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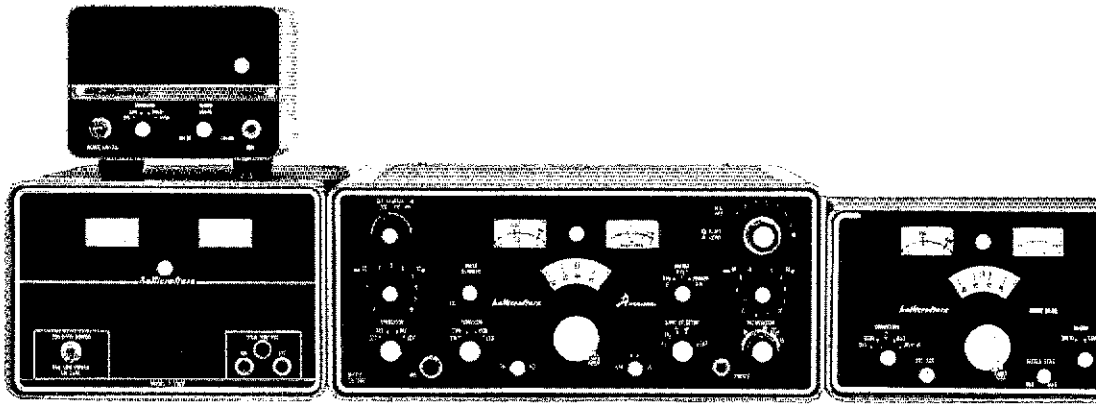

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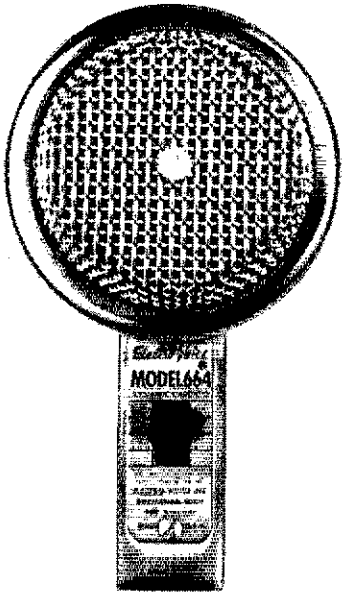

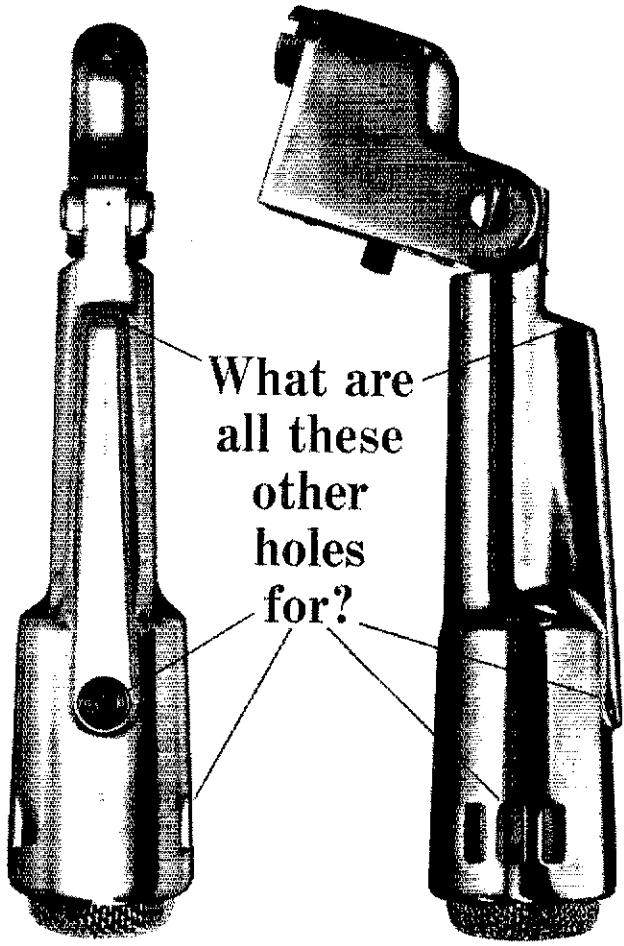

The holes in the top, sides and rear of the Electro-Voice Model 664 make it one of the finest dynamic cardioid microphones you can buy. These holes reduce sound pickup at the sides, and practically cancel sound arriving from the rear. Only an Electro-Voice Variable-D® microphone has them.

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OUR COVER

While not quite in time to send a holiday message from space, as illustrated by longtime *QST* artist Harry R. Hick, Australis-Oscar 5 will soon be greeting amateurs with its cheery "Hi." See page 50.

