gun slightly, coming from Hanford, Calif. to assist W1CW in the burgeoning DXCC Branch is Ron Hill, K6OZL. Ron has not yet arrived at this writing, but is expected shortly. He has traveled all over the world in the Navy and has been licensed for eleven years, mostly working DX from one place or another, so we're expecting great things of him. — W1NJM.

RESULTS SEPTEMBER FREQUENCY MEASURING TEST

The September 13, 1969 FMT, open to all amateurs, brought entries from 173 participants who made a total of 820 measurements. Of these 75 ARRL Official Observers submitted 322, and 98 Non-OOs made 498 readings. All Observers have received individual reports of their readings. The standings accredited to the more precise in each group appear below; all listed show ability of the highest order in Frequency Measurement.

Following is a report of the standings of the FMT leaders in this test. In consideration of the minimum possible error, due to 'doppler' and unavoidable factors, we accredit as of equal merit all reports where computations show 4/10ths parts per million or higher accuracy. Our direct comparisons with the umpire's readings otherwise establish this order of listing.

January *QST* will announce details on the February 14 ARRL FMT.

Observers	Parts/ Million	Non- Observers	Parts/ Million
W1BGW W3BFF		W1PLJ WA2BXX	
W4CMP W4JUI		K2HWS K3LPP	
W4NTO W6RG		W4TEW W6AAL	
W7UXZ W8GRG		WA6PLV/5 W7EJD	
(0 to 4)		W8LZY W8NWU	
W5KYD.....1.2		W9BCY W9MNY	
WA4OSR.....1.5		VE2HL VE3CUS	
W3CSZ.....1.8		R. Ireland	
W0BF.....2.1		(0 to 4)	
K9WMP.....2.3			
K9GDF.....3.2			
VE6HM.....3.2			

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for September Traffic:

Call	Orig.	Recd.	Rel.	Del.	Total
K6BPI	4968	799	715	84	6566
W3CUL	428	1793	1501	279	4001
W7BA	2	906	851	50	1809
K5BNH	5	825	755	29	1614
K0ONK	115	582	563	24	1284
K5TEY	5	603	603	0	1211
W6RBY	11	544	425	116	1096
W01CX	15	538	454	24	1031
W3VR	121	387	381	19	808
W9UEM	18	398	345	56	817
WA7HKR	0	400	376	18	794
WA60XE	66	318	288	96	768
W6VNG	20	347	334	1	702
K9IVG	6	335	320	5	667
W3EML	22	330	251	2	605
WA0THQ	60	272	235	37	604
K9FZX	4	294	290	3	591
W8UPH	5	281	240	40	566
WB6BBO	8	247	301	5	561
W3MPX	115	231	174	8	528
W7DZX	7	286	230	3	526
Late Reports:					
WA5UEG (Aug)	485	755	310	85	1635
W5LLB (Aug)	299	1013	1	277	1590
WA9VZM (Aug)	17	291	294	7	609
WA4SCK (Aug)	37	238	227	4	506

More-Than-One Operator Station

Call	Orig.	Recd.	Rel.	Del.	Total
WA4ECY (Aug)	317	875	816	59	2067

RPL for 100 or more originations-subs deliveries

K9NBH 381	WA7AXT 120	W8DIL 108
WIGES 219	WA6BYZ 115	WA0VTD 106
W6MLF 219	K1BCS 112	W3TN 105
K0JMF 151	W2OE 111	WA1LE 103
K4YZU 130	WA3HTV 110	WA3HGK 102
W8QCTU 126	WA8DWL 109	
WA0VAS 125		

More-Than-One Operator Station

Call	Orig.	Recd.	Rel.	Del.	Total
K0NEB 471	WA0RLL 167	Late Report:			
W1HFM 186	W4FQP 104	K3HKK (Aug) 124			

RPL Medallions (see July, 1968 QST, p. 99) have been awarded to the following amateurs since last month's listings: WA5FII, WA8UPI, W9ICU, W9FWH, W0LXA, K0ZZR, K17PLS.

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 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.

East Bay	Paul J. Parker, WB6DHH	Sept. 2, 1969
Santa Barbara	Cecil D. Hinson, WA6OKN	Sept. 2, 1969
Manitoba	Keith Witney, VE4EI	Oct. 10, 1969
Vermont	E. Reginald Murray, K1MPN	Oct. 17, 1969
Hawaii	Lee R. Wical, KH6BZF	Nov. 11, 1969
Oklahoma	Cecil C. Cash, W5PML	Dec. 11, 1969
Illinois	Edmond A. Metzger, W9PRN	Dec. 15, 1969
Western Florida	Frauk M. Butler, Jr., W4RKH	Dec. 15, 1969

In the Virginia Section of the Roanoke Division, Mr. Robert J. Slagle, K4GR, Mr. William M. Holland, WA4EUL, and Mr. Albert E. Martin, Jr., W4THV, were nominated. Mr. Slagle received 287 votes, Mr. Holland received 268 votes and Mr. Martin received 245 votes. Mr. Slagle's term of office began Oct. 11, 1969.

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 two years immediately prior to nomination. Petitions must be received 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 memberships 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 names of all eligible candidates.

The following nominating form is suggested. (Signers should be sure to give city, street address and zip code.)

Communications Manager, ARRL [Place and date
225 Main St., Newington, Conn. 06111

We, the undersigned full members of the.....
.....ARRL Section of the.....
Division, hereby nominate.....
as candidate for Section Communications Manager for
this Section for the next two-year-term of office.

You are urged to take the initiative and file nominating petitions immediately.

--- George Hart, W1NJM, Communications Manager

Section	Closing Date	SCM	Present Term End
Southern			
New Jersey	Dec. 10, 1969	Edward G. Raser	Mar. 4, 1970
Canal Zone	Jan. 2, 1970	Russell L. Oberholtzer	Nov. 10, 1969
Ontario	Jan. 2, 1970	Roy A. White	Dec. 12, 1969
Maritime	Jan. 9, 1970	William J. Gillis	Mar. 11, 1970
Georgia	Jan. 9, 1970	Howard L. Schonher	Mar. 26, 1970
Ohio	Jan. 9, 1970	Richard A. Egbert	Mar. 28, 1970
Connecticut	Feb. 10, 1970	John J. McNassor	Apr. 11, 1970
Saskatchewan	Feb. 10, 1970	Gordon C. Pearce	Apr. 11, 1970
Nebraska	Mar. 10, 1970	V. A. Cashon	May 29, 1970

A.R.R.L. AFFILIATED CLUB HONOR ROLL

Each year, from the data given in or supplementing the annual affiliated club questionnaire (CD-18), we send out special certificates and make a special listing of those clubs all of whose members are members of ARRL. The first such listing appeared in June QST (p. 101). We are happy herewith to present the second listing of clubs who qualify as "100% ARRL Clubs."

Next February we plan again to forward to every affiliated club on the "active" list a questionnaire form for filing new data. How about putting your club on this honor-shrouded 100% list?

Amateur Radio Technical Society of St. Louis, Missouri.
Anderson Radio Club, Anderson, S. C.
Beacon Radio Amateur's Club, Philadelphia, Pa.
Fountain City Radio Club, Fountain City, Tenn.
Golden Triangle DX Club, Seminole, Florida
Kings County Radio Club, Brooklyn, N. Y.
Loudon County Amateur Radio Club, Lenoir City, Tenn.
Mt. Vaca Radio Club, Rio Linda, Calif.
Murphy's Marauders, New Britain, Conn.
North Alabama DX Club, Huntsville, Ala.
Scarboro Amateur Radio Club, Toronto, Ont., Canada
South St. Louis Radio Club, St. Louis, Mo.
St. Louis Amateur Radio Club, Inc., St. Louis, Mo.
The Orange Amateur Radio Club, Inc., Orange, Texas
Victor Valley Amateur Radio Club, Victorville, Calif.
West Jersey Radio Amateurs, Burlington, N. J.
York Amateur Radio Club, York, Pa.

CLUB COUNCILS AND FEDERATIONS

Canadian Amateur Radio Federation, The, Mr. K. Rolison, VE3CR, Secy., 53 Westgeln Cres, Islington, Ontario, Canada.

Chicago Area Radio Club Council, Inc., Mr. Karl A. Kopitzky, K9AQJ, Secy., 1052 Loyola Avenue, Chicago, Illinois 60626.

Council of Connecticut Amateur Radio Clubs, Mr. James W. Parker, K1VII, Secy., 17 W. Main St., Niantic, Connecticut 06357.

Federation of Eastern Massachusetts Amateur Radio Assn., Mr. Eugene H. Hastings, W1VRK, Secy.-Treas., 28 Forest Avenue, Swampscott, Massachusetts 01907.

Hudson Amateur Radio Council, Mr. Fred J. Brunjes, K2DGI, Secy., 22 Ivy Drive, Jericho, New York 11753.

Michigan Council of Amateur Radio Clubs, Mr. Harold W. Bowers, W8CRP, Secy., 911 Edison Ave., Lansing, Michigan 48910.

Ohio Council of Amateur Radio Clubs, Mr. James W. Benson, W8OUU, Secy., 2463 Kingspath Dr., Cincinnati, Ohio 45231.

San Diego County Amateur Radio Council, Mrs. Louise Davis, W6NSR, Secy., 150 South Anza, 103, El Cajon, Calif. 92020.

W6OWP (W6ZRJ, alternate) will transmit a qualifying run on 3590 and 7129 kHz, 0500 GMT December 3. (In converting, 0500 GMT December 3 becomes 2100 PST Dec. 2.)

Code Practice

W1AW transmits daily code practice according to the following schedule. For practice purposes, the order of words in each line may be reversed during the 5-13 w.p.m. transmissions. (Each tape carries a checking reference.)

Speeds	Local times/days	GMT times/days
10, 13, 15	7:30 P.M. EST daily 4:30 P.M. PST	0030 daily
5, 7½, 10, 13, 20, 25	9:30 P.M. EST (SuTTh 6:30 P.M. PST (Sat	0230 MWFSn
"	9:00 A.M. EST MWF 6:00 A.M. PST	1400 MWF
35, 30, 25, 20, 15	9:30 P.M. EST MWF 6:30 P.M. PST	0230 TThSat
"	9:00 A.M. EST TTh	1400 TTh
"	6:00 A.M. PST	

ARRL CODE PROFICIENCY PROGRAM Qualifying Runs

Any person can apply for an ARRL code proficiency award. Neither League membership nor 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 (10-35 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. Each month the ARRL Activities Calendar notes the qualifying run dates for W1AW, and W6OWP (W6ZRJ, alternate) for the coming 3-month period.

W1AW will transmit a qualifying run on all listed cw frequencies at 1400 GMT December 10. (In converting, 1400 GMT Dec. 10 becomes 0900 EST/0600 PST Dec. 10.)

W1AW will transmit a qualifying run on all listed cw frequencies at 0230 GMT December 16. (In converting, 0230 GMT December 16 becomes 2130 EST December 15.)

The 0230 GMT practice is omitted four times a year on designated nights when Frequency Measuring Tests are made in this period. To permit improving your list by sending in step with W1AW (but not over the air!), and to allow checking the accuracy of your copy on certain tapes, note the GMT dates and texts to be sent in the 0230 GMT practice on the following dates:

- Date Subject of practice text from October QST
 Dec. 10: *It Seems to Us*, p. 9
 Dec. 18: *Amateurs' M and Repeaters*, p. 11
 Dec. 22: *ARRL Awards*, p. 50

- Date Subject of practice text from *Understanding Amateur Radio*, First Edition
 Jan. 5: *Beam Antenna Gain*, p. 117
 Jan. 9: *Workshop and Test Bench*, p. 119

QST

W1AW SCHEDULE, DECEMBER 1969

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 1 P.M.-1 A.M. EST, Saturday 7 P.M.-1:00 A.M. EST and Sunday 3 P.M.-11:00 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 December 25-26 and January 1, in observance of Christmas and New Year's Day.

GMT*	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0000					RTTY OBS ^{3,7}		
0030	← CODE PRACTICE DAILY ¹ 10-13-15 w.p.m. →						
0100					C.W. OBS ¹		
0120-0130 ⁴			3.700 ⁵	7.020	3.520	7.150 ⁵	7.020
0130			3.700 ⁵	7.080	3.555	7.150 ⁵	7.080
0200					PHONE OBS ²		
0205-0230 ⁴			3.820	50.120	145.600	1.820	3.820
0230	← CODE PRACTICE DAILY ¹ (35-15 w.p.m. TThSat), (5-25 w.p.m. MWFSn) →						
0330-0400 ⁴			3.555		1.805		3.555
0400	RTTY OBS ³				RTTY OBS ³		
0410-0430 ⁴			3.625	14.095	7.095	14.095	3.625
0430	PHONE OBS ²				PHONE OBS ²		
0135-0500 ⁴			7.220	3.820	7.320	3.820	7.220
0500	C.W. OBS ¹				C.W. OBS ¹		
0520-0530 ⁴			3.700 ⁵	7.020	3.945	7.150 ⁵	3.520
0530-0600			3.700 ⁵	7.080	3.945	7.150 ⁵	3.555
1400	← CODE PRACTICE ¹ (5-25 w.p.m. MWF), (35-15 w.p.m. TTh) →						
1800-1900		21/28 ⁵	21/28 ⁵	21/28 ⁵	21/28 ⁵	21/28 ⁵	
1900-2000		14.230	7.255	14.280	7.255	14.280	
2000-2100		14.280	21/28 ⁵	14.095	21/28 ⁵	7.080	
2130-2230		14.100	14.280	14.100	14.280	14.100	
2230-2330		7.255	21/28 ⁵	21.1 ⁶	21/28 ⁵	7.255	

¹ CW OBS (bulletins, 18 wpm) and the code practice on 1.805, 3.52, 7.02, 14.02, 21.02, 28.02, 50.02, and 145.6 MHz.

² Phone OBS (bulletins) 1.82, 3.82, 7.23, 14.22, 21.27, 28.52, 50.12, and 145.6 MHz.

³ RTTY OBS (bulletins) 3.625, 7.095, 14.095, 21.095 and 29.015 MHz.

⁴ Starting time approximate. Operating period follows conclusion of bulletin or code practice.

⁵ Operation will be on one of the following frequencies: 21.02, 21.08, 21.27, 21.41, 28.02 or 28.52 MHz.

⁶ W1AW will listen in the Novice segments for Novices, on the band indicated, transmitting on the frequency shown.

⁷ Bulletins sent with 170-Hertz shift, repeated with 850-Hertz shift.

Maintenance Staff; W1s QIS WPR. * Times-days in GMT. Operating frequencies are approximate.

DX Century Club The following list contains the call letters and country totals of holders of the DX Century Club Award who have submitted confirmations to ARRL Headquarters for the period from October 1, 1967 through September 30, 1969. New Members in DXCC for the period from September 1, through September 30, 1969, also appear in this list. DXCC members qualifying for the Honor Roll appear in the Honor Roll list below. Since the necessary space to run the complete DXCC Roster is not available (the total number of DXCC certificates issued as of September 30, 1969 was 15,467), this list contains only the calls and totals of those who have shown an active interest in their DXCC rating over the indicated 24 month period.

Honor Roll

The DXCC Honor Roll consist of the top ten numerical totals in the DXCC. Position in the Honor Roll is determined by the first number shown. The first number represents the participant's total countries less any credits given for deleted countries. The second number shown represents the total DXCC credits given including deleted countries. All totals shown represent submissions received through September 30, 1969.

DL1IN.....321/339	WBKIA.....319/345	W2QKM.....317/337	W6REH.....316/324	W1CBB.....314/331
G3FKM.....321/340	W8NGO.....319/338	W2PV.....317/321	W6SQP.....316/333	W1JNV.....314/333
H9BJ.....321/347	W8PHZ.....319/336	W2RDD.....317/333	W7ENW.....316/342	W2FZY.....314/329
W4VPD.....321/340	W8WQ.....319/338	W2WVG.....317/330	W7IQ.....316/326	W2NO.....314/320
W5ABY.....321/340	W0MLY.....319/337	W2YY.....317/327	W8CJ.....316/325	W2QJD.....314/323
W6AM.....321/348	W0QGI.....319/337	WA2XS.....317/335	W8RN.....316/336	W3MO.....314/321
W7GUV.....321/346	W0SJR.....319/339	WA2RAU.....317/320	W9ILW.....316/325	W4AAU.....314/335
W8BF.....321/344	CE3AG.....318/344	W3GRS.....317/331	W9RCJ.....316/330	W6ANN.....314/336
W8JBF.....321/342	DL3RK.....318/337	W3NKM.....317/336	W0AII.....316/333	W6BSY.....314/332
W0BW.....321/344	W6EN.....318/335	W3RNO.....317/337	Z1HY.....316/342	W6FZY.....314/317
G8KS.....320/340	K2BZT.....318/337	W4BYU.....317/337	G8GBX.....315/334	W6HYG.....314/328
H9MQ.....320/340	K4TWF.....318/326	W4MR.....317/338	DJ2BW.....315/334	W8DE.....314/317
OE1ER.....320/344	K6EC.....318/334	W4TM.....317/341	G2BVN.....315/335	W0LWG.....314/328
VE2NV.....320/339	LU4DMG.....318/336	W5AO.....317/338	G5VT.....315/338	YV5AB.....314/335
W1GCK.....320/347	PA0FX.....318/340	W5GR.....317/339	H9VTL.....315/333	YV5BOA.....314/317
W2CTO.....320/342	W1BAN.....318/333	W6ID.....317/338	K1SHN.....315/321	K8AIM.....313/329
W2NUT.....320/338	W1CKA.....318/330	W6RKP.....317/333	K4IKC.....315/329	K4PDV.....313/329
W3GAW.....320/345	W1CLX.....318/343	W6OOP.....317/324	K8L8G.....315/328	K6EV.....313/317
W4GXB.....320/343	W1DK.....318/337	W7GNM.....317/336	K0EZH.....315/319	K9BGM.....313/316
W4OM.....320/344	W1FZ.....318/339	W8ONA.....317/335	KP4RK.....315/327	K9CE.....313/324
W4PL.....320/337	W1GYE.....318/335	W8OJR.....317/336	L47Y.....315/339	PY3CO.....313/316
W5POA.....320/340	W2AGW.....318/344	W8YCP.....317/330	VE3CFG.....315/331	PY3SO.....313/316
W6BZE.....320/342	W2CP.....318/326	W9HB.....317/334	W1HH.....315/328	W1GT.....313/318
W6CYV.....320/340	W2DXX.....318/326	W9HUZ.....317/339	W2CH.....315/335	W2TQC.....313/334
W6EPT.....320/343	W2JVU.....318/341	W9SFR.....317/333	W2PN.....315/331	WB2HXD.....313/316
W6KZL.....320/338	W2PC.....318/337	W9YFV.....317/343	W2GQN.....315/318	W3DJZ.....313/323
W6PT.....320/339	W2RGV.....318/336	W8MO.....317/332	W2IG.....315/329	W4TC.....313/320
W6ZO.....320/343	W2SAW.....318/337	W0PNO.....317/341	W2QHH.....315/338	W4VU.....313/335
W7AC.....320/346	W2SSC.....318/336	DL7AA.....316/340	W2YTH.....315/335	W4SSU.....313/323
W7AOB.....320/334	W2SUC.....318/337	DL7BA.....316/335	W2ZBG.....315/332	W5AFX.....313/340
W7GBW.....320/346	W2TF.....318/329	G2BZO.....316/336	WA2ELS.....315/321	W5HDS.....313/332
W8JIN.....320/347	W2ZX.....318/339	G3HGT.....316/329	W3EGR.....315/334	W5HE.....313/316
W8MPW.....320/340	G3HDA.....316/330	G3HDA.....316/330	W4RLS.....315/321	W6CFY.....313/334
W8UAS.....320/343	W4ML.....318/340	G3IVJ.....315/333	W5CB.....315/326	W6ED.....313/336
W9NDA.....320/346	W5KBU.....318/338	JA1BK.....316/326	W5KTV.....315/321	W6PUY.....313/336
G4MJ.....319/338	W6CUO.....318/345	JA1DM.....316/333	W5OGS.....315/333	W6YY.....313/335
K4LNM.....319/335	W6DZ.....318/333	K1IXG.....316/325	W5OLG.....315/338	W6EPO.....313/320
K4TJL.....319/339	W6GFB.....318/341	K2LWR.....316/331	W5URK.....315/331	W7ADS.....313/332
K7GCM.....319/329	W6WY.....318/327	K4AN.....316/339	W6WZC.....315/331	W6CFY.....313/338
LU6DJX.....319/345	W6NJU.....318/334	K6VVA.....316/327	W6WFL.....315/319	W8DM.....313/335
ON4DM.....319/340	W6OSU.....318/332	K9KYF.....316/326	W6LNL.....315/337	W9JUV.....313/335
PY2CK.....319/344	W6TA.....318/334	K9LUI.....316/325	W6ZJY.....315/321	4X4DK.....313/333
W1BHH.....319/345	W6UOV.....318/334	K3KUB.....316/341	WA6GLD.....315/318	DJ7ZG.....312/315
W1EX.....319/341	W6VY.....318/327	W1AZY.....316/333	W8EVZ.....315/320	G2PL.....312/337
W1WV.....319/338	W7CMO.....318/330	W1YH.....316/341	W8KIT.....315/323	G3D.....312/336
W2BQM.....319/334	W8WZ.....318/342	W2CR.....316/335	W8KPL.....315/335	K6YRA.....312/316
W2WZ.....319/344	W8ZCO.....318/334	W2FXA.....316/331	W9AMU.....315/333	ON4NC.....312/335
W3KT.....319/345	W9DWO.....318/333	W2GKZ.....316/320	W9GIL.....315/334	W1FH.....312/340
W3LMO.....319/334	W9GFF.....318/333	W2HTI.....316/334	W9WYB.....315/331	W2DOD.....312/332
W3WGH.....319/336	W9LNM.....318/343	W2LX.....316/335	W0LW.....315/321	W2UYE.....312/332
W4AIT.....319/344	W0DU.....318/342	W2LV.....316/337	W0NLY.....315/335	W2ZTV.....312/314
W4BJ.....319/333	W0ELA.....318/343	W2OM.....316/333	DL1KB.....314/335	W4LY.....312/334
W4LRN.....319/333	W0PGL.....318/336	W3AFM.....316/328	ILAMU.....314/335	W4RBZ.....312/317
W4OPM.....319/336	DL9OH.....317/330	W3CGS.....316/337	IT1TAI.....314/332	W5GJ.....312/321
W6AM.....319/345	I1Z.....317/331	W3BVW.....316/340	KZDCA.....314/333	W8ARH.....312/317
W6BAF.....319/331	K2OE.....317/335	W3LVA.....317/340	W4LW.....314/316	W8CFY.....312/319
W8MT.....319/338	K6LGF.....317/331	W3MWC.....316/332	K2YXY.....314/323	W8HGW.....312/339
DL1IN.....318/335	K8IKB.....317/330	W4AVY.....316/330	K8ONV.....314/325	W9FKC.....312/335
K4TJL.....318/329	W2BOK.....317/336	W4NFJ.....316/321	OH2NB.....314/337	W9OON.....312/315
	W2BXA.....317/343	W6OZF.....316/336	SM3BIZ.....314/333	W9TKD.....312/325
	W2RIS.....317/345	W6HOC.....316/331	VE2BV.....314/333	W0BN.....312/320
	W2THT.....317/335	W6LVC.....316/341	K4QOM.....314/339	W0QDF.....312/331
	W2JIT.....317/338	W6MVL.....316/329		

Radiotelephone

W8BF.....321/344	ON4DM.....318/339	G8KS.....317/333	W8MPW.....317/328	W2HTI.....316/333
W6GYM.....320/343	PY2CK.....318/343	K8RTW.....317/328	W9NDA.....317/339	W2PVP.....316/320
W8CZ.....320/345	W2BXA.....318/342	LU4DMG.....317/335	W0BW.....317/334	W6REH.....316/320
W4PDL.....319/331	W2PE.....318/326	T1ZHP.....317/341	DJ2YI.....316/333	W9ILW.....316/325
W6AM.....319/345	W2ZX.....318/339	W1JFG.....317/334	DL9OH.....316/329	W9NZM.....316/322
W8BAF.....319/331	W2BXA.....317/343	W1ONK.....317/335	K1IXG.....316/325	W9WHM.....316/334
W8BT.....319/338	W2RIS.....317/345	W2RGV.....317/333	K9KYF.....316/326	2E4ERR.....316/340
DL1IN.....318/335	W2PHO.....318/338	W2YV.....317/332	K9LUI.....316/326	D4.....312/336
K4TJL.....318/329	W0COM.....318/337	WA2RAU.....317/320	W1BAN.....316/330	PA0HBO.....315/330

W2EXH	315/321	I1AMU	314/335	W6ZJY	314/320	W6YYY	313/335	W3KTT	312/333
W2TJ	315/331	K6LGF	314/326	WA8AJI	314/317	WRJIN	313/330	W5POA	312/329
WA2IZS	315/324	OEIME	314/329	YV3AB	314/335	W8UAS	313/333	W6TA	312/320
W3NKM	315/333	P Y4TK	314/333	Z P5CF	314/332	G6TA	312/328	W7CMO	312/317
W3WGH	315/326	VK5MS	314/336	G5V G	313/336	K4AIM	312/328	W8HGW	312/336
W4ANE	315/332	W2BQM	314/329	G3TVL	313/328	ON4DH	312/330	W9GAA	312/317
W5CG	315/326	W4NFJ	314/319	H9TFL	313/330	W3PTE	312/331	W5AIF	312/323
W5KBU	315/334	W5EFL	314/317	K2YLM	313/315	W2VMG	312/318	4X4DK	312/332
W8QJR	315/334	W6RKP	314/325	W4OM	313/331	W2ZTV	312/314		

340	W1QJR	OE1FF	303	296	0Z7BG	273	W1SXQ	W7UVR	W8MAF	236	222	WA4LSK	W6HF	
PA0FX	W2AEB	OH1TM	K4TWK	DJ4TZ	SM5WJ	F9RM		W80MM	W5DMR	DL1MD	DL1LZ	W48RWU	W6HF	
	W6EL	VE4OX	W2FXE	W2FXE	W2LJT	K9GZK	262	253		KISLZ	K8TYO			
336	W9RKK	W1BPY	W1BWP	W50BS	W3KV	K0MAS	DJ5DA	HB9MD	244	235	LAIKI	217	E15F	
W3MP	W9XKP	W10RV	W2LQJ	W81BX	W6GB	K7ATV	K1ZSI	W6D0D	CE6GS	DL30L	LH1A1	DJ4QJ	H89A	
W4QCW	W0LJW	W1QJR	W3HTF		WA6QWN		OH2BR	W9UX	J41MN	KR6UD	PY1BTX	W40EQ	J2AJB	
		W1RLQ	W3PH	295		272	PA0FAB		E5LNN	W3WHF	SM0MC	W0FDL	VE5K	
332	319	W1UOP		I1PP	W7MX	DL8CH	W6EYR	252	W8LVA		VE2AYY		WA4G	
W0DZZ	W1DWD	W2PDB	302	K2ISP	W9LTR	K4HJE	W9BGX	DJ5AA		234	K38Y	VE3FMZ	216	WA5A
	W2CKY	W2PN	HB9MO	W4NO	281	VE3CTX		DL7EG		243	W86CIY	VE3KLZ	K7VYU	W6M1
331	W8CLR	W82CKS	HB9EL	W6TXL	F8P1	W1FPH	261	D46DCE	DL1BS	J44XW	W8AHFN	W83KX	W92KO	W8KZ
G3AAE	YS10	W3KDP	K31ZY	294	K5LLI	W3VKD	DL3ZA	PA6VO	DL1NS	W1FTX		W2BKTO		
W6AHC	ZL1AH	W4CKB	SM5BCE	W2MQ	SM6CAS		HK3RQ	W4GYP	DL3A	W4GYP	VE6APB	W8B6ED		
W1HZ		W4FR0	W2YCW		W2DDR		K1DFC	W5NGV	DL8NU	W9ZRX	W5NGV	W8HBR		
W5FFW	318	W5CP	W4DLG	292	W1HRI		K2LAF	W8GGE	HK3RQ	W92RX	W8GGE			
	W1TS	W6DQ	W60F	IRRB	W2BXC		W1DEP	W49NUQ	DL9RM	W92RX	W8GGE			
330	W7GXA	W6ISQ	W7CSW	292	SM0AJT		SP5CK		251		233			
W1RB	ZL3IS	W8DA	W7QPK	W5AG	W4EJN		W1ECH		DJ9MR	W0CYP	W41HN			
W9YSX		W9NLJ		W9DH	W51PH		W3BWZ		HP1BR	W41HN				
W0VBQ	317	W1DQJ	301	ZL3AB	W9DQ		W4RJJ		DL9RK	232				
	W2GQS	W2QJY	HB9DX		J301				DL9RK	CR6CA				
329	W4DR	W3GJY	J301	291	J301		270		K5SSZ	I1JL				
	W4BQY	W4BQC	J301	DJ0PN	J43CWV		G2GM		K5STL	K1NIE				
	W9GB	W9CB	J301	I1XK	K2JWM		K6ALH		K9ZTH	K5QVH				
328	SM3BZ	2GT	316	308	K6BFZ		K9COS		K0LFL	W38K				
W4BBR		W4BBR	K6OW	DL1HH	OH2YV		W1EWS		OE7UD	W6AO				
			SM5BPJ	W6E6TP	W2GDX		K4S8HB		VE3IR	W8QLE				
			WA2DIG	W1WY	W4AXE		W4BHG		W1BGD	W8VLC				
			W5NMA	W6ABA	W81FC		W4AGCS		W4BRE	W9EXE				
			W6VUV	WA6KNE	W8BFV		K6JPL		W4REZ	W90VF				
			W5BRR	W9WFS	W9QLD		W1RLV		W5DJ	W90W				
			W5PM	315	307		W6RUC		W82CK					
			W9WHM	K5AAD	DJ9KQ	300	W6VNV		W91GW	I1ARS				
				K7ADL	HB9JG	K2PXX	W6KNH		W4BRJ	PY4GA				
				LA5HE	J1A1N	K3HQJ	W6NUU		W4BRJ	W1A1C				
				L15AQ	K1YZW	K4RZK	W7BGH		W7RVM	W1A1C				
				OH2HB	K9WTS	K4YYL	W0GNX		W2LAA	W2LAA				
				J11HX	VE3ACD	K6EDE			W44XX	W86AU				
				K3AKA	W0UPT	K8DYZ	289		W1RVL	W82CK				
				WA2RLQ	W2WD	K9BVR	JA4BJO		W1VAN	W86AU				
				WB2FSW	W3ZYI	ON4QJ	OE1FT		W2MZV	W82CK				
				W2BKM	W3PN	W4EQE	W52VKO		W3HTO	W91GW				
				W5TIZ	W6MYM	W4UKA	SM7ANB		W3TQ	W91GW				
				W6CAE	W0YBK	W4VMS	W1OHA		W48RB	W91GW				
				W9MQK	YV5BPJ	XE1CE	W6AAQ		W48RB	W91GW				
				W0TJ	314	306	W6HWT		W5LJT	W91GW				
					W5EJT	K2KER	W2PQK		W7RVM	DJ3BB				
					W5FT	K41D	WA2HUW		W8LSO	G2TA				
					W7BA	KL7PI	W4ZKI		W9CXH	PY4P				
						W82EPG	W5QVZ		W91JL	SM5CKS				
						W5NW	W5VA		W0CAW	W01BD				
						W5PIO	W6CUP		W1AW	W1AW				
						W5ERE	W6NVI		W2FB	W2FB				
						W4UB	W7GHB		W4HBG	F8CV				
						W60ME	W0DEI		W4USQ	G2MI				
						ZS6LW	W6AFI		W46GJ	I1FO				
									W7X6A	K2DDK				
										K6JR				
										SM5AHK				
										SP4JF				
										HB9NU				
										K5AEU				
										OH2SB				
										OZ7KV				
										PY1DH				
										SM5FC				
										W2LWY				
										W4AFP				
										W6PMPK				
										W12ZF				
										W7MH				
										W7YEX				
										DL3BJ				
										HB9NU				
										K5AEU				
										OH2SB				
										OZ7KV				
										PY1DH				
										SM5FC				
										W2LWY				
										W4AFP				
										W6PMPK				
										W12ZF				
										W7MH				
										W7YEX				
										K5AEU				
										OH2SB				
										OZ7KV				
										PY1DH				
										SM5FC				
										W2LWY				
										W4AFP				
										W6PMPK				
										W12ZF				
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										DL3BJ				
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										K5AEU				
										OH2SB				
										OZ7KV				
										PY1DH				
										SM5FC				
										W2LWY				
										W4AFP				
										W6PMPK				
										W12ZF				
										W7MH				
										W7YEX				
										DL3BJ				
										HB9NU				
										K5AEU				
										OH2SB				
										OZ7KV				
										PY1DH				
										SM5FC				
										W2LWY				
										W4AFP				
										W6PMPK				
										W12ZF				
										W7MH				
										W7YEX				
										DL3BJ				
										HB9NU				
										K5AEU				
										OH2SB				
										OZ7KV				
										PY1DH				
										SM5FC				
										W2LWY				
										W4AFP				
										W6PMPK				
										W12ZF				
										W7MH				
										W7YEX				
										DL3BJ				
										HB9NU				
										K5AEU				
										OH				