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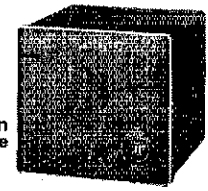

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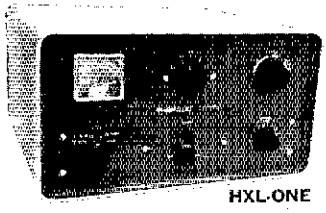

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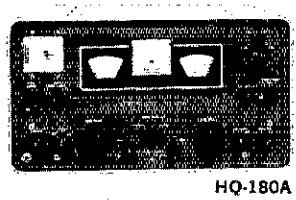

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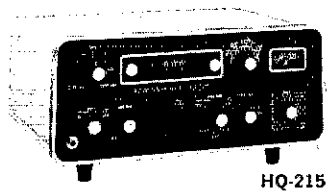

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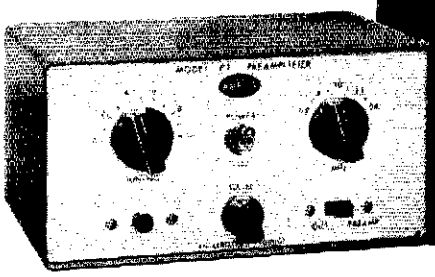

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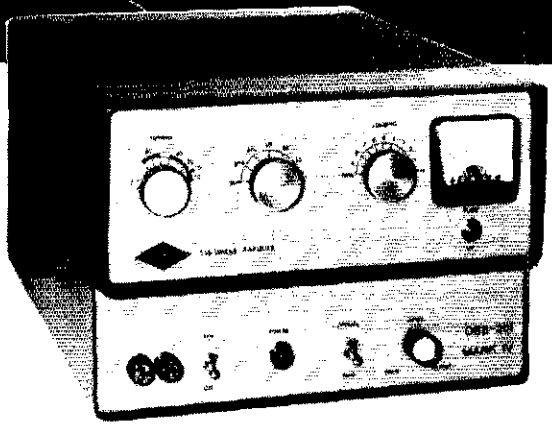

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Reports Invited. All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. *Radio club reports are also desired by SCMs for inclusion in QST.* **ARRL Field Organization station appointments** are available in areas shown to qualified League members. General or Conditional Class licensees or higher may be appointed ORS, OVS, OPS, OO and OBS. Technicians may be appointed OVS, OBS or V.H.F. PAM. Novices may be appointed OVS. SCMs desire application leadership posts of SEC, EC, RM and PAM where vacancies exist.

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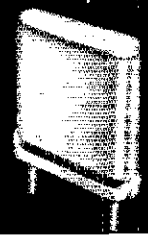

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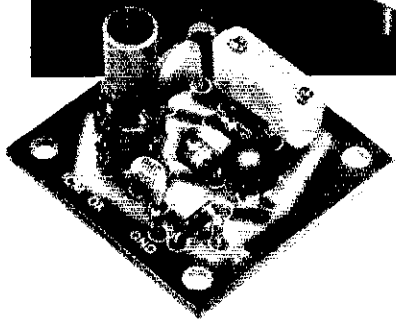

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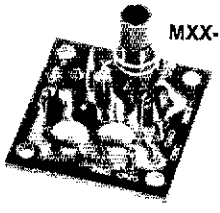

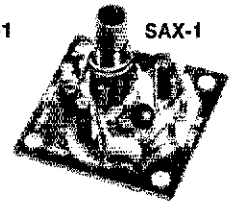

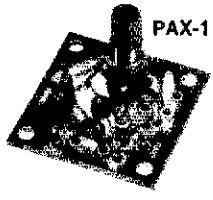

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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors.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

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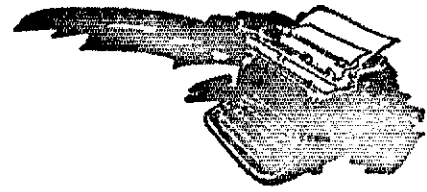


THE YEAR IN REVIEW

The Moving Finger writes; and, having writ, moves on . . . — THE RUBAIYAT OF OMAR KHAYYAM

IN 1969, the Moving Finger wrote another moving account of hams rising to the needs of their neighbors when the worst hurricane yet to hit the U.S. mainland, Camille, caused widespread destruction and death in the Gulf Coast and in Virginia along with almost-total paralysis of normal communications. Amateurs were there, beforehand and after, with mobile rigs, fm repeaters, putt-putts, "instant antennas" — and the know-how to use them all to save lives, to move supplies, to quiet fears. Know-how gained from everyday operation, from nets, from tinkering, and from such activities as Field Day and the Simulated Emergency Test.

In the 1969 Field Day, fast set-up — under conditions like those of a real emergency — was rewarded by extra time for contacts. The SET, in January, saw all sorts of new records established, particularly by local groups outdoing their own previous efforts, perhaps the best sort of training for disasters like Camille.

Speaking of records, several were established on the very high- and ultra-high frequencies. The earth-moon-earth distance record on 144 MHz was stretched to 11,055 ground miles by ZL1AZR and SM7BAE, while up on 2300 MHz an EME distance of 750 miles was recorded by W3GKP and W4HHK and the 1296 MHz moonbounce mark reached 5492 miles between WB6IOM and G3LTF. Meanwhile, down in the "dc bands" (actually, 28.7 MHz) W8SH and SMØBUO crossed the pond with slow-scan television, following up on the VE3EGO / SMØBUO work in 1968.

Elsewhere on the technical scene, integrated circuits were featured in *QST* articles on frequency counters and standards, keyers and keyboards, power supplies and product detectors. A 144-MHz transmitter using overlay transistors produced inputs of 7 to 8 watts, while a VU amateur described a transistor rig running 75 watts cw, 25 watts a-m, on 40, 20 and 15 meters. Direct conversion receivers, somewhat like the receivers of the 20s in principle, were big news on the construction scene, one featuring FETs and ICs. Lots of antenna articles appeared, mostly variations on earlier themes, but one was really novel, the Delta Loop. Speech processors, keyers, digital counters, phone patches (now finally "legal" due to new telephone company tariffs) and other accessories furnished much fascinating reading during the year and much fodder for soldering guns on rainy weekends.