PY2DTV	107	KR6BY	W7F1M	WB2YJS	VE2UN	JA2UJ	W4GHV	DL5SF	WA2AXY	DM4PKL	KH6FMS	WB2RXS	W7E
SP5BAK	DJ1KE	UA1BT	WA8CKY	W3QNQ	VE7WL	K1ASJ	W4KEB	DL8DE	WB2DRJ	F9DH	KH6SP	WB2SLQ	W7G
UA6YD	J4WGD	UA9MX	W9EVD	WA4KYR	VP7FN	K1CND	W4VON	DM4UBO	WB2NSG	G3COI	K5PFT	WB2WSP	W7L
UT5ZB	DJ7YM	UA9VY	W9CHO	WA5PPJ	W1PRT	K1JLD	WA3SP	E19AR	WB2TBP	G3IDG	KP1	W3HMR	W7R
UV3TE	DK1BY	W2SE	Y03KAA	WB6QJZ	W2DVG	K1YXG	WA4THL	F7DC	WB2JAJ	GCSACI	KX8SZ	W3IRE	W7V
VE7BQF	DL1PC	W2EFU	YU2HDE	W7FCD	WA2CSP	K4ZYM	W5BGY	G2FAS	W3BAP	HA6VK	LA3K	W3NLU	W7A
WA1COW	DL8RE	W3FLZ	4X4KPE	WB9FRJ	WA2VDA	K4YXI	W5NLJ	GW31NO	W3BYI	HB9XO	LA90I	W3QZV	W7A
W2FCR	DL8AA	WA3DCM		WA8FJA	W2BLCZ	K5KMA	W5NOQ	HA2MJ	WA3DMH	JA1FGB	LU4ECO	W3RUV	W7A
W2HGV	DM2AQL	W4LXX		WA8GBE	W3CU	K5RBU	W5QBV	JA1JXU	WA3EQM	JX5C1	OK1KCB	W3TLQ	W7B
W2PZF	G2CKN	W5DAU		WA8ORF	W4DPR	K6MGT	W5WZ	JA1KXW	W4DMS	KA1EC	OK2BBI	W43AT	W7F
WB2QJW	HB9ALB	WA5QFQ		WA9NYA	W46WV	K6MQU	WA5DOS	K1PRB	W4FVY	K1GXU	SM5BTX	W43BME	W7D
WB4LEH	L1LA	WA8RLS		W0EGC	WA4LDM	K8HKM	WA5NQK	K1STW	W4JVN	K1L1H	SP7AGA	WA3FKJ	W7J
W6ZGM	JA1AZR	WA8TNI		YU2PG	WA4QPL	K8ILK	WA5QEW	K2QOJ	W4LBP	K1NLQ	TJ1AJ	W43GK	W7K
W8CJW	JA1ERB	WA9QXY		9Y4LO	WB4EIX	9CKMB	W6BB	K7ADD/3	W4RM	K1RBX	TU2CA	W43ZMU	W7M
W8HXZ	JA2FEG	WA9VBX			W6NEX	K9IDQ	W6DH	K3GYS	W4RNL	K1UJX	UA1KAS	W43HM	W7N
WA8EBW	K6OTW/1	WA9WJF			W6RXT	K9USE	GC5ACH	K6MHO	W4VE	K1YKN	UA9FM	W43HU	W7R
WA9SLD	K1UKC	WA9UFS			WA6JDT	K6KVR	W6KAC	K6Q6Q	W4VZD	K1YXK	UM8FM	W43EB	W7W
W8N2Y	K8YRD	YU1NQF			W6BRAW	W6BRU	GC5ACH	K6ZMZ	WA4JNK	K2MPG	UT5KDP	W43WJ	W7A
WA8LKL	K9MDK	ZL1AV			W7EXM	W7EXM	W6GK	K7AXF	WA5OKE	K2MFG	VE2AY	W43NE	W7A
ZD8Z	OK1ADH	5N2AAJ			W8FE	W8FE	W6UJ	K7CZM	W6JZG	K2SFA	VE2BSU	W43ZR	W7A
	OZ8BZ				W9YGN	W9YGN	W6B7AY	K7JLF	W6ZHU	K2EJE	VE3CAA	W43F	W7A
	VE6AVR				WA9EBT	WA9EBT	WB6RTJ	K8VSH	W6BOIE	K3GVK	VE3DTQ	W43PQ	W7A
	W3DPR	CT1SH			JA2CZS	DL9QM	W7ETZ	K9HKJ	W7LVH	K3MNT	VE6ZB	W43HLR	W7A
	W3PZ	DJ6HC			JA3BSM	DM3XED		W8QUL	W8QUL	K3RCM	V86FX	W43UZV	W7A
	W4IG	DL8CN			JA4FM	F3EA		K9U1K	W8CWL	K2VCQ/3	VU2DIA	W43WB	W7A
	W4IN	DL8SC			JA5LI	F3IV		K9ZXE	WA8BU	K4CDZ	W1ELB	W43WJ	W7A
	W4AVT	F2JV			JA7KE	G3VVF		W8YB	WA8JRL	K4CXO	W1SBM	W43EPC	W7B
	W5WLA	G3FTP			JA8BF1	HA4KYB		W8ZVL/	WA8SL	K4FSD	W1WEE	W43EPJ	W7H
	W7RGL	K1NGZ			JA1PQJ	JA1PQJ		K17	WA8SRQ	K4JSD	W1YK	WB4JEN	W7I
	W9KCY	G3VAD			JA3IVA	JA3IVA		KZ5AF	WA8SLQ	K4VX	WA1CQW	W5CIV	W7T
	ZL4LZ	G5AAJ			K3RFB	K1HDO		L2ZFJ	WA8XG	K5CDS	WA1DVE	W5OUT	W7A
	5N2ABD	HA5DA			K6R1F	K3ZAW		W8A0TY	OK1AOR	W9G1M	WA11JB	W5ULN	W7A
		JA1EMG			K9J1L	K4MRZ		OE2LEL	W9LHM	K5MBB	WA11ON	W5AVL	W7A
		JA7DY			LA1ZE	K4VHF		OK1AOR	W9DQU	K5USU	WA11TM	W5PQW	W7A
		JA9AWF			LA9OE	K77NV		OK1AOR	W9LHM	K6OD	W2DUN	W5PQW	W7A
		K4LRL			OK1ARN	K9KUM		W88GQ	W9LHM	K6L	W2EGX	W6BDI	W7K
		K5PTB			OK1KOK	OK3KFV		OK1AOR	W9LHM	K85US	W2HLI	W6EGX	W7K
		K5PKA			ON5KL	P21AV		W89JW	WA9JLW	K7EXT	W2IPR	W6MPZ	W7A
		KX6ER			PA8AD	SM5ACQ		WA9AGK	WA900U	K8AFW	W2MYK	W6SCV	W7A
		OE2HVL			PJ2ARI	SM5CZK		WA900U	YA1NOL	K8LUM	W2R2P	W6ZOL	W7A
		OE3BJW			SM6EOC	SM7BBV		W9AGK	W9A00U	K8AFP	W2AHG	W6AKN	W7C
		WA8HJ			SP1BHX	T2ABK		WA900U	YU2XT	K8BVS	W2A2CFD	W6AKHK	W7C
		UA9ML			UA1FZ	UA1FZ		W9AGK	YU2XT	YU2XT	W2A2CFD	W6AKHK	W7C
		UA6GD			UA3KW	UA3KW		W9AGK	YU2XT	YU2XT	W2A2CFD	W6AKHK	W7C
		UB5TN			UA4QP	UA4QP		W9AGK	YU2XT	YU2XT	W2A2CFD	W6AKHK	W7C
		W1ULH			UA6GL	UA6GL		W9AGK	YU2XT	YU2XT	W2A2CFD	W6AKHK	W7C
		W2DMW			UB5KL	UB5KL		W9AGK	YU2XT	YU2XT	W2A2CFD	W6AKHK	W7C
		W3CWC			UB5LS	UB5LS		W9AGK	YU2XT	YU2XT	W2A2CFD	W6AKHK	W7C
		W5QWY			UB5NM	UB5NM		W9AGK	YU2XT	YU2XT	W2A2CFD	W6AKHK	W7C
		W6CLM			UB5SC	UB5SC		W9AGK	YU2XT	YU2XT	W2A2CFD	W6AKHK	W7C
		W6MBJ			WB2VYA	WB2VYA		W9AGK	YU2XT	YU2XT	W2A2CFD	W6AKHK	W7C
					UW9F	UW9F		W9AGK	YU2XT	YU2XT	W2A2CFD	W6AKHK	W7C

Radiotelephone

335	ZS6LW	W2LV	309	LA5HE	ZS6YQ	W5HJA	W1BKY	279	LA5YE	W67ZD	K1JDP	WB2UKT	W7W
ZL1HY	W20DO	SM5BCO	W21OT	W9NJO	W21OT	W7KHN	W5AG	G3UML	G3UML	W9HPS	OK1MP	WA4HOM	W7V1
334	CR6AB	W6NDWQ	ZS6UR	W8NJD	W21OT	YS10	W6KUT	W3QKJ	WA3ATP	264	SM3ATN	W30NE	24
G3DO	K5JEA	ZS6UR		W6NDWQ	W21OT			W5LZQ	W5LZQ	G3AAE	W1HJW	W1QCO	HB9N
333	HB9J	320	314	DL7HU	W2FGD	303	298	W5LZQ	W2JLH	SM5SWJ	W2BWOJ	W5LEF	K8OE
	K4HEF	OZ7FG	W9HB	DL7HU	W8DE	F2TAA	308	W5LZQ	W2JLH	W1PFP	W3EVW	YV5ANQ	W6TC
	OZ7FG	W9HB		DL7HU	W8DE	DM2AO	303	W5LZQ	W2JLH	W1PFP	W3EVW	YV5ANQ	W6TC
331	W9RNX	311	307	K4TWF	VE2NV	K5AWR	289	W5LZQ	W2JLH	W5GXP	W3NIG	W4TRG	24
	W4FPS	W6YHG	VE2NV	K4TWF	VE2NV	SM5RZ	11RB	W5LZQ	W2JLH	W5GXP	W3NIG	W4TRG	24
	W6YHG	W9BQM		K4TWF	VE2NV	W1FZ	K4YYL	W5LZQ	W2JLH	W5GXP	W3NIG	W4TRG	24
330	W4CQW	313	306	G1J31M	PA8EEM	302	297	W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
	W4CQW	DJ7ZG	G1J31M	PA8EEM	W6CIV	K4JC	PY7YS	W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
	W4CQW	W62FSW	PA8EEM	W6CIV		K6ERV	W8ARH	W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
329	W2OKM	319	305	SM5SRK	W62HOK	302	296	W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
	W2OKM	W6EL	SM5SRK	W62HOK		K4JC	W9TKD	W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
	W2OKM	W6EL	SM5SRK	W62HOK		K6ERV	W9TKD	W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
328	W1MMV	318	305	SM5SRK	W62HOK	302	296	W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
	W1MMV	W2WZ	SM5SRK	W62HOK		K4JC	W9TKD	W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
	W1MMV	W2WZ	SM5SRK	W62HOK		K6ERV	W9TKD	W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
327	W4EEE	317	305	SM5SRK	W62HOK	302	296	W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
W4SKO	K7GCM	W6SUU	SM5SRK	W62HOK		K4JC	W9TKD	W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
SM3BIZ	W2CKY	W6SUU	SM5SRK	W62HOK		K6ERV	W9TKD	W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
	W7ADS	W6SUU	SM5SRK	W62HOK		K4JC	W9TKD	W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
	W7ADS	W6SUU	SM5SRK	W62HOK		K6ERV	W9TKD	W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
326	W9YSX	316	305	SM5SRK	W62HOK	302	296	W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
	W9YSX	G3HDA	SM5SRK	W62HOK		K4JC	W9TKD	W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
	W9YSX	W1DQJ	SM5SRK	W62HOK		K6ERV	W9TKD	W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
	W9YSX	W3DJZ	SM5SRK	W62HOK		K4JC	W9TKD	W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
	W9YSX	W8NGO	SM5SRK	W62HOK		K6ERV	W9TKD	W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
	W9YSX	W8NGO	SM5SRK	W62HOK		K4JC	W9TKD	W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
325	DL7BA	315	310	K8ONV	W5JWM	300	295	W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
VE3QA	DL2BW	DL9DAH	K8ONV	W5JWM	W5JWM	IAIA	294	W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
ZL1RG	LI9DAH	K4BZT	K8ONV	W5JWM	W5JWM	JA1BK	LA7Y	W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
	LI9DAH	K4BZT	K8ONV	W5JWM	W5JWM	K2KER	W4VMS	W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
	LI9DAH	K4BZT	K8ONV	W5JWM	W5JWM	K6ENX	W1VMS	W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
	LI9DAH	K4BZT	K8ONV	W5JWM	W5JWM	K8IKB	ZL30Y	W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
	LI9DAH	K4BZT	K8ONV	W5JWM	W5JWM	K1GKX		W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
	LI9DAH	K4BZT	K8ONV	W5JWM	W5JWM	K1ORV		W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
	LI9DAH	K4BZT	K8ONV	W5JWM	W5JWM	K1ORV		W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
	LI9DAH	K4BZT	K8ONV	W5JWM	W5JWM	K1ORV		W62KM	W7GBW	W6P7S	W263	W55RV	0Y7M
	LI9DAH	K4BZT	K8ONV	W5JWM	W5J								

• 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—SEC/PAM: W3DKX. RM: W3EEB. The Delaware Six-Meter Net again is active. Check in every Tue. at 9 P.M. on 50.4 Mc. K3GKF is definitely a leader in OO-ing; 140 notices during the third quarter. W3ZNF attended the Atlantic Provinces Convention at Halifax, Nova Scotia. Sussex hams: Want to try your hand at c.w. traffic-handling? Check into the MDD/MDDS or contact W3TRC. W3EEB vacationed to Vermont. W3FUT is active again from Seaford. WA3GSM handled traffic for the Governor. WA3GAY is set up for traffic-handling at the U. of Del. I wish to thank the amateurs of Delaware for reelecting me as SCM. With your help I am sure that we can continue as top ARRL section. Net reports: DEPN, QNI 51, QTC 11; DTMN, QNI 37, QTC 5; KCEPN, QNI 21, QTC 1. Traffic: (Sept.) W3DKX 56, WA3GSM 30, W3TRC 15, WA3GAY 13, WA3DUM 10, W3EEB 4, WA3HWC 4, K3NYG 4, W3ZNF 4. (Aug.) W3TRC 14, W3EEB 2.

EASTERN PENNSYLVANIA—SCM, George S. Van Dyke, Jr., W3HK—SEC: W3ICC. RMs: W3EML, K3MVO, W3MPX, K3SLG, WA3GLI, V.H.F. PAM: W3FGQ. OBS reports were received from W3ID, WA3-EC, W3CBH, WA3AFI, WA3JKB, WA3JKO; OO reports from WA3EEC, K3RDT, WA3IUV, W3NNC, WA3FBP, K3WEU, W3AES; OVS reports from WA3-IAZ, WA3FEC, WA3JWZ, WN3JYC, W3ZRR, W3CL, WA3JWL, K3VAX, K3WEU. BPL was made by W3-CUL, W3VR, W3EML, W3MPX, WA3IUV, WA3HGX.

Net	Freq.	Operates	QNI	QTC	RM/PAM	
EPA	3610	Daily	6:45 P.M.	322	267	W3MPX
PTTN	3610	Daily	6:00 P.M.	271	173	W3MPX
PFN	3960	Mon.-Fri.	5:30 P.M.	549	425	K3SLG
EPA&P&T	3917	Daily	6:00 P.M.	156	218	WA3GLI
RNTN	3726	Daily	7:30 P.M.	198	113	WA3IUV
VHF (6)	50.64	Mon.-Fri.	7:00 P.M.			W3FGQ
VHF (2)	145.35	Mon.-Fri.	8:00 P.M.			W3FGQ

New club officers: W3YR, Lafayette College ARC—WA3EEC, pres.; K3MNT, vice-pres.; K3KBO, secy.-treas. Penn Wireless Assn.—WA3KTK, pres.; K3PHL, vice-pres.; K3JQH, treas.; K3HNP, rec. secy.; W3-MJH, corr. secy. Hurricane Gerda alerted the Haverford Twp. Emergency Radio Net. Philadelphia AREC, Bucks Co. AREC, Lower Merion Twp. C.D. Radio, the Mobile Sixers, Clifton Heights C.D. and both Army and Navy MARS. The net was on 6 meters with liaison stations for the low frequency nets. WA3-HDI was NCS, with WA3GAP assisting as liaison. Penn Wireless took top honors for Field Day this year. Penn Wireless has started a traffic net on 29.4 Mc. at 9 P.M. Wed. & 8 P.M. Sun. WA3UV has a new quad antenna. The Penn Jersey YLs have their own net on 3970 kc. at 10 P.M. Thurs. Contact five members and get a nice certificate. K3WEU is teaching amateur radio at the Aciba Hebrew Academy. WA3AFI is getting the Phelps School radio station back on the air. WA3HBT really is going all out on traffic. WA3LVC says getting his General has really opened ham opportunities to him. WA3IYC got his 25-w.p.m. sticker. W3BNR finally got off the night shift. W3OML is now off sick list. Penn Wireless had a terrific Awards Banquet. The U. of P. ARC has a new trustee, K3MNIJ. The club also is on a modernization program. Traffic: (Sept.) W3CUL 4001, W3VR 898, W3EML 605, W3MPX 528, WA3IUV 176, WA3JGN 169, WA3HGX 155, K3MVO 154, WA3GAT 96, WA3ATQ 95, WA3GUK 80, WA3EXW 75, WA3JKB

68, W3HNK 66, K3SLG 65, WA3AFI 47, WA3JWL 47, K3WEU 47, WA3JZB 43, WA3JXN 35, WA3HBT 30, WA3FBP 29, K3BHU 27, W3CBH 27, W3VAP 27, W3HK 24, WA3JWF 22, WA3LAK 19, WA3LYC 19, K3VAJ 19, WA3IYC 17, W3FPC 16, WA3JRY 13, WA3LMO 12, W3JSX 10, W3BNR 9, WA3JKO 7, W3AES 6, K3KTH 6, W3OML 6, W3VA 6, WA3EEC 4, WA3BSV 3, WA3IAZ 3, W3OY 3, W3CL 2, W3ABT 1, WA3BJQ 1, W3EU 1, WA3FME 1, W3ICC 1, W3ID 1, K3KQE 1, K3VAX 1, W3YPF 1. (Aug.) WA3HGX 157, WA3GUK 80, W3ID 1, W8YPF 1.

MARYLAND-DISTRICT OF COLUMBIA—SCM, John Munnholland, K3LFD—SEC: K3LFD (Acting).

Net	Freq.	Time	Days	Sess.	QTC	QNI	Mgr.
MDD	3643	0000Z	Daily	30	162	10.2	K3JYZ/RM
MDDS	3643	0130Z	Daily	29	31	4.6	W3CBG/RM
MDCTN	3920	2300Z	STTS	17	68	19.6	W3ATQ/PAM
MEPN	3920	2300Z	MWF				K3IAG
						1800Z SS	
MTSN	50,400	0100Z	M				WA3EOP
MTMTN	145,206	0200Z	T-S	25	26	9.0	W3IFW

Appointments: WA3IHW as OPS, KILPL/3 as OO. Endorsements: K3GZK as ORS and OPS, WA3IRQ as ORS, WA3IAQ as ORS, K3JYZ as ORS, W3ATQ as ORS, W3EOK as ORS, W3FU as OO, W3BWT as ORS, WA3ERL as OPS, K3OAE as ORS, W3PZW as ORS, W3TIN as ORS, W3WV as ORS, W3ZSR as OO. W3LDD and W3UCE/3 have found it necessary to resign as SEC and RM respectively. K3LFD will act as SEC and K3JYZ as RM until new appointees can be found. The MDC section sponsored the ARRL Exhibit at the Far-Gaithersburg Hamfest again this year. Our thanks to K3JYZ, W3UCE/3, W3CBG, K3-IYJ, W3ATQ, K3GZK, W3TIN, W3FA, WA3IYS, WA3-IHW and others who helped make it a success. W3CDQ is back hamming after an enjoyable visit to KH6-Land. K3GRB departs Baltimore for the D.C. area with a fine record of achievement as Baltimore City EC. K1PKQ/3 enjoyed the Pennsylvania QSO Party. K3TEZ/3 got his new HW-100 on the air on schedule. A hearty welcome to W3FOR, ex-WIUGH, a newcomer to MDC with an Arnold QTH. WA3GAU is getting ready for the winter contests. W3GKP treated W3OIL, W3KMY and W2AD/3 with live operations, and the Rock Creek ARA with tapes, of his Moonbounce Project on 2304 Mc. W3ECP reports K3DML and K3PUI got Advanced Class tickets. WA3-HJY got his too. Springbrook High ARC's officers are WA3HUJ, pres.; WA3JHP, vice-pres.; WN3MJZ, secy.-treas. W3FU continues to keep ARRL well posted with Intruder Watch reports. W3EOV is experimenting on RTTY. WA3IAQ is QNI at Maryland U. and W3EAX, K3NCM gets on MEPN more often now. K3JTE and W3PTJ enjoyed an interesting trip to Geneva, Switzerland, for the IARC and CCIR meetings. Traffic: WA3IYS 335, WA3IUR 287, W3ATQ 184, W3TIN 164, WA3GUI 113, W3DYA 77, K3GZK 67, W3CBG 62, W3LQY 56, K3LFD 46, WA3IAQ 45, WA3-GXN 19, WA3HEN 18, K3LFN 17, W3FA 13, W3EOV 12, W3ECP 10, K3ORW 9, W3PRC 8, K3TEZ/3 8, W3GEB 7, W3CRE 6, K1PKQ/3 4, W3ZSR 4, WA3IRQ 3, W3BWT 2.

SOUTHERN NEW JERSEY—SCM, Edward G. Raser, W2ZI—Asst. SCM: Charles E. Travers, W2PZ. SEC: W2LVW. RMs: WA2BLV, WA2KIP. PAMs: WA2UVB, W2ZI. NJN reports for Aug./Sept.: QNI 813, traffic 451. NJPEN reports 30 sessions, QNI 474, traffic 225. WA2BLV is doing a good job as net mgr. I am sorry to report that W2BEJR became a Silent Key Sept. 28 in Dover, N.J. Another old-timer, W2BZR, also is a Silent Key. W3SDO is in the Methodist Hospital, Philadelphia, Pa. W2ZQ/TV was first on the air Sept. 28 at 0200Z. Transmitter is a homebrew affair, camera a Fairchild-Dumont, antenna a sixteen element colinear at 80 feet. W2VU is back on the air after a long absence. W2ISZ is a new OPS, also operator at W2ZQ Sunday Net. W2MR has a new Galaxy GT-550 that sounds real good! W2VJ joined NJPEN, WA2BLV put out a fine NJN Bulletin for Sept. Don't forget the NJN Annual Meeting

to be held at the home of W2CVW. Sat. Nov. 1. W2ZQ made a good score in the N.J. QSO Party and also participated in the V.H.F. Contest and Sept. CD Party. K3CPF has sure kept the operators busy and is doing a fine job as director of the station. WA4HUT, formerly of Winston-Salem, N.C., is now WA2TBJ/NØTPL in Pennington. WA2CUB/NØZLE is the new Navy-MARS 4th District Coordinator. W2YPZ made his vacation trip to Nova Scotia, while W2HX went to the Smoky Mountain area in Tennessee. W2IU is back on the air after a break-down. Traffic: (Sept.) WA2BLV 206, WB2VEJ 105, WB2DRG 83, W2PU 80, W2ZI 24, W2DNF 23, W2IU 17, WA2-BPL 11, WA2BLM 9, W2ZQ 8, WBSFX 6, W2J 4, WB2WHB 4, W2YPZ 4, W2ORS 3, WB2APX 2. (Aug.) WA2BLV 114.

WESTERN NEW YORK—SCM, Richard M. Pitzerius, K2KTK—Asst. SCM: Rudy W. Ehrhardt, W2PVI. SEC: W2RUF. PAM: WB2VSL. RMs: K2KIR, W2FR, W2MTA, W2RUF. The list of section nets appears in the June column. A new appointee is WB2FHS as OBS. Renewals are W2FE, K2MLT as OOs, K2GUG as OBS, W2RUT as ORS, K2EVJ, WA2BPE, K2ZEV, W2IYR, K2GUG, K2PVN as OVSs, WA2YNS, W2ICE, WA2HWG, WB2VND, WA2HEC, W2FAN, WA2IYB/TFV as QPSs. WB2HYQ received his General, while W2FXA and WB2YQH earned their Extra Class licenses. WB2YEE (an OPS) received his ARRL CP-25. The NCAR elected K2RAC, pres.; W2OKS, secy; WB2VVZ, secy.; WB2FRK, treas.; and W2FUL, director. W2RQF is back at his winter QTH. The New York State Post Office Net held its picnic at Samson State Park on Seneca Lake. Congratulations to K2KQC on passing her Civil Service exam. W2WS attended all three of the state net picnics this year. Jack writes a very interesting amateur radio column every week in the Syracuse *Herald-American* on Sun. W2CFP visited the Signal One factory and says he is drooling more than ever now. Welcome to WA8ZXU as a new resident of our section. K2KIR heard 18 states, plus VE1, 2 and 3 on the 2-meter band during the aurora of Sept. 29. W2FAN continues active handling Navy MARS traffic, particularly on RTTY. W2RUF notes the increasing importance of the 2-meter f.m. guys for local emergency communications. WA2AWX has a new HA-1200 2-meter transmitter. WB2VVZ has his new HW-17A working. K2EVJ is developing a 432-Mc. antenna system. Ed also has acquired several acres of land on a hilltop. WB2QKQ has left for a vacation in Europe. W2FR, K2KIR and K2KTK each have about 80 countries worked on 80 meters since Jan. 1. WA2AIV has a new QTH in Batavia. NYS reports a slow month with 274 messages handled and 653 check-ins. W2OE gets this month's only BPL award. Best Season's Greetings to All. Traffic: (Sept.) WA2CAL 426, W2OE 325, W2FR 225, W2QC 216, W2MTA 186, W2RUF 136, WB2SMD 136, WA2BEX 106, K2RYH 101, K2KIR 83, WA2AIV 58, WA2E/2 54, WB2ND 40, W2FHS 33, W2HYM 29, WB2QKQ 28, W2WAM 19, WA2DHS 13, WB2RWR 17, K2KTK 16, W2RQF 16, W2PVI 15, WA2GLA 13, WB2-WGF 13, WB2YEE 12, WA2ICU 10, WA2HSB 8, K2-DNN 5, K2IMI 4, W2CFP 4. (Aug.) WB2OYE 15, K2RYH 10, WA2HLO 9, K2DQT 1. (July) K2DQTQ 29. (June) WA2HLO 15. Total traffic reported: 2431. Last year: 2487.

WESTERN PENNSYLVANIA—SCM, John F. Wojtkiewicz, W3GJY—SEC: W3KPJ. PAMs: W3WFR, K3-ZNP. RMs: WA3AKH, W3KUN, W3LOS, W3NEM. Traffic nets: KSSN, 2330 GMT; WPA, 0000 GMT 3585 kc. This column regrets to record the sudden passing of W3SIR. He was a front runner in all Breezeshooters Club activities. W3NEM reports the recent Pennsylvania QSO Party was a howling success. K3EED stepped up 28-Mc. activity with a mobile. W3NMP is now W3WS. W3DMK is now W3YO. K3S3N upgraded to Amateur Extra; WA3KQA to General. W3TOC graduated his 50th Novice and he is completely sightless. WN3NAZ operates 80, 40 and 15 and is a member of ARRL and AREC/ARPS. K3IXR is now General Class with an SB-101. WN3-NCH is a newly-licensed Novice at Aliquippa. More upgrades, Amateur Extra Class, K3GEO and W3-NGI; General Class, WA3KFX and WA3KKT. WN3-KSA has confirmed his 49th state. W3AEN locates at Indiana. Newly-elected officers of the Etna Amateur Radio Club are: K3HZL, pres.; K3OTY, vice-pres.; W3OJM, secy, K3FGQ, treas.; W3OVM, act. mgr.; K3VYO, director. WA3LSY attends DeVry institute in Chicago. WA3CYD now locates in Ellwood City. K3IOX is now K4CAN at Salem, Va. W3BRB obtained his Masters Degree. WA3JBN is looking for a station in State College who can handle phone patch traffic on a regular schedule. If you can help, drop

him a line. WA3GSH has been appointed Erie County EC, replacing K3IOX who has left the section. W3BBO runs an HW-100. K3AFO is editor of the new club bulletin put out by the Radio Association of Erie. K3QIP purchased a new SX-146 receiver. WA3HJC has gone into the Navy. K3VLP put up a new quad. The Annual Memorial Award, previously known as the William G. Walker, W3NUG, Memorial Award will hereafter be designated as the Harold Link, W3SIR, Memorial Award. May I take this opportunity to wish you and your families all the very best during the upcoming holiday season. Endorsements: W3WVE as PAM; WA3AKH as RM; K3SMB as OBS; K3AHT as OO; WA3AKH, W3CA, K3HCT, W3IYI, W3YA, W2KAT/3 as ORS; K3CFA, as OVS. Traffic: (Sept.) WA3IPU 191, W3LOS 166, K3ZNP 166, W3NEM 103, W3KUN 86, WA3AKH 81, W3GJY 45, K3HKK 24, K3HCT 23, K3SMB 23, W3CFC 10, WA3JBN 4, K3-SJN 3, W3UEN 2, W3IDC 1. (Aug.) K3HKK 213, W3NEM 110. (July) W2KAT/3 38, K3HKK 26.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9RPN—SEC: W9RYU. PAMs: WA9CCP and WA9PDI (v.h.f.). Cook County EC: W9HPG. RM: WA9ZUE. Net reports:

Net	Freq.	Times	Days	T/c.
IEN	3940 kc.	1400Z	Sun.	no report
ILN	3760 kc.	0100Z	Daily	134
NCPN	3915 kc.	1300Z	Mon.-Sat.	268
NCPN	3915 kc.	1800Z	Mon.-Sat.	
Ill. PON	3915 kc.	2245Z	Mon.-Fri.	792
Ill. PON	3915 kc.	1430Z	Mon.-Fri.	
Ill. PON	145.5 Mc.	0200Z	M.W.F.	64

W9HRY reports that 9RN handled a traffic count of 895 during Sept. The Barrington Amateur Radio Society and the Hiawatha Amateur Wireless Keyers Society were approved by the League's Executive Committee as duly affiliated societies. The Deerfield High School Radio Club expects to be on the air shortly having raised the antenna and waiting to install equipment. WA9LHU is now mobilizing. WA9YQT's additional new call is W9LMI. WA9ZUE has accepted the RM appointment for the Illinois section. The Hamfesters celebrated its successful hamfest with a banquet for its picnic workers and families on Sept. 27. WN9CQM is a new Novice in the Moline area. WA9YU is holder of a new Advanced Class license. W9IWI has just finished an HW-32A kit. W9HSD received an award from the Champaign County Civil Defense for teaching amateur radio classes. Mr. Ed Ponder, of 3456 North Damen Avenue, Chicago, Ill. 60618, has asked all amateurs interested in helping Concerned Citizens for Clean Air and Clean Water to contact him. K9KGV has a new Drake TR-4, WN9-CFG and WN9CDD are graduates of the Rockford Amateur Radio Assn. code classes. K9LJB is operating on the SS *Hone*. New appointments this month include WA9ZLN as OBS, WA9UNR as OBS and W9-ZTK as OVS. WA9CZC's new QTH is Centralia. K9QJS is now an East Coast resident. WN9CCL, WN9ADM and WN9YSU are new amateurs in the Chicago area. WN9ADM and WN9BDP have new verticals. WN9BEK and XYL WN9BFL have moved to a new QTH. K9YEE is recuperating after a hospital session. This column's sympathy is extended to the family and friends of W9BLO and W9CZB, who recently passed away. New officers of the Sangamon Valley Radio Club are K9IDQ, WA9LDC, WA9QEL, W9FFP and W9RPN. The Hamfesters held its Annual Auction Oct. 24. Traffic: (Sept.) W9NXG 464, K9NBH 381, K9AVQ 200, W9JXV 114, WA9ZUE 104, W9DOQ 74, WA9LDC 48, W9YH 31, W9HSD 24, WA9NZF 21, W9LNO 20, W9PRN 20, K9WMP 11, WA9LHU 8, WA9YQT 8, K9HSK 3, WN9CIG 2. (Aug.) W9JXV 120.

INDIANA—SCM, William C. Johnson, W9BUQ—Asst. SCM: Mrs. M. Roberta Kroulik, K9IVG. SEC: W9BUQ.

Nets	Freq.	Time	Sept. T/c.	Mgr.
IPN	3910 1330Z	Daily 2300Z	M-F 140	K9IVG
ISN	3910 000Z	Daily 2130Z	M-S 482	K9CRS
		2300Z S-S		
QIN	3655 0100Z	Daily	177	WA9FDQ
Ind. PON	3910 1245Z	Snn.	48	WA9YXA
Ind. PON V.H.F.	50.7 0200Z	M-Thurs.	23	WB9AMB
Hoosier V.H.F.			46	W9PMT

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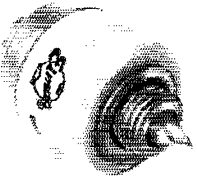
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K90XA received the Man Volunteer of the Year Award from the Indianapolis Area Chapter, American Red Cross, for his time in setting up Red Cross amateur station WA9LQ. Twenty other local amateurs received 5-Year Awards, W9FQN is back from the Caribbean Islands. W9CJJ is back on the air. EL2BI, U.S. Embassy of Liberia, visited W9PUB; also K9FNP, WA9MOE and W9WIB were at Dave's QTH. W9EGQ handled Hurricane Camille traffic. K9LSB reports that W9INX and K9LSB are both equipped for Simplex operation on 146.880 Mc., giving full back-up to the system. W9ILY/K2YZI is back in Indiana and very active in QIN. K9AJC, Rev. Benjamin Clark, has moved to South Carolina at the Trappist Abbey. To get more active on 6 around Evansville W9VZX has several pieces of 6-Meter Equipment to lend. W9BIQ has rebuilt his shack since his retirement and can now work all frequencies from 80-420 Mc. Because of the long skip that will be in effect this winter we would like very much for check-in to be on time so as not to miss anyone. There will be more stations moving up to high end of the band, and there will be more unavoidable interference. QIN Honor Roll: W9QLW 24, K9VHY 20, WA9KA 20, W9QXF 18, K9HYV 15. Amateur radio *visita because of the service it renders.* BPL certificates went to W9UEM, K9IVG and K9FZX for Sept. traffic: WA9VZM for Aug. Traffic: (Sept.) W9UEM 817, K9IVG 667, K9FZX 597, W9ERY 211, W9FWH 139, W9QLW 99, W9BUQ 84, WA9TJS 70, K9CRS 53, WA9YXA 48, W9YBN 47, K9HYV 43, W9CMT 41, W9JBQ 41, K9RWQ 34, WA9BHG 27, WA9WJA 25, WB9AMB 24, WA9GJZ 21, K9VHY 21, W9EJW 20, WA9OHX 20, W9YXX 17, WA9BVL 16, K9CBY 15, WA9OAD 15, W9PMT 14, W9DZC 11, W9FJL 10, W9SNQ 10, W9HWR 8, K9ILK 8, K9JQY 8, WA9SBR 8, WA9BRD 7, W9FC 7, K9KTB 7, W9DOK 5, WA9EQE 5, W9RTH 5, K9GWN 5, K9BSL 4, W9ICU 4, WA9JIX 1. (Aug.) WA9VZM 609, K9JYV 178.

WISCONSIN—SCM, Kenneth A. Ebnetter, K9GSC—SEC: W9NGT. PAMs: K9DBR, WA9ZK, W9NRP, WA9QNI, W9AYK and WA9QKP. RMs: K9KSA and WA9TXN.

Nets	Freq.	Time	Days	QNI	QTC	Mgr.
BWN	3985 kc.	1245Z	Mon.-Sat.	318	149	W9AYK
BEN	3985 kc.	1800Z	Daily	580	102	WA9QKP
WSBN	3985 kc.	2300Z	Daily	1240	160	WA9QNI
WIN	3662 kc.	0115Z	Daily	255	119	WA9TXN
WSSN	3780 kc.	0300Z	Tue.-Thurs.-Sat.	56	16	K9KSA
WRN	3620 kc.	0130Z	Sun.	18	2	K9GSC
SWRN	50.4 Mc.	0300Z	Mon.-Sat.			K9DBR
SWZRN	145.35 Mc.	0330Z	Daily			WA9IZK

A net certificate went to W9CUA for BEN. Renewed appointments: W9NGT as SEC and K9KJT as EC for Milwaukee County. K9DHN received his Extra Class license and is mobile with a new HW12A. Congratulations to the Beloit Amateur Radio Club upon its affiliation with the ARRL. The Wisconsin QSO Party will be held Jan. 24, 25, 31 and Feb. 1. Rules will be in QST or can be obtained from K9FHI and K9GSC. K9GDF led the OOs in Sept. with 39 notices sent. Traffic: (Sept.) W9CXV 390, K9CPM 284, WA9QKP 166, WA9RAK 164, W9ESJ 63, W9AYK 61, K9FHI 50, W9SUF 44, W9KRO 40, W9IHW 28, K9-TBY 28, W9CBE 25, WA9PKM 24, K9KSA 22, W9-NRP 20, W9DXY 18, WA9VKI/9 18, W9RTP 17, W9BCH 11, WA9TEF 11, K9GDF 3, WA9SAB 2. (Aug.) K9DHN 17, K9GDF 1.

DAKOTA DIVISION

MINNESOTA—SCM, Larry J. Shima, W9PAN—SEC: WA9MZV. RMs: WA9RRA, WA9IAW, V.H.F. PAM: WA9DWM. PAMs: WA9MMV, WA9OEE, WA9HRM, K9GYO.

Section Nets	Freq. (Mc.)	Time (GMT)	Days
MSPN (noon)	3.945	1805Z	Mon.-Sat.
MSPN (noon)	3.945	1500Z	Sun. & Holiday
MSPN (evening)	3.945	2345Z	Daily
MSN	3.685	0300Z	Daily
MJN	3.685	0100Z	Tue.-Sun.
MSTN	50.400	0430Z	Daily
Minn RTTY	3.620	0200Z	Sun.
Minn AREC (ECs)	3.912	2300Z	Sun.
PICONET	3.934	1900Z	Sun.
SCM INFO NET	3.945	2230Z	Sat.
MPON (post office)	3.910	1830Z	Sun.

Note that the MSPN evening session is now at 1745 CST on a permanent basis. Welcome to newly-affiliated club, the East Central Minnesota Radio Club at

Stanchfield. W9VHO recently passed the General Class exam. W9RHV is now W9LV. WA9MNE was presented with an award and plaque by the North Suburban Wireless Assn. as its "Ham of the Year." WA9PQF is back in Minnesota after 4 years on Guam. The Des Moines Radio Amateur Assn. has taken over the W9-K9-WA9 QSL Bureau duties from W9DMA. Our most sincere thanks to Alva for his 30 years as W9 QSL Bureau manager. Rules established by DMRAA for QSL handling: Envelopes must be on file at the bureau for an amateur to regularly receive the DX cards meant for him. You will always be notified when the last envelope on file has been used. If you have more than one call, an envelope must be on file for each call. Do not send money for the bureau to buy postage. Put 1 or 2 six-cent stamps on the envelope. Business size (or a little larger) envelopes are preferred. Put your call in the upper left-hand corner of the envelope. Traffic: (Sept.) WA9VAS 285, WA9IAW 231, WA9THI 180, K9MVF 151, K9ZRD 148, WA9OEB 145, WA9RRA 105, W9ZHN 79, K9ORK 66, WA9QIT 65, WA9MMV 54, WA9TGM 51, WA9EEX 45, W9PAN 44, WA9-VTZ 41, WA9RKF 38, W9FHH 37, WA9URV 37, WA9WEZ 35, W9BUC 33, WA9VDG 32, WA9HRM 31, WA9TYL 31, W9NOYAH 29, WA9JPR 26, WA9-RXM 24, WA9TQT 24, K9LJL 23, WA9GRX 22, WA9VIS 19, W9KNR 17, WA9WUV 17, WA9RQ 16, W9EQC 15, WA9VKP 13, WA9DWM 11, K9FLT 11, K9GYO 11, K9ICG 11, WA9KLG 11, WA9PZY 10, W9BE 8, W9BUC 8, W9UMX 8, W9SJS 7, WA9VYV 7, K9ZVG 7, WA9PMM 6, W9SZZ 4, K9ZBI 4, WA9CJU 3. (Aug.) WA9UNS 40, WA9-EPX 26, WA9VHX 17, WA9UTQ 11, W9AZR 8, K9LJL 8, WA9VPK 7, WA9DFT 5.