In the regulatory field, 1969 was the first year under a revived incentive licensing with band privileges tied to license class. Occupancy of the Advanced and Extra Class phone bands was impressive enough to the Federal Communications Commission that it went ahead with the second phase on November 22, 1969, but on the 6-meter band and in the 80 through 15 meter cw subbands, the Commission held allocations at the November 22, 1968, level. This was the first year, too, that ex-amateurs (gone for a year or more) could return via the Novice route, but, in a trade-off, the Novice and Technician licenses could no longer be held simultaneously. The antenna height regulations for amateurs were brought into line with other rules of FCC and the Federal Aviation Agency; the main benefit to amateurs was acceptance of the "shielding" principle — if a proposed antenna structure in a built-up area will be shielded by other structures, trees, hills and the like taller than it, no permission need be sought from FAA.

At year-end our wandering brethren at sea got the right to use 7.0–7.1 MHz in Regions 1 & 3, outside the Western Hemisphere. The confusing rule about "control of the premises" on which an amateur station was to be located disappeared from the rulebook. A revised FCC form 610 and a new form 610-B for group stations were issued by FCC; the 610 now has a space on the reverse side for a volunteer examiner to certify results of a code test, eliminating the need for ARRL form S-45. The FCC examination for General Class was made available in Braille to all the district FCC offices.

Petitions by individuals for experimental subband reservations in the ham bands and for measurement of amateur transmitter power by output rather than input were denied by FCC. ARRL requests awaiting FCC action included reduction of the two-year wait for Extra Class to one year; "grandfathering" of former Extra First Grade licensees; Technician privileges in 29.5–29.7 MHz and across the whole 144 MHz band; and a return to dual holding of Novice and Technician.

In the halls of Congress, Senator Barry Goldwater, K7UGA, introduced a bill, S-1466,

(Continued on page 82)

League Lines . . .

On November 5, the regular weekly formal meeting of FCC was postponed an hour so that Commissioners and senior staff might view the new ARRL film, with our President WØDX as host. During the day numerous other FCC personnel attended additional showings -- all of which were warmly received and prompted complimentary comments.

Looking far ahead, W2FGD for the Long Island DX Assn. suggests some kind of special distinctive prefix for W and K stations during 1976, the 200th anniversary of American independence. Hq. would like to know whether it strikes you as a hot idea -- or potential mass confusion. If in favor, give us some prefix suggestions also, please. W, K, N and A (up to ALZ) are available under the Geneva regs.

One of the hams earlier convicted for obscenities has found his renewal application designated for FCC hearing. Which prompts the reminder that renewal applications -- of amateurs as well as broadcast and other stations -- can be granted only after the Commission has concluded that the public interest, convenience and necessity will be served. Organized amateur radio has over the years written a sufficient record of such service that most applications -- including yours, probably -- are granted without the need for individual showing. "In unity there is strength."

Made your New Year's resolutions yet? How about: Use of vhf for short-distance QSOs? Minimum power necessary for each communication? Proper choice of other bands appropriate to distance you want to cover? Minimum bandwidth, depending on the mode in use? And an extra helping of patience and courtesy!

W2EKU in his "Newark News" column says that with an administration theme of "advancement" -- based in part on incentive licensing -- the Irvington (N.J.) ham club had a 30% increase in membership last year. Shows what leadership, plus a goal, will do.

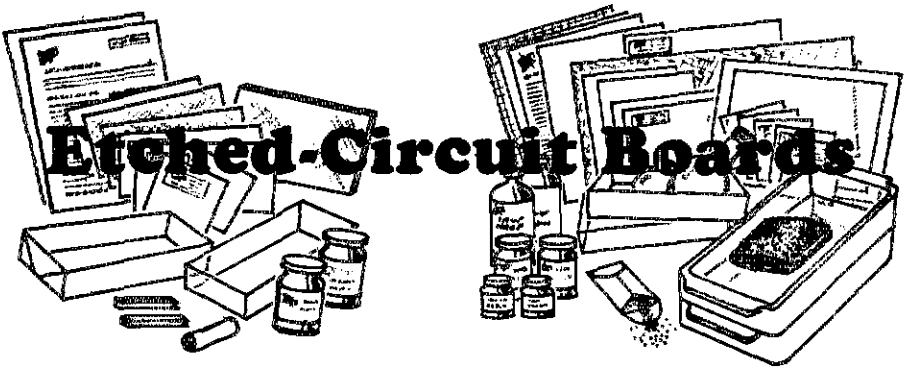
Again this year the Handbook has been substantially revised by W1CER, with help from the rest of the technical crew. Watch for its new, blue cover, early in February. And the venerable ARRL L/C/F coil-winding calculator has similarly undergone change, this time a complete redesign.

Canada is undertaking an extensive study of the field of telecommunications, particularly management of the radio frequency spectrum. ARRL Director Eaton, VE3CJ, is not only a participant in the spectrum study but a member of the steering committee overseeing the project.

Quote-of-the-month, from "The Commission" (not FCC, but a publication of the Southern Baptist Foreign Missions Journal): "Ham radio is at its best when it puts concerned people in touch with others in crisis." See page 56 for the Camille story a striking example.