NORTH DAKOTA—SCM, Harold L. Sheets, W9DM—SEC: WA9AYL. OBS: K9SPH. PAM: W9CAQ. RM: WA9RSR. OO: W9BF. The Dakota Feedbacks Radio Club is a newly-affiliated club in Grafton. W9FVX has recovered from his bout in the hospitals and is back in the office again. WA9SDQ has the SB-101 on the air now and is putting out a good signal with a new dipole. We wish to correct an error in the flood write-up that the Corps of Engineers made to QST in the Sept. issue. It was the RACES Net which was in the action. More net participation and traffic reports are needed. Stan wants more c.w. operators on 3640 at 9 p.m. By this time the YL WX Net no doubt is in operation with those two gals. WA9MND and WA9GRX, at the helm on 3995 at 0730 CST. WA9TBR worked mobile from Rochester. His YL is back and recuperating well. K9SPE reports that his YL is in the hospital. WA9EKT was at a filling station in Kansas when a gal drove up with an overheated car. It was W9DM's daughter, who lives in Kansas City. WA9HUD and W9NMV are leading in traffic-handling.

ND RACES Net	17 Sess.	489 check-ins	51 Tfc.	3996.5 kc.
				M-F 1830 CST K9SPH
NDPON	Net 12 Sess.	212 check-ins	6 Tfc.	3915 kc.
				S-1730 WA9HUD
				Sun. 0900-1730
NDCW	Net 13 Sess.	27 QNI	1 Tfc.	3640 kc.
				M-F 2100 WA9RSR

Traffic: WA9HUD 103, W9NMV 68, W9DM 10, W9-WWL 10, K9TNI 6.

SOUTH DAKOTA—Acting SCM, Ed Gray, WA9-CPX—WA9MWN is the new net manager for the Early Session Phone Net. SEC WA9FUZ reports 88 AREC members. EC volunteers are needed from the Pierre, Chamberlain, Yankton, Mitchell and Vermillion areas. League members in these areas are asked to submit applications for the EC post to the SEC. W9DJO recently passed the Amateur Extra Class exam. WA9WNE, of Winner, got on s.s.b. with an HT-37. WA9QMV, WA9YFE, WA9TKX and WA9-WAS have put up beams. W9AEN, of Winner, recently was married. K9TXV traveled to the West Coast and maintained mobile contact back home. On a new Swan Cymnet. Morning Net: 490 QNI, 49 QTX; Noon Net: 381 QNI, 37 QTX. Early Evening Net: 341 QNI, 13 QTX. Late Evening Net: 1256 QNI, 55 QTX. The C.W. Net is active. Traffic: WA9SKA 256, WA9PNB 151, W9IG 28, K9AIE 22, W9HOJ 22, WA9RIQ 20, WA9UEN 8, WA9FVZ 7.

DELTA DIVISION

ARKANSAS—SCM, Robert D. Schaefer, WA5IIS—SEC: W5PRZ. RM: W5NND. PAM: WA5QM. The Russellville ARC is thinking about a 6-meter repeater. WA5HNN is operating portable from Biloxi,



SWAN'S magnificent

MODEL 508 VFO—SWAN 500C TRANSCEIVER—117XC POWER SUPPLY—MARK II LINEAR

For several years Swan Electronics has been specializing in value engineering of single sideband transceivers to give radio amateurs the best possible equipment at the lowest possible price. We're pleased to say that we have thousands of satisfied customers all over the world, many who have purchased their third or fourth Swan as we continue the evolutionary improvement of our product. (Trade-in value of a used Swan is well above average.) We would like to say that the station illustrated above is a typical Swan station, but that would be misleading. Actually, the average Swan owner finds the quarter kilowatt or half kilowatt transceiver very adequate for his operating needs. What the picture illustrates is some of the Swan accessories that will add more versatility and greater operating pleasure to your Swan station. For the DX operator, the model 508 external VFO provides separate control of transmit and receive frequencies, or for the MARS and Net operator, the 510X crystal oscillator provides up to 10 fixed channels. For breaking through those weekend QRM pile-ups there's no better cure, legally, than the Mark II Linear Amplifier with its 2000 watts of P.E.P.

TOP OF THE SWAN-LINE THE FAMOUS 500C TRANSCEIVER

520 watts P.E.P. input on 10, 15, 20, 40 and 80 meters. Finest crystal lattice filter with 1.7 shape factor. 1/2 microvolt receiver sensitivity. Voice quality, performance and reliability are in the Swan tradition of being second to none. **\$565**

MODEL 508 EXTERNAL VFO

Provides full coverage of 80, 40, 20, 15 and 10 meters in 8 ranges of 500KC each. Enables you to transmit and receive on separate frequencies. Plugs directly into either the 500C or 270. **\$145**

CRYSTAL CONTROLLED MARS OSCILLATOR

For Mars or Net operation. Model 510X. 10 channels. Plugs directly into 500C or 270. Less crystals. **\$55**

POWERHOUSE MARK II LINEAR AMPLIFIER

2000 watts, P.E.P. input, 10 through 80 meters. Uses two 3-500Z triodes. Complete with matching power supply. **\$660**

MODEL 117XC MATCHING AC SUPPLY FOR 500C TRANSCEIVER

For 117 volts, 50-60 cycles, with speaker and phone jack. **\$105**

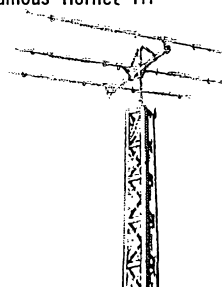
12 VOLT DC POWER SUPPLY FOR 500C TRANSCEIVER

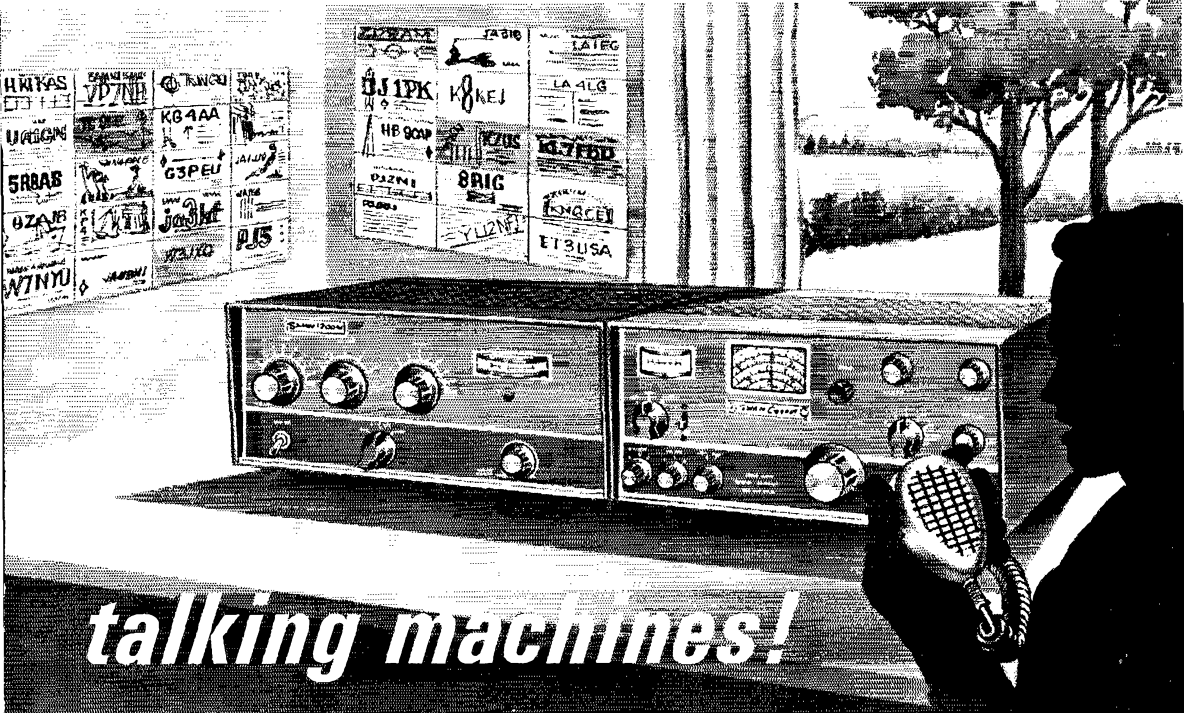
Model 14-117, designed for mounting under hood. Includes cables, plugs and fuses. Can operate from 117 volt AC by detaching DC module and plugging in 117 volt line cord. **\$130**

SWAN HORNET BEAM ANTENNAS

Latest addition to the Swan-Line. High quality, high performance antennas for the amateur bands. Best known are the famous Hornet Tri-banders, made in 2, 3 and 4 element models. The TB-1000 series is rated at 2000 watts, the slightly smaller TB-750 at 1500 watts.

- TB-1000-4 4 element... **\$159**
- TB-1000-3 3 element... **129**
- TB-750-2 2 element... **89**
- TB-750-3 3 element... **109**





talking machines!

MODEL 1200W LINEAR AMPLIFIER -- SWAN 270 CYGNET TRANSCEIVER

The new Cygnet line is our latest development, and promises to become tremendously popular. Being self-contained with AC and DC power supply and loudspeaker, it is designed for easy portability, ideal for vacation or business trips, field day, or mobile operation. At the same time it provides all the necessary power and versatility for a complete home station. The 508 external VFO or 510X crystal oscillator will plug directly into the deluxe Cygnet 270, as will the VX-2 Vox unit or FP-1 Phone Patch. And, if you feel the need for more power, the Cygnet Linear provides a 5 times increase to better than 1200 watts. The Cygnet line comes with the same high quality and reliability that is traditional with all Swan products. And with the famous Swan customer service, if and when required.

THE LITTLE GIANT DELUXE CYGNET TRANSCEIVER MODEL 270

260 watts P.E.P. input on 10 through 80 meters. A complete amateur radio station including 117 volt and 12 volt DC power supply and loudspeaker in one package with a handle. Has 100KC crystal calibrator, Dial Set, A.F. Gain, R.F. Gain, AGC, ALC, S-meter, side-band selection, all the features required for home station operation with enough power to work the world. Yet, the Cygnet is small and light enough for mobile or portable operation; an ideal traveling companion on business or vacation trips. **\$525**

CYGNET MODEL 260

Standard version of Deluxe 270. Same power and circuitry, without some of the Deluxe features. Still a magnificent talking machine. **\$435**

SWANTENNA MOBILE ANTENNAS

10, 15, 20, 40 and 75 meters. 500 watt power rating. High efficiency. No more coil changing.

MODEL 55 **\$95**
(Remote switching model)

MODEL 45 **65**
(Manual band selection)

CYGNET LINEAR AMPLIFIER

1200 watts, P.E.P. input, 10 through 80 meters. Has self-contained AC power supply, and same cabinet size as Cygnet Transceivers. Utilizing a grounded grid, super cathode drive circuit with four 6LQ6's, both efficiency and linearity are exceptionally high. Plugs directly into Model 270. May be easily adapted to the 260 and other transceivers. **\$295**

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Model VX-1 **\$35**

PHONE PATCH.

For all Swan Transceivers. Model FP-1 **\$48**

CYGNET CARRYING CASE

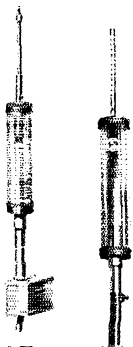
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HAPPY

Operating tips.

See page 120

Licensing questions?

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Interesting thoughts.

See page 128

Don't delay. Join today.

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A brand new item.

See page 155

You must keep records.

See page 153

Send the gift that lasts all year.

ARRL Membership with QST. See page 126

The AMERICAN RADIO RELAY LEAGUE Inc.

NEWINGTON

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Miss., and has a new harmonic. WA5KQU is now on RTTY. WA5GPO is working lots of DX with his new Classic 33 beam. Congratulations to W5YHT on receiving an Extra Class ticket. Welcome to W4CNA, who moved to Little Rock from Florida. Net reports for Sept.:

Net	Time	Freq.	T/c.	QNS	Minna.	Mgr.
RN	2330Z	3995	21	447	447	WA5QMQ
OZK	0000Z	3790	9	410	468	W5NND
APN	1100Z	3937	15	464	1381	W5VFW
PON	2130Z	3925	52	591	668	W5ELF
Teenage	2230Z	3995	24	307	408	WA5QMQ
VHF PON	0100Z-W-Sat.	51Mc.	3	116	454	WA5SKE

Traffic: (Sept.) W5NND 132, WA5QMQ 79, K5AJM 36, WA5TJB 21, W5MJO 14, W5ELF 12. (Aug.) W5NND 274.

LOUISIANA—SCM, J. Allen Swanson, Jr., W5PM—SEC: W5OB, RM: K5ANS/5. V.H.F. PAMs: WA5-DXA, W5UQR. Fellows, don't forget the Annual La. QSO Party, Jan. 17 and 18. Rules same as last year. (See Jan. '70 QST) This event is sponsored by the Lafayette gang. W5JYA is off to college for a year. W5OU is active again after many years. W5EA has been bitten by the RTTY bug. During "Camille" W5CEZ handled 311 messages and spent 317 hours helping. K5ARH, K5TTA, K5EGW, W5VMU and K5-VJZ are all active on 2 meters from Lafayette. WA5-QVN says the Twin City Hams is moving its club location to the airport. WN5ZQG is a new addition to our ranks. W5OB was hit recently by a "bug" that laid him low for a week. W5MI has been most active on LAN. K5ANS/5 missed "Camille" as he was on vacation in California. Frank reports the Auto-start RTTY Net has been moved to 3587.5. Frank also requests that the various NCS on LAN to please get their reports in on time. The CENLA plans a booth at the Rapides Parish Fair. Incidentally, its publication, *Spark*, recently had a fine article on tornado detection via your home TV set. W5CEW commutes between Shreveport and Abbeville. The Southwest ARC recently had a bang-up banquet at which the AREC members of S.W. La were awarded a Certificate of Merit, each member being given a copy of the certificate. Traffic: (Sept.) W5MI 173, W5CEZ 121, K5ANS/5 77, WA5QVN 22, W5EA 8, W5JYA 1. (Aug.) W5MI 307, W5PM 109.

MISSISSIPPI—SCM, Clifton C. Comfort, WA5KEY—SEC: WA5JWD, WA5UEG had the top traffic count for the "Camille" emergency. W5BW had a heart attack but is recovering in a Biloxi hospital. W5RFV is in the V.A. hospital, Memphis. WA5RRE, WA5UIH, WN5YOU, WA5DYH, WA5GHF and WA5FCP are at Miss. State U. Welcome to the Miss. Nets, WA8YUW (just back from Vietnam), WN5ZTW and WN5ZYZ are the newest Novices reported. We welcome W5JJA back to the 75-meter band. Talk up the petition WA5KPS has started for mobile amateur radio tag exemption. See your state senator and representative and explain it to them. Alaska set the example! WA5TM has resigned as net mgr. for MSBN because of business pressures. WA5UBQ is taking over. WA5-UBQ says make plans to go to the MSBN Winter Picnic, time and place to be announced. WA5KEY says you should try typing with a finger in a cast! It is worse than trying to send c.w. under the same conditions.

MSBN	3990 kc.	0015Z	Daily
CGCHN	3935 kc.	0100Z	Daily
GCSBN	3925 kc.	0330Z	Daily

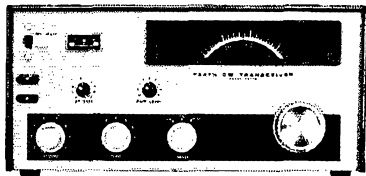
Traffic: (Sept.) W5RUB 65, WA5UBQ 40, WA5CAM 3. (Aug.) WA5UEG 1635, W5LLB 1590.

TENNESSEE—SCM, Harry A. Phillips, K4RCT—SEC: W4WJH, PAMs: W4PFP, WA4YBT, WA4EWW, WB4HMA. RM: K4AMC.

Net	Freq.	Days	Time	Sess.	QNI	QTC	Mgr.
TSSB	3980	M-Tue.-Sun.	0030Z	26	1155	126	WA4YBT
TPN	3980	M-Sat.	1245	30	1277	76	W4PFP
		Sun.	1400				
ETPN	3980	M-Fri.	1140	22	630	49	WA4EWW
TPON	3980	Mon.	0030	4	125	49	K4RTA
TTN	3980	Daily	2200	30	230	50	WB4HMA
TN	3635	Daily	0100	30	161	127	K4AT
ETVHF	50.4	M-W-F	0000	13	149	4	WA4TJJ
ETVHF	145.2	Tue.-Thurs.	0000	9	55	0	WA4TJJ

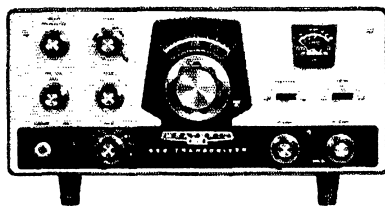
K4AMC has been appointed RM to replace WB4GSS. I hope you will support the TN on 3635 kc. The success of the TN is dependent on traffic activity.

Merry Christmas To A Ham Is Heathkit® Amateur Radio Gear



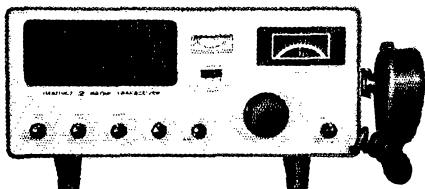
HW-16 Novice CW Transceiver ... a high-performance 3-band CW transceiver ... covers the lower 250 kHz of 80, 40, & 15 meters. 75 watts input for novice class — 90 watts for general class. Provisions for VFO transmitter control with Heathkit HG-10B.

Kit HW-16, 25 lbs. **\$109.95***



HW-100 5-Band SSB-CW Transceiver ... second only to the famous SB-101 in performance & value. 80-10 M coverage ... 180 watts PEP SSB input, 170 watts CW. Solid-State (FET) VFO ... patented Harmonic Drive™ dial mechanism ... crystal filter ... built-in 100 kHz calibrator.

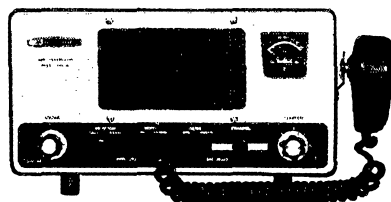
Kit HW-100, 22 lbs. **\$250.00***



HW-17A Solid-State 2-Meter AM Transceiver ... the easy way to 2-meter phone. 25-30 watts AM input ... solid-state dual-conversion superhet receiver ... 4 crystal sockets plus provision for external VFO ... ANL ... Squelch ... comes with PTT mike & mobile mount. Get on 2 FM with the HWA-17-2 FM Adapter.

Kit HW-17A, 17 lbs. **\$129.95***

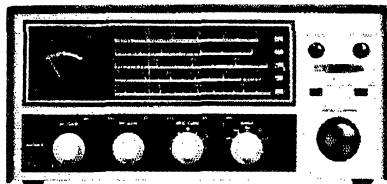
Kit HWA-17-2, 2 lbs. **\$17.95***



HW-18 CAP. SSB Transceiver ... 200 watts PEP SSB input ... 25 watts with carrier for AM compatibility ... 2 switch-selected crystal controlled channels ... crystal filter IF for 2.1 kHz selectivity ... 1 uV sensitivity ... mobile mount & PTT mike included.

Kit HW-18-1, CAP xcvr., 16 lbs. **\$119.95***

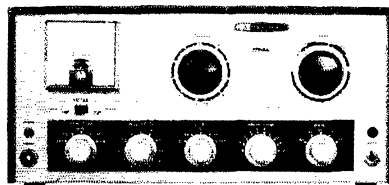
Wired HW-18-1, wired CAP xcvr., 16 lbs. **\$179.95***



HR-10B Amateur Band Receiver ... with extra-durable two-tone wrinkle finish to match the "Single-Banders" and novice transceiver. Tune AM, CW, and SSB with 80 through 10 meter coverage. Provisions for plug-in 100 kHz crystal calibrator.

Kit HR-10B, 20 lbs. **\$81.95***

Kit HRA-10-1, 100 kHz crystal calibrator, 1 lb. **\$9.95***



DX-60B Phone & CW Transmitter ... with wrinkle finish matching HR-10B and the "Single-Banders". Here's 90 watts on 80 through 10 meters ... operates at reduced power for novice class.

Kit DX-60B, 24 lbs. **\$81.95***



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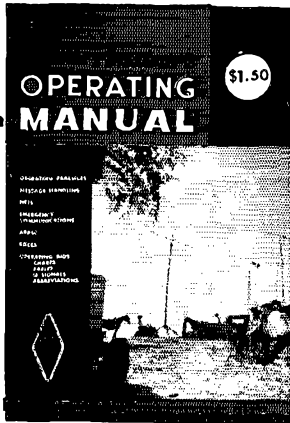
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therefore I urge all PAMs, NCS, and individuals to direct out-of-state traffic to TN whenever possible. TN is our link to the National Traffic System. The RATS (Nashville) elected Mike Campbell as chairman for this term. The club station W4PQP/4 made the BPL while operating from Camp Boxwell Scout Camp. The International Harvester Radio Club (Memphis) drew a crowd at the Mid-South Fair where they operated a station and traffic booth. The Delta ARC (Memphis) reached a new plateau recently when the 100th ham joined. Traffic: W4WBK 198, WA4UAZ 189, K4AT 143, W4PQP/4 114, W4SQE 103, W4OGG 93, WB4EHD 77, WB4HMA 65, WB4GSS 55, W4FX 49, WA4GLS 45, WB4JTS 41, WB4JDD 37, WB4DYJ 20, W4KAT 18, W4LHE 18, WA4YFG 18, W4PFP 17, WB4ANX 16, WB4JFT 16, WA4CGK 13, WA4EWW 10, K4UMW 9, K4LTA 3, WA4KYT 7, W4VJ 7, WB4-HSS 6, WB4HLH 5, K4AMC 4.

TENNESSEE QSO PARTY

December 21, 1969

All amateurs are invited to participate in the Sixth Annual Tennessee QSO Party, sponsored by the Radio Amateur Transmitting Society.

Rules: 1) Contacts may be made during the 24 hour period starting at 0000 GMT and ending 2400 GMT December 21. 2) No power or time limitations. 3) The same station may be worked on different bands and modes. 4) The general call is CQ Tenn. All modes to be combined as one entry. 5) Exchange QSO number, report and country (Tennessee stations) or state, province or country (non-Tennessee stations). 6) Tennessee stations count 1 point per complete QSO, times the number of states, provinces, countries and Tennessee counties worked for final score. Out of state stations multiply QSO points by the number of different Tennessee counties worked. 7) Certificate awards for the first place per state, province or country and for the first five places within Tennessee. A suitable engraved loving cup will be awarded to the grand aggregate score outside and within Tennessee. All amateurs contacting 10 separate Tennessee stations during the contest will be awarded a "Certificate of Achievement." 8) Suggested frequencies: 3530 3900 7030 7250 14070 14275 21050 21325 28300 28900. 9) Any station disrupting a working Tennessee traffic net for the purpose of contest contacts will be automatically disqualified from any award.

Logs showing date, time, stations contacted, band, modes, location and computed final scores must be received no later than January 22, 1970. Send logs to the club station W4PQP, c/o American Red Cross Bldg., 22nd & Patterson, Nashville, Tenn. 37203.

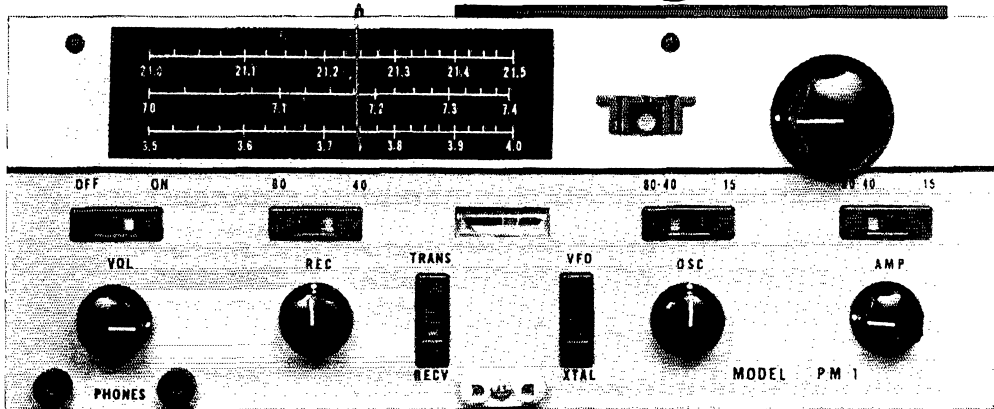
GREAT LAKES DIVISION

KENTUCKY—SCM, George S. Wilson, III, W4OYI —SEC: W4VYS. Appointed: W4BEJ as PAM-KRN, WB4IOU as ORS. Endorsed: W4VYS as SEC; WA4-ADH as OVS; W4UK, W4BTA, W4MWX, K4AVX, K4HOE, WA4UHR, WA4VZZ, WB4EQY as ORS; WA4AGH, WA4WSW as OPS; K4AVX as EC; WA4AGH as PAM-KTN; K4TRT as PAM-MKPN; WA4AGH as OO and OBS. K4YZU made the BPL.

	QNI	QTC		QNI	QTC
KRN	377	22	KYN	352	257
MKPN	420	71	FCATN	219	67
KTN	742	149			

"Well done" to long time PAM of "The Rebels," K4KIS, and good luck to his successor, W4BEJ. This is a good time to remind everyone what a tiring and thankless task it is to be Net Manager. Ours, W4BEJ, K4TRT, WA4AGH, W4BAZ and W4OTP are the best anywhere. W4JUI popped in and out of the hospital, while WB4HUS busted an arm in a car wreck. FCATN tries to monitor 50.7 from 9 A.M. to 10 P.M. in Louisville. W4VUC is "/TA" until '71. Welcome to Kentucky, K4CRB (ex-K7KKA), at Hustonville. There sure were a gang of Kentuckians at the Cincy ham-fest. The Owensboro gang went to Perryville for the big Scout hike. Keep those reports coming. Traffic: (Sept.) WB4KPE 161, K4YZU 140, WB4FLA 118, W4BAZ 93, K4HY 89, WA4DYL 83, W4OYI 83, WA4-VZZ 61, WB4HUS 55, WA4AGH 54, WA4VUE 47, WB4IOU 46, K4TRT 45, K4UMN 35, W4OTP 33,

where excitement begins

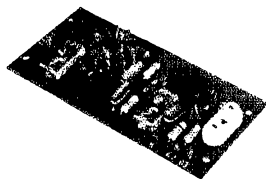


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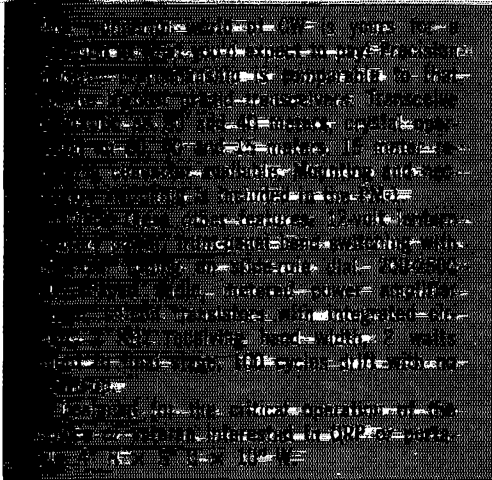
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 (SEE ADV. ON PAGE 159 OF THIS ISSUE)

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W4CID 31, WB4EOR 31, WB4FDK 24, WA4GHQ 19,
 WB4GCV 17, WB4ILF 16, WA3WSW/3 16, WB4HFU
 13, W4KJP 13, WB4EQY 9, K4UDZ 9, K4YCB 9,
 K4VDO 8, WA4FAF 7, WB4HFY 7, WB4HTN 7,
 K4AVX 6, W4BTA 5, WB4LKP 5, K4NYO 3. (Aug.)
 W4NBZ 67, W4AVZZ 52, W4BTA 11, W4VYS 3.

OHIO—SCM, Richard A. Egbert, W8ETU—Asst.
 SCM: Roger Barnett, K8DDG. SEC: W8OUU. RM:
 W8IMI. PAM: K8UBK. V.H.F. PAM: WA8ADU. Sept.
 net reports:

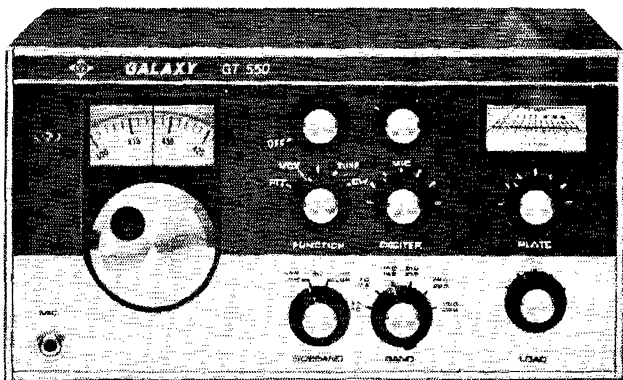
Net	QNI	QTC	Secs.	Freq.	Time	Mgr.
OSSBN	1869	943	64	3972.5	1530 & 2345Z	K8UBK
BN	0616	349	59	3580	0000 & 0300Z	W8IMI
06MtrN	0573	68	57	50.61	0000Z	WA8ADU
				50.16	0200Z	
OSN	0209	87	30	3580	2325Z	WA8VNU
Apricot	0325	525	30	51.0	0200Z	K8ONA

BPL certificates for Sept. traffic go to W8UPH, W8-
 QCU, WA8DWL and WA8ORL/8. RM W8IMI an-
 nounces that the BN alternate frequency is now 7082
 kc. QCEN Communications Mgr. WA8COA reports
 regular liaison from QCEN to all section nets. The
B.V. Bulletin tells us that WA8RWK is compiling
 a list of stations with 52.025-Mc. f.m. capability.
 Sept. appointments were WB8BLEH as OPS and ORS,
 WB8CEH as OBS and K8QHJ as OO. Ohio Technical
 College now has a club station with the call WB8-
 EYC. Cleveland Wireless Association's new officers are
 W8QAV, pres.; W8MBB, vice-pres.; W8BE, secy-
 treas. Henry Co. ARC produced six new Novices from
 its recent code and theory class. Welcome to the
 newly ARRL-affiliated Piqua Radio Club, Marlinton
 H.S. ARC and St. Joseph H.S. ARC. Congratulations
 to new Extra Class W8DPW and W8NAL and to new
 Advanced Class W8FSQ, W8RZM, W8RZQ and W8-
 SMI. WRRL writes that he is now residing in Clear-
 water, Fla., signing K4NB. Toledo's *Ham Shack
 Gossip* tells us that K8WVZ is signing slant 9 from
 Illinois on 40 through 10. Franklin Co. EC W8ERD
 reports that his group handled communications for the
 U.S. National Championship Road Rally. I had to
 miss the Cincinnati Stag Hamfest, but K8DDG tells
 me that it was first-rate as usual. Observer W8BU
 continues to receive notes from grateful recipients of
 Cooperative Notices, evidence that OO efforts are not
 in vain. Our new Ohio Section Emergency Plan seems
 to be getting wide acceptance among the ARPSC-
 inclined. Key city ECs are taking steps to implement
 the plan, as are our net managers. I hope that those
 who requested additional copies will hear with me on
 the slow returns. Getting the copies duplicated in
 quantity ran into a snag. There is a place in
 ARPSC for every ham. Participate in AREC and/or
 NTS. Best wishes to all for a Merry Christmas.
 Traffic: W8UPH 566, WA8ETX 328, WA8VNU 281,
 WB8BZX 233, WA8OCG 217, WA8DWL 214, W8QZK
 210, WA8UPI 208, W8QCU 207, WA8ZTV 200, WA8ORL
 167, WB8DSV 163, W8STU 160, W8IMI 148, W8OE
 139, W8PMJ 135, WB8PPB 124, K8ONA 114, W8GVX
 113, W8CHT 105, W8UX 97, WA8LFL 92, W8LRF
 86, W8JH 82, WA8YB 81, WB8ALU 80, W8JD 78,
 WA8DUL 77, WA8ETW 75, K8UBK 74, W8OUU 73,
 WA8CXY 65, WB8AKW 64, WA8WAK 57, W8ERD 55,
 W8GNL 55, WA8SED 55, W8MOK 53, WA8YUB 53,
 WA8TYF 51, K8DDG 45, WB8CHW 42, WA8QFK 41,
 K8EHU 40, W8FGD 38, WA8ADU 37, WA8BZR/8 33,
 K8BYR 32, WA8VYN 31, WA8SHP 30, W8DAE 29,
 W8NAL 28, WB8AKU 27, WA8PPK 26, WA8ZNC 26,
 W8UDG 24, WB8BLH 23, W8ETU 23, WA8YLW 22,
 K8PBE 21, WA8VWH 21, WA8COA 19, W8SZU 19,
 WA8WJR 19, WA8LAM 18, W8GOE 16, WA8NOQ 16,
 WA8SXI 16, WA8YHN 16, WA8CFJ 14, WA8ARW 12,
 WA8FSX 11, WA8MHO 11, WA8RUC 10, WA8AJZ 9,
 W8LZE 9, W8IO 8, W8WEG 7, WB8CKI 6, W8GRT
 6, K8EKG 5, WA8TKM 5, W8AL 4, K8CKY 4, W8-
 MGC 4, W8BZX 3, W8FEQ 3, WB8EHI 3, WA8MCR
 2, W8TV 2, WA8RQ 1.

HUDSON DIVISION

EASTERN NEW YORK—SCM, Graham G. Berry,
 K2SUN—Asst. SCM and RM: Ruth E. Rice, W4VYS.
 SEC: W2KGC. PAM: WB2VJB. V.H.F. PAM: WB2-
 YQU. Section Nets: NYS on 3675 nightly at 2300Z;
 ESS 3590 nightly at 2300Z; NYSPT&N on 3925 night-
 ly at 2300Z. Appointments and renewals: K2BK (ex-
 WA2OJD) as OO; W2SZ as ORS, W2SZ and WA2-
 MID as OPSs; WA2EAH, WB2SIH, W2SZ as OVSs;
 WA2BRA as OBS. Station activities: K2UYK now is
 on 6 meters. The Westchester ARA heard K2IA on
 "A Ham Views S.E. Asia" at its Sept. meeting. The
 New Rochelle Club heard WA2TEQ on "Digital Logic
 Circuits" in Sept. WB2ZXH is en route to Guyana.

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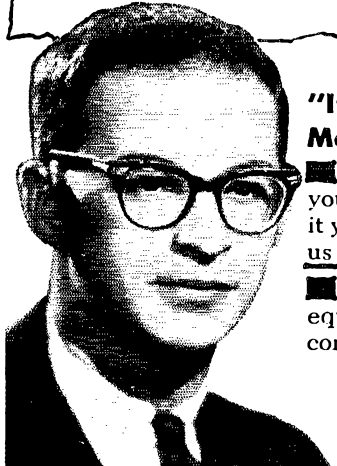
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| <input type="checkbox"/> Galaxy GT-550 Transceiver (\$475) | <input type="checkbox"/> Check |
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| <input type="checkbox"/> AC400 Supply (\$89.95) | |

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WA2HXM is now Advanced Class. W2AGQ is trustee of the Holy Cross station at West Park. WA2HHO is operating 4 from Jacksonville U. in Florida. As a Novice during the summer, he worked 36 states and 14 countries. The Schenectady Club is conducting classes as part of the Niskayuna Adult Education program, with 55 enrolled. WIANA spoke at the Sept. meeting of the Schenectady Club on the early days in amateur radio. Holidays have dinners programmed by many clubs, with the Communications Club of New Rochelle on Dec. 5 and the WARA on the 11th. WA2RDP is now Extra Class. WA2FBI is NCS for the Eastern Novice Training Net Thurs. WB2HXZ picked up 9 states during the Aurora-Tropo openings in Sept. V.H.F. PAM WB2YQU added 4 for a total 22 the last two days of Sept., including direct contact with VE1PL and W8WEN. WA2EAH is operating from R.P.L. in Troy with the call WA2LNX. RPI Club officers are W2DVQ, pres.; WB2DRW, vice-pres.; WB2ECU, secy. K2KKU is now Advanced Class. W2URP, with 2 stacked seven-elements up 80 feet reports hitting 8 repeaters. The Niskayuna HS club officers are WA2JSN, pres.; WA2DUS, vice-pres.; WN2EUQ, treas.; WA2CRW, secy. New RACES RO in New Rochelle is W2DPV, with K2SJJ stepping up to Communications Chief. Welcome to WA2LTZ and WA2ZGV, newcomers to the section. WA2RAU was behind the curtain with a medical touring group and glad to get back out. Traffic: (Sept.) W2EAF 124, WA2VYS 82, W2ODC 68, WA2EAH 65, WA2CRW 23, W2ANV 22, WA2FBI 18, W2URP 18, WB2FUV 11, WB2VJB 11, WA2WGS 11, K2SJJ 8, WA2VYT 8, W2TFV 6, K2HNW 3, WB2AFV 1. (Aug.) W2ODC 63.

NORTHERN NEW JERSEY—SCM, Louis J. Amoros. W2ZZ—SEC: K2KDQ. RM: WR2KK. PAMs: W2PEV, K2KDQ, WA2KZF and WA2TBS.

ARPSK Sections Net Schedules

Net	Freq.	Time	Days	Sess.	QNI	Tjc.	Mgr.
NJN	3695 kc.	7:00 P.M.	Dy	30	473	225	WA2BLV
NJN	3695 kc.	10:00 P.M.	Dy	30	274	85	WA2BLV
NJSN	3740 kc.	8:00 P.M.	Dy	26	163	28	WB2FEH
NJEPNTN	3950 kc.	6:00 P.M.	M-Sat.	30	474	225	W2PEV
NJPON	3930 kc.	6:00 P.M.	Sun.	4	73	21	WA2TBS
NJAN	50,425 kc.	8:00 P.M.	M-F	22	203	38	WA2KZF

PVETN 145,710 kc. 7:30 P.M. Dy 30 212 182 K2KDQ
ECTN 146,700 kc. 9:00 P.M. Dy 30 205 128 WA2TBS

New appointments: WA2BAN as EC for Livingston and vicinity; WA2DNU as EC for Glen Rock and vicinity; WA2DQE and WA2GOC as ORs; WA2-BHJ and WA2DQE as OPSs; W2PEV, WA2BCT and WB2JCI as OBSs. Endorsements: WB2FEH as OBS. WN2JQF passed the General Class exam. WB2IVH, WB2JAE and WB2VYA passed the Advanced Class exam. K2KDQ still is looking for an EC for Jersey City. WB2KPD is operating K9NBH while at Boot Camp. W2TRZ, WA2DAX, WA2DNU and WB2WUZ all joined Navy MARS. The K2DEL group has an HB linear on 8. K2KDQ is working on his 100-w.p.m. RTTY. W2VHE is back home from the hospital. WB2DYB reports over 50 confirmed for DXCC. WN2-KEJ is using the DX-40 and HB-600. WB2IWH now using a TR-4. WA2CRU received the WAC award. WB2YPQ is trying 80 c.w. With deep regret we report the passing of WB2EJR, a regular member of our NJEPTN. He will be missed by his many friends. The K2OQJ group has a new Drake Line and reports the first Novice class had 20 students. WB2VPX is on 20 c.w. and s.s.b. WB2HEO is chasing 15-meter DX. WB2VYA is a pre-med student at Tulane and WA2CKU is at NCE. We welcome WA2LDX to our section. He also is W8IBX and ex-W3DPR and formerly ORS, OPS and OO. The EARA thanks all for the fine showing in the recent N.J. QSO Party. N.J. high scorers: WB2WOW, WA2CFA, WA2ATO, WA2-QNW, WB2CKB, WA2CGM and K2OQJ. K2KDQ is the new Navy MARS coordinator for N.N.J. Many thanks to all who sent best wishes during our visit to the hospital. The arm is OK again and needs a good contest to get it in shape. My sincere thanks to all for the help during the past year. A Merry Christmas and a Happy New Year to all. Traffic: (Sept.) WA2IGQ 267, K2DEL 249, K2KDQ 237, WA2-BAN 169, WB2DDQ 156, WB2FEH 124, WA2TBS 88, WA2DNB 62, W2PEV 60, K2OQJ 55, WA2BHJ 53, WB2YXJ 43, WB2BXX 40, WB2YPQ 35, WA2HJS 34, WA2DQE 33, WA2NJB 31, W2WID 31, WA2FRZ 24, W2ZZ 23, WB2RKK 22, WA2EUO 19, WA2ACP 18, WB2WUZ 15, WB2HEO 14, WA2CCF 12, K2DQT 6, K2TFI 6, WB2DRJ 4, WA2EUX 4, WA2KZF 4, WA2-



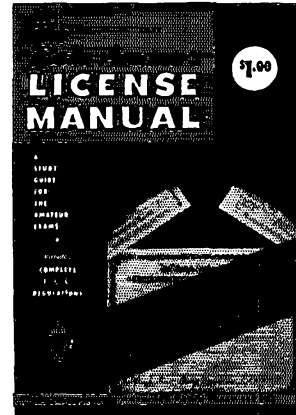
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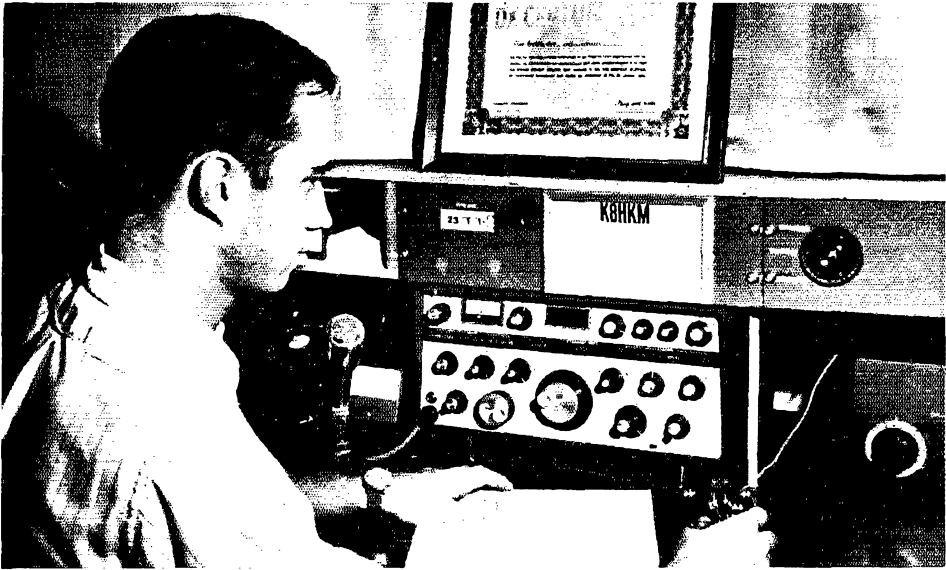
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LDX 4, WA2DNU 3, WB2BCS 2, WA2GIE 2, WB2-RUM 1. (Aug.) W2ABL 6, WA2TAF 4, WB2ZSH 1. (July) WB2ZSH 40. (June) WA2FRZ 48.

MIDWEST DIVISION

IOWA—SCM, Wayne L. Johnson, K0MHX—SEC: K0LVB, PAM: W0PZO, RM: W0LGG, OBS: W0-LCX, W0JAQ, W0LR, WA0MIT. New appointee: WA0EYQ as EC Story County. W0BDR has joined the Silent Keys. Russ was the Iowa SCM about ten years ago. W0CXN is now W0LR, having passed the Extra at the National Convention. Vera has been continuously licensed for 44 years. K0JGI enjoyed portable operation in VE-5, 6, and 7-Land while on vacation. WA0YVR is a German and Spanish major at U. of I. WN0ZY is an EE major at ISU. WA0SDC is another convert to open wire fenders. Tom reports exotic DX with this antenna. K0AZJ, in his fall newsletter to the TLCN, reports new interest. A QNI to TLCN will get you on the roster. Dave has an up-to-date roster for a SASE. Sunday night is slow-speed night. A pleasant new voice on the noon net is WA0VZH. Dot is helpful with traffic in the Ft. Dodge area.

Net	Freq.	Day	GMT	QNI	QTC	Mgr.
Iowa 75	3970	M-Sat.	1830	1442	337	W0PZO
Iowa 160	1815	Daily	0100	160	8	K0TDO
Iowa S.S.B.	3970	M-Sat.	2359			W0YLS
TLCN	3580	Daily	0030	173	106	K0AZJ
PON	3915	W-F	0030			WA0DYV

Traffic: (Sept.) W0LCX 1031, W0UPX 316, WA0VJD 138, WA0OTQ 117, W0PZO 72, WA0MLE 65, K0AZJ 64, WA0POE 51, W0LGG 47, W0KB 41, WA0VDC 36, WA0VZL 33, WA0YVR 21, WA0VRJ 19, W0MOQ 18, WA0QZL 15, K0TDO 13, WA0PPW 12, WA0-AIW 10, K0KAQ 10, WA0MIT 10, WA0SRM 10, W0BW 7, K0JGI 5, K0LKH 4, W0DMX 3, K0GHH 2, WA0SDC 2, WA0VDP 1. (Aug.) K0JGI 16.

KANSAS—SCM, Robert M. Summers, K0BXF—SEC: K0EMB, PAM: K0JMF, RM: K0MRI, V.H.F. PAM: WA0CCW. Renewed appointments: K0VQC, K0JDD, K0LPE as ECs; W0RSY, W0AQ, WA0-JII as ORSs; K0LPE, WA0LLC, W0BGX as OPSs; K0UVH as OBS; W0LYC as OO. New appointment:

W0BGX as EC for Zone 5, Wyandotte and Leaven-worth Counties. We received a new bulletin from the Tri-State ARC. W0VLD, of Pittsburg, is the editor. On Sept. 12-14 the Hiawatha Amateur Radio Club provided communications for approximately 120 Boy Scouts and leaders at the Atchinson County Lake. Station WA0SJV was used by WA0SJV, WA0UHV, WA0UDR, WA0UCZ, WA0UQA, WA0SR, WA0-UGV, WA0UFR, WA0KDC, W0PB and EC Zone 1 WA0OZP. Activity in Topeka in Sept. included helping the Red Cross with its usual run of collecting messages for servicemen. The action took place at the State Fair. On Aug. 31 the gang in Topeka took part in the Red Cross program of collecting funds for the "Kansas Cares" disaster fund for the Hurricane Camille victims. Those who were active, either fixed or mobile, were W0JLY, W0WIZ, K0JMF, K0QMZ, K0QKY, K0BJF, K0BXJ, WA0FNX, WA0FZY, WA0FZO, WA0KBW and WA0TZW. WA0SPO and WA0SVO are now Advanced Class. WN0ZVT is a new ham in Lawrence. W0ZJY reported working, Ill., Mich., Okla., Nebr. and Mo. recently on 2. All our nets reported good traffic counts: KSBN, QNI 703, QTC 135, in 26 sessions; KPN, QNI 198/25/16; KPON, 1127/605/30; QKS, 354/139/60; KWN, 725/46/31; Ks EC Net, QNI 36, QTC 2 in 4 sessions. Traffic: WA0THQ 604, K0JMF 425, W0INH 337, W0HI 273, W0LXA 237, WA0LLC 99, K0MRI 80, WA0LBB 71, W0CGZ 62, K0BXF 57, WA0SHG 41, WA0UTT 33, W0GCJ 29, WA0OWH 29, WA0OZP 22, WA0TZK 20, K0GI 18, K0EMB 17, W0BGX 15, W0CHN 13, K0UVH 11, K0KVF 5, W0CHJ 4, W0PB 4.

MISSOURI—SCM, Robert J. Peavler, W0BV—SEC: W0BUL. New appointments: W0ENW as EC for Pettis County. WA0QIA as OPS, W0JKF as ORS. Appointments renewed: WA0KUH as PAM, K0DEQ and W0GBJ as ORSs. Net reports:

Net	Freq.	Time	Days	Sess.	QNI	QTC	Mgr.
MEN	3905	2330Z	M-W-F	12	174	8	W0BUL
MNN	7063	1900Z	M-Sat.				W0UD
MON	3585	0100Z	Daily	24	159	70	K0AEM
MoSSB	3963	2400Z	M-Sat.	27	1098	132	W0RTO
MoPON	3983	2300Z	M-Sat.	26	405	152	WA0TAA
SMN	3585	2200Z	Sun.				W0OUU
PHD	50.55	0130Z	Tue.(GMT)	5	93	8	WA0KDH
MWN	3585	0300Z	Daily	30	170	159	WA0RVR



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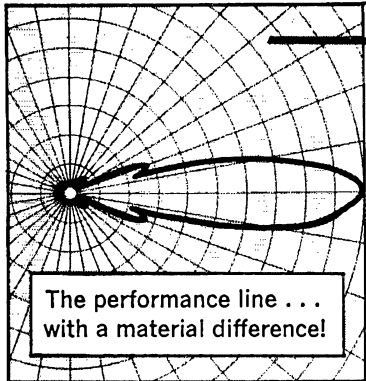
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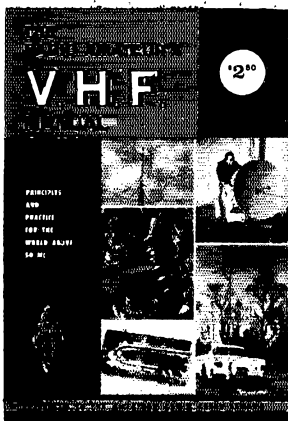
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Note the new frequency for MEN, effective Oct. 6. It is good to hear WOOD back on the air with a Cygnet. The Tri-State Amateur Radio Society has established a station in memory of Alfred H. Dangerfield, WØDE, and has applied for that call; persons wishing to contribute ideas, equipment, or assistance should see WØBUL or WØVLD. WAØITU, Kansas City, has set up an informal net on 145.3 Mc. at 8 P.M. local time every evening. All are welcome. WAØDGG is a DJ and TV sports announcer for an Armed Forces station in Vietnam. KØORB continues his Intruder Watch and daily schedule with KC4USN. Congratulations to: WAØLCV, who was recently married; WØDSW, on Extra Class; KØJJP on Advanced Class. The Mules Amateur Radio Club at Central Missouri State College is sponsoring a candidate for Homecoming Queen. Traffic: KØONK 1284, WAØVRI 226, WAØRVR 152, KØAFM 104, KØRPH 56, WØBV 52, WAØTAA 48, WAØQIA 44, WØJKF 39, WAØFKD 36, KØORB 36, WØBUL 35, WAØQXG 33, WAØHTN 29, WAØWQA 23, WAØVJN 20, KØJJP 13, WØRTO 9, WØOOD 8, WAØKUH 7, WNØZLP 1.

NEBRASKA—SCM, V. A. Cashon, KØOAL—SEC: KØODF. NEB II resumed schedules Sept. 20 and would appreciate more QNI. KØKKJ has built a super ham shack in his basement which includes the mini TV his XYL gave him. WØBM transmits Official Bulletin Sat., Sun. and Mon. on 3590 kc. at 0200Z. Each NCS is urged to get his QNI and QTC to the PAM/RM in sufficient time so the monthly reports may be compiled in time for forwarding to the SCM. Your cooperation is appreciated. From Jan. 1969 to date the net total is QNI 48,447, QTC 3878; individual station reports 429, QTC 12,169. Merry Christmas, everyone!

Net	Freq.	GMT	Days	QNI	QTC	Mgr.
NSN I	3982	0030	Daily	844	56	WAØLOY
NEB II	3590	0300	Daily	8	3	WAØHWR
NMN	3982	1230	Daily	1030	54	WAØJUF
WNN	3950	1300	M-Sat.	527	29	WØNIK
AREC	3982	1330	Sun.	183	2	WØIRZ
CHN	3982	1730	Daily	1470	180	WAØGZ
NSN II	3982	2330	Daily	880	89	WAØLOY



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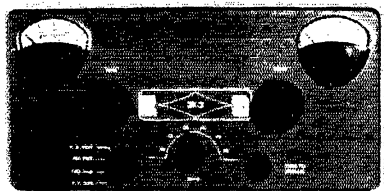
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Aug. net report
NSN I 3982 0030 Daily 842 58 WAØLOY
NSN II 3982 2330 Daily 985 73 WAØLOY

Traffic: KØNEB 471, WØLOD 176, WAØOMY 166, KØUWK 107, KØJFN 67, WAØHWR 62, WAØØGHZ 51, WØBFW 36, WAØBOK 33, WAØTTM 27, WAØ-CBJ 26, WAØLOY 26, WAØJH 17, WAØIKD 16, KØJTW 16, KØODF 16, WAØQX 16, WØFQB 14, WAØMHW 14, WØGEG 12, WØHTA 10, WAØTMG 10, WØZOU 10, WØHOP 9, WAØEEI 8, KØHNT 8, WAØPPC 3, WAØSOP 6, KØDVG 5, WAØJAV 5, WAØJUF 5, WØATU 4, WAØCHN 4, KØFRU 4, WØRJA 4, KØUDV 4, WAØUPK 4, WAØIBL 3, WØNIK 3, WAØQEI 3, WØVEA 3, WAØDCI 2, WØEXJ 2, WAØLRQ 2, WAØNYM 2, KØOAL 2, WØPHA 2, WØRAM 2, KØSFA 2, WØSWG 2, WAØ-VJI 2, WØYFR 2, WAØPIF 1.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, John J. McNassor, W1GVT
—RM: WAIHSN. PAM: K1YGS. V.H.F. PAM: K1-SXF. Sept activity rept.:

Net	Freq.	Days	Time	Sess.	QNI	QTC
CN	3840	Daily	1845	30	239	230
CPN	3965	M-S 1800 Sun	1000	30	424	109
VHF 2	145.98	M-S	2200	22	84	21
VHF 6	50.6	M-S	2100	22	195	16

High QNI: CN—WAIHOL, WAIHSN and WAIJGA. CPN—WIDQJ, WAIKMS and WIGVT 27; K1YGS 26; WAIKMR, K1SXF and W1YBH 25; WAIJVV 23; WAIHOL 22 and WAIIGF 20. Thanks to K1SXF, WØHGH/1, W1HHR, W1WX, K1SRF, K1PJQ, K1ILJ and K1BEN for AREC reports. New ECs include W1NBP, WAIKMR and WAIJQC. ECs, as well as all AREC members, should be active in the Annual Simulated Emergency Test in Jan. All nets are ready, many clubs are preparing for it. It could be a Winter Field Day! Will appreciate contacts and reports. Now is a good time for club reports to Director W1QV. Let him know how active you are. Thanks to: RM WAIHSN for the fine issue of *Nutmeg Net News*, W1ADW for the EC pitch in the *CARA Newsletter*, W1YYM for a well-done *Murphy Message!* The FCC Incentive Licensing regulations are now the Law. If QRM is a problem, get that Extra Class license and use the "Freedom Frequencies"! Congratulations to: K1GUD on Extra Class; WAIHK and W1JZC on Advanced Class; W1N1NR on becoming a Novice and WAIHOL on CP-30! Santa Claus may give you a full coverage rig but you must work for the full coverage ticket. It is within your reach—why not get it! My sincere thanks and appreciation to all who have helped make this a wonderful year. Merry Christmas and Happy New Year to all. Traffic: W1EFW 301, WAIKMR 155, WAIHOL 148, WAIHSN 128, W1EJ1 127, WAIIGF 86, W1AW 73, WAIJVV 49, W1GVT 48, K1SXF 45, WAIJMO 35, WAIJGA 28, K1YGS 28, W1KUO 28, W1YBH 23, W1BDI 22, WAI-JQC 20, W1NBP 17, W1QV 15, W1CTI 11, W1B1NB 10, WAIJYE 10, W1CUH 9, W1OBR 9, WAIKMS 8, WAIJQ 2, WAIHK 1.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, Jr., W1ALP—SEC W1AOG received reports from W1s LE, RPF, K1s DZG, ZUP and WAI DXI. WAI-DXI and WAIJE were on standby during Hurricane Gerda. Sorry to report W1SIV as a Silent Key. The Catholic Memorial HSARC is now an ARRL affiliate. W1KOL is in charge. Wellesley Sr. HSARS, WAI-DUL, is a new club. W1MPP and W1PS are getting ready to leave New England. K1AGB, W1s BRW and EEC are on 2. W1NLUB is W1ZSJ's wife. New YLs: W1s LTT, LTR, LUS and LUT. W1OL is ex-W1GGH. The South Shore Club held a meeting. K1GFR, of MCDA in Framingham, is going after his General. WAIJCL is on 75. WAIJHQ and W1K1BG had a setup at the Foxboro Fair. K1VJI is mobile on 75. W1ULJ is busy as head of Whitman VFW. W1AEC, Tech. Class, will start again. K1IBR got out its paper, *Zero Beat*, again. WAIJVL is building a 6-meter rig and grid-dip meter from old QSTs. W1BGW put a new PTO in his Collins receiver. Correction: In *Oct. QST* it should have read W1JNV (not W1JNV) is up to 334 in DXCC. W1ALP, K1KBB, W1s RUD and LR are members of Mass. Emergency Communications Commission. K1ESG is busy at Tufts College. WAIIFE is covering our nets on 2 and 6. W1ABC is on 2 and doing some traffic-handling in EMN on 3880. WAIENM is checking in to the Guardian Angel Net and ECARS. WAIFHU had OH2BR at his QTH. EM2MN had 22 sessions, 207 QNIs, 120 traffic. W1OJM is home after an operation and handling traffic again.

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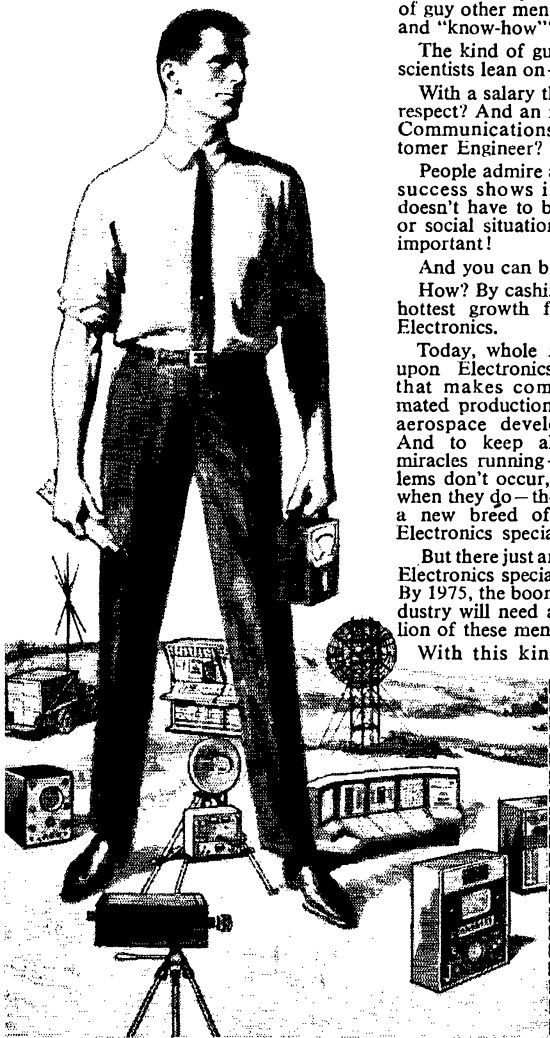
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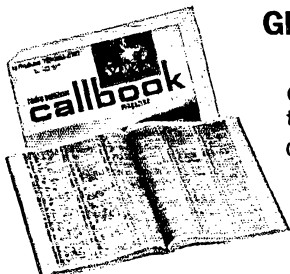
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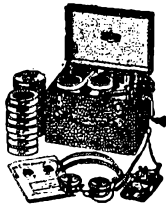
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The 6-Meter Cross Band Net reports 18 sessions, 59 QNIs, traffic 3. K1OKE is down on the Cape for a few weeks. NEEPN had 5 sessions, 102 QNIs, 3 traffic in Aug.; 4 sessions, 60 QNIs, 2 traffic in Sept. The T-9 Radio Club met at W1WVK's QTH. W1IBF has retired. K1EPL is moving to Yarmouth. W1IIFZ has an SB-101 on the air. W1MKN has his new rigs going now. The Middlesex ARC had Mel Miller as a speaker. W1ADFL worked a lot of VEs on 6. W1ALBD is at Salem State College. W1AUR is on with a Galaxy on s.s.b.; also 2 and 6. W1AQV is busy working on a book to be published. W1YGC is on 6 RTTY. The Whitman ARC held a Hilltopping Expedition on 6. W3FOR is ex-W1UGH. W1AKY's son, W1ADWV, now is in Vietnam. Appointments endorsed: W1FAD as PAM for 2. W1AQV as OBS. W1s SH and QMN as ECs. W1IDGG as ORS. K9AQP/1 as OVS. The Massachusetts ARA had K1IDU and W1AGDN demonstrate some rigs on 432. The Hibanders Net meets on 50.7 Mc. Sun. at 1900. WINN has his Extra. W9GTC/1 has his tower up 85 feet. W1s AOG and DFS went to the Antique Wireless Assn. conference in E. Greenwich. The R.I. Quannapowitt RA had WB2EJ and W1-CEN from National Radio talk on the NCX-1000. The Capeway RC met at W1ANB's QTH. A breakfast meeting was held at K1LOE's, to get the "hole in one" for his tower. WB6BST was NC for the net one night on 10. K1NFZ has an HW-100 in the car. W1ZST is active on 20. The Barage Net meets on 3915 Wed. and Sun. at 8 p.m. W1DA moved to New Mexico. W1EHHK worked W2UK in the V.H.F. QSO Party. K1VGM and W1ACRT, up on Mt. Greylock, worked 6 mobile. The North Shore RA, W1GES, had a booth at the Topside Fair. Keep your ear on ECARS on 7255 kc. every day. W1AJLX was in the State CD alert during the hurricane. Six stations were under W1ZOM, C.D. Comm. Officer, Traffic: (Sept.) W1PEX 455, W1GES 219, W1AEY 197, W1AJVL 123, K1PRB 114, K1ESG 108, W1FAD 108, W1EMG 90, K7JRE/1 87, W1HKJ 87, W1BUF 65, W1CTR 48, W1-OJM 47, W1AFHU 43, W1AIRY 41, W1AIFB 35, W1A-HK 21, W1ADPX 16, W1UX 13, W1ABC 8, W1AJLX 6, W1AJY 5, K1CLM 4, W1AFNM 2, W1NLIX 1. (Aug.) W1OJM 415, W1AFHU 45.

MAINE—SCM, Peter E. Sterling, K1TEV—W1PS and W1MPP are moving to Pa. W1GJY is back on the air after being off for a long time. I am sorry to report that W1EJS is now a Silent Key. New hams in Maine are W1AERJ, W1NLWW, W1NLTD, W1-LVB, W1NLTG, W1NLWU, W1NLUC, W1AULU, W1NLVZ, W1NLVV, W1NLTO and W1NLVJ. W1ETZ is home recuperating after being in the hospital. I am very disappointed in the small amount of participation in the Maine QSO Party. I thought that we had more active stations in the state. K2UIR, ex-W1DMV, and W1YB, ex-W1QWV, have weekly skeds every Fri. at 8:30 p.m. on 3590-3600, and would like to hear from some of their old Maine friends. I still am looking for news, and will appreciate any type that you send me. W1AFQW is working the other bands with his new tri-bander. Glad to see that someone is representing the state on the other bands. K1SOW is active on 75 and 20 meters with his new mobile rig. Traffic: (Sept.) W1BJG 436, W1AFCM 78, W1AFLG 43, W1OTQ 10, K1TEV 4. (Aug.) W1BJG 361.

NEW HAMPSHIRE—SCM, Donald Morgan, K1QES —SEC: K1RSC. RM: K1BCS. PAM: K1APQ. Welcome to the Belknap College Radio Club, W1AIFD. Also W1As LTW, LUI, LTX, LXX. W1Ns LRU, LRV, LVL, LYF, LYG, LXX, LXV, LXS. The MeVtNH Net reports 28 sessions, QNI 194, traffic 183. The GSPN reports 924 check-ins and 104 traffic. The Manchester Radio Club operated from the Canterbury Fair and originated 74 messages on c.w. New appointments include W1AJTM as ORS, W1DTY as OO, W1RCC as EC of Hillsboro County. Endorsed: K1DWK as EC. K1-BCS made the BPL again. The Bow Radio Club and Manchester Radio Club both report much activity. K1-RSC is moving but still in Rye. W1BYS has moved back to winter quarters. K1PQV has closed the station until winter preparations are completed. W1SWX holds the all-time record on c.w. for World-Wide DX on 3.5. Welcome to W1EEF as a new OO. Club members will, I hope, support those officers they elected. I would appreciate a list of club officers from all clubs. The Manchester Radio Club originated 182 messages at the Deerfield Fair. Traffic: K1BCS 343, W1HPM 188, W1-MEX 118, K1PQV 93, W1MSX 20, K1QES 17, K1RSC 13, W1AJTM 5, W1PZU 3, W1SWX 1.

RHODE ISLAND—SCM, John E. Johnson, K1AAV —SEC: K1LII. RM: W1BTV. PAM: W1TXL. V.H.F. PAM: K1TPK. Endorsement: W1POP as EC. The Newport County Emergency Net meets each Sun. from

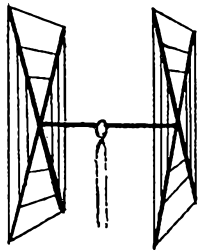
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Beam Mount: Square aluminum alloy plate, with four steel U-bolt assemblies. Will support 100 lbs.; universal polarization.

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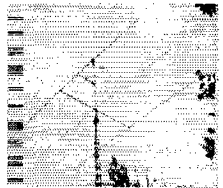
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BEAMS "Just a note to let you know that as a Novice, your 3-E1. 15 Beam got me R1 Section Winner and New England Division Leader in Novice Round-up. See June QST, p. 57 for picture of ant. (below). Tnx for a fine working piece of gear. 73s, Jay, WA1JFG"

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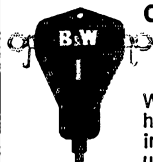
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1000 to 1100 local time on 29.53 Mc. and invites any ham to check in. Checking in recently were WAIJJB, W1-BFB, K1PTV, WA1ACP, W1WIG, WA1DRB and W1-JFF. W1JFF acts as Net Control but if he is absent control goes to WITXL or WIWLG. The Rhode Island State Phone Net meets at 1830 local on 50.6 Mc. and invites all to join. The RISPN report for the month was 30 sessions, 441 QNI and 74 traffic. At a recent meeting of the W1AQ Club of Rumford, New England Director Robert Y. Chapman, W1QV, was guest speaker. W1QV was introduced by K1AAV and gave an interesting talk about the ARRL, followed by a question-and-answer period. The members had a Coffee Hour and reception after the program. The SCM has several appointments open and League members can write to him for information. Traffic: WITXL 116, W1-YQ 91, K1VYC 62, K1QFD 44, WB2HPW/1 44.

VERMONT—SCM, E. Reginald Murray, K1MPN—We still are in need of net reports (and some traffic reports) for monthly recording in this column. They should reach me by the 6th of each month to meet the deadline. Frequencies of various nets have been changed to comply with restricted segments of bands. The Green Mt. Net is on 3932 at 2230Z; Me.-N.H.-Vt. Net is on 3685 at 2330Z; Vt. Carrier Net is on 3945. A 2-meter f.m. repeater is scheduled for Mt. Snow which will cover the southern part of the state. Congrats to WA1KSS (Waterbury) who went from Novice to Advanced Class in one step. Welcome to WA1LXH, a new Conditional in Newport. New BARC officers are K1-SLU, pres.; W1FS, treas.; W1FIS, W1BRG, W1KXG, trustees; XYL W1FIS, clerk. WA1GKS has been appointed OBS. The 1970 Vt. QSO Party will be held Feb. 28-Mar. 1. Traffic: K1QBQ 121, WA1GKS 29, K1-MPN 16, W1MRW 2.

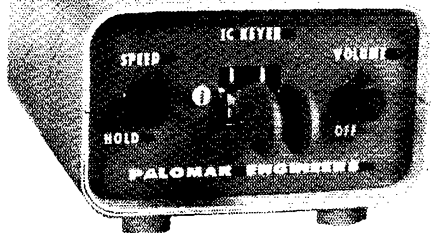
WESTERN MASSACHUSETTS—SCM, Percy C. Noble, W1BVR—C.W. RM: W1DWV. New appointments: W1WV as Berkshire County EC; W1IHI as ORS and OPS. The HCRA reports WA1IAU as a Silent Key. W1ZPB is installing a 55-ft. tower. W1HRC is active on 75-meter s.s.b. Ditto WIIC. WA1DNB has a mobile 10-meter a.m. rig. W1JUUJ dropped the "N" for a General and W1IYB for a Technician. Congrats also to K1YLU, recently wed. W1BVR has a new Swan Cygnet and is active on s.s.b. and c.w. W1QWJ gave a demonstration of his home-brew transistorized receiver at an HCRA meeting. C.W. RM W1DWV reports WMN is picking up with total QNIs 160 and 158 messages handled. A total of 17 stations reported in. The Central New England Net meets daily at 6:30 a.m. on 3945. WA1IEK has a new HQ-110. W1IUB has a new TR-3. WA1HLC now has his General. W1UKR and her husband have taken over New England QSL Mgr. job for the HCRA with the retirement of K1PMK. Valley Amateur RC's officers are K1ZKH, pres.; K1ZQB, vice-pres.; WA1CXD, treas.; WA1HYI, secy. VARC has a Sun. night 29. Mc. net at 8:00 p.m. K1ZKH is trying to rejuvenate the Navy-Marine MARS Net in West. Mass. The CMARA reports WA1HEP as a Silent Key. WIIC is now Hampden County EC. Montachusett Amateur Radio Club officers are W1IPZ, pres.; K1-WMN and K1FGP, vice-pres.; W1GUI, secy.-treas. The HCRA 10-Meter Net is still being held Wed. on approximately 28.985 at 9:00 p.m. local time. A first report was received from WN1LNF, 12-year-old son of W1JA (formerly W1UMN). He wonders about the possibilities of a West. Mass. Novice Net (now reporting into EMNN). Traffic: (Sept.) W1ZPB 127, W1BVR 104, W1DWV 94, W1IHI 53, W1UPE 44, K1WZY 24, WA1BTU 18, WA1ABW 15, W1PUO 11, WIIC 10, WA1-DNB 7, W1STR 7, WN1LNF 3, W1HRC 1. (Aug.) WIIC 23.

NORTHWESTERN DIVISION

ALASKA—SCM, Albert F. Weber, KL7AEQ—Alaska hams had emergency communications problems again during the huge Kenai Peninsula fire. Nine straight days saw KL7s EKO, EKN, EAN, GIC, EJM, GON, GDZ, CQS, CAH and VE6NH/KL7 in the thick of things. The Arctic Club handled communications again for the Equinox Marathon, all 26 miles plus of it. KL7s DG, ARU, GBG, AZJ, BDW, EVO and AEQ did the course, and I'm sure there must have been others. Latest report from Anchorage is that KL7BJW's 130-ft. tower and beam came down in the recent windstorm. Total loss is the report we received. The Windcharger tower recently grown on the AEQ/AZJ house is sprouting all manner of tubing. Even thinking of building the shack-annex up in the base of the thing. KL7EKZ was up in the Interior for a couple of days, and while up here showed the rest of the State Police as well as others just how a pistol should be handled. He took the big trophy. Traffic: KL7CAH 54, KL7EKZ 8.

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IDAHO—SCM, Donald A. Crisp, W7ZNN—The FARM Net convenes at 0200 GMT on 3935 kc. week days. The Idaho RACES Net convenes at 1515 GMT on 3991 kc. week days. WN7MIY is a new amateur in Idaho Falls. WN7MIK is a new call in Moscow. K7TEK has reluctantly resigned as Idaho SEC because of pressing business. K7CSL and WA7JZJ are new Net Control Stations on the FARM Net. WA7GSM and WA7EDT were heard operating portable from elk-hunting camps. K7CSL received an OPS certificate endorsement. FARM Net report: 20 sessions, 438 check-ins, 75 traffic handled. Traffic: W7GHT 175, WA7BDD 33, W7YON 19, W7ZNN 14, K7CSL 5, W7Y 2.