December QST carries ads from seven different manufacturers of electronic keys, but as it happens, none in this issue on microphones. Some kind of message here?

See pages 50 and 78 for the latest on Australis-Oscar 5; and monitor W1AW for possible changes in launch date and other information.



Etched-Circuit Boards

—Make 'em at Home

BY DOUG DeMAW,* W1CER

It doesn't take an artist's eye to appreciate the difference between a project that has been built on a circuit-board and one that was assembled using point-to-point wiring on an ordinary chassis. The circuit board version will come out the winner every time! But, in addition to aesthetic considerations, a circuit board wins out over the more cumbersome wire-and-terminal construction technique for other reasons. Where electrical stability is a consideration — local oscillators and v.f.o.s. — circuit boards are hard to beat. There are but few loose wires that can vibrate and cause microphonics and related mechanical instability. For club projects, where a given circuit is to be repeated by several builders, there is little chance for errors in wiring. Unfortunately, this is not usually the case with earlier construction methods. Though circuit boards are usually associated with solid-state circuits, they can be and are used extensively in vacuum-tube layouts as well. And, if the reader wishes to look at the matter from an entertainment viewpoint, there are few home-builder projects that are more interesting and challenging than circuit boards. Planning a circuit-board pattern is similar to working a puzzle, and most people enjoy that pastime.

Laying Out the Pattern

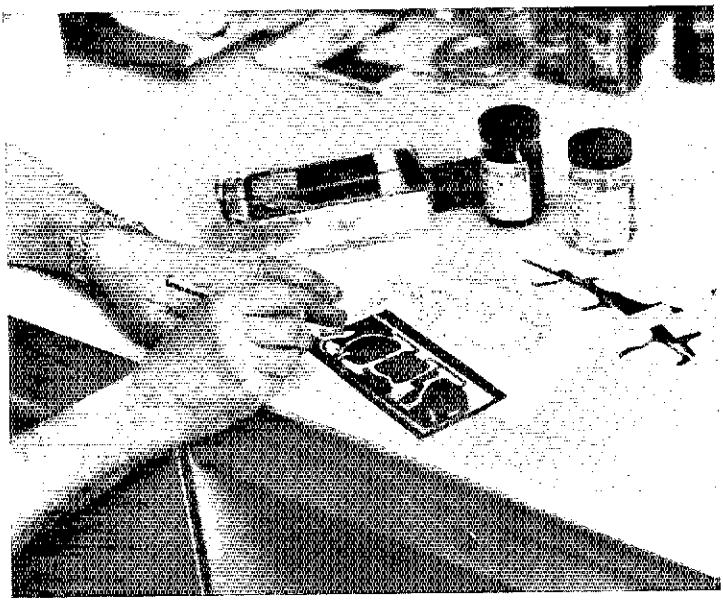
Converting the schematic diagram of a project into a pictorial layout is probably the most difficult task connected with making one's own circuit board. This takes a certain amount of imagination and skill, attributes which most radio amateurs possess anyhow. First, each component on the diagram should be assigned a number, using standard electronics symbols — *C* for capacitors, *R* for resistors, *Q* for transistors, and so on. This will help identify the parts on the pictorial drawing, and will enable the designer to know which parts have already been transferred from the circuit diagram to the pictorial. These numbers will be used later while installing the components on the completed board.

Next comes the real artwork. Using a sheet of plain paper, draw a scale outline of the circuit board to be built. The circuit-board elements and component parts will have to be kept within these boundaries. Next, allow at least ¼ inch of margin around the outer edges of the pattern for the ground foil of the completed board. This provides short-path connections to ground. In other words, the main ground bus will be available all the way around the board when it is needed, rather than having to thread a ground bus throughout the remainder of the copper elements of the board. The outer margin can be wider or narrower if need be, but this will depend upon the builder's particular requirements. Mark the area to be retained by shading it lightly with a lead pencil.

Select one corner of the board drawing as the starting point for the pictorial layout. This should correspond to a starting point for the circuit being laid out, usually the rf amplifier stage of

*Assistant Technical Editor, *QST*

There is much to be gained from the use of etched-circuit boards — compactness, project repeatability, neatness, and circuit stability. Circuit-board design and fabrication can be carried out with ordinary household tools and materials by even the least-experienced builder once the etchant solution and circuit-board material are purchased. This article describes several methods for home processing, and lists available chemicals and components that can be used.



In this photo a negative of the circuit-board pattern is being prepared by cutting away the unwanted sections with an X-acto knife. The pattern on the negative is the same as that of the original drawing shown adjacent to it. This negative is for use during photo-etching, and is part of a Kepro kit.

a converter, the crystal oscillator stage of a transmitter, or the microphone input section of an audio amplifier. Using a lead pencil, lightly draw the outline, to scale, of one or two of the small parts in the corner of the board. Most resistors and capacitors can be placed on a circuit board either vertically or horizontally. If space is at a premium, use the vertical format wherever practical. An example of the latter can be seen in most imported a-m pocket radios. After a few of the parts are sketched in, decide whether or not the layout is as compact as is desired. If so, sketch in the interconnecting copper elements of the circuit board which join the parts to the circuit-board ground, B-plus, or signal lines. Be sure to label each component according to earlier instructions. Proceed in the foregoing manner until all of the circuit is drawn on the paper layout. After completing the drawing inspect it for errors by tracing the circuit shown on the schematic diagram. While doing this it may become apparent that some portions of the layout can be improved upon by slight rearrangement of the parts. If so, erase the parts to be removed and redraw them accordingly.