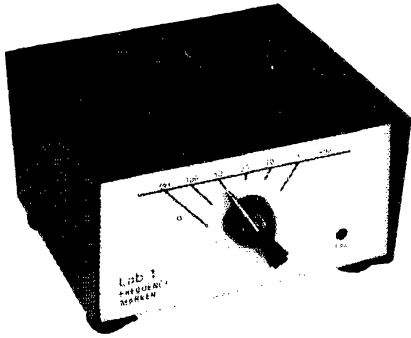
MONTANA—SCM, Joseph A. D'Arcy, W7TYN—SEC: W7RZY. PAM: W7ROE. Nets:

Montana Traffic Net	3910	0000Z	M-F
Montana PON	3950	0245Z	Daily
Montana Section Net	3950	1700Z	Sun.

The Montana SCM and SEC attended the annual meeting of the Northwest Division at Walla Walla, Wash. All of the SCMs and SECs attended the meeting. We still are in need of ECs and ORSS as well as OOs and OBSs. If you are interested, write your SCM at the address on page 6 of this issue. The Butte Club has its repeater on for tests. W7RZY has a repeat input on at Harlowton for 34 in and 76 out. WN7MYW, WN7MYX, WN7MYZ, WN7MXX, WN7MXR, WN7MYM, WN7MZA, WN7NAA, WN7NZU, WN7MZV, WN7MZW, WN7MZX, WN7NBH, WN7NCT, WN7NCQ, WN7NCH, WN7NCG, WN7NPP, WA7NDX, WN7NFM, WN7NDO, WN7NFV, WN7NPL, WN7NFL, WN7NFX, WN7NGD and WN7NGE are the calls of some of the new stations on in the section. W7OIQ was married recently and is back in Livingston. Traffic: WA7ZR 399, W7TYN 10.

OREGON—SCM, Dale T. Justice, K7WWR/WA7-KTV—SEC: W7HLF. RM: W7ZFH. PAM: K7RQZ. Sept. net reports: K7IFG and WA7HKV report for the BSN, sessions 57, check-ins 1113, traffic 187, contacts 46. K7YQM reports for the AREC Net, sessions 30, check-ins 739, traffic 55, contacts 76, maximum number of counties 16. K7YLA reports for the Salem Area AREC Net, sessions 30, check-ins 260, traffic 32, mobiles 10. W7HLF sends in a nice SEC report. WA7GFP reports good 6-meter openings. Your SCM attended a meeting of the Eugene hams with the Division Director at which we previewed the ARRL film. Seventy-three amateurs were present. A similar meeting was held in Portland with over 50 present. WA7ADW is working on a new shack. W7ADF is mobile with a Swan 260. WA7ICD is in Inyo and Kern Counties, Calif., operating portable. WA7HIL sends in a nice report and has received his ARRL membership. K7GEQ relays a traffic report for K7OUF. OSN is active again after a slow summer. Traffic: K7RQZ 397, WA7IFS 232, WA7HKV 101, K7IFG 83, K7WWR 59, K7OUF 51, WA7JAU 31, WA7JMD 25, W7DEM 19, W7BNS 17, WA7KIU 12, W7MLJ 12, K7KPT 7, W7CPK 5, WA7GFP 4.

WASHINGTON—SCM, Harry W. Lewis, W7JWJ—During early Sept. an amateur radio booth was established at the N.W. Washington Fair at Monroe. The NC 200 club station was moved to the site for the event. 77 messages were handled to the U.S., Canada and the Far East. Operators of the station were WA7-FKM, with WA7JEG, and WA7CYY, with Mike Hinds assisting. During most of the fair a Novice, Bruce Perrine, assisted by handing out C.D. literature, and accepting messages from the public for the other operators to put on the National Traffic System. The end of Sept. marked the return to the Northwest for W7UWT. Ray served a three month on-the-job training session back in Boston. W7BUN entered the Washington QSO Party and made 400 contacts in 56 different states and countries. Jerry also won the Annual Tacoma Logger's Contest with 272 contacts. The first week in Sept. marked "Amateur Radio Week" in Washington State as proclaimed by Gov. Dan Evans. K7BBO a new OBS, began the transmitting of Bulletins on 50.85 Mc., the Puget Sound AREC Net. K7UDG moved from Wenatchee to Oregon. Fall elections saw W7OEB as the new manager of the Northwest Single Sideband Net, and W7DYS as head of the Columbia Basin Net. Sept. 20th marked the Annual Meeting of the SCMs and SECs from Montana, Idaho, Oregon and Washington, as called by ARRL Director Thurston, W7PGY. With Washington SEC in Boston our PAM, WA7DZL, represented the Evergreen State. Congratulations are in order to WA7AXT, of Bremerton. Wally made BPL this month and this is his first after 39 years as a traffic handler. Traffic: W7BA 1809, WA7HKR 794, W7DZX 526, W7KZ 425, W7PI 325, WA7AXT 234, WA7KOB 125, K7CTP 118, WA7ACQ 82, W7GVC 65, W7BQ 61, W7-



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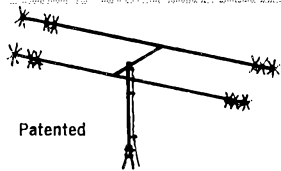
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PACIFIC DIVISION

EAST BAY—SCM, Paul J. Parker, WB6DHH—A new appointee in the section is WB6NMT as OVS. W6-IPW reports that the traffic from the fairs in the area seems to have died down but band conditions all over seem to be good. W6CBF reports that he will be in the Orient until around Thanksgiving. K6PJ reports about a fifty-fifty chance of finding that rare DX on the upper h.f. bands. WA6DIL has been appointed to the position of manager on the slow-speed version of the Northern California Net that meets daily on 3630 kc. at 2030 local time. Anyone interested in seeing what the world of the traffic-handler is like is invited to attend this informal but very effective branch of the National Traffic System. For all you speedsters there is the fast version of the same net at 1900 local time. On Oct. 10, I attended the Fall League Officials Meeting in San Jose. Among the topics brought up was the new ARRL film on ham radio, which is going to be on local TV if possible. If you ever receive a questionnaire in the mail from your Pacific Director please, please take the time and five cents to get the thing filled out and back to him. This will help him to decide on how to present the problems that exist. Such pertinent questions on these forms refer to actions pending before the FCC such as incentive licensing, proposed band usage, new band allocations, etc. All of these topics warrant your comments and believe me they all are read and appreciated. Keep the cards and letters coming in. Traffic: WA6DIL 388, W6IPW 373.

HAWAII—SCM, Lee R. Wical, KH6BZF—SEC: KH6GQW, RM: KH6GHZ, PAM: KH6AD, QSL Mgr.: KH6DQ, ECs: KH6GPQ, KH6GLU, KH6GKV and KH6GKD. RACES nets can be coordinated with KH6-AIN.

Nets	Freq. (Mc.)	Times (GMT)	Days
Friendly Net	7.290	2030Z	M-F
Boy Scout Ham Radio Net	21.360	1800Z	Sat.
Pacific Interisland Net	14.320	0830Z	M-W-F
S.E. Asia Net	14.320	1200Z	All
Marianas Islands Net	3.850	0830Z	2, 3, 4th Tue.
Gecko Net (Marianas Is.)	14.240	0930Z	Tue. & Thurs.
Pacific DX Net	14.265	0600Z	Tue. & Thurs.
Marine Corps Net	21.380	1900Z	All
Confusion Net (phone patches)	21.400	0200Z	All
Pacific Typhoon Net	14.265	During Typhoon Alerts	

Congratulations to our newly-appointed: KH6GKV, EC Honolulu; KH6GKD, EC Leeward Oahu; W7UZH/KG6, EC Guam Island; KH6HDB/K5LTH, OO. Those interested in OO, OPS, ORS, OVS and EC appointments should contact SCM KH6BZF, page 6 this issue. Mahalo to our departing EC-Guam Is. EC, KG6AQI, who becomes WA0PQF/9 in Green Bay, Wisc. KH6-AHD now is signing his new call KH6AG. KH6OR recently retired from Civil Service at Pearl Harbor and is now with Granger Associates at their Pacific rep. here. KH6HBZ had a great time chasing DX and Wahaines before returning to Med. School. KH6GRG reports the Kailua High School station, KH6GFI, is very active on 10-15-20 meters. The Honolulu DX Club met at Keaiwa State Park recently to bid Aloha to Mr. and Mrs. Van Melvin, W4UAF/KH6, and to bid Hello to K5MWZ/KH6 and K0QZP/KH6. KH6-BZF finally received a much-sought-after QSL from PJ3CC. Traffic: K1HNO/KH6 45, KH6GRG 19, KH6-GQW 16, KH6BZF 15.

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: WA7BEU. Southern Nevada ARC of Boulder City members have been busy with SAROC. Look for the classified and display advertising. Nevada's First ARRL QSO Party has been formulated. Check the rules and try for a certificate signed by Governor Paul Laxalt. KTUGT Slide Mountain f.m. repeater near Reno, has been getting a workout with W7DFT, WA7-CSG, WA7DIA, WA7BU, WA7HVN, WA7HVV, WA7-HVU, WA7IRW, WA7LGP, WA7MOD, WA7MOF and WA7DNX with a new or different rig setup keeping the squelch open with activity. W7AKE, repeater on Mt. Charleston (near Las Vegas), is being heard in Los Angeles and Reno via the WA7TTL repeater on Silver Peak (near Bishop, Calif.). W7PRM and W7THH still are looking for some of that silver and yellow stuff by



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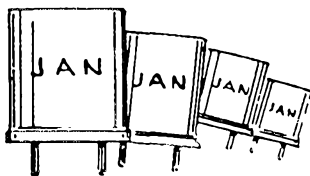
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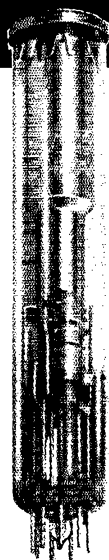


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busting Nevada rocks. K7RKH, one of Nevada's outstanding v.h.f./u.h.f. enthusiasts, is now W6LET. W7TVF will schedule anyone needing a Nevada QSL, DX or state-side. Need information on coffee beans? Contact W7VYC. W7OK is an authority on peanuts.

SACRAMENTO VALLEY—SCM, John F. Minke, III, W8KYA/WA6JDT—ECs: K6REW, W6SMU, WA6-TQJ. RMs: W6LNZ, W8VDA/8. WB6MAE is presently in Bullhead City, Ariz., working on a construction project of a power plant. K6GG is disturbed with the increasing amount of tuning and testing on the air. It seems that many amateurs have never heard of a dummy load. I had the pleasure of operating at Sardine Lake in the Sierra Butte area during the California QSO Party. With mountains on three sides of me and the dipole only a few feet off the ground, WA6JDT/8 didn't do too well with only 84 QSOs from Sierra County. Another rare county in Sacramento Valley activity during the party was Alpine. Let's have some more activity reports, especially from you fellows up north. May you all have a Merry Christmas and a Happy New Year. May 1970 be a good year for you. Traffic: (Sept.) W8VDA 168, W6LNZ 54, W6VUZ 4. (Aug.) W8VDA 202, WA6RBD 39, WB6ZJV 33, WB6-WJO 13.

SAN FRANCISCO—SCM, Hugh Cassidy, WA6AUD—SEC: W6WLV, K6CWS has moved to the Sebastopol area for health reasons. WA6ALK still gets most of her activity on 2 meters. New OVs are W6ERS, WA6-DJI and W6PTS. WA6EY is another traffic man reporting in from the Eureka area. W6EAJ, in the wilds of Humboldt County, is looking for another wet winter to supply the necessary water power to the water wheel which does the work for his power supply. WB6JQP operated from the High Sierra in the California QSO Party. W6EQA is a new Extra Class license holder in San Francisco, joining W6AU, W6RQ, W6MSM and K6BI, all in the same city block. K6SRM continues his law studies in San Francisco. W6JJJ is a new member of the Mission Trail Net, covering Marin County. WA6-BYZ made his 9th consecutive HPL in 1969 with his Sept. report. W6KUF was the auctioneer in the Marin Club annual Oct. clean-up. The Marin Club also traveled to Angel Island in Oct. for a picnic headed up by K6KEW. WB6UJO has returned from Europe. W6KWE, ex-W3DPJ, a transplant from the Potomac Valley Club, is now in San Francisco. WN6HMG, in San Francisco, is a new AREC member. K6TZN continues active in the MTN, this year serving as EC for the traffic net. WA6AUD made the Sept. meeting of the Potomac Valley Radio Club in Washington. W6ZC continues to organize monthly luncheons for the old-time amateurs in Marin County. VU2AJK visited his uncle in San Rafael during Sept. and expects to go to Laos on his next foreign job. K6AQV was another visitor traveling through the section during the month. Traffic: WA6BYZ 352, WB6JQP 71, WA6EY 40, W6BWV 29, K6TJW 22, WA6AUD 8, W6CYO 1.

SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6JPU—I am looking for someone to volunteer for EC in Stanislaus County. K6KOL is looking for check-ins on NCM from Hanford, Porterville, Visalia and Fresno. Anyone interested in handling traffic, please check in. W6DPD reports nothing unusual on the high frequencies. WA6TZN is now KH6HAM. WB6WQV has a 500C. WB6RGU and WA6OYR were operating 8-meter portable in Sequoia and made many contacts. WB6VOG is on 6 meters. W6PKP has a full-spaced 20-meter beam up 120 feet in the air. WA6WXP is the local TVI chairman. WA8EPP has an SB-401 and SB-201. W6SVM has an HW-22A. WB6VPU is on 75 a.s.b. with a kw. W6MEY and WA6BUH are heard on 10-meters s.s.b. when the band is open. W6BWM is on 10-meter s.s.b. W6IHK is on 75 a.s.b. W6ILR is the activities chairman for the Tulare County Amateur Radio Club. K6RGZ is conducting code and theory classes. WN6PRO passed his General Class license. WB6ETQ is vacationing in Canada. I would like to take this opportunity to wish each and every one of you a very Merry Christmas and a very Happy New Year. Traffic: WA6SCE 215, K6KOL 59.

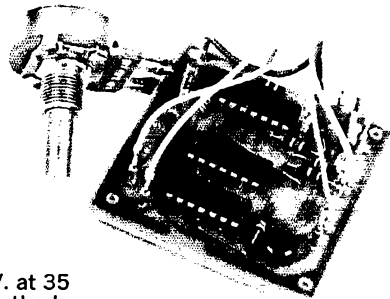
SANTA CLARA VALLEY—SCM, Albert F. Gaetano, W6VZT—SEC: W6VZE. RM: WA6LFA. Several months have slipped by since the passing of Harry Engwicht, W6HC. To many of the hams in this section it was just the passing of another Old Timer. Those of us who grew up in this area will always remember Harry as the father of amateur radio. When we were just kids, Harry was a long-established amateur. He would help us when we needed it and correct us whether we thought we needed it or not. The kids he helped will always

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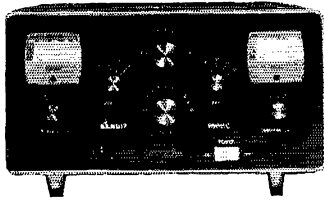
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remember him as Mr. Amateur Radio. I am one of the kids and I knew him for over thirty years. WA6CVU has been transferred back into the area by the Navy and again is active on the traffic nets. Welcome home, Rod. WA6AUC has been very busy handling phone patches on 10, 15 and 20. W6ZRJ was the speaker at the SCARA meeting in Sept. and discussed the incentive licensing program. A heated battle followed. There are several positions that need filling as NCS on RN6. If you want to really help the traffic nets, get in touch with WA6ROF, the net manager. W6DEF filled in as manager of NCN/2 while looking for a new manager, who now is WA6DIL. W6RFF has completed a new linear amplifier. W6BVB was active while on vacation in the Maine and Pennsylvania QSO Parties. Traffic: W8RSY 1096, WA6OXE 768, W6YBV 257, W6VZT 96, W6DEF 90, WA6LFA 77, WA6AUC 59, W6NW 58, W6BPT 35, W6ZRJ 25, W6RFF 9, W6BVB 8, WA6ASH 5.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Calvin M. Dempsey, WA4UQC—Asst. SCM: James O. Pullman, W4VTR. SEC: W4EVN. RM: W4IRE. PAM: W4AJT, V.H.F. PAM: W4EJZ. The Yadkin Valley Radio Club has 8 Novices. The Raleigh Radio Club is going strong and has a lot of projects in the making. WB4ILO has been very active in several contests. Buncombe County AREC was activated when civil disturbance was expected. No emergency developed but 7 stations were on hand and ready to go. W4FDV is now K4MC. Nice going, Bob. We are pleased to welcome the Carteret-Craven Amateur Radio Club as an ARRL affiliated Club. Keep up the good work and good luck. We are pleased to have WN4NVN and WN4ODB as new AREC members. The Tarheel Emergency Net had its annual fishing outing at Ocean Isle and a fine trip and meal at Calabash was enjoyed by all who attended.

Net	Freq.	Time	Days	QTC	Mgr.
THEN	3923	0030Z	Daily	95	WA4VNV
NCN (E)	3573	2330Z	Daily	71	W4IRE
NCN (L)	3573	0300Z	Daily	54	WB4GHK

Traffic: (Sept.) W4EVN 203, WB4HGT 81, WA4GMC 54, K4EO 38, K5TGA/4 32, K4VBG 28, WB4GHK 25, WA4VNV 21, K4MC 20, K4TTN 8, WA4AKX 6, WB4-BGL 6, WA4UQC 6, K4ZKQ 3, WB4ILO 2, WA4KWC 1. (Aug.) WA4VNV 44.

SOUTH CAROLINA—SCM, Charles N. Wright, W4PED—SEC: WA4ECJ. PAM: W4VFO. RM: K4-BSS/4.

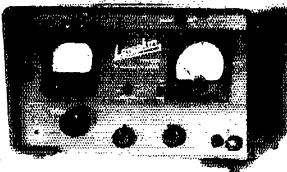
SCPN	3930 kc.	0830 and 1530 EST Sun., 12 Noon Daily
SCN	3795 kc.	2345Z Daily Sept. Tfc.: 42
SCSSBN	3915 kc.	0000Z Daily Sept. Tfc.: 95

John Polatty, who was K4MYR in Spartanburg and Columbia, reports that he again is active as W3RVB from Dallas, Tex. WB4CJB reports that the Carolina Repeater Society has added a 6-meter repeater at its site near Pelion and plans to add a 200-ft. tower to replace the 35-ft. one now in use. W4VHH has relocated near North Augusta and is back in operation on 144 and 432 Mc. from a much better QTH. K4II says that his operation as GC5AGA netted him 1200 QSOs in 97 countries in 30 hours of operating. Bill also operates as DJ2AA, IIII and TF3EA. W4NTO is restoring a Wilcox CW-3 for WWV listening and reports OQing is a little slow. Traffic: K4BSS/4 101, W4NTO 59, W4PED 46, K4OCU 24, W4MC 18, W4JA 1.

VIRGINIA—SCM, H. J. Hopkins, W4SHJ—SCM-elect: Robert J. Slagle, K4GR. SEC: K4LMB. RMs: WA4EUL, K4MLC. In late Sept. W4ONC succumbed to a heart attack. We regret to list him among Silent Keys. W4ZYT has WAC. WA4BCW won the 1989 FAR scholarship and K4IPV was awarded the QST Cover Plaque Award for Aug. W4JUJ has all but cinched 200 counties. W4YZC is now mobile a.s.b. and c.w. This is being prepared while W4SHJ is passing the SCM office and records to K4GR and for that reason is somewhat brief. Traffic: (Sept.) K4KNP 167, W4UQ 151, WB4CVY 149, WB4FJK 107, WB4GTG 72, K4GR 46, W4OKN 45, K4MLC 42, W7WST/4 30, WA4PBG 26, K4FSS 23, WB4IRA 15, WB4FDT 14, WA4MJF 14, K4JM 11, W4ZYT 11, WB4GTS 9, K4LEF 8, W4MK 8, WA4NJG 8, W4GEQ 6, W4KFC 5, W4WG 5, K4LMB 4, W4THV 4, W4DM 3, W4OP 3, W4TE 3, W4KX 2, W4JUJ 1. (Aug.) W4GEQ 14.

WEST VIRGINIA—SCM, Donald B. Morris, W8JM—SEC: W8EV. RMs: K8TFF, K8MYU. PAMs: K8-CHW, W8IYD. Net Mgr. c.w., WB8BBG; phone, WB8-

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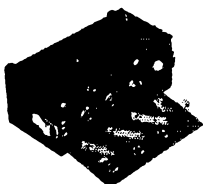
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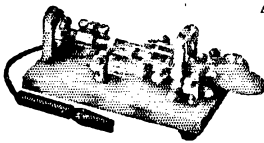
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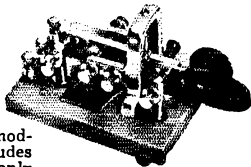
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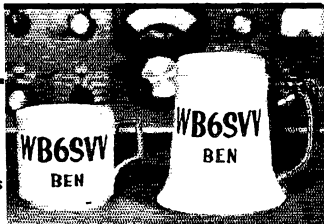


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AQE. Congratulations to Vice-Director W4ACY on receiving the Roanoke Division Public Service Award at the Huntington Convention. The State Radio Council held its fall meeting in Charleston, with WA8PFB appointed chairman of the license plate reduction fee committee. The QCWA held a fall dinner meeting during the convention in Huntington and welcomed new member W8HIC. WVN Phone Net, with 30 sessions and 457 check-ins, handled 42 messages. The C.W. Net, with 2 sessions daily; had 152 check-ins and a total of 52 messages. WA8NDY was appointed State Radio Officer for civil defense. K8QEW reports 6 members of the Weirton Radio Club have 2-meter transceivers. WB8CDX now is WB8CDX. WA8YWK is a new OBS. WB8BDG received a certificate of commendation from civil defense for services during the Aug. floods. Congratulations to the Tri-State ARC of Huntington on a most successful division convention, the first in West Va. in 30 years. New club officers are W8IT, ex-W8-BDD, pres.; WA8RQB, vice-pres.; W8DUV, secy.; W8SQQ, treas. Traffic: WB8BG 58, WA8NDY 33, W8CKX 32, W8JM 21, WA8WCK 17, W8DUV 15, WA8-RQB 8, WA8YHH 4, WA8YSB 4, WA8ZZI 4, WA8LFW 3, WA8WIX 3, WA8AGC 2, W8CUL 2, W8OIH 2, K8-QEW 2, W8BAQE 1, K8CHW 1, WA8CKN 1, W8IMX 1, WA8QND 1, WA8UIH 1, WA8UNP 1.

ROCKY MOUNTAIN DIVISION

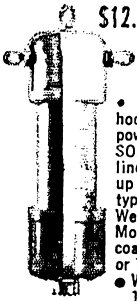
COLORADO—SCM, Charles M. Cotterell, W0SIN—Asst. SCM: Neal Morris, K0TIV. SEC: WA0HLQ. RM: W0LRN. PAM: W0CXW. V.H.F. PAM: WA0-LIK. W4UDS has new SB-200 linear, W0LRN has a new home-brew linear and is working on the new Slow Speed C.W. Net. The Arapahoe Radio Club, with the Rocky Mountain Relay League, provided the Boy Scouts with communications on a recruiting drive. W0UAT is the new CCN Mgr. W0LRN now is on 2-meter f.m. K0JSP now QN1s TWN and PAN. W0WYX now has telephone; been down all summer. Also another emergency power plant. Colorado ECs are: Districts—1-K0UQM 2-K0TIV 3-K0WGC, 4-N for none. 5-N, 6-N. 7-WA0TOJ, 8-K0DXF, 9-N, 10-W0BPT 11-N, 12-WA0HLA, 13-(a) K0FLQ (b) W0FA, 14-W0LKD, 15-WA0JEV, 16-N, 17-K0QIX, 18-W0YCD, 19-N, 20-WA0WJ. 21-WA0KAQ, w/332 AREC members. W0MOX reports openings on 144 Mc. and that W0EYE worked W0DRL on 432 Mc. W0MOX and W0EYE are in Boulder and the other stations in Minnesota and Nebraska. OO cooperative reports were received from W0GIL 3 and W0LRW 2. High-Noon Net Mgr. K0IGA reports total QNI 911, QTC 103. CCN Mgr. W0UAT reports QNI 94, QTC 42. Columbine Mgr. W0GDC reports QNI 982, QTC 95. C.E.P. Mgr. is W0CXW. The Denver Radio Club soon will have a new Colorado Ham Directory with names, calls, phones and zip. Traffic: (Sept.) W0WYX 114, K0JSP 96, W0LRN 65, WA0MNL 54, K0MNO 28, W0SIN 16, W0UAT 14, K0ECL 11, W0KPF 8, WA0KOQ 7, W0LRW 5, W0OWP 2. (Aug.) K0JSP 177.

NEW MEXICO—SCM, James R. Prine, W5NUI—The traffic count for Sept. shows a fairly good increase, especially from the phone stations. I would appreciate more reports from the c.w. gang. In your next station activity report include a note indicating the quantity of traffic on c.w., h.f. phone and v.h.f. Tabulation of this information will afford some friendly competition. K5MAT has scored a bit of DX on 160 meters, contacting VP9GJ. The 160-meter band offers some interesting possibilities for those wishing to escape the congestion of 75 and 40 meters. With the near arrival of the New Year, evaluate your public service accomplishments and plan accordingly. Let's make the new decade a good one. Traffic: K5MAT 38, W5NUI 31, W5NON 18, W5DMG 16, WA5UJY 16, W5GPZ 10, WA5-OHI 9, WA5ISJ 8, WA5JNC 7, WA5LZX 4, WA5MIY 4, W5NTG 2.

UTAH—SCM, Thomas H. Miller, W7QWH—SEC: W7WKF. RM: W7OCX. Nets:

Net	Freq.	Time	Days	Seas.	QNI	QTC
BUN	7272 kc.	1930Z	Daily	30	671	71
UARN	3987.5 Kc.	1530Z	Sat.-Sun.	—	—	—

W7EM has been running phone patches to the Salt Lake area for FAA people who are at the FAA Academy in Oklahoma City and are away from their families. W7MEL recently passed the General Class exam and is waiting for the new call. As a Novice Dallas worked 35 states using a 6550 rig with a BC-348-Q receiver. W7HTL has moved to Vernal, Utah, from Washington and is working 160 meters at the high end. He reports



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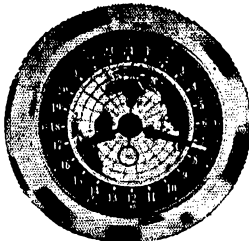


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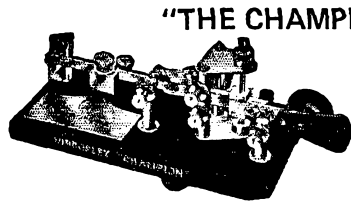
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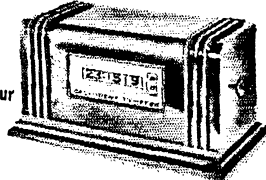
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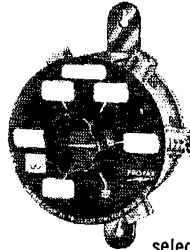


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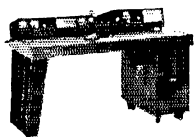
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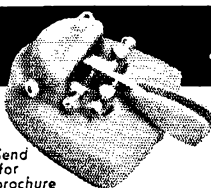
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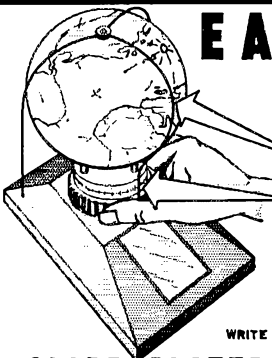
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that more stations from Utah are needed on 160 where he is working stations from California to Missouri. OO K7ZJS reports a good crop of poor signals in Sept. and he sent out 70 OO reports. Traffic: W7OCX 87, WA7-BME 35, W7EM 28, W7JQ 6.

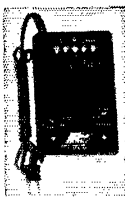
WYOMING—SCM, Wayne M. Moore, W7CQL—SEC: K7NQX. RM: K7KSA. PAMs: W7TZK, K7SLM. OBSs: K7SLM, K7NQX, W7SDA, K7TAQ, WA7FHA. Nets: Pony Express, Sun. at 0800 on 3920; YO, daily at 1830 on 3610; Jackalope, Mon. through Sat. at 1215 on 7280; Wx Net, Mon. through Sat. at 0630 on 3920; PO Net, 1900 Mon. through Fri. on 3950. Notice that the YO Net now meets at 1830 local time. New appointments: K7QJW as EC for Platte County, WA7JYO as EC for Laramie County, W7TZK as EC for Carbon County, W7BXS has been keeping skeds with 90GJ, an M.D. in the Leopoldville Mission Hospital, so he can talk with his parents here. W7PJX has started a code and theory class. W7GMT, ex-W7ZOS, is now active from Laramie. K7HAW spent the summer building on a summer home. There was a nice attendance at the Officials meeting in Casper in Sept. W7IDO has her rig running again. The Casper Club is well along with its code and theory classes. Traffic: K7NQX 259, W7-TZK 34, K7KSA 32, K7SLM 27, K7VVA 16, K7TAQ 12, W7SDA 11, W7GMT 1.

SOUTHEASTERN DIVISION

ALABAMA—SCM, Donald W. Bonner, W4WLG—SEC: K4KJD. PAM: WA4EEC. RM: W4HFU. If you are interested in a 40-meter Alabama Ragchew Net look for WB4LNM in the afternoons. It looks like the AEND slow-speed c.w. net is the leading net this month in average traffic. WN4LXN passed the General Class exam. WB4CJC is a new member of the AENB. It's good to have W4EMP/DL4OE/KR6PN/SV0WG back in Montgomery after a short stay in the Air Force (28 years). Norm is waiting for his Swan 500C. K4-WHW worked in the V.H.F. QSO Party 1/4 in Ft. Bluff. Be on the look-out for the Annual Old Timer's Banquet in Dec. or Jan., sponsored by the Birmingham Radio Club, or see W4DGY for details (BARC is W4-CUE). It's good to see an active club like the BARC. It has an FB station, as was evident during Hurricane Camille. I hope other clubs in the state will try to get their own stations and become active on the air (remember, we desperately need more public service interest and activities, and maybe we can keep our ham bands open and maintain the high standards of radio that hams have made). Traffic: W4FVY 135, W4HFU 109, WB4KSL 79, WB4JMH 51, K4AOZ 48, WN4NJG 39, WB4LAO 34, WB4LAL 31, WN4LXN 27, W4MKU 22, K4BSK 17, WB4KDI 13, K4KJD 11, K4WHW 8, WB4CJC 6, WB4LNM 6, K4UMD 4, WA4WLD 2, WB4-BLX 1.

CANAL ZONE—SCM, Russell E. Oberholtzer, KZ5-OB—New hams in KZ5-Land include PCN, XEN, FON and PNN. KZ5MP and KZ5FA dropped the "N." KZ5SA and KZ5CT are off on a stateside vacation and to study to get their pilot's licenses. KZ5NC is leaving to make his home in Burlington, N.C. KZ5PCN is the proud owner of an FTDX 400. KZ5BR is on the air with an FLDX-400 and an FRDX-400. KZ5RZ and KZ5BO raised quads. Our sympathy goes to KZ5BDN on the loss of his wife. The CARC has reorganized its emergency net. It meets each Tue. at 2400Z on 7.090. Everyone is invited to join. Traffic: KZ5PA 128, KZ5OA 51.

(Continued on page 150)



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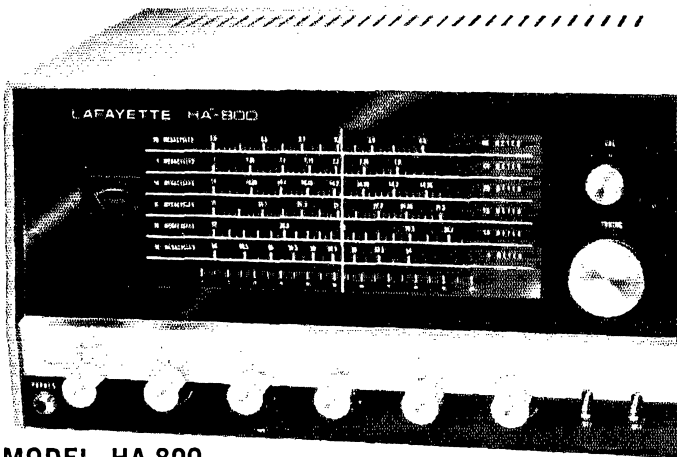
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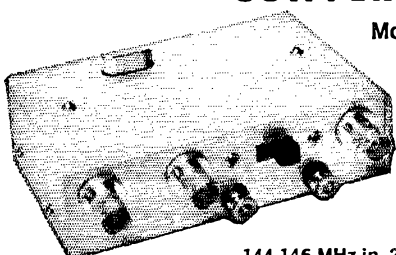
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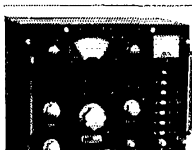
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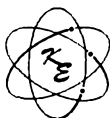
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(Continued from page 146)

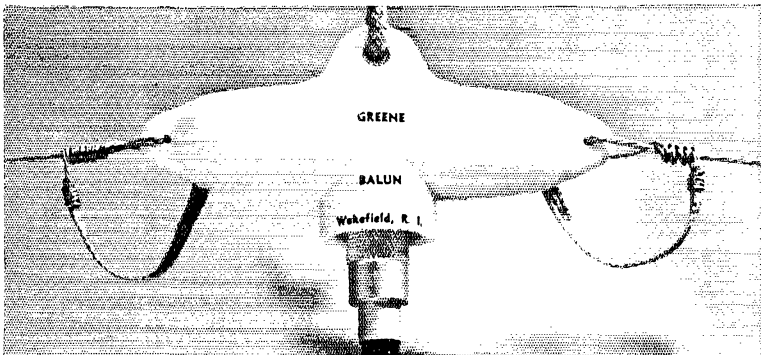
EASTERN FLORIDA—Acting SCM, Ronald J. Locke, W4YPX—SEC: W4IYT. Asst. SEC: W4SMK. RMs: K4EHY (C.W.) W4RWM (RTTY). PAM 75: W4OGX. PAM 40: W4SDR. PAM V.H.F.: W44BMC. Official Bulletin reports were received from WA4EYU, K4LPS and K4DAX. Your SCM attended a called meeting of the Southeastern Division LOs in Augusta, Ga., during Sept. SCMs and SECs from all over the Division were there, plus CM George Hart, WINJM. W4YNM reports the Columbia Amateur Radio Society has applied for affiliation with ARRL. WB4DSP/4 continues the high-power binge with a new 4-1000 amplifier. Florida welcomes WB4OGW, ex-WA9MMT. Camping enthusiasts W4NGR and WB4FJY go mobile in the scrub most every week end. Herman's in high cotton with a new TR-4 added to the "old" S/Line. W4ILE is working hard on the third edition of the *Florida Traffic Handlers Routing Guide*. The book will list 307 locations in Florida with pertinent information. It should be out in January. Elections are complete for Director and Vice-Director. Please give these fellows your support. Inform the Director of your needs and ideas. This is the only way he has of knowing what we want. Back up your statements with facts—then watch 'em work! The new ARRL film narrated by Arthur Godfrey and Barry Goldwater now is available from the Director. Get your reservation in early. Contact local TV stations and get them to schedule it. It makes fine viewing for the non-ham. Publicity might eliminate some of your TVI complaints. Watch for frequency and time changes of your favorite NTS nets with the fall weather. Load the NTS with traffic it keeps net managers and the CM off my back. Your SCM is lacking DX news, also v.h.f. You send it and I'll try to print it. Traffic: (Sept.) WB4AIV 338, W4ILE 268, WA4FGH 198, WB4HJW 179, K4EHY/4 149, WA4IJH 145, WA4SCK 143, W4DVO 127, K4QYV/4 103, W4SDR 95, W4YPX 82, WA4HED 79, WB4HJV 63, WB4EPD 62, K4SJK 62, K4LEC 60, W4EHV 58, WB4FJY 53, WA4NBE 46, K4DAX 44, W4NGR 44, W4TJM 43, WA4CIQ 41, W4SMK 33, W4BNE 23, K4LPS 27, W8BZY/4 26, K4IEX 24, W4ROA 23, WB4GHD 22, W4LE 21, W4IAD 20, W4OGX

20, W4BFQ 19, W4ZAK 19, WB4IER 17, WA4EYU 16, WA4WZZ 16, W4GDK 15, W4VPO 15, WA4BGW 14, K4LQ 14, WB4FLW 13, WB4DSP/4 11, WB4ICD 11, W4BKC 7, W4LEP 7, W4IYT 6, K4OER 5, K4EBE 4, K4YLE 4, WA4LIW 3. (Aug.) WA4SCK 506.