Once the final layout is achieved, each part and each circuit-board foil element can be inked in with heavier lines. This writer likes to use ball-point pens for this, using ink of different colors for easy visual identification of the components — red ink for capacitors, blue ink for resistors, green ink for coils and chokes, and black ink for the circuit-board foil. The part numbers can be identified in the same manner, thus avoiding confusion later on.

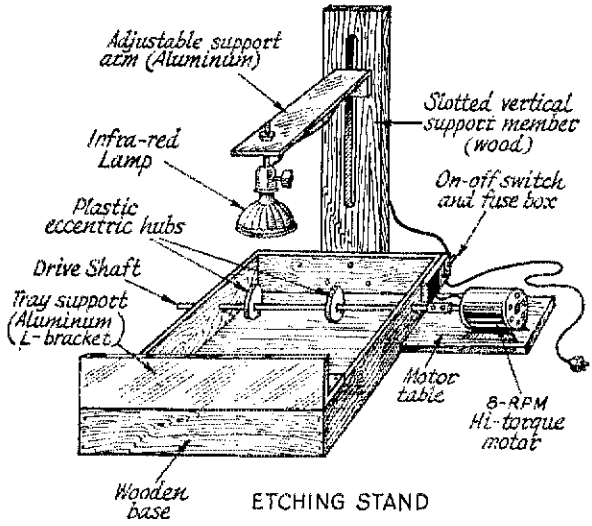
It is helpful to retain as much of the copper foil as possible so that larger areas can be used for the ground bus. This provides additional shielding on the board, and prolongs the life of the etchant solution. The more copper that must be etched away, the sooner the solution becomes exhausted. It is wise, however, to allow at least 1/32 inch of space between the various foil strips on the circuit board. If this is not done it is sometimes difficult to prevent unwanted solder bridges between the foils during assembly.

One should keep in mind that the pictorial layout shows the side of the board on which the parts are to be installed. The foil is actually on the opposite side of the board, as though one were looking through a transparent piece of material, or at a mirror image. For this reason it is necessary to hold the drawing up to the light and trace the circuit-board foils on the reverse side of the paper. It will be unnecessary to trace the outlines of the component parts. This tracing will be the drawing from which the following steps are taken. The original sketch will be used when installing the parts, later on.

Preparing the Circuit Board

Perhaps the easiest method of transferring the layout to the foil side of the circuit board is to place a sheet of carbon paper, wax side toward the foil, over the board. Tape the carbon paper in place with Scotch Tape, then tape the original drawing (tracing side up) over the carbon paper. Make sure that the sides of the circuit board line up with the outer lines of the sketch. Trace over the lines of the drawing with a ball-point pen so that the carbon paper will leave an image on the foil. Those working with simple layouts can avoid the foregoing procedure by drawing their lines directly on the copper side of the board with a No. 2 lead pencil.

It will now be necessary to apply some type of etch-resist material to the circuit board so that only the unwanted part of the foil will be etched



ETCHING STAND

Fig. 1—Details of a home-made etching stand which can be built at a moderate cost. The actual dimensions will have to be determined by the builder, based on the size tray he will use to contain the etchant bath. The solution tray is placed on the two eccentric hubs of the drive shaft, its rear end resting on the aluminum L bracket in the foreground. The hubs raise and lower the tray as the shaft turns, thus providing agitation of the solution. An infra-red lamp is supported by an arm which can be raised or lowered to a distance that maintains a 100-degree solution temperature. A wing nut and bolt secure the lamp arm to the vertical support member at the rear of the sketch. Almost any low r.p.m. motor will work, but an 8- or 10-rpm type is preferred.

away. This can be done in any one of many ways. Strips of ordinary masking tape can be pressed firmly in place over each part of the copper to be retained. This can best be done by first sticking the tape to wax paper, then trimming the strips to size with scissors. When ready to apply them to the board they can be peeled away from the wax paper. Alternatively, the entire copper side of the circuit board can be covered with wide masking tape, the circuit pattern traced or drawn on the tape, then the unwanted portions cut away by means of an X-acto knife. Both methods work well, but are somewhat tedious when working with complex layouts.

A resist marking pen can be used to cover the areas of the board which are to be protected. A Kepro RMP-700 works well and costs approximately 75 cents. The ink dries almost immediately and offers good protection to the copper foil. Etch-resist paint can be applied with an artist's brush, filling in the copper areas to be retained. Though slower drying, exterior enamel house paint can be applied in the same fashion and works nicely as a resist agent. Finger-nail polish has been successfully employed by some, while others have reported good luck with India ink as a resist material. If the finished artwork does not look like it was prepared by Picasso, don't fret. The circuit will perform admirably just the same, provided it is wired correctly. Practice, so it's said, makes perfect. The work will look better after a few projects have been built.

The Etchant Bath

Only two chemical baths will be discussed in this article — ferric chloride and ammonium persulfate. Although other chemicals are used by some, these two are probably the least dangerous to handle and store. Caution should at all times be the watchword when handling *any* acid or strong alkali solution. Etchant solutions fall into this category. They should be stored out of the reach of children, and the user should wear rubber gloves when handling them. *If etchants make contact with the skin or the user's eyes, the affected areas should be washed immediately with clear water.* Both of the etchants described here are available from electronics wholesale stores, so no attempt will be made to describe the chemical-to-water proportions used in their makeup. The ferric-chloride solution comes ready to use. The ammonium persulfate comes in crystal form, along with a small amount of mercury bichloride, the latter serving as an activating agent. The package has instructions which tell how much water to mix with the chemicals.