GEORGIA—SCM, Howard J. Schonher, W4RZL—SEC: WA4WQU. RM: W4FDN. PAMs: K4HQI, W4YDN, W4LRR. WA4GXZ has that old fine signal back on the air. We welcome WA4LLI back to the nets. K4BAI is getting settled in a new QTH and getting the equipment active again. The Ft. Gordon ARC has been reactivated with W4DDY as pres. K4HQI reports local 2-meter activity is off somewhat but he hopes for an increase with fall activity beginning. Macon area is rumored to have a 2-meter boom started. K4WYF has a new HW-17 and K4ODI is on 2. W4BGH has a TR-4. WB4FTZ is on 6-meter s.s.b. K4HQI has a new 50-ft. tower, W4LYG a new Galaxy. GSN met all sessions with 37 stations accounting for 354 QNI and 182 messages. W4LRR reports the Sept. V.H.F. Sweepstakes was a great success. He worked Alabama, South Carolina and North Carolina on 2. The Chattanooga Tri-State F.M. Assn. is a newly-affiliated society. Sorry that activity at this station has been so drastically curtailed because of long working hours but will make every effort to be on the bands whenever possible. How about some v.h.f. net registrations for the column so the gang will know where to look when touring? Traffic: (Sept.) WB4NQA 111, W4PIM 88, W4CZN 86, WA4RAV 84, WA4GXZ 76, W4FDN 59, WA4LLI 42, K4BAI 37, W4NSO 31, WA4UQQ 20, W4DDY 18, W4UVP 16, WB6UTC/4 11, W4TYE 10, W4AGI 6, K4HQI 1. (Aug.) W4UVP 27.

WEST INDIES—SCM, Jose Medina Hernandez, KP4CO—Please send your 6-meter reports to KP4-DBK, v.h.f. editor for the P.R. Amateur Society bulletin. Active on 6-meter s.s.b. are KP4s DBK, AFK, CAS, ANG, AST, AAB, BAP, ES, CL, CK, DEC, CQM, DCH, DGH, BBU, AAN and WIHOY/KP4. The Radio Club de P.R. Hamfest at Isla De Cebra was very FB. Back in KP4-Land are KP4s VC, BBN, AAM, YT, AWX and WA5WDK and W2KPR. 160-meter activity: W1FZ/KP4, KP4-

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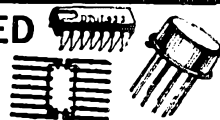
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| <input type="checkbox"/> 2N3662 | 5 for \$1 |
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| <input type="checkbox"/> 2N4248 | 5 for \$1 |
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| <input type="checkbox"/> 914 | Dual Two Input Gate | |
| <input type="checkbox"/> 915 | Dual 3 Input Gate Nand/Nor | |
| <input type="checkbox"/> 923 | JK Flip Flop | |
| <input type="checkbox"/> 925 | Dual 2 Input Gate, Expander | |
| <input type="checkbox"/> 927 | Quad Inverter | 2 |
| <input type="checkbox"/> 930 | Dual 4 Input Gate Nand/Nor | for |
| <input type="checkbox"/> 932 | 4 Input Nand/Nor Buffer | |
| <input type="checkbox"/> 933 | Dual Input Gate, Expander | |
| <input type="checkbox"/> 944 | Dual 4 Input Power Gate | |
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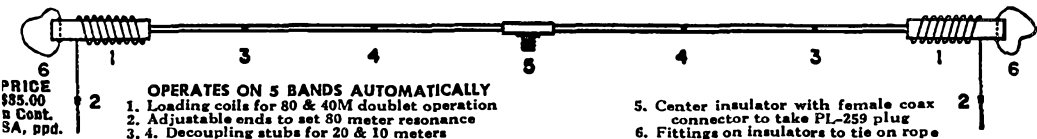
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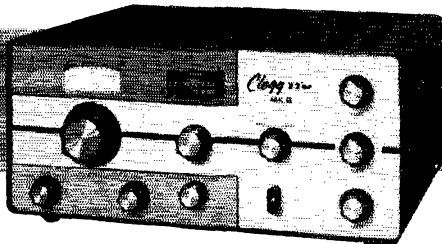
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WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4IKB, PAM: W4MIQQ, RM: K4UBR, RM-RTTY: W4WEB.

Net	Freq.	Time	Days	Sess.	QNI	QTC
WFPN	3957 kc.	2300Z	Daily	30	501	49
QFN	3651 kc.	2330/0300Z	"	60	—	—
NW Fla FM	146.94 Mc.	0130Z	Thurs.	4	—	—

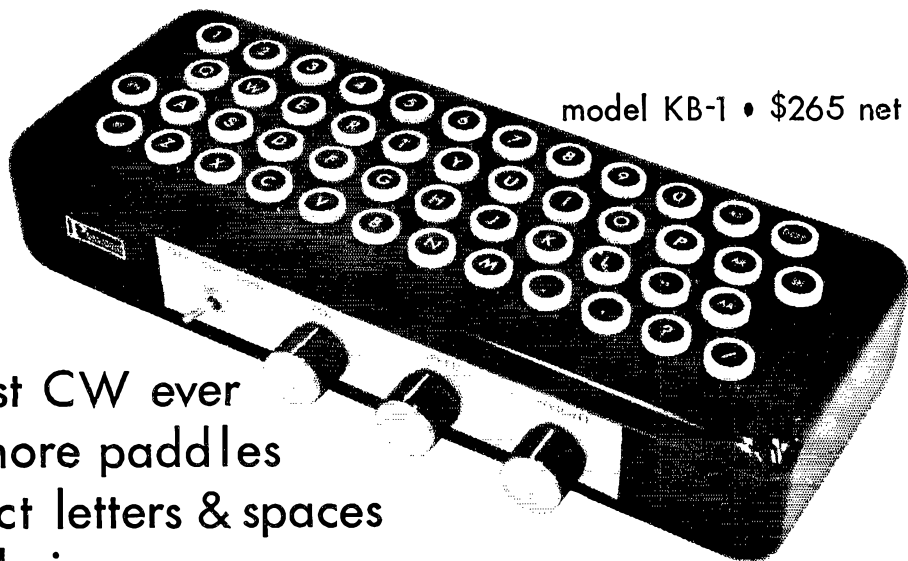
New hams this month include WN4NWV and WN4QHW in Pensacola, WB4OGQ (XYL of W4UHI) in Ft. Walton, WN4NWM and WN4OJN in Panama City and WN4OEL in Tallahassee. Pensacola: Nearly 50 attended the FFARA Fish Fry at the home of W4ETE. Glad to see another station on QFN from here—W4DJ, W7BNR is looking for local contacts from the U.S. Naval Academy station, W3ADO, Fort Walton: WA4VSI is now in Turkey, EC WB4EQU called a surprise drill and got a turnout of 15 hams. CB operators were also utilized, K4RIV moved here from Gulf Breeze, W5RHE/4 is now WB4OHK. New officers of the N.W. Fla. FM Assn. are W4SMS, pres.: WB4HCD, W4FDJ, WB4CFQ and WB4GTK, W4ZGS, W4VMR, W4LRC and W5YOW are building rigs for ATV. Defuniak Springs: K4VWE got his Advanced Class ticket. Chipley: W4IKB is instructing a 10-hour course at Chipola Jr. College on obtaining commercial and ham FCC tickets. Tallahassee: The FSU Ind. Arts ARC is now affiliated with ARRL. WB4LOQ was appointed OBS. WA4IBL is active on 2-meter f.m. Traffic: (Sept.) K4VFF 153, WB4DVM 37, W4RKH 21, WB4JGY 10, W4IKB 9, WA1EBN/4 7, WB4EQU 7. (Aug.) WA4ECY 2067, K4UBR 470, W8RIT/W4 191.

SOUTHWESTERN DIVISION

ARIZONA—SCM, Gary M. Hamman, W7CAF—SEC: K7GPZ, RM: K7NHL, PAM: W7UXZ. Recent appointments are WA7GDC, K7ZMA and WA7HUH as ECs for Yavapai, Mohave and Gila Counties, respectively. K7UOY was presented an award at the Civil Defense Conference in Page for outstanding work in Cochise County. K7CET told the Conference about the RACES program and used Pima County as a good example of how it is working. Also attending the Conference were K7GPZ, K7UGA, K7WUG and W7CAF. Maricopa County Red Cross had an emergency communications test on Oct. 12 under the direction of W7QNO and K7GHS. The Arizona ARC had about forty persons attend a hot dog roast at Squaw Peak Park Sept. 26. WA7IK is attending the U. of A. and WA7ISP is attending N.A.U. WA7JUX is putting up a four-element quad for 10, 15 and 20 meters so he can run overseas phone patches. K7UXG is now operating 2-meter f.m. mobile in addition to h.f. mobile. Any amateur desiring appointment as ORS, OPS, OO, OBS, OVS, etc., should contact your SCM. Best wishes for a happy holiday season from your SCM. The Copperstate Net handled 228 messages in Sept. Traffic: (Sept.) K7NHL 229, WA7AAJ 61, W7GEP 58, W7FOJ 57, WA7ISP 35, W7DLE 31, W7AMM 30, W7OUE 25, K7WUG 24, W7CAF 19, W7MIQ 14, W7LLO 13, K7ZMA 13, K7RDE 12, WA7GAE 11, W7UXZ 4, K7RBI 2. (Aug.) K7EXF 56, K7RDE 24.

LOS ANGELES—SCM, Harvey D. D. Hetland, WA6KZI—WB6NST is a proud father in addition to sporting a new tower. The So. Calif. V.H.F. ARC is working on a club jacket for its members. Acting pres. of the Antelope Valley ARC is WB6ZES, who is planning a club bulletin. New pres. of the Palisades ARC is W6TXJ. WA6OKP is pres. of the Pasadena City College QSO Club, and WB6ZZN is secy. of the Atomic Int'l.-Rocketdyne ARC. WB6NSH has a surplus store going at 1434 Pioneer Blvd., Norwalk, and the profits go to the Rio Hondo Council of the Blind. WB6NJU is concentrating on 80/75 meters with two half-waves in phase in hopes of completing 3BDXCC. K6YRA has a new compressor to aid 20-

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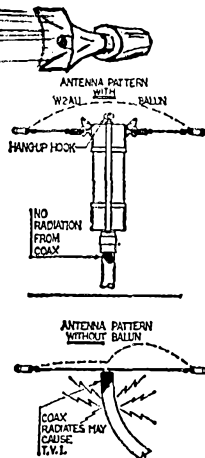
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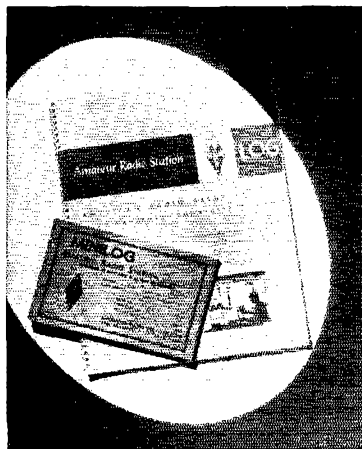
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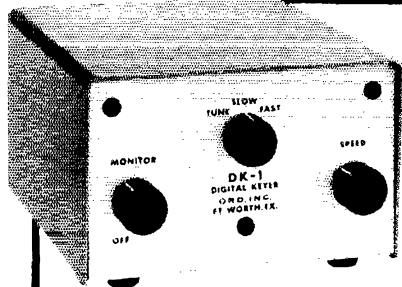
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meter DX efforts. WB6PKA is working on new amplifiers for the station. W6ORG advises that the following members of the So. Calif. ATV Club are known to be on the air with two-way video: K6CHS, WA6EPX, W6CMQ, W6GTZ, K6INQ, WA6KAA, K6-KTP, K6MWN, W6NZN, W6ORG, W6FHY, W6QDP, W6TFS, W6TXG, W6VCF, K6VLM, WB6VQD, K6-YSG, WA6ZIO, WB6ZYE, WB6FXG, WB6WFQ, W6-PCQ and W6RIT. K9ZMS has moved from L.A. to San Diego, and W6KQI is now located in San Pedro. The So. Calif. DX Club hosted WICW from ARRL Hq. as a guest speaker. W6BBO has been elected to the Telegraph Hall of Fame. Active Official Observers in the section include K6CL, W6CRQ, W6EL, K6NA and W6RW. More OOs are needed in our section especially those with v.h.f. interests. Contact WA6KZL. W6FTS has a new Conrac monitor for the home station, and K6YSG has a solid state ATV rig on the air. Under the direction of EC WA6JXG the East San Gabriel Valley AREC has coordinated a program in cooperation with the Baldy District of the Angeles Nat'l. Forest to provide backup communications for the Service and communications for the Service's news media representative. All but one point suggested by the Service was found to be in the coverage area of the W6FNO f.m. repeater, and the remaining point was covered by relay. Noted V.H.F./U.H.F. operator W6NLZ is a Silent Key. New Calif. DX QSO Bureau is c/o NCDXC, P.O. Box 11, Los Altos, Ca. 94020. The JPL ARC has acquired the call of the late W6VIO, one of its founders. The 1989 Southwestern Division Convention in San Diego proved very successful. Congratulations to WA6TAD and the San Diego Council of Radio Clubs on a job well done. Regarding last month's column, please note that those interested in arranging ATV demonstrations for club meetings should contact W6ORG rather than W6ORS. W6MN has moved to Red Bluff, Ca., forcing his resignation as net manager of the So. Calif. Net (3800 kc 7 p.m.) after a fine, dedicated tour of duty. Merry Christmas and all the best during the new year. Traffic: (Sept.) WB6EBO 581, W6MLE 424, W6-INE 194, K6CDW 162, W6PJT 72, W6MN 48, W6RHG 34, W6SYP 20, W6HUJ 13, W6JPH 10, W6DGB 9, WA6ABP 3, WB6UHP 2, W6DQX 1. (Aug.) K6QPH 25, WB6UZS 20, W6JPH 15, K6PPC 2, WB6PKA 2, WB6UHF 2, WB6ZVC 2, WA6JED 1, WA6WKF 1.

ORANGE—SCM, Roy R. Maxson, W6DEY—W6-JPX has been named Radio Officer for the Victor Valley Civil Defense District 6, San Bernardino County. The Victor Valley ARC, K6QWR, 100% ARRL, P.O. Box 869, Victorville, Ca. 92392, meets the 2nd Fri. of each month at the City Highway Yard on Seneca St. at 7:30 p.m. Officers are W6TTR, pres.; K6QCZ, vice-pres.; W6BGG, secy-treas. Everybody is welcome. OPS W6GB is having a ball with a new Drake TR 4. He is retiring Jan. 1 from Aerospace Corp. OVS WB6WRX, advises the Autonetics RC, WB6YPX, completed 2776 PPs to Vietnam in July. They still are looking for volunteers to help man the station. WA6UBP's son John now is with MATs in Vietnam. ORS WB6ZEC worked VE1AI with a 20-meter dipole 4 feet above the ground and 55 watts. WA6ORJ has a new job in Newport Beach. After Feb. 1, 1970, the new address of W6PJU and W6DEY will be 221 Knoll Road, Vista, Ca. 92083. Traffic: WA6ROF 252, W8ELW/W6LCP 194, W6BNX 123, W6WRJ 32, WB6ZEC 4, W6GB 3.

SAN DIEGO—SCM, Richard E. Leffler, WA6COE—Asst. SCM, Art Smith, W6INI, SEC, WA6KHN. Christmas programs for clubs are scheduled for this month, and so are many elections. Hope you will support the best candidate to assure a great year to begin the '70s. (Clubs, be sure to advise the SCM on changes in leadership.) ARC El Cajon ends the year with a membership in the 80s! The DX Club met at the home of WB6OYU in Sept. and at the home of K6EZA in Oct. The No. Shores Club has the county emergency program this month put on by Harry Masters. New clubs are Greenfield Jr. High and SD State (WA6GRF). Section news: K6YRF now is K6PM. WB6SEZ, WA6CKB, WB6NKG passed the Advanced Class exam. New to the section is K9ZMS/8, an ORS. BPLers for Sept. were K6BPI and W6-VNQ. A Novice net (AREC) under EC WB6SEZ has been started. Novices only are asked to contact the EC and join in the net. K6EC continues to send out OO notices. WB6TFC reports that his camera is alive and well on ATV. K6BTO monitors 222.52 on a.m. for contacts. WA6COE, W6IJO and WB6KSA operated K6SD/6 during Red Cross Field Day in Oct. WB4-



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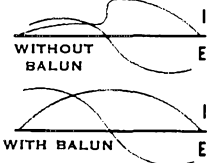
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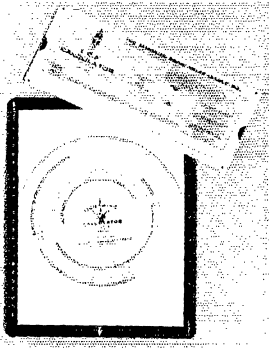
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CYP/6 has orders to Pensacola. WA6PFP is back and has reported to W6LAB at Pendleton. Look for the SCM, Asst. SCM and SEC around 3005 evenings at about 2000. The new address for the SCM will be posted on the ARRL board at Western. Keep the news coming! Season's Greetings and Best Wishes to All. Traffic: (Sept.) K6BPI 6566, W6VNU 702, W6-BGE 453, W6EOT 432, W6LRU 141, K6HAV 23, WA6-COE 10, K9ZMS/6 1. (Aug.) WA6BWD 34.

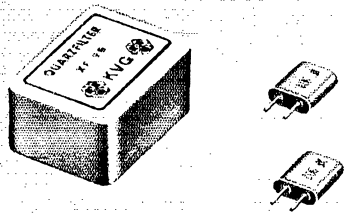
SANTA BARBARA—SCM, Cecil D. Hinson, WA6-OKN—SEC: K6GV, RM: W6UJ. The Estero ARC announces advancements in the amateur ranks as follows: WB6ECM made General, WA6FHV Conditional and a new Novice, WN6DSH, has been added. The Estero Club handled communications and public address systems for the Morro Bay Rock-a-Rama Parade again this year. W6BYCH has had club help in raising the tower she got at the Fresno Ham Convention. K6VBX completed his HW-17 transceiver and has had a few contacts. K6SUA has QRP 1-watt rig on 40 meters. K6CFJ worked the Apollo Communications Station in New Orleans during his summer vacation trip with a mobile rig. K6JA purchased a new Swan 350 and is working 40 and 20 c.w. The club station at the Moorpark Elementary School (WA6OPY) is active again with its HW-100. One of our new General Class licenses went to Bruce Wesley, of Lompoc, with the call WA6CQE assigned. After some time on the air Bruce discovered that the call has been held for some time by another ham in Lancaster, Calif. W6ORW has time to run phone patches for the USS *Repose* off Vietnam in addition to teaching ham classes. WA6DEI moved to a new location and ordered an SB-301. WA6HOM, in Carmarillo, is on with a new Swan 350-C and is putting up an 18AVQ antenna. Traffic: WA6DEI 83, W6ORW 9, W6UJ 6.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. E. Harrison, W5LR—Asst. SCM: Gene Pool, W5NFO. SEC: W5JSM. PAM: W5BOO. PAM (v.h.f.): WA5KHE. RM: W5-QGZ. Asst. SEC (EastTex): WA5KHE. The Kilocyte Club of Fort Worth's pres., WA5QOJ, reports the

program of Sept. 17 covered Part II Incentive better than any presentation yet devised. Discussion was led by Director Albright, W5EYB. The score was 75% against and 25% for implementation. Attendance was 85. The Panhandle ARC members toured the SoWest-PubSvc 40-megawatt generating plant. The Amarillo repeater now is active on 146.94 simplex. WA5VTO says the new RACES SOP/training manual is permanent. OO W5PBN did FB work on 7290 QRM Whistler. There are 26 affiliated clubs in No. Tex. Dallas ARC now is issuing a 2-way gear for radio watch, in cooperation with the Police Department. W5ONL resigned as OO. K5RVY is living in Irving. WA5VJB resides at Crowley, Tex. K5PAW wants an OPS appointment. W5VVA resigned because of pressing business. W5UAT applied as EC for Kaufman County. The Texas Instruments Ham-Swapfest was "way-out." Attendance was 435. Special subjects, including DX, Antennas, Intruder Watch and League appointments, were discussed. The ARRL meeting was attended by 35. K5LZA was appointed EC for Dallas County. LZA is the popular net mgr. of the 3961 group. WA5DQP is a new ORS. RM W5QGZ reports little operation as the transmitter was in for factory overhaul. K5MOT and WA5QCW are new and active on NTX. No anti-League comment was heard at the TI Hamfest. Three CBers asked for assistance in obtaining licenses. Your RM ran into zoning restrictions while erecting an antenna. W5QJA, of the Texas Traffic Net, reports the loss of WA5AUZ and WA5-FGC. Jim has a list of hurricane weather stations and if you want one write W5ABQ or your SCM. Our star OO reporter, W5QPX, submits a list of 95 discrepancies in the 7-, 14 and 21-kc. bands mostly by T8 and T9 signals. SEC W5JSM reports a total of 98 AREC members, 74 full and 22 limited. Total emergency nets active number 8, with liaison 8. WA5-QWA submitted forms for OPS. Remember your Director cannot act on official ARRL matters unless he hears from you personally. Traffic: K5BNI 1614, K5EFO 164, WA5KIV 48, K5LZA 46, W5HVF 32, WA5DQP 27, W5LR 25, W5JSM 15, W5QGZ 12, W5-PBN 8, WA5QWA 8, W5MSG 2.

OKLAHOMA—SCM, Cecil C. Cash, W5PML—Asst. SCM: W. L. (Smoky) Stover, K3OOV SEC: WA5FSN.



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High performance 9 MHz crystal filters for SSB, FM, AM and CW application. Symmetrical input and output. Small size (1²⁷/₆₄" x 1³/₆₄" x 3/4") perfectly suited for miniaturized solid-state equipment.

Filter Type	XF-9A	XF-9B	XF-9C	XF-9D	XF-9E	XF-9M
Application	SSB-Transmit.	SSB	AM	AM	FM	CW
Number of Filter Crystals	5	8	8	8	8	4
Bandwidth (6dB down)	2.5 kHz	2.4 kHz	3.75 kHz	5.0 kHz	12.0 kHz	0.5 kHz
Passband Ripple	< 1 dB	< 2 dB	< 2 dB	< 2 dB	< 2 dB	< 1 dB
Insertion Loss	< 3 dB	< 3.5 dB	< 3.5 dB	< 3.5 dB	< 3 dB	< 5 dB
Input-Output	Z _i 500 Ω	500 Ω	500 Ω	500 Ω	1200 Ω	500 Ω
Termination	C _t 30 pF	30 pF	30 pF	30 pF	30 pF	30 pF
Shape Factor	(6:50 dB) 1.7	(6:60 dB) 1.8	(6:60 dB) 1.8	(6:60 dB) 1.8	(6:60 dB) 1.8	(6:40 dB) 2.5
Stop Band Attenuation	> 45 dB	> 100 dB	(6:80 dB) 2.2	(6:80 dB) 2.2	(6:80 dB) 2.2	(6:60 dB) 4.4
Price	\$21.95	\$30.25	\$32.45	\$32.45	\$32.45	\$23.00

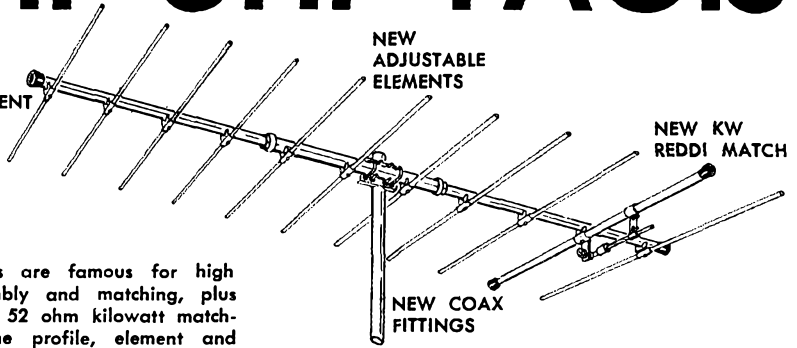
Matching HC-25/U crystals: 8998.5 (USB), 8999.0 (BFO), 9000.0 (carrier) 9001.5 (LSB). \$2.75 each.



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Coaxial stacking kits are available for dual and quad arrays. See your local distributor or write for free literature today.

A144-11,	2 meter 11 element	\$16.95
A144-7,	2 meter 7 element	12.95
A220-11,	1-1/4 meter 11 element	14.95
A430-11,	3/4 meter 11 element	12.95

A50-3,	6 meter 3 element	\$18.50
A50-5,	6 meter 5 element	29.50
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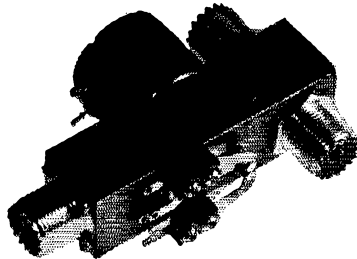


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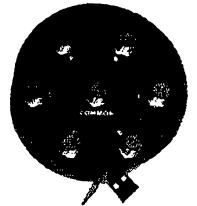
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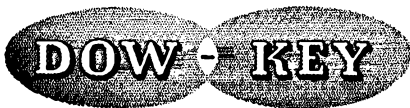


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71-260401

SERIES 78 The series 78 coaxial switches are manually operated with true coaxial switching members (not wafer switches). They are offered in 2, 3, 4 & 6 position (illustrated) types, plus a transfer or crossover and DPDT. The useful frequency range is 0-1 Ghz except 500 Mhz using UHF connectors. The unused positions are open circuited or non-shorting. Also available with other type connectors such as N, BNC, TNC or C.

SERIES 60 The series 60 are remote operated, of rugged construction and designed for low-level to 1 KW use. The unit illustrated is equipped with a special high isolation connector ("G" type) at the normally closed or receive position. This "G" connector increases the isolation to greater than -100db at frequencies up to 500 Mhz, although it reduces the power rating through this connector to 20 watts. This is also available with other type connectors such as BNC, N, TNC, C or solder terminals.

SERIES 71 High power 6 position switches commonly used for switching antennas, transmitters or receivers at frequencies up to 500 Mhz. The unit is weatherproof and can be mast mounted. The illustrated unit has the unused input shorted to ground. It is also available with a wide range of connectors, different coil voltages and non-shorting contacts or resistor terminations. Each of the six inputs has its own actuating coil for alternate or simultaneous switching.



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DX Century Club List

(Continued from page 110)

WA1FNS	WA5QUR	102	JA1HRQ	DL8RM	W1PRT
WB2FFZ	W6HUR	CP5ED	JA4WI	F5AN	WA1EDR
WB2YRU	W7DZO	CT1PQ	K4DHZ	F8HB	W2GTQ
WB4DJ1	W7LLR	DJ2UP	K8MHO	G3LRQ	W2HSM
WA5RTD	WA7BAV	DL1EQ	K6GAK	G3RRD	W2VDE
W9CWX	W8FRJ	G3VVU	K8YBK	G3UQR	W2YTO
ZE1CX	WA8YXE	G31LV	K9DCG	G3XBR	WA2DXJ
5N2HJA	W9QEE	H89ALE	K9HJK	GM5AIF	W2HBV
	WA9RKY	K4ADK	K0VBA	HC1MH	WB2NSG
	Z56KC	K4CEE	KACL2	HP3MC	WB2RKU
	524JH	K4OSE	KH6GKD	I1HBP	W3BAB
105		K4ZLE	K1DEP	W4IME	W41ME
DJ3EJ		K5UKN	O8EAY	K1EIN	W4PWB
DL6QT		K91DQ	VP5AA	K1KNQ	WA4QHN
F6BI	103	DK2BJ	W4JNY	W24LZC	WA4TMP
I1AKJ		DK2JW	W4JNY	WB20IV	K2OYN
JA6SU		GM3TDS	KP1	WB20VQ	K3CAP
K4NSU		H45BY	LA8RI	W3NGV	K3FDL
K9BJM		H8AQA	OE1HGW	WA3GYY	K4CG
TA2BK		K1JHX	SM7SX	WA4GZZ	K4DPG
VE3QW		K2PXX	SV0WV	WA4ZXO	K4IHP
VE5DG		K3HTZ	UW3IN	W5FUZ	K4JZ
VP1LL		K4HFO	VK2AG	W5NQL	K4JXZ
W1RFP		K9HFR	W1TIV	W5ULN	K4V8R
WB2SUP		LA1ZE	WA1BFD	WA5DOS	K4PPN
W4CHC		LA8PF	W28HE	WA5LUM	K4V8R
W4FOD		SM5ZE	W2VDX	W6ASA	K5EFW
W4QD		SV1BY	WB2RBG	W6DOD	K5YMY
WA4TWP		TF2WKP	WB2TWM	W6EF	K6EIV
WA6YXP		W1KJL	DL7KX	W6FKD	K7JLF
W9NUH		WB2SAF	W2	WB6FGT	K7TIC
WA9SLD		W3CRE	W3AVJ	WB6WIT	K7UBC
W0NZY		W3PQJ	W3AYS	W7GHB	K8ZFR
ZL4Z		W4NBO	W31WF	W8HJ	K9ERP
8R1P		W4SD	W4EJM	WA8GBE	K9T5Y
		WA4DWR	WA4SLH	W92WQ	K9UFK
		WB4ASG	WA4VTV	WA9TFM	K0BX1
104		W5LVQ	WB4GLG	W0IBZ	K0TWW
DJ1AM		WA8DCH	WA5POH	WA0IYH	W1FZJ
JA3DGC		WA8ORF	W98CN	WA0MOJ	KP4
JA7BHQ		W80VM	WA9SVZ	XE1NNY	KR6KQ
K1NKZ		WA9ACB	Z1UHQ	Y1V1P	LA2BK
K1ZJW		WA9DJO	524KO	Z12AMN	LA3K
K2YIO		WA9KYK		ZS2DC	OA4JR
K41EX		WA9TBZ		5W1AS	OK1ZL
K4MAM		W0EGC	101	9Y4VT	OX5AP
K4PUZ		YV1EC	DJ3NK		W0KRU
K5ZSC		YV1YK	DJ4JT		WA0HHX
K8VBS		YV4QQ	C3RBB	100	WA0LBK
MP4TAO		YV5AAZ	C3VZD	DJ7JK	VE2BGI
VE8NO		4X4AK	DJ9MZ	DJ9MZ	VE3BGT
W2OPF		6Y5JR	DL9MZ	DJ9MZ	VE6AHV
W4LX		8P6CV	H89ALB	DL9GW	ZL3FT
W5KNZ		9X5PB	HK4AZX	DL5NJ	VEK3AMK
					WILFE
					9M6NQ

QST

SOUTHERN TEXAS—SCM. G. D. Jerry Sears, W5AIR—SEC: K5QQG. PAM: W5KLV. RM: W5EZY. Congratulations to new Emergency Coordinators W5UEQ, Jose' Cordere, for Tyler County and W5URW, Bob Herndon, now in Colorado County. An EC certificate was presented to WA5TCP at Jasper by SCM W5AIR, with K5HMF, W5UEQ, WA5WEN, WA5SCE, K5FIY, WA5UKW and WA5NOT present under the tall pines. WA5YRL, now of Corpus Christi, collects articles for the Corpus Museum while roaming the world as a Merchant Marine officer. Keep your ear open for his Maritime Mobile. Congrats to WA5FJN on his 3rd BPL certificate this year. EC W5KR's *Off Resonance* reports WA5GZI now in Edinburg, Tex., A5SJA is mobiling to and from work in McAllen. W5HBL is doing a whale of a job at CARCOB and has several Novices about ready to bloom. W5QO now has Extra First. Director Roy Albright, along with his charming XYL, have been getting around. They visited El Paso Sept. 26 and 27. Roy can be found by checking the Tex Tfc. Net, 3770 kc at 1900 and 2200 local time. Just ask for W5EYB. He needs all the dope he can get on amateur radio in our section, good and bad—Fellows, W5EYB is working for you. Give him your support. EC W5TFW reports South Jefferson County amateurs now are operating from the Nederland Operating Center. SEC K5QQG is now at home recuperating from a wound in the left thigh during a hijacking attempt Sept. 24. K5WYN, NCS for the West Gulf Emerg. Net was on vacation for most of Oct. Come on fellows, let's have your traffic reports. Traffic: WA5MXY 96, K5BZR 44, W5TFW 32, W5ABQ 25, W5BGE 20, W5AIR 14, W5QO 13, WA5QKE 4, W5KLV 3.

CANADIAN DIVISION

ALBERTA—SCM. Don Sutherland, VE6FK—SEC: VE6AFR. PAM: VE6ADS. I wish to extend sincere sympathy to VE6VE on the untimely passing of his XYL, VE6ABV. Congratulations to the following on their recent appointments: VE6AFR as SEC and Calgary EC; VE6AHE as OVS; VE6SB as OBS. VE6MJJ reports a direct QSO on 2 meters with VE6NT. VE6MJ did very well in the recent PMT. He also reports a few more cards will complete his DXCC. The CARA is starting its fall and winter classes again. The NARC has commenced a campaign to get inactive amateurs back on the air. The club's next meeting will be well publicized with a non-technical program designed to introduce amateur radio to non-amateurs. The new executives of the NARC are VE6JDD, pres.; VE6VJ, secy-treas.; VE6EA, club historian and editor of *Emitter*. Other executive members are VE6ALJ, VE6ATA, VE6HR, VE6ASZ, VE6AJY, VE6AYH and VE6ON. The Hanna Ham Club ran a fine display and station at the Hanna Annual Fair. I wish to thank all who helped in our summer public service work. You did a fine PR job for amateur radio. Traffic: VE6MJ 10, VE6FK 9, VE6SS 5.

BRITISH COLUMBIA

BRITISH COLUMBIA—SCM. H. E. Savage, VE7FB—The BCARPC Net lost its net manager as VE7BVB resigned. Chilliwack ARC's new officers are VE7XV, pres.; VE7XX, vice-pres.; VE7BHG, secy. The club's AREC plan has seven base and eight mobiles on 147.33 Mc. VE7BHG has his Class A and an HW-100. VE7XV is now making big noise with his FT-DX-400. VE7BEN has a tower up for his TA-33. East Kootenay ARC's PD turned into a search for a lost person. The club's repeater proved its value in this exercise. VE7KY still is in the extensive care unit, but improvement is being noted after five months. VE7GG, ORS/OO, has the TH-4 up and working well. The North & West ARC and visitors were treated to a talk on quads by VE7OP. I suggest that pressure be applied for a repeat for those who missed it. The lads erected VE7BXD's tower and quad tri-bander and now for the DX. *Zero Beat*, Victoria SWC's official magazine is a good one. Its new editor is VETAEK and the mailing address is Box 134, Victoria. Traffic: VE7AAJ 15, VE7SE 15, VE7AC 8, VE7LL 8.

MARITIME

MARITIME—SCM, William J. Gillis, VE1NR—SEC: VE1HJ. Our sincere sympathy to the family of VE1AL, VE1s IF, AFB and IK are active on 432 Mc. VE1IF and VE1ZZ reported working on 1296 Mc. VE1PL reports meteor scatter work on 2 meters. Truro now has a 2-meter repeater on the air. VE1MY is on the sick list. The Moncton Club has a new class started with 13 participants. A trophy, the Maritime Sparkettes Award for Traffic Handling in memory of Bert Whittaker, will be offered annually for the VE1, VO1 operator passing the largest number of pieces of formal traffic during the period Jan. 1 to July 31, 1970. Scores will be totaled from the figures published each month in QST starting with

RM: W5QMJ. PAMs: W5MFX, K5TEY, WA5JGU and K5ZCJ. The Lawton-Fort Sill ARC received a real nice letter of thanks from the Oklahoma State University ARC, W5YJ, for a pair of 811-As which put them back on the air. K5WPP reports he is back on in full force to include 2 meters. Several thousand attending the Oklahoma State Fair visited the information booth operated by the Oklahoma Central V.H.F. ARC. W5FW and XYL W5PWN are grandparents again and a little birdie told me that they are planning a trip soon to Houston to check on their grandson's little sister. At least one Texan found greener pastures in Oklahoma, as K5CMC is a new member of the local club and engineer at one of the local b.c. stations. The Enid 2-meter repeater is now in full operation under the call WA5QYE, receive on 146.34 Mc. and transmit on 146.94 Mc. Congratulations to new licensee WA5ZVI. Net schedules.

Net	Freq.	Time	Days
OPEN	3915 kc.	1300Z	Sun. only
OWXN	3915 kc.	2300Z	Mon.-Sat.
OPON	3920 kc.	2200Z	Mon.-Fri.
STN	3855 kc.	2230Z	Mon.-Sat.
OLZ	3682.5 kc.	0001Z	Mon.-Sat.
SSZ	3682.5 kc.	0245Z	Mon.-Sat.

Traffic: K5TEY 1211, WA5QIQ 236, WA5IMO 59, W5MFX 42, WA5ZOO 34, W5FKL 26, W5FWL 25, K5SWL 23, WA5LWD 18, WA5MYF 16, W5QMJ 12, WA5YRO 11, K5WPP 10, WA5FSN 3, K5OCX 5, W5IQ 3.

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(Please see the other side of this page for a list of available League publications.)

THE AMERICAN RADIO RELAY LEAGUE, INC., NEWINGTON, CONN. 06111

Jan. 1970. Since no logs will be requested, stations are urged to send their monthly totals in to your SCM promptly for publication in QST. Any station winning the trophy for three consecutive years will hold it permanently and will be ineligible for further competition. Let's have more reports. Best wishes for a Merry Christmas and a Happy New Year to all.

ONTARIO—SCM, Roy A. White, VE3BUX—The Ontario Science Centre in Toronto opened for business Sept. 27. It cost thirty million and boasts a fabulous ham station, VE3OSC, active on all bands. Congrats to VE3CGO, who is our new EC in Ottawa. Incidentally, she monitors 3760 s.s.b. and 146.94 daily from 8 A.M. to 6:30 P.M. Sorry that VE3FXP has had to give up as EC for Muskoka because of a change in QTH. VE3ESH was in Kingston Hospital for surgery. Bert is the c.w. ham for 36 years who always makes a point of contacting a Novice every time he goes on the air. A recent QSO was with WN9BTC who is a deaf mute and reads c.w. by vibrations. Sorry to hear that VE3BMU is in the hospital and quite sick, too, but glad to hear that VE3BXL is out after surgery. VE3GUM, VE3ABN and WA9VZS/VE3 provided communications for the speed-boat races at the recent C.N.E. in Toronto. Frank, ex-VE3FNO, is now in Malta with the call 9H1BM. VE3CMT is now VE1DF and VE3GOC is now VE4EX. Welcome to VE3GHO as a controller on the Ontario Phone Net. The OQN boys had a week-end camp-out north of Port Hope in Sept. Among those present were VE3s LK, A11, CYR, DBG, EBH and FZA. VE3GMZ has acquired a new organ. The type that produces music—not a transplant! Some character has been bootlegging the call of VE3DPO much to the disgust of Reg, its real owner. Rumor has it that Ivy, VE3EZI, and the OM, VE3EZO, are taking flying lessons. The same Ivy was top phone and c.w. in Canada in the '69 YL/OM Contest. How about that! To paraphrase a famous saying, "Ask not what amateur radio can do for you. Ask what you can do for amateur radio!" Traffic: (Sept.) VE3EMQ 175, VE3GI 166, VE3DPO 103, VE3EBH 102, VE3FRE 73, VE3DBG 54, VE3BZB 47, VE3DU 43, VE3DV 40, VE3ATI 34, VE3EHL 21, VE3GCE 13, VE3APL 12, VE3ERU 9, VE3VD 9, VE3GHO 1. (Aug.) VE3ERU 94, VE3GMQ 7, (July) VE3FRE 79, VE3DBG 60, VE3DU 28, VE3GMQ 6.

QUEBEC—SCM, J. W. Ibey, VE2OJ—HR6RD was

a recent visitor. VE2PJ looks for improved DX through the new antenna. VE2EC says things are routine in Three Rivers while VE2AJD does communications for boat races there. VE2WM reports fall activity at Club St. Laurent with nine new licensees, VE2DKZ, VE2DLA, VE2DLB, VE2DLC, VE2DLE, VE2DLF and VE2DMR. VE2ES, the 2-meter repeater, Mont Joli, should be on at this time. It was nice to receive a fine report from the Lower St. Lawrence gang. VE2AOX skeds OA8J. Thanks to SEC VE2ALE for much of this report as I have been in the hospital for a few weeks. Our sincere regret at the news VE2DIH becoming a Silent Key. VE2CA is now VE3CZL. VE2GH plans a Florida visit this winter. VE2KT now is on h.f. with an SB-34. From VE2ASU comes the following: Les activités de RAQI ont repris de plus belle et les projets sont nombreux pour la saison 1969-70. Félicitations à VE2BYF pour son excellent travail comme président de l'Associations Provinciale. RAQI songe à donner plus d'importance au réseau du Québec en organisant un service pour les stations en télégraphie. Parmi les nouveaux amateurs, spulignons, VE2ARO, VE2MY, VE2DLL, VE2PA fut très actif sur le 75 mètres durant la saison d'été; Edmond compte plusieurs amis sur cette bande. VE2DR et VE2ADA se sont lancés dans le télétype. Traffic: VE2DR 53, VE2CP 19.

SASKATCHEWAN—SCM, Gordon C. Pearce, VE5HP—During Sept. Regina hams participated in a Walkathon providing communications along the way. Saskatoon hams also took part in their Walkathon, as well as a Sports Car Rally, Travelers Day Parade and miscellaneous activities. Much activity is expected during the Boy Scout Jamboree on the Air. During July and Aug. Canada had a visit from GI3CVE. The boys in Regina and Prince Albert and others along the route hosted him royally. Bill extends a welcome to all to the Green Isle. We were extremely sad to learn of the passing of VE5OP, former ARRL QSL Manager. Congratulations to VE3CJ and VE2MS on their reelection as Director and Vice-director of the ARRL Canadian Division, respectively. A picnic and directors meeting of SARL which was intended for mid-Sept. was not permitted by the weatherman. Remember next year's hamfest in Regina—it will be one of the best. Traffic: VE5GL 42, VE5SC 25, VE5BO 11, VE5KZ 9, VE5SN 8, VE5HZ 5, VE5EO 4, VE5FA 4, VE5JK 4, VE5YR 3, VE5EQ 2, VE5LQ 2, VE5OJ 2, VE5XL 2.

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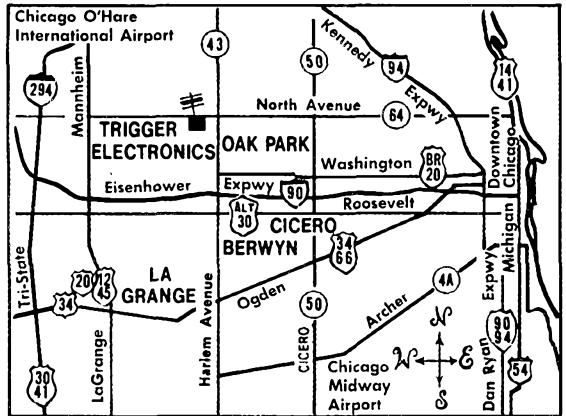
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HAM-ADS

(1) Advertising shall pertain to products and services which are related to amateur radio.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others. No Box Reply Service can be maintained in these columns nor may commercial type copy be signed solely with amateur call letters. Ham-ads signed only with a post office box or telephone number without identifying signature cannot be accepted.

(3) The Ham-Ad rate is 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 lead 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 column 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.

ROCHESTER, N.Y. is again Hamfest, VHF meet and flea market headquarters for largest event in northeast, May 16, 1970. Write WNY Hamfest, Box 1388, Rochester, N.Y. 14603.

R. L. Drake Co. notice: come say hello to the fellows from the R. L. Drake Company at the following convention: Las Vegas, Nevada, SAROC convention, Jan. 7-11, 1970.

AN INVITATION NYC area Hams and SWL's are invited to attend NY Radio Club meetings—2nd Monday of every month, George Washington Hotel, 23rd St. and Lexington Avenue at 8 P.M.

QCWA—Quarter Century Wireless Association is a non-profit organization founded 1947. Any amateur radio operator licensed 25 or more years is eligible for membership. Write for information, A. J. Giordano, W2JE, Box 394, Mamaroneck, N.Y. 10543.

MICHIGAN Hams! Amateur supplies, standard brands, Store hours 10-10 730 Monday through Saturday, Roy J. Purchase, W8RP, Purchase Radio Supply, 327 E. Hoover St., Ann Arbor, Michigan 48104, Tel. NOrmandy 8-8262.

AUCTION—Flatbush Radio Club on December 29th at 7:00 P.M. held at 22 Webster Ave., Brooklyn, N.Y. For information and directions, call Morty, K2BDQ at a.c. (212)-763-4233.

DAYTON Hamvention April 25 1970: Sponsored by Dayton Amateur Radio Association for the 19th Year. Technical Sessions, Exhibits and hidden transmitter hunt. An interesting program for XYLs. For information watch ads or write to Dayton Hamvention, Dept. Q, Box 44, Dayton, OH 45401.

FREE Sample copy Long Island DX Association Bulletin. Latest DX news, Business size SASE to K2AFY, Box 74, Massapequa Park, N.Y., L.I. 11762.

CHECK your first 2-way radio contact. If it was 40 or more years ago, you are eligible for membership in the most exclusive club in all of Amateur Radio. The Old, Old Fimmers Club. Write for membership application and details, Bert E. Gamble, W5ZC, Executive Secretary, 402 Beck Building, Shreveport, La. 71101.

PROP Pitch rotor, WW2, small, excellent, \$45.00. Link, 1081 Aren St., Cocoa, Fla. 32922.

WANTED: Military and commercial laboratory test equipment, Electronics, Box 13, Binghamton, N.Y. 13902.

FILTER-Condensers: Aerovox oil-filled 100 mfd. @ 3000Vdc condensers, \$30.00 each. Basil J. Weaver, 1821-C Ave. M., Lubbock, Texas 79401.

SOUTHERN California Amateur Network. Scan 14.325 MHz Monday through Friday 0400 GMT. Join us, K6YCM.

SAROC new OTH Stardust Hotel new OTR February 4-8, 1970. Cocktail parties hosted by Ham Radio Magazine, Swan and Galaxy. Additional information and Stardust Hotel special room rate card QSP SASE SAROC, Box 73, Boulder City, Nevada 89005.

WELCOM E To Maritime. Mobile service net, 14313 KHz, daily 2130Z, Amateur Radio N.Y.'s service to the Fleet. Vic Barry RDC USS Cory, DD817 FPO N.Y., N.Y. 10950.

OSLS—100, \$1.40 and up postpaid. Samples, dime. Hollan R3, Box 649, Duluth, Minn. 55803.

C. FRITZ—OSLs that you're proud to send, bring great returns! Samples 25¢ deductible. Box 1684, Scottsdale, Arizona 85252.

OSLS "Brownie" W3CJ1, 3111 Lehigh, Allentown, Penna 18103. Samples 10¢. Catalog 25¢.

OSLS. With all this competition, you've gotta have something different. Try us, Samples 10¢. Alkanprint, Box 8494, Minneapolis, Minn. 55408.

OSLS stamp and call brings samples. Eddie Scott, W3CS Fairplay, Md. 21733.

OSLS Free samples, attractive designs. Fast return. W7II Press, Box 2387, Eugene, Oregon 97402.

OSLS—SWLS. Samples 25 cents. Malgo Press, Box 375, M.C. Toledo, Ohio 43601.

DELUXE OSLS Petty, W2HAZ, P. O. Box 5237, Trenton, N.J. 08638. Samples 10¢.

10¢ Brings free samples. Harry R. Sims, 3227 Missouri Av. St. Louis, Mo. 63118.

RUBBER Stamps \$1.25 includes tax and postage. Clin Radio, W2UDO, 32 Cumberland Ave., Verona, N.J. 07044.

3-LINE engraved badge, any color, \$1.25. Special rates clubs. Fallert's Engraving, 121 N.C. St., Hamilton, Ohio 45011.

OSLS, samples 10¢. Fred Leyden, WINZJ, 454 Proctor Av. Revere, Massachusetts 02151.

OSLS by K1FF: \$2.00 for 100. Others at reasonable price. Samples 25¢ (deductible). K1FF OSLS, Box 33, Melrose, Mass. 02177.

OSL SWL cards that are different. Quality Card Stock, Samples 10¢. Home Print, 2416 Elmo Ave., Hamilton, Ohio 45011.

CREATIVE OSLS Cards. Personal attention. Imaginative designs. Send 25¢. Receive catalog samples, and 50¢ return coupon. Wilkins Printing, Box 787-1, Atascadero, Calif. 93424.

OSLS, SWLS, XYL-OMS. Sample assortment, 25¢. All 1 fabulous designs of the late Warren Rogers, K6OAB, Patton Printing Co., 961 Arcade St., St. Paul, Minnesota 55111.

OSLS 300 for \$4.50, samples 10¢. W9SKR, George Veser, Rt. #1, #100 Wilson Road, Ingleside, Ill. 60041.

OSL cards Finest quality. Economical prices. Fast service. Free samples. Little Print Shop, Drawer 9848, Austin, Tex. 78757.

OSLS-100 3-color glossy \$3.50; silver globe on front; return on back. Free samples. Rusprint, Box 7575, Kansas City, Mo. 64116.

OSLS. Gorgeous rainbows, cartoons, etc. Top quality! Prices! Samples 10¢ refundable. Joe Harms, W4BLO, P. O. B. 158, Edgewater, Fla. 32032.

OSLS SWLS, WPE, Samples 15¢ in adv. Nicholas & S. Printery, P.O. Box 11184, Phoenix, Ariz. 85017.

RUBBER Stamps, 3-line address \$150. J. P. Maguire Company, 448 Proctor Avenue, Revere, Massachusetts 02151.

OSLS, finest YLRL's. OM's samples 10¢. W2DJH Press, Wrensburg, N.Y. 12885.

OSLS. Neat, Quick, 10¢. Filmcrafters, Box 304, Martin's Fer Ohio 43935.

OSLS-SWLS. Hundred, \$2.00. Samples dime. Willow Press 223 N. Uldriks Dr., Battle Creek, Michigan 49017.

OSLS Kromekote glossy 2 & 3 colors, attractive, distinctive. Choice of colors, one hundred—\$3.00 up. Sample 15¢. Ag for Cal-D-Calls, K2VOB Press, 457 Chancellor Ave., Newa N.J. 07112.

3-D OSLS—The modern concept that makes all others of fashioned. Samples 25¢ (refundable), 3-D OSLS Co., Monson Mass. 01057.

EMBOSSSED OSLS's. Free Samples, with cut catalog 25¢. Ace Printing Service, 6901 Clark Ave., Cleveland, Ohio 44111.

OSL. Second to none. Sameday service. Samples airmail 25¢. Ray, K7HLR, Box 331, Clearfield, UT 84015.

ORIGINAL EZ-IN double holders display, 20 cards each plastic, 3 for \$1.00 or 10 for \$3.00 prepaid and guarantee. Free samples to Dealers or Clubs, Tepabco, John K4NM, Box 198T, Gallatin, Tenn. 37066.

LOW Priced OSLS! Free samples! K.L.L. Press, Box 2 Martinsville, N.J. 08836.

OSLS 3-color glossy 100, \$4.50. Rutgers Vari-Typing Service. Free samples. Thomas St., Riegel Ridge, Milford, N.J. 08836.

PICTURE OSLS cards of your shack, etc from your photograph, 500, \$12.00, 1000, \$15.25. A unique non-picture signs. Generous sample pack 25¢. Half pound of samples 5 Rums', 4154 Fifth St., Philadelphia, Penna. 19140.

OSLS, Kromekote, 100/\$2.50 up. Buy best for less. Sample 10¢. Mills Printing, P.O. Box 1004, Lima, Ohio 45802.

OSLS. \$2.50 for 100, Samples 10¢. Diamond-Somar, 863 18 St., Euclid, Ohio 44117.

NEW! OSLS's professionally designed. Every card original. Free samples. Printing follow through by W1FLX, C. Desian, 20 Britton St., Pittsfield, Massachusetts 01201.

SAVE. On all makes of new used equipment. Write call Bob Grimes, 89 Aspen Road, Swampscott, Massachusetts 617-598-2530 for the gear you want at the prices you want to pay.

NOVICE Crystals: 40-15M \$1.33, 80M \$1.83. Free list. P. Stannette, Umatilla, Fla. 32784.

SELL swap and buy ancient radio set and parts magazin Laverly, 118 N. Wycum, Lansdowne, Penna. 19050.

DUMMY Loads, 1 KW, all-band, \$7.95; wired, \$12.95. H. Kits, P.O. Box 175, Cranford, N.J. 07016.

POLICE Fire Radio Dispatcher directories! Exclusive office directories; Call signs, frequencies of local, county, state agencies. National. For all VHF fans, CD, AREC, RAC MARS, VFD's Catalog for stamp. Communications, Box 56 Commack, N.Y. 11752.

WANTED: Military, commercial, surplus, airborne, ground, transmitters, receivers, test-sets, especially Collins Airborne. We pay cash, and freight. Rico Electronics, Box 156-Q567, Annandale, Va. Phone: 703-560-5480 collect.

WANTED: 2 to 12 304T1 tubes, Callanan, W9AU, 625 West Jackson Blvd., Chicago, Ill. 60606.

HAM'S Spanish-English manual \$3.00 Ppd., Gabriel, K4BZY, 1329 N. E. 4th Ave., Fort Lauderdale, Florida 33304.

WANTED: For personal collection: How to Become a Radio Amateur, Edition 9; The Radio Amateur's License Manual, Edition 12, WICUT, 18 Mohawk Dr., Unionville, Conn. 06085.

QST's Wanted: December 1915 to December 1916, 1913, IRE proceedings. Any unreasonable price! Ted Dames, W2KUW, 308 Hickory Street, Arlington, New Jersey.

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. 11551.

CASH Paid for your unused Tubes and good Ham and Commercial equipment. Send list to Barry, W2LNI, Barry Electronics, 512 Broadway, N.Y. 10012. Tel: (212) 925-7000.

TOROIDs, 88 mh uncased, \$72.50. Postpaid. Humphrey, WA6FKN, Box 34, Dixon, Calif.

WANTED, Tubes and all aircraft and ground radios. Units like 17L, 51X, 618T or S, R388, R390, GRC. Any 51 series Collins used test equipment, everything URM, ARM, GRM, etc. Best offer paid, 20 days of fair dealing. Ted Dames Co., 308 Hickory St., Arlington, New Jersey 07032.

INTERESTING Sample copy free. Write: "The Ham Trader," Sycamore, Illinois 60178.

RTTY gear for sale. List issued monthly, 88 or 44 Mhz toroid for \$2.50. Free paid. Elliot Buchanan & Assoc. Inc. Buck, W6VPC, 1067 Mandana Blvd., Oakland, Calif. 94601.

WORLD QSL Bureau. See ad page 149.

1000 PIV \approx 1.5 amp. epoxy diodes includes disc bypass caps and bridging resistors, 10 for \$3.95. Postpaid USA. With code purchase, 125 Mf. at 350 volt electrolytic capacitors, 50¢ each. Postpaid USA no limit. East Coast Electronics, 123 St. Boniface Rd., Cheektowaga, N.Y. 14225.

WANT Early issues Pioneer Wireless Magazines for W4AA Historical radio library. Wayne Nelson, Concord, NC 28025.

INTEGRATED Circuits: New Fairchild MicroLogic; epoxy TO-5 package, 900 buffers, 914 gates, 60¢ each, 923 I-K flip-flop 90¢ each. Guaranteed. Add 15¢ postage. HAL Devices, Box 3650, Urbana, Illinois 61801.

"DON & Bob" guaranteed new buys. Monarch FSI-5 dual power-SWR bridge, measures forward, reflected SWR simultaneously, 15.95; Telex HMY-2K stethoscope headset \$3.95, Raytheon 6LQ6 \$3.50; Eimac 4X250B, \$25.00; Cetron 572B/160L \$15.95; Capacitor 3000 mfd/30v, 35¢ ea., 001/2500v mica 25¢ ea, 15 mfd/10 kv \$50; Connectors PL-259, SO-239, 49¢ ea/\$1.50/through RG-22B/U coax for Polygon quad, 15¢/ft. Belden copper braid 35" 10¢/ft, diodes: 800V/1A 25¢ ea, 1200V/.3A, 49¢ ea. Write for list. New E-Z Way 7.5 ft. 121 in. dia. steel tower, E-Z assembly \$14.45/section, QST, complete sets 1940-1949, 50-59, 60-69, \$25 ea. CO 1946-66, \$35.00; Binders \$2.00 ea. Write for needs, Madison Electronics, 1508 McKinney, Houston, TX 77002. Tel: a.c. (713)-224-2668.

NOVICES: Need help for General Ticket? Complete recorded audio-visual theory instruction. Easy, no electronic background necessary. Write for free information. Amateur License, Box 6015, Norfolk, Virginia 23508.

WANTED: All types of tubes. Top prices paid for Varian and Eimac. Jaro Electronics Corp., 150 Chambers St., New York, N.Y. 10007.

SELL: Swan 250 with AC and DC power supplies, plus speaker cabinet, \$100.00. B. S. Caverhill, W2EBC, 1688 Stanley Road, Cazenovia, N.Y. 13035.

WE'RE Trying to complete our collection for 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.

TELETYPE Wanted: Models 28, 32, 33, 35, Receivers R-390A, R-388, Cash, or trade for amateur equipment. Altronics-Howard Co., Box 19, Boston, Mass. 02101. Tel: a.c. 617-742-0048.

SPIDERS For boomless quads. Heliarc welded aluminum. AI's Antenna Accessories, 1339 South Washington St., Kennewick, Washington 9336.

R389, R390, R390A, 5114, 75A4, 75S3A, NC101X, HR050T1, HR060T1, SP600, KWM-1, KWM-2, 62S1, 312B5, HA-2, and others. List for SASE, W2ADD.

SELL, trade or buy Call Books, Handbooks, magazines, and old radio sets and parts. Erv Rasmussen, 164 Lowell, Redwood, City, California 4062.

WANTED An opportunity to quote your ham needs, 30 years a ham gear dealer. Collins, Signal One, Drake, Swan and all others. Also \$25,000.00 inventory used gear. Request list, Chuck, W8UCG, Electronic Distributors, 1960 Peck, Muskegon, Mich. 49441.

TRANSFORMERS rewind. Jess W4CLJ, 411 Gunby, Orlando, Fla. 32801.

GREENE-Center of dipole insulator with or without balun. Free flier. O. Watson Greene, Box 423, Wakefield, R.I. 02880.

WANTED: OST copies in good condition 1920, 1921, 1922 and August of 1958 to complete personal 50-year collection. Rex Bassett, W4QS, Box 4163, Fort Lauderdale, Florida.

1000v. P.I.V. epoxy diodes, 1.5 amp, 10 for \$2.40 ppd. Satisfaction guaranteed. Send for new 6 p. flyer, Weimschenker, Box 353, Irwin PA 15642.

REPAIR and calibration service. Write before shipping. Pan Tronics, Inc., 6608 Edsall Road, Alexandria, Virginia 22312.

TOROID Coils 88 mh uncased postpaid, \$5/2.00. La Von Zachry, P. O. Box 845, Apple Valley, Calif., 92307.

HALLICRAFTERS SR-150 DC Supply, Mobile Mount Antenna, \$375.00; SX-117W/spkr, \$225.00; HW-29 \$45.00; CB G3WA \$89.00. All in excellent condition. W2ERV, 14 Bernice Dr., Freshold, New Jersey 07728.

QSTs: August 1922 to date, in excellent condition, complete with single exception of March 1953. Highest offer by January 1, 1970; you pay freight. Write Mrs. Scott Cooper, 1714 Alder Court, Bozeman, Montana 59715.

WIRELESS Shop, New and reconditioned equipment. Write, call or stop by for free estimate, 1305 Tennessee, Vallejo, Calif. 94590. Tel: a.c. (707)-643-2797.

WANTED: Good electronic keyer and Vibroplex, XE1NE, Box 2807, Mexico City, Mexico.

VALIANT modified for SSB exciter or adapter. This rig worked 225 countries AM/CW/SSB, in excnt condx, with new finals. Prefer NYC area. Price \$130. W4ZLOK, 1105 Lowne House Village, Hauppauge, L.I., N.Y. 11787.

GOVERNMENT Surplus Electronics Bargain Catalog, 96 picture pages. Send 25¢. Meshna, Nahant, Mass. 01908.

DX-pedition XYL approved? VP2M OTH, DeLuxe station. Universal power supply, 6-160 antennas. You supply transceiver. Beautiful house and garden overlooking Caribbean. Swimming pool. K. Holtz, VE3FHO, P.O. Box 1178, Elmira, Ontario P., Canada.

4XC250B tubes, new, postpaid, \$21.00 pair. C. M. Pruett, Star Rex C, Flamingo Bay, Ft. Myers, Fla. 33901.

HEATH HW-12 mint condition. \$88.00. L. Johnson, 2400 Jams, Topeka, Kansas 6614.

SWAN 350 with 117-XC power supply, speaker, \$350. All in excnt condx, original packing and manuals. Used little, never mobile. W8DXR, 933 Havensport Drive, Cincinnati, Ohio 45240. Tel. a.c. (513)-851-2919.

NEW Galaxy GT-50, Will consider your gear in trade. W4UHP, 1300 Milton Street, Clearwater, Florida 33516.

75A4 late number \$370.00. Heath SB101 with AC supply \$325.00, HO13 Ham Scan \$10.00, 40 Ft.-Tri-Ex crank-up tower \$49.00, Globe King 500B \$99.00, 2 to 4 KV 100 mil. power supply kit \$49.00, Viking VFO \$10.00, Dr. W. F. O'Rourke, 102 East 23rd Street, Scottsbluff, Nebraska 69361.

PERFECT Condx: HT-37, \$190.00. Eico "scope, \$25.00. W2MXV, Tel: a.c. (516)-676-4477.

BECKMAN eput meter 5310; transistorized; operates to 200 kc, \$195.00. Other units available. Parts, Sundtek, 131 Allen Ave. Springfield, Oregon 97477.

SELL: Collins 75A-3, \$215.00 and 32V-3, \$125.00, both recently aligned. Teletype model 19 with communication keyboard and table, \$125.00. All equipment in excellent condition. Buyer pick up. Write W2CMVD.

KNIGHT TR-108 two meter transceiver; Hy-Gain two meter halo; Knight T-150A, AM-CW transmitter; WRL, Globe Scout 65B, AM-CW transmitter; Keyer and Brown BTL paddle. Rey Crawford, W4VRO, 7120 Kingsbury Cir., Tampa, Florida 33610.

WANTED: Collins 75S-3, 32S-1 or 32S-3, 312B-4, 516F-2, Hallicrafters SX-117, HT-44 combo. All must be mint with manuals. WA6JWV, 4, 2304 N. Florida Street, Arlington, Va., 22207.

COUNTER, 100K, Borkley, eput, model 7150BDC, excellent condition, \$200. John Link, 1081 Aron St., Cocoa, Fla. 32922.

DISCOUNTS: L. A. Amateur Radio Sales, 20% off list on THGDXX or C33 W/AM, \$87.00, 8 ft. RG58U .95/ft. GD-104 mike, \$28; Drake 14XB, \$375; R4B, \$355, GSB201 MK II 2KW, \$339; BTI LK2000 reg 795 "Display" \$699; Swan 500C, \$485; MK II linear, \$589. Prices f.o.b. Send s.a.s.e., for used equipment list/quotes. 24214 Crenshaw Blvd., Torrance, Calif 90503.

WANT Receivers SK-88, NC-183D, BC-779, SP-600 LF, NC-400. Must operate perfectly. No modifications, clean, no junk. Desires full time. E. M. Odgers, 490 Macklyn, Santa Rosa, California 95405.

NATIONAL NCX-500, \$325.00, as supply \$85.00, never used, brand new, factory sealed cartons, warranted, "Chick" Whitely, W4TKX, 280* Cornwall Drive, Greensboro, N.C. 27408; call 919-292-1350.

TEST Equipment wanted: Any equipment made by Hewlett-Packard, Tektronix, General Radio, Stoddart, Measurements, Boonton. Also Military types with WRM-O, USM-O, TS-O, SG-O and similar nomenclatures. Waveguide and coaxial components also needed. Please send accurate description to Tucker Electronics Company, Box 1050, Garland, Texas 75040.

DX Awards Log. This 150-page book just published giving number and type of contacts needed for over 100 local awards for hams and SWs. Clubs worldwide included, cost and how ann where to apply. Individual lots provided for each award to keep complete record of contacts and confirmations. Required over two years to prepare. Most complete and up-to-date source of DX Awards available, \$3.95 postage paid (4.95 foreign). The McMahon Co., (W6)12-R, McMahon) 1055 So. Oak Knoll, Pasadena, Calif. 91106.

B&W 5100B, \$75; matching B&W L-1000A linear, \$125.00. Both for \$175. Excellent full power c.w. or a.m. pair. Don Rose, W4ZKH, 11 Ivanhoe Circle, Greenville, S.C. 29607.

MERRY Xmas and a Happy New Year from W0CVU. Join the Old Old TIMERS Club if licensed for forty years. Send QSL Card for application.

BADGES, engraved, laminated plastic 1" x 3" your name and call, \$1.25 prepaid. Satisfaction guaranteed. We make Club Badges! Write B. Brown, Jr., K6PBE, P.O. Box 1307, Alhambra, Calif. 91802.

FOR Sale: Spectrum analyzer, 10, 100, 3000 cycle resolution. Built by authors of "Basic Spectrum Analyses", CO 1961, \$300. S. Rand, 27 Forest Ave., Ossining, N.Y. 10562.

DRAKE 2A revr. xlcnt condx, w/code rex. key oscillator, manual, \$139. K6RMM, 4919 1/2 Gloria Ave., Encino, CA 91316.

SALE: Hallcrafters HT-41 linear, \$175.00, in mint condx. QSTs run 1955-1965, \$25.00. QSTs some months in 1927-1939 era. Meters all kinds. S.A.s.e. for complete list. W2BTU, Paul Sokolakis, Rte 22 and Vosseller Ave., Bound Brook, N. J. 08805.

FOR Sale: Hallcrafters SX-88 General Coverage receiver, \$200.00; Heathkit RF generator IG-42, \$50.00; Kuhn 353B VHF receiver 27 to 174 MHz, \$40.00, H. Pietsch, 26 Woodland Terr., Wilmington, Del. 19802. Tel: a.c. (302)-328-7708.

CRYSTALS: Amateur, Mars, Commercial, Marine, etc. Novice 40 or 80 meter bands type P-T-243 etched to frequency, .02% accuracy, \$1.50 each; 3400 to 10,000 kc. 0.1% accuracy, type FT-243, \$1.90 each; 2000 kc. to 3399 kc. 0.1% accuracy, \$2.50 each. Add 50¢ for .005% accuracy. Add 50¢ for type H6CU metal holder. State your frequency and type. Postage paid. Quality crystals since 1929. Precision Piezo Service, 427 Mayflower St., Baton Rouge, La. 70802.

SELL Heath and Scott hifi tuners, \$75 @. Lots of other miscellaneous ham components and gear. S.A.s.e. for list. R. L. Baldwin, 26 Ridge Road, Simsbury, Conn. 06070.

FOR Sale: Swan 250, VT2, power supply, make offer, Charles Doby, WA2EUS, 110 Lafayette St., Copiague, N.Y. 11726.

FOR Sale: Drake RA4, T4X, MS-4, AC-4, xcint condx, \$730.00. Will consider first best offer or sell separate. WA1KZZ, Meadowcrest Dr. REF 5, Bedford, N.H. 03102.

FOR Sale: Four 1000 amplifier in 6 ft. cabinet. Solid-state power supply 4 kV lamp, \$300 or best offer. May sell parts separately. #4-1000 tube and aluminum air socket, \$40; UCS 300 vacuum variable and counter, \$50; B&W 850 A coil, \$50; Cardwell capacitor 1500 mmf, \$20; B&W FC30A, \$10. All parts one year old. Paul Neveu W1CKA, P.O. Box 653, Bristol, Conn. 06010. Tel: a.c. (203)-58-2485.

SELL: Racal RA17C-12 Communications receiver; RA-137B L.F. converter, RA-63 SSB adaptor. Condition as new. Sidney Feldman, 321 West 78th St., NYC 10024. Tel: a.c. (212)-877-1730.

SELL: Jennings UCS300 vacuum valves, \$25; S-40 rcvr (excellent), \$35; HP560A digital recorder, \$100; Knight kit 400A tube checker, \$15; Ray-Gal 2TD, 80-40 dipole traps, \$12; rack-mount regulated supplies, 200-225 volts at 200 mA, \$15.00; Kintel broadband DC amplifiers, make offer; Beckman counter parts. S.A.s.e. brings list. Trammel, 1507 White Oak Ct., Martinsville, Va. 24112.

DRAKE TR-3-RV3-AC3, excellent condition. Will ship, \$425.00. J. M. Kootsey, 1511 James St., Durham, North Carolina 27707.

FOR Sale: HT-37 xmtr, HQ-1704 rcvr, \$175.00 each! In xcint condx. Toni Adler, WB2QSK, 2 Garden Rd., Scarsdale, N.Y. 10583. Tel: a.c. (914)-723-3041.

VIKING II and VFO 122; HQ-129X. Manuals each. E. N. Wood, 3800 Whittaker Lane, Lithia Springs, Ga. 30057.

WANTED: FR-2409 Bandpass Filter. Ira Curtis, WAØRGQ, 2526 E. 23rd, Des Moines, Iowa 50317.

COLLINS Crystal Filters: 219-271 KHz. Bandwidth 400 Hz.—3db. 3 KHz, 30 db. Information, write, Filter \$3.75 ppd. WØRPZ, Box 1038, Boulder, Colorado. 80302.

FOR Sale: Wired and tested, unused Knight TR-106 6-meter transceiver, V-107 vfo, mobile mounting bracket. Misc. accessories and P-SWR/power meter. First best offer. Henry Roger, 68-B Heritage Village, Southbury, Conn. 06488.

MISC. Test gear: OS-4B scope, \$75; OS-34 scope, \$75; GR-734 wavemeter, \$60; I-191 polar relay test set, \$21; TS-11B/A Bird wattmeter, \$69; UPM-2 wavemeter, \$60; Hickok Micro-volter, \$36. Abbey MC-10C RS-34 Universal Meter calibrator, make offer. All F.o.b. Grattan Gray, 636 Hollywood, Monroe, MI 48161.

ALLIED HR-500S receiver/Drake 2-NT transmitter \$300. Stewart Weis, 4250 Davis St., Skokie, Ill. 60076. Tel: 675-0184.

COLLINS 32S1 and 516F2, \$475; 75S1 with 500 cps filter, \$300; 312B2, \$75; with all mods by Collins, \$800 for lot. \$15F, \$115.00. 30L1, \$325; HR600, 10 coils 50 kc to 30 MC. NBFM, xtal cal. \$300. HG-10, \$75; HG-30, \$100. All of above in mint condx. Johnson Challenger, \$70; CE10B with VOK, \$50; Vibrokeyer, \$12. Jim, 14 Cardinal Drive, Moorestown, N.J. 08057. Tel: a.c. (609)-235-5434.

DRAKE TR-4, AC-4, MS-4, \$500. In excint condx. One year old, little used, WA1HEC, Mark, 1011 Washington Tower, University of Massachusetts, Amherst, Mass. 01002.

WANTED: Antique radio receivers, transmitters, part, apparatus before 1930. Give description, price and condition. Tom Wherry, W5MMD, 1432 Osage, Bartlesville, Oklahoma 74003.

FOR Sale: Collins 1514 mint, original condition, no modifications, 1,3,6 kc., mechanical filters, cabinet, \$575 f.o.b. W7QCW/R 1610 Shasta Drive, Colorado Springs, Colo. 80910.

SELL Drake 2B receiver with 28Q multiplier and speaker, two extra xtals for 10 meters, top condition. \$160.00. W5OF, Maj-Gen Daniel A. O'Connor, USA (ret.), 8916 El Dorado Dr., El Paso, Texas 79925. Tel: a.c. (915)-598-8112.

FOR Sale: HQ-110 speaker and manual included, \$100. DX-40, VF-1, \$50. Hugh Fisher, WN4NIF, 3511 Sawyard Dr., Durham, N.C. 27707. Tel: a.c. (919)-489-5687.

JOHNSON Invader, SSB xmtr, \$225.00; HT-32, \$195.00; Collins 75A1 receiver, \$150.00, Johnson 642, \$70. Ameco PCL preamp, \$15.00. List available. John Kaktys, 18 Hillcrest Ter., Linden, N.J. 07036. Tel: a.c. (201)-486-6917.