The actual time required for complete removal of the unwanted copper areas will depend to a great extent upon the thickness of the copper foil on the board. Most low-cost boards (not surplus) have very thin foil, and etch rapidly. High-quality commercial and military grade boards have much thicker copper and take longer to etch. Ordinarily, even the thickest copper will take no longer than 30 minutes to etch. As little as 10 minutes is needed with the thinner material. The important factor in etching time is the strength and age of the solution. Another important consideration is the bath temperature. Ideally, 100 degrees F should be the solution temperature, and this can be maintained by placing an infrared lamp an appropriate distance from the bath. Lower temperatures will work, but the lower the temperature the longer the time required to etch a board.

Nonmetallic trays should be used to contain the etchant solution. Pyrex cooking trays or bowls work well, or the builder can use photographic darkroom trays. Pour the solution carefully into the tray, bring it up to the desired temperature, then lower the circuit board into the solution, copper side down. Slowly rock the tray during the etching period to provide agitation. This shortens the etching time and assures uniform chemical action. A homemade etching

stand is shown in the sketch of Fig. 1. Such a device is handy if a lot of circuit-board building is anticipated.

After the etching is completed, wash the circuit board with plenty of clean water until all of the chemicals are removed. Peel away the etch-resist tape, or if paint has been used it can be brushed away by a few vigorous strokes with a ball of steel wool. Holes can now be drilled in the board for mounting the parts. A No. 60 drill will allow adequate clearance for most capacitor and resistor pigtails. Use the smallest drill size that will allow passage of the wires and pigtails. If too large a drill is used it will be difficult to make good solder joints on the foil.

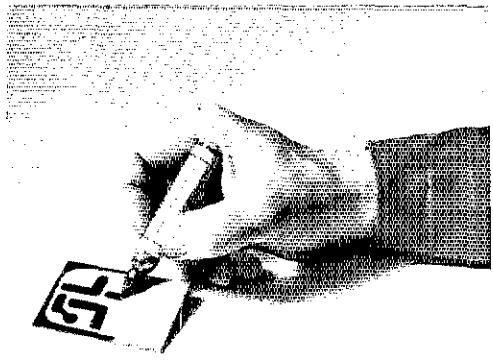
Some Other Methods

Some builders may prefer to avoid etching their circuit boards. Perforated phenolic boards are available from most supply houses, and these do not have copper foil on them. Metal push-in terminals are available for snug-fit insertion into the holes in the board. These can be used as tie points for the various components. Bus wire can be used for interconnections of the circuit, and as ground and B-plus lines. Alternatively, strips of flashing or hobby copper can be cut to size, then glued to phenolic board (Formica sheeting works well for this too) with epoxy cement to provide a satisfactory circuit board.

Another type of circuit board is available to hobbyists which eliminates the need for etching. This material is sold under the trade name Vero. The board contains numerous straight-line copper strips, side by side, which can be broken up by means of a special cutting tool (a spot-face cutter) made by the same company. Connections between the foil strips can be made with hookup or bus wire. Vero board is easy to use and makes a neat job.

The Photo-Etch Method

The circuit-board sophisticate can go the full route if he wishes, employing the more professional photo-etch technique. What this buys the builder is a neater final product. This method permits the artwork to be drawn several times scale, then reduced by means of a camera to scale. Imperfections are greatly reduced in this way, providing sharply-defined foil elements. A large-format view camera is required for this work, a 5 × 7-inch type at least, and high-contrast negative material must be used. The negative is used as the master for making as many identical boards as are needed. Hobbyist kits are available for this type of work, but do not provide for image reduction. All work must be done to scale, and the negatives are prepared from a master transparency which is supplied with the kit. The circuit-board pattern is prepared by cutting away a thin film of light-resistant plastic from the main transparency. The negative is then placed over photosensitized circuit board and exposed for a few minutes under a No. 2 flood lamp. The board is then developed in a chemical solution. After being developed it is placed in the etchant bath and processed in the same manner as the boards discussed earlier in the article. The photo-etch kits come complete with all of the materials required, and complete instructions are provided. A photo-reversal kit is also available for those who wish to reverse the image on the master negative. This kit provides the user with another transparency which is then used as a master. Eastman Kodak Company has complete literature on photo etching and it can be purchased for a small fee. Ask for booklets P-91 and P-66-GLP-BE.



An etch-resist pen can be used to protect the retained portions of the copper foil.

Types of Boards

Most circuit boards use either glass-epoxy or phenolic-base material. Either is suitable for most ham radio work, but the glass epoxy has a better dielectric factor and is less subject to warping. It is more immune to the effects of heat and moisture than is the phenolic material. Phenolic is cheaper and can be used in most instances. Glass epoxy is preferred in high-voltage circuits and where good mechanical stability is important. This writer prefers using it for vhf and uhf projects as well. The decision whether or not to use the more expensive glass-epoxy board is usually based on cost as well as performance requirements.

Some of the newer circuit boards use polyester as an insulating base material. It too is superior to the paper-base phenolic board.

Most circuit boards are available with copper on only one side, or double-sided if there is to be a circuit on each side of a single board. Double-sided circuit boards are seldom used by radio amateurs.