SELL: CE20A/VFO very gud condx, \$80.00. Utica 650 xcvr/VFO in mint condx, \$75.00; BC696A, \$10.00. Ceramic mike 7295R, \$5.00. Tel: a.c. (602)-964-4601 or WA7NDW, 1701 E. Greenway, Mesa, Arizona 85201.

MINT HR-10 DX 60B; HG 10-B; HS-24; headphones, desk mike. Package deal \$160.00. Home-brt 30-watt xmtr, \$10; 6 xtals, Novice 40-15. \$5. WA2DZV. Tel: a.c. (212)-462-4837.

COLLINS 32S-1 xmtr, Ser. No. 3018; 516F-2 p/s and 312B-4 console at \$575.00. Arthur H. Welke, WB8DUK, 1429 Eastwood, Detroit, Michigan 48205. Call a.c. (313)-371-5383.

WANTED: Hammarlund HC-10 converter. State condx & price. S. E. Hyatt, WA4VYV, Box 530, Canton, Georgia 30114.

75A-3 receiver, exc. condition with 800 and 3000 cycle mechanical filters and Collins vernier knob, best offer over \$200.00. Gonset GSB-100 SSB transmitter in gud working order, top perfect. Best offer over \$150. Above gear replaced by Collins S/Line. H. A. Minna, KØGXR, 414 N 13th St., Clinton, Iowa 52732.

COMPUTER Boards—Over 30 silicon transistors, tantalum diode, some with several trim pots. Two sizes 6 x 11 @ \$3. 6 x 7 @ \$2.00 plus 30¢ postage. Check or m.o. Aquar Enterprises, P.O. Box 20898, Dallas, Texas 75220.

SELL: Lound QST 1920 to 1951, inclusive. Also augo made Rudolph Lamp. 67 E. Main St., LeRoy, N.Y. 14482.

WANTED: Swan 210 VFO. For Sale: Ameco TX62, 1 m. l. m. l. best offer. Gysan 53 Lotherop St., Beverly, MA 01915.

WORLD Radio Labs used gear has trial-guarantee-term. KWM-2, \$695.00; G50, \$159.95; SR-150, \$299.95; SR-126.95; Swan 250, \$279.95; DuoBander 84, \$119.95; \$119.95; TR-3, \$369.95; NCX-3, \$169.95; NC-200, \$249.95; SB-33, \$199.95; SB-34, \$299.95; Galaxy 300, \$139.95. More and free list. Write Box 919, Council Bluffs, Iowa 51501.

COLLINS S/Line 32S-1, 75S-3, 312S84, complete. In Condition: \$895.00. First money-order or certified check to all. Raymond C. Miller, K2QWG, 25A Hillcrest Rd., Warren, N.J. 07060.

HT-37, \$165.00, Autronic keyer, \$35.00; Heath SWR Bridge \$10. All in xcint condx. Charles Lachterman, 3 Archer La. Scarsdale, N.Y. 10583.

WANTED: Heath HQ-13 or SB-610. Tom Dornback, K9MR, 19 W. 167 21st, Lombard, Illinois 60148.

FOR Sale: R-390, 75A4 with two filters, HQ-120, H. F. Price Jr., W9KCY, 65 Bunting Lane, Naperville, Illinois 60563.

I'VE Had It! Clegg 22-er Ameco VFO, beam and Linear, \$2 like new. Swan 350, VOX, callibrator and a.c. supply, \$295. shipping! WA2LIM, at tel: a.c. (212)-428-6133. Also BC-34 w/speaker and a.c. supply, works good, \$20.

SELL Comdel speech processor, best cash offer. No trade. Marvin Fein, W2AH, 151 Rock Creek La., Scarsdale, N.Y. 10583.

HIGH-Voltage power supply components. Four 30-uf, oil-filled capacitors 3000 v., \$25.00 each. Power transformer good about 3000 volts, 2 amps, very heavy, \$50. Bridge rectifier assembly with four 575A tubes, filament transformers and lams, \$25. \$150.00 for the lot. KW modulation transformer (a.m.) yet \$10. No shipping on these—pick-up only. Dumont 208 scope, \$25.00. Johnson 10-watt speech amplifier, \$5. Write or phone Baldwin at ARRL Hq.

HENRY 2K3, new. For details and price, write Mel Mars, 2242 Stevens Ave., Kalamazoo, MI 49001. Tel: (616)-342-8181.

WANTED: BC-624C (SCR/522) receiver, converted for continuous tuning, 100-150 MC. Must be in gud operating condx. Paul West, 201 E. Liberty St., Martinsburg, W.Va. 25401.

DRAKE 2B in perfect condx, \$150.00, WB2JBL, 316 Valley Run Dr., Cherry Hill, New Jersey 08034.

WANTED: Two sockets for 4CX1000A. Ed MacIag, W8YU, 7649 Ragall Pkwy., Cleveland, Ohio 44130.

COLLINS 51S1A with a.c. and d.c. power supplies, plus in xcint condx, \$1000. Firm, K2BOQ, Paul W. Haczela, 8 Y. Place, Armonk, N.Y. 10504. Tel: a.c. (914)-4R3-9067.

SELL: NRI First Class Radiotelephone course. 48 texts, study guide, \$100. Tom Barbish, WA3MMI, P.O. Box Joppa, Maryland 21085.

COMPLETE Station: \$200. Antenna, 40 meter dipole; receiver Drake 2B with Q-multiplier; transmitter Heath DX-60; V. Heath. Mike and headphones. W. R. Norris, WB2W, 31 Ridge Rd., Clark, N. J. 07066.

KWM2, mint condx, recently back from Collins factory overhaul with latest mods. Waters rejection tuning, Heath a.c. supply 516E d.c. supp., 351D mobile mount, complete set of Husky mobile antennas, new manual. Asking \$850. Prefer package deal. Collins complete station, mint condx, 3253, #1268 755 #16480, 516F supp., 312B4 console, SM1, mic, All manuals. Asking \$1150 for package deal. Ed Safrine, WIBYU 14 Park Rd., Chelmsford, MA 01824.

FOR Sale: Hammarlund HQ-180A receiver with clock and Noise Immunerizer; CE-200V transmitter; NCL-2000 linear amplifier; Hallcrafters 32-B transmitter; Model 32 KSR telepage-printer. Price \$325.00 each unit. Each unit in neat clean, and in gud operating condition. Basil McGinty, W8CB, 218 River View, Alabama 36872.

WANTED: The following antique radios: Colin B. Kenn Model 20, 226 stage antenna; Pilot AC Super VHF Shortwave receiver with plug-in coils; Atwater Kent B board and Horn Speaker. Wallace E. Glavich, 1208 G Street, Eureka, California 95501.

SELL: SR-160 Transceiver, matching a.c., d.c. power supplies, complete: \$275.00. HQ-170AC, like new condx, \$2.00. WA9N1L, Owen Station, Route 1, Crawfordsvle, Indiana 47933.

GALAXY V. \$220.00; HP-13, \$40.00. Will take Eico Plus cash. HR-10, \$55.00, 931A photo-tubes, w/socket \$4. 4X150As. \$5.00. 4FP7 w/diagram. \$4.50. K4EPI.

HT-37 \$150.00. J. Michel, 9 Hennessy Drive, Huntington, L.I., N.Y. 11743.

SELLING: Johnson Thunderbolt 2KW linear, excint condx \$260.00; Gonset GSB-100 transmitter, \$150.00; Harvey-V R-9 double conversion receiver, ham bands only, \$70.00. Johnson Ranger 1, \$80.00. Manuals for all of the above listed. Can ship. WB6MUV, 17180 Copper Hill Drive, Morgan California 95037.

NATIONAL HR60 A-B-C-D coils, spkr, xtal calibr. original owner, \$225. NCX-A, NCX-D xtal cal. All like \$135. K2EDU, 97 Miller Ave., Brooklyn, NY 11207.

HIGHEST Trades on Galaxy, Hallicrafters, Hammarlund, National equipment. We pay shipping both ways. Package deals on E-Z Way, CDR, Hy-Gain or Mosley combinations. SASE for reconditioned equipment list. Class Amateur Radio Shop, 104 Wetzel Road, Pittsburgh, Penna. 15209.

DRAKE R4B original carton, \$310; Hallicrafters SX-110, \$85; Hammarlund HQ-170A VHF, \$250; Johnson Invader 2000 \$400; 6N2, fair, \$45; VFO \$25; Swan 350 updated \$275. P&H AF02, \$18; Photos available. Will ship. George Mies, 3730 Windy Hill Dr., Solon, OH 44139. Tel: (a.c.) 216-248-7099.

FOR Sale: QSTS 22 yrs. 1947-1968. Fair cond. 4 missing. Cash and carry: \$25. W2VFW. Millburn, NJ Tel: 201-376-6492. SELL HW-22 (4 Dm) 906; SB-620 panad. \$98; 6/12vdc solid-state p/s for HW-22, etc. \$60. All xclnt cond; Cal bet. 2025 and 2130 ur time. Tel: 805-736-3762. F.o.b. WA6PGA.

SELL Swan 250C, 117XC/a.c. supp, 14C/d.c. mod., NS-1 noise blander. All xclnt cond. manuals, orig. cartons. Used only 4 mos like new. Package deal only. Asking \$525 or first best offer, no trades. Will ship. WA2WYQ, Steve Elko, 16 Parsons, Binghamton, NY 13903.

WANTED For cash: P&H VFO-Matic Model 80-10, Transenna 102 T-R switch with sidetone, right or left pedestal for Johnson Desk Kilowatt, Master Mobile Micro-Z Match. State condition and price. F. R. Claus, W3VEQ, 104 Wetzel Road, Pittsburgh, Penna. 15209.

WANTED: Johnson Kilowatt Matchbox and Lafayette HA-350, Dave Thomas, 81 Rosewood Terrace, Lakeview, New York 10485.

FOR Sale: Heathkit SB-301 receiver, in exclnt condition, never used, and works perfectly. Must sell for college expenses. Will sell for 300 dollars. Also includes AM and CW filters. Have an excellent DX-60A for 50 dollars; SB-600 speaker for 15 dollars. Contact Byron Tatum, Box 506, Alvin, Texas 77511. Tel: a.c. (713)-658-4318.

SELL: HA-14, HP-24, New tubes. \$175.00. K4RON, P.O. Box 363, Sylacauga, Ala. 35150.

HEATH HX-20 xmtrr, with a/c supply, 90 watts SSB/CW. \$90.00. K9AMS/4, 1612 Kingsway Road, Norfolk, Virginia 23518.

SELLING: Hallicrafters SR-400 xcvr with a.c. and d.c. supplies and MR-400 mobile mount, \$795. WA9SZ2, 944 Lincoln, Manitowish, Wisconsin 54220.

FOR Sale: Collins 75S3B, 32S-3, 516F2, 312B-4, like new condx, with manuals, cables, \$1350.00. WA0GUN, 231 So. Jasmine St., Denver, Colorado 80222.

500 Watt, Globe King transmitter, matching VFO and microphone, \$100 takes all. Gear is in Toledo, Ohio. Melvin Vye, KP4IDFA, Box 5334 College Station, Mayaguez, Puerto Rico 00708.

NCX-5 Mk II, NCX-A, XC-300-U, VX-501, \$500. HX-20, HR-20, HP-20, \$200; Gonset G77A, G66B, \$95.00; Topaz C-10-WWD, \$25.00. W6MU, Box 297, Altadena, Calif. 91001. Tel: (a.c.) 213-681-2517.

SELL: KWM-2 with Waters Q Multiplier Notch, 136B-2 noise-blanker 351-D-2 mobile mount, 516F-2 a.c. supply, MP-1 mobile supply, MM-1 mobile microphone. \$850.00. W4DFA, 3134 Singleton, Fairfax, Va. 22030. Tel: (a.c.) 703-273-8278.

WANTED: Johnson SSB generator, Johnson accessory audio amplifier, F. Cufini, W9MLZ, 6359 So. Keeler Ave., Chicago, IL 60629. Tel: (a.c.) 312-767-8938.

COLLINS 1 1/2 years old, in mint condx. Will sell for cash \$253. \$495.00, \$315.00; 516F2, \$120.00. All complete with cables and instruction manuals. SB-620 Scanzler, used for 75S-3B. \$85.00. SB-610 Monitor \$50.00. Will ship in original cartons. Phone (a.c.) 216-312-4518. Dick Pierce, K8TSH, 2165 Demington Drive, Cleveland Heights, Ohio 44106.

WANTED: HAL LICRAFTERS HA-10 LF/MF tuner. State condx, price, WA4SCA, Alan Biddle, S.P.O. Box 70, Sewanee, Tennessee 37375.

FOR Sale: SB-400 \$260.00; SB-301, \$230.00. Both are in xclnt condx. WA8DVX, 619 N. Sugar St., Celina, Ohio 45822.

COLLINS 5113 w/Collins speaker, \$395.00; Central Electronics 100V, \$300.00; Eldico R-104 (comparable to 75S1 w/2.1 and .5 KHz Collins mechanical filters), \$195.00; SP-60, \$200.00. RC-22 w/power supply, \$50.00; Hornet TB-750, w/new trans, \$45.00. W8OJJ/D, 16 Crestview Drive, Council Bluffs, Iowa 51501.

HAMMARLUND HO-110C receiver, in exclnt shape, first best offer over \$90.00. Heath AT-1 transmitter, in fair cond, \$10.00. Steve Keiser, WA8RXS, 427 S. Kimmel, Berrien Springs, Michigan 49103.

FOR Sale: Heath HR-10B receiver, in mint condx, factory aligned, \$70.00; Conar Model 500 receiver, factory aligned, with earphone and code oscillator, \$35.00. A. L. Feurer, M.D., WR4LIR, 1006 Fairfield Drive, Gastonia, N.C. 28052.

NCX-3 with offset tuning/a.c. power supply, \$175.00; Heath Kilowatt Compact linear with a.c. supply, \$115.00; Swan 140/Topaz d.c. supply, \$90.00. Art Kendall, WB2VXN, 37 Passaic Ave., Livingston, N.J. 07039. Tel: (a.c.) 201-992-6391.

SELL: AR-8R receiver, \$75.00; Johnson Ranger \$90.00; NC-300 receiver, crystal calibrator, speaker, \$150.00; Swan 350, 117 XC power supply, speaker, VOX, xtal cal., \$375.00. Gonset 2-meter receiver, \$100.00. W3WYN, 2123 Armstrongs Ave., Morton, Penna. 19070.

BC348R QST conversions, transistor p/s, S-meter, base, control unit, calibrated dial, \$75.00; Cush Craft A28-3 10M beam, in rud condx, \$19.00; 2, 200 ft. reels Belden 8008 Formvar, \$4.50 each. Trade complete Bogen hi-fi org. \$480.00 for gud general coverage rcvr like HQ-180. No shipping, sry. Ken Cossaboom, K1LZV, 47 Wild Rose, Andover, Mass. 01810.

SELL: Drake 2NT with 10 xtals, \$120.00; MN-4 with dummy ant., \$70.00; Codax automatic keyer, \$70.00; Drake 2-B with 2-A-O, 2A-C, \$150.00. Prefer pickup deal. All brought new in July. WN8EJT, 191 West First St., Mansfield, Ohio 44905.

Collins 3.1 and 6 Kc. filters for 75A-4, \$20.00 each; MP-2 p/s, \$90.00; SB2-XC for SB-34, new, \$15.00. WA2IZU, W. Schiffrin, 15 Family Lane, Levittown, L.I., N.Y. 11756.

CHRISTIAN Ham Fellowship is now organized for Christian fellowship and witness among licensed amateurs. Free gospel tract sample and details on the organization on request. Christian Ham Callbooks, listing members. \$1.00 on donation. Christian Ham Fellowship, 5857 Lakeshore Drive, Holland, Michigan 49423.

DESK Model-28 teletype in fine unmodified condition. Make offer. Frederick Maas, WB2ZFX/5, Rte 1, Box 1-A, Glorieta, New Mexico 87535.

JENERAL Electric sta. combination Type EU-DO37NK6 desk-mate FM transmitter/receiver 80-watt 150.8/174 Mc. Mint condx w/book. Make offer. J. Hoey, 25 Metcalf Dr., Cumberland RI 02864.

CAPACITORS. 140 ufd at 450 VDC aluminum electro lytics. Brand new, 10/\$9.50. Mehaffey, K4IHP, 6835 Sunnybrook NE. Atlanta GA 30328.

FOR Sale: All parts and tubes for 60 watt modulator. First best offer over \$25. Tel: Prov. RI, 351-6759.

RADIO Receiver U.S. Army SCR-59 brass bound, oak case. Pilot/Observer type, originally patented in 1902. Suggestions? W1QCO, Rufus Taylor, 20 Fairmount Ave., Lincoln, RI 02865.

HQ-170A built-in 25 Kc IC calibrator. 160-6 mtrs. \$195.00. K8QJH 3882 Carnegie NW, Massillon, OH 44646.

PERFECT HW-16 c.w. xcvr, \$90; HG-10 VFO, scratched, but sound condx; \$20. Package with HM-15 SWR, extras \$120. Larry Schoen, WA2GUA, 1446 East 52 St., Brooklyn, NY 11234. Tel: a.c. (212)-CHI-8855.

SELL: HT-44--PS 150 and SX-117, all A-1 condx. \$485.00. Dr. C. R. Crosby, Chatham, Mass. 02633. Tel: 432-1157.

HEATH SB-400 xmtrr, SB-300 rcvr, HO-13 monitor scope, multiphase MM-1 transmitter signal analyzer scope, electronic keyer with Vibro-Keyer, phone patch, 14 AV0 vertical antenna with 75 ft. of foam coax, Astatic 335 H Dynamic mike. All equipment professionally maintained and calibrated. Package: \$475.00 or first best offer. K7J16, Leroy M. DuBois, 1316 Martin Lane, Tempe, AZ 85281. Must sell! Tel: (a.c.) 602-967-5058.

MANUALS: TS-323/UR, TS-173/UR, R-274/FRR, \$5.00 each. Many more. List 20¢. S. Consalvo, 4905 Roanne Drive, Washington, DC 20021.

SELL: Ranger II with PTT and new final. Vy gud condx; \$150.00. WA2FBU, T. McGee, 26 Irving Ave., Tarrytown, NY 10591.

DEALERS Amateur-CB. Now is your opportunity to make money by selling new, full warranty, major-line, equipment and accessories. Send letterhead for Flyer to Robert Weaver, WA5UUK, Madison Electronics, 1508 McKinney, Houston, TX 77002. Tel: a.c. (713)-224-2668.

COLLINS KWM-1, perf condx, complete with Collins a.c. power, phone patch, speaker and directional watt meter in matching factory cabinets. Also complete manual, \$400 or make offer. Will split postage R. R. Hoffines, 2112 Celement Rd., Manhattan, KS 66502.

WANTED: Drake 2-B. Will trade new 35 MM Olympus Pen FT single lens reflex camera w/leather case, Ron Maurer, #42, Darby Ave., Northridge, Calif. 91324. 600L Central Electronics linear amplifier. One owner, in mint condx, original factory carton, \$175.00. WA1EN, 600L Central Electronics linear amp, one owner mint condx, original factory carton, \$175. WA1EN.

COLLINS KWS-1/175A4, Vernier knobs, 3 filters, etc. Perfect, \$1000. Bob W0VVA/4, 4423 N. 17th St., Arlington, VA 22207. Tel: 7035242398.

GALAXY V \$220 or will swap for HW-100, HR-10, \$49.00. 4X150A, 3FP7, \$5.00. 2A1A, 3XP1, \$6; 931A, 3HP7, \$3. K4EPI, Roland L. Guard, Jr., 750 Lily Flagg Rd., Huntsville, AL 35802.

CLEGG 66'er and Cush Craft 4-element beam, used only 4 hours. \$150 postpaid. K0ALL, P.O. Box 721, Fargo, ND 58103.

DRAKE R4-A, xclnt condx, \$275. Richard Harker, WA7DOK, 2711 Kincaid, Eugene, OR 97405.

RANGER II, like new condx, \$125.00; Tecraft 6-meter converter and power supply; \$25.00. K4AOZ, 572 Park Ave., Birmingham AL 35226.

FOR Sale: Drake 2B rcvr, \$180; Clegg 99'er 6Mxcvr, \$90.00. Both are in xclnt condx. Lt J. Fishback, BOQ, Bx 1111 LG, Hanscom Field, Bedford, MA 01730.

FOR Sale: By widow of Claude Vaughan, WB4JGJ, of Athens, TN; new Drake R4B and T4XB, speakers and a.c. power supply plus other ham equipment, inc. antenna (6 mtr beam) and 50 ft. tower. Call 745-1416 after 6 PM. Mrs. Claude Vaughan, P.O. Box 176, Athens TN 37303.

SELL General Coverage RX: HQ-100C with clock and spkr, \$95.00; trans. Collins 32V-2, 150 watts, AM-CW, \$100. Both are in xclnt condx. K4BWH, Durant, 217-7th St., Apt 1, Pittsburgh, Penna. 15215. Tel: a.c. (412)-781-0850 evenings.

SBE-34, \$265.00; Drake R-4, \$275; pick up, or deliver only. Ameco 50 Mc. converter, \$25.00. Labo, 1700 Mosher Enid, OK 73701.

SALE: Mint condx, HA-14, HP-24 and HW-32 with power supply. Manuals. First highest bid on all or part by 15th of this month. Hoke Francisus, W3ELV, c/o Kronenbergs, Carlisle, PA 17013.

SELL: Valiant II conv. Johnson SS adapter, scope, FSK shifter. Collins speaker with clock; \$375.00. Schwartz, K2-KKU, Tel. days: a.c. (194)-668-3534, nights, a.c. (914)-668-3677.

FOR SALE: Eico 720 with VFO, \$45.00. Like new condx. W6YG, 6811 Monero Drive, Palos Verdes Peninsula, CA 90274.

SPECIAL: Gyrotor-Filter Kit, Q's cup to 1500. Make your own low-pass, band-pass or band reject filter up to 50 KHz. Instructions included. \$32.00. Special offer wood until Dec. 31, 1969. Reaction Instruments, Inc. 215 Mill St., N.E., Vienna, VA 22180. Tel: a.c. (703)-281-4040.

COLLEGE: Heath SB-401 with xtals, \$250; matching microphone, \$20; HQ-170C with S-100 speaker, \$150. K9AUD, 169 Townsend URH, Urbana, IL 61801.

MOHAWK Heath receiver RX-1, in xcint condx, manual, \$95. Mosley TA-33 Triband beam, \$55. F.O.B. Joe Watson, WA5YBQ, 312 Arborcrest, Richardson TX 75080.

EICO 753 w/p.s. never used, this one works! First best offer or will trade 6M mobil WA6 60W 1160. Oaden #303. Denver, CO 80218.

EICO 753 xcvr. SSB-CW-AM on 80-40-20 meters, plus 751 power supply/speaker, in original factory cartons, \$150. Will ship. Steve Bartha, 9 Dixon Ct., Sea Cliff NY 11579.

HBR-16 receiver. See October 1965 QST. Clean, works perfectly. Professionally built. \$60.00. ppd. Worth much more! K8AIA, 322 Hyde Park, Hamilton, OH 45013.

HEATH SB-301 with c.w. filter, SB-600 spkr, SB-401 with SSB mike, in mint condx, on the air. \$75.00. Not sold separately! Leonard Hart, Dudley Road, Box 257, Billerica, MA 01821.

WANT: FM-MPX adapter for SX-62-A. SES, Box 1494, Evanson, IL 60204.

LOOK at these goodies! Hallcrafters HT-37, \$200; SBR/SB-33, \$175.00; Clegg 99'er, \$70.00; Collins K278B/GR w/remotely control head and antenna, \$340.00; Swan 250, 117XC supply, xtal calibrator, in mint condx, factory cartons, \$250.00; Collins 75A1 w/ 3.1 K mech. filter and matching speaker, \$125.00. Steve Cook, 1344 Marion, Niles, MI 49120.

HALLCRAFTERS SR-400 transceiver and P-500AC power/speaker \$629.00; SX-117 receiver, \$109. unused Harman-Kardon FM Multiplex adapter, \$9; 4X150A's, \$5; AC250K's, \$15; 6159's, \$5; Eico 710 grid dipper, \$25; Heath 2'er, \$39; Gardiner code machine, ten tapes, \$12; International Crystal FCV-2 meter converter and power, \$12.00; Offers OK. Bill Bode, 13241 Fton Place, Santa Ana, CA 92705.

WANTED: Viking Valiant. Pls advise condx and price. Will consider pick-up 150 mile radius. Williams, WA2RYT, 18 Beaconfield Rd., Rochester, NY 14623.

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SELL: Johnson Viking II, VFO, Johnson Matchbox, homebrew linear 500 W, low-pass filter, key click filter, and c.w./fone monitor, all only \$100.00. Mario Cera, W2IRV, 47 E. Bayview St., Massapequa, L.I. NY 11758. Tel: a.c. (516)-798-1694.

SELL: Hallcrafters SX-101 MK I-A, \$120; Hallcrafters HT-32, \$150.00. Both for \$225.00. Collins URR-388, Ser. No. 2214, \$250. WAØRKH, Box 163, Juniata, NB 68955.

NCX-5 and NCX-A with Shure 444 mike; rig used less than 50 hours. Original cartons, all manuals, in mint condx: \$400, HQ-160 general coverage rcvr with matching speaker, excellent condx, manual, \$140; Ameco 6-meter converter with matching power supply, in excnt condx, \$30. KRHW, d. Grimmer, 8800 Blvd. East, North Bergen, NJ 07047. Tel: a.c. (210)-869-3723.

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TEACHERS. Established elementary school radio club seeking other school contacts. Principally s.s.b. WA2VAU, Deer Park Ave. Elem. School, N. Babylon, LI, NY 11703.

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NC3-3 transceiver, \$150; have DC supply. Gary Anderson, 733 Timberland Dr., Berrien Springs, MI 49103. Tel: (a.c.) 616-471-1270.

WANTED: Hallcrafters SX-100. State condition and price. Sell: Collins 32-V2, B&W 51-SB, 200 PEP 80 thru 10, 130 watts A.M. First best offer. Paul Donovan, 232 Silver Creek Road, Box 11, Marquette, MI 49855.

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FOR Sale or trade Kodak Model FS-10-N portable 16 mm sound on film moview movie projector with 1600 foot reels extra 3 inch f 2.0 lens, speaker, carrying cases, X-50 Pa-Lit screen, etc., all in excnt condx. Want 5-band SSB/Pa-Lit or xcvr (OM). Connie Malinowski, 29 Main, So. Deerfield MA 01373.

NOVICES: Entire rig: Heath HW-16, key, Heath speaker built, still perfect: \$125.00. W9N2ZH, 1515 Brummel, Evanson, IL 60202.

STATION For sale Knight T-60 AM/CW xmtr and matching Knight 4-58 rotor with built-in X-10 xtal calibrator with original cartons and manuals \$90 total price. WA7JLU, 1109 Utal Ave., Libby, MT 59923.

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P & H Transceive VFOmatic \$39; FIT 220 xmtr, pair 45 10's, \$75; Drake 2RQ, \$25; 2AC, 39; S-37, \$50; APR-57; Seneca General Radio coax line stretcher, \$35. Trade VHF UHF, list s.a.s.c. W4API, Box 4095, Arlington, VA 2204.

MOTOROLA Handi-Talkies, lo-band FM, \$8; RCA VTM \$5; Link 6-meter transmitter, \$5; Panadaptor, \$15; many other bargains. 3-page list, s.a.s.c. appreciated. Want schemati 1114. SOUFEN transceiver, WA9DYE, 114 Lakeview, Milwau kee, WI, 53217.

COLLINS KWS-1 ser. 781; 75A4 ser. 2023, speaker, verni dials, low-pass filter, changeover relay, new spares for film manuals, spotless. Ship in original cartons, \$1000. W4NFI 1969 Muncie Ave., Jacksonville, FL 32210.

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SWAN 350 transceiver, \$295; a.c. power supply and speaker, \$90; Electro-Voice dynamic mike, \$20 or entire station for \$400. Contact Barry Widegren, P.O. 154, Thompson, CT 06277, or tel: a.c. (203)-923-2408.

SELL: DX-100B, \$79; G-76 xcvr and p.s., \$109; HE-45B and VFO, \$49; Olson RA-570, \$59; SX-42, \$99; CN-144, \$25. Need high band NBFM transceiver. What have you? K8GNZ, Box 683, Fairmont, W. VA 26554.

HW-100 and p/s, \$250; Gotham 3-band quad, \$25; Vibroplex Champion bug, \$15. All are in A-1 condx. Tom Auger, WA1-KLO, 37 Glenwood Ave., Portland, ME 04103. Tel a.c. (207)-775-0893.

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SELL: Swan 400, 420 VFO, A.c./p.s. In perfect condx. \$300. Will ship F.o.b. this QTH, but prefer local deal. WASHGC, 10521 Chapala Place, N.E., Albuquerque, NM 87111.

HAMMARLUND HQ-145 receiver, HX-500 transmitter. Hallcrafters HA-1 keyer, Autronics bug. Exclnt condx. Manuals. Together, \$500. Separately, you make offer. John Farr, 33292, Bremerton, Dana Point, CA 92629.

SWAN 500C transceiver, brand new, \$450, including power supply, 14AVQ, \$10. Other accessories. After 5 PM, tel. (a.c.) \$16-488-2649. Jay Friedman, 484 First St., Elmont, NY 11003.

SELL: Hallcrafters SX-100 (\$120) and Heathkit DX-100 (\$90). Both for \$200, and both in excellent condition. Carl Johnson, WA3MXS, 2213 University Blvd., East Hyattsville, MD 20783.

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HAMMARLUND HQ-170, ham-band receiver, 160 through 6 meters, Exclnt condx, \$165.00. Jim Kennard, WA2EKE, 2210 Turk Hill Rd., Victor, NY 14564. Tel: (a.c.) (716) 377-4262

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TRANSPONDER DME, 3 racks, for information send s.a.s.e. to Amateur Radio Club, c/o Ernie Johnston, Box 6032, Clemson, SC 29631.

WANTED: Comdel speech processor, Ed Garman, 3408 Route 176, Crystal Lake, IL 60014.

VHF Wanted: Gonset 903A linear, MK II preferred, Gonset 2M Sidewinder or GSB-2 version Thunderbolt 6N2, Don Harris, W4BUZ, 2606 Immanuel Rd., Greensboro, NC 27407.

SALE: DX-100B, RME 4350A receiver, 160-10, 11 meters AM-CW, 160W input Used vy little since 1964 (log is proof), \$85 each. Both for \$150. Write: K3MGO, 1229 Allegheny Avenue, Reading, PA 19601.

SELL: LN freq meter, w/cal. book, w/110 Vac p/s. \$47; Aiwa stereo tape recorder, \$80; tube checker, \$15. Send s.a.s.e. for list of other items. K6LBV, P.O. Box 474, Port Hueneme, CA 93041. Tel. a.c. (805)-649-9058.

BIG Discounts: New Hy-Gain antennas, Tri-Ex towers. Write for quotations, Miller Brothers, Box 48, Harmony, PA 16037.

HQ-180AC for sale, good, no modifications, manual, \$300 F.o.b.; HT-37 in excnt condx, new finals, manual, \$185 F.o.b. First Certified check or money-order. Vince Humphrey, 2309 N. Huron, Arlington Heights, IL 60004.

SELL: Collins 75S1, with manual, without scratches, in mint condx, with less than 100 hours operating time: \$300. Want: Heath SB-100, Richard Ahrenholtz, 203 Meadow Lane, Norfolk, NB 68701.

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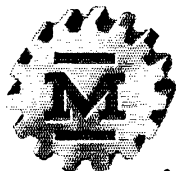
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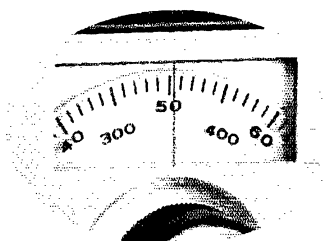
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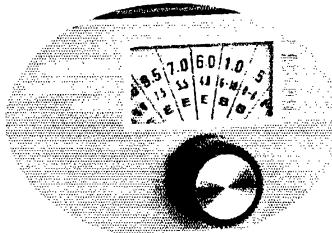
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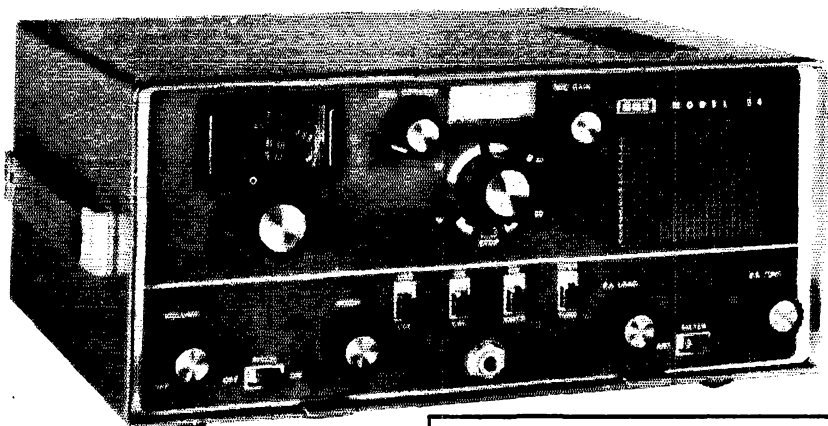
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John R. Griggs, W6KW	75, Aug.
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Fishback Wins Sept. 1968 Cover Plaque (Photo)	63, Feb.
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Landry, Ney R., W6UDU and Forrest A. Bartlett, W6WFP, receive ARRL Certificate of Merit (Photo)	70, Jan.
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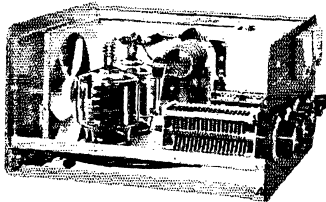
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The New Heathkit® 2-KW Linear Is Here

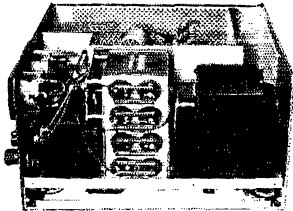
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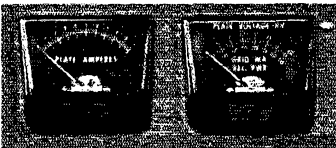
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Two rugged, dependable Eimac 3-500Z finals for top performance. Zener regulated operating bias reduces idling Ip for cool running.



Reliable power supply . . . plate transformer on right, capacitor bank in center for excellent regulation, filament & bias circuitry on left.



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Kit SB-220, 55 lbs. \$349.95*

SB-220 SPECIFICATIONS — Band coverage: 80, 40, 20, 15 and 10 meter amateur bands. **Driving power required:** 100 watts. **Maximum power input:** SSB; 2000 watts P.E.P. CW; 1000 watts. RTTY; 1000 watts. **Duty cycle:** SSB; Continuous voice modulation. CW; Continuous (maximum key-down 10 minutes). RTTY; 50% (maximum transmit time 10 minutes). **Third order distortion:** —30 dB or better. **Input impedance:** 52 ohm unbalanced. **Output impedance:** 50 ohm to 75 ohm unbalanced; SWR 2:1 or less. **Front panel controls:** Tune, Load, Band, Sensitivity, Meter switch, Power CW/Tune — SSB, Plate meter, Multi-meter (Grid mA, Relative Power, and High Voltage). **Rear Panel:** Line cord, Circuit breakers (two 10 A), Antenna Relay (phono), ALC (phono), RF Input (SO-239), Ground post, RF output (SO-239). **Tubes:** Two Eimac 3-500Z. **Power required:** 120 VAC, 50/60 cycles, at 20 amperes maximum. 240 VAC, 50/60 cycles at 10 amperes. **Cabinet size:** 14 $\frac{1}{8}$ " W x 8 $\frac{1}{4}$ " H x 14 $\frac{1}{2}$ " D. **Net weight:** 48 lbs.



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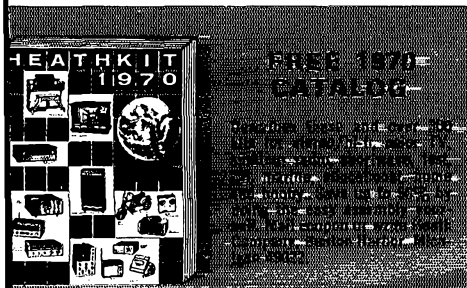
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*ARRL Message No. 60: "All the Best in the New Year"