Silk Screening

If a single pattern is to be used in making several identical circuit boards, the silk-screen method of applying the etch-resist material should not be overlooked. The layout is trans-

ferred to a silk-screen master stencil, to scale, thed the master is used over and over again to stencil the etch resist pattern on as many boards as we are needed. Kits are available for making one's own screens, and at reasonable cost. Shis method is worth consideration by clubs and CD groups wishing to make several pieces of identical gear. If handled with care, a silk-screen master can be used several thousand times before it will wear out.

List of Materials

The following is a list of materials, tools, and kits that are available from many of the large electronics mail-order wholesale outlets. Type numbers are listed to aid the reader when ordering material. The list is by no means complete, but it should enable anyone starting from scratch to secure the basic equipment needed to make circuit boards at home. It is suggested that the reader write to the companies listed at the end of this article and request their latest catalogs. Some items are available on a custom basis from some of the firms.

Circuit-Board Stock

1—Copper-clad phenolic, single-sided, *unsensitized.* (A) Kepro Co., XXXP type (4 sizes up to 12 × 12 in.). (B) Vector Co., XXXP type (3 sizes up to 8½ × 4½ in.).

2—Copper-clad epoxy, single-sided, *unsensitized.* (A) Kepro Co., PI type (3 sizes up to 12 × 12 in.). (B) Vector Co., WE type (3 sizes up to 8½ × 4½ in.).

3—Copper-clad phenolic, double-sided, *unsensitized.* (A) Kepro Co., XXXP type (3 sizes up to 12 × 12 in.). (B) Vector Co., XXXP type (3 sizes up to 8½ × 4½ in.).

4—Copper-clad, single-sided, *sensitized.* (A) Kepro Co., phenolic type (5 sizes up to 12 × 12 in.). (B) Kepro Co., epoxy type (5 sizes up to 12 × 12 in.).

5—Copper-clad, double-sided, *sensitized.* (A) Kepro Co., phenolic type (5 sizes up to 12 × 12 in.). (B) Kepro Co., epoxy type (5 sizes up to 12 × 12 in.).

6—Non-clad perforated board. Available from Vector Co. in XXXP phenolic, epoxy-paper, epoxy-glass, and glass-silicone materials. Available with 0.062-diameter hole size, and with various quantities of holes per square inch. Also available in single- or double-sided copper-clad form. Vector T28 push-in terminals are available for this style of board. A P-91 insertion tool is available for installing the terminals. These boards are also available with 0.091-diameter holes.

7—Strip-clad, single-sided phenolic board is manufactured by Vero Co. and comes in two kit sizes, BK-6 and VBK-7. The kits include the spot-face cutter tool. These boards and the cutting tool were discussed earlier in the article.

Layout Materials

There are many layout aids available for making negatives for photo etching, and for planning circuit-board patterns to be used during the ordinary processing procedure discussed at the beginning of the article. Since this list would be rather long and detailed it will not be given here. The catalogs provided by the manufacturers, and those of some of the electronics wholesalers, list the various items which can be purchased for layout purposes.

Etch-Resist Materials

The following are but a few of the many products which can be used as etch-resist when making circuit boards.

1—Masking-tape strips and circles.

2—Model airplane lacquer, any color.

3—Vinyl-plastic tape strips and circles, any color.

4—Finger-nail polish.

5—Automotive touch-up paint, any color.

6—Etch-resist pen (Kepro Co. RMP-700 or similar).

7—Vector dry-transfer, wax-base, strips and circles.

8—Etch-resist paint (Kepro Co. R-2)

9—Household-type enamel, any color.

10—Vector resist ink No. 3082, ¼-oz. bottle.

Etchants

These chemicals are available from many electronics wholesalers and hobby stores. Instructions for mixing and using them are included in the package in most instances.

1—Ferric-chloride solution (Kepro Co. E-1PT, pint bottle, and E-1G in the gallon size).

2—Vector ammonium persulfate crystals and activator with plastic mixing bag (Vector No. 2595).

Available Kits

This is a partial listing of the small kits which are available for various phases of circuit-board fabrication. Hobbyist-size kits are listed here, but many of these kits are also available in the larger, lab-size packages.

1—Vector etched-circuit kit No. 27XA. Contains two copper-clad boards, etch-resist material, etchant powder, layout paper, mixing bags, and instructions ($6.50 each).

2—Kepro etched-circuit kit No. S-101A. Contains one sheet of 3 × 6-inch perforated copper-clad board, two sheets of solid board, etch-resist tapes, and etchant solution ($3.95 each).

3—Amidon Associates E-Z Etch kit. Contains one 4 × 6-inch copper-clad epoxy board, dry-transfer etch-resist lines and circles, and one bag of etchant powder ($3.49 each).

4—Kepro P-101A photo-etch kit. Contains two 3 × 6-inch copper-clad boards, and one 3 × 3-inch board. Also includes material for making negatives, developer, and etchant solution ($5.85 each).

5—Photo-reversing kit, Kepro Co. FK-701. For preparing photo-etch negatives from line drawings and sketches. Contains all necessary materials ($7.20 each).

(Continued on page 81)

Transistor Module for SSB Transceivers

A Complete I-F and Audio System

BY GUY M. GILLET,* ON5FE

BECAUSE of the many advantages to be gained with a transceiver, separate receiver-transmitter configurations are less used these days. Economy may be the most important reason: obviously, one circuit is cheaper than two, and there is needless duplication in separate units. Some other advantages are weight and size reduction, especially for mobile use, and ease of operation. However, a transceiver must often be more sophisticated, because of the problems presented by the switching.

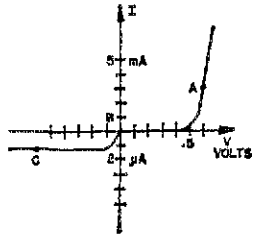


Fig. 1—Typical current-vs.-voltage characteristic of a silicon diode. Note change in current scale below horizontal axis.

These switching problems are not to be minimized, particularly when switching a "hot" lead from receive to transmit. Spurious signals can be induced in the wiring going to relay contacts. Also, energizing the relay may change such circuit parameters as stray capacitance and lead coupling. For example, the load capacitance on a crystal filter may change appreciably when switching from receive to transmit. These troubles can be avoided by diode switching. Let us explain briefly how it works:

A diode forward-biased by a few milliamperes dc (point *A* in Fig. 1) loses its rectifying property for small alternating currents. That is, a small reduction Δi in the polarization current may be interpreted as a current Δi passing through the diode in the reverse direction. For this Δi, the diode acts like a dynamic resistance of about 50 ohms.

In order to make the diode look like an open circuit, it is usually only necessary to reduce the bias voltage to zero, which results in a dynamic resistance of about 100 kilohms (operating point *B*). However, the diode is usually back-biased to point *C* to avoid eventual rectification problems and to reduce the effective junction capacitance. This results in a more positive switching action.

Fig. 2A shows a conventional spdt switch, while Fig. 2B is the diode equivalent. If *X* is connected to $-V$, D_1 conducts and D_2 is off. The ac signal passes through D_1 from point *O* to *M* as in the conventional switch. Switching is accomplished by changing *X* from $-V$ to $+V$ (V is the power-supply voltage) which turns D_1 off and D_2 on. The signal current must be small compared to the dc bias current to avoid nonlinearity.

Overall System

A block diagram of the complete transceiver is given in Fig. 3. This article covers only the

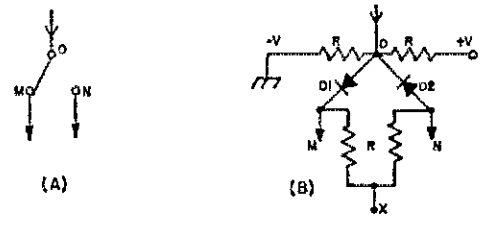


Fig. 2—Conventional switch (A) and corresponding diode switch (B). V is the source of voltage required for biasing the diodes, forward for conduction, reverse for nonconduction. Resistors R are needed for isolating the switched circuit from the dc source.

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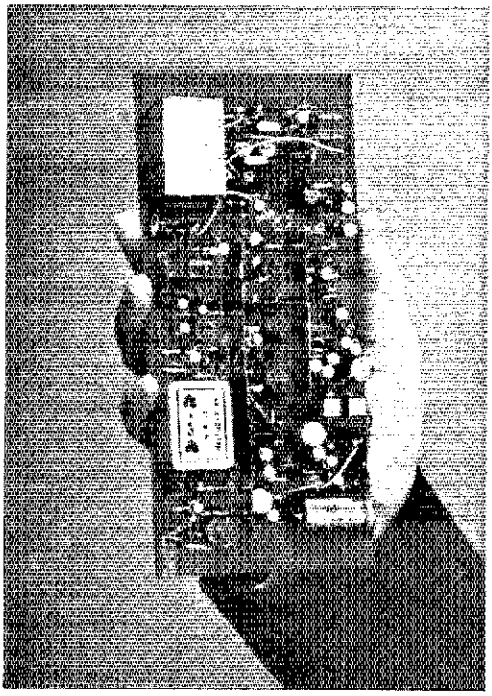
The ssb transmitting output of this little handful is 12 peak-to-peak volts at 9 MHz.; in receiving, the audio output is 2.5 watts for a 50-μV 9-MHz input signal. Diode switching is used throughout, and there is a novel rf clipper which doesn't require an extra sideband filter.



The small size of the module built by ON5FE is evident from this photograph. It contains a complete transceiver i-f system, including speech amplifier/balanced modulator for transmitting and product detector/audio amplifier for receiving, along with VOX and clipping circuits.

blocks within the dotted outline. Design problems with the VFO, driver and power amplifier will not be treated here. Note that there are separate channels for transmitting and receiving; only the filter is switched.

It is obvious that this approach is different from the one often taken in commercial transceivers where, for instance, the i-f amplifier is used for transmit as well as for receive. It may seem that components are being duplicated, and it is true that this circuit arrangement does not offer any advantages if only a simple transceiver is being designed. However, if features such as VOX and rf clipping are desired, the circuit results in a simpler overall design because only one pair of switching points is needed.

Now let us turn to the individual circuits.

Microphone Amplifier and VOX System

The gain of the microphone amplifier in Fig. 4 is 45 dB, and its input impedance is about 150 kilohms. This high impedance can be obtained with a transistor if it is operated at very low collector current (30 μA) providing it retains a high h_{fe} at this current. The approximate formula is $Z_{in} = \frac{26}{I_c} h_{fe}$, where i_c is the collector current in mA and h_{fe} is the small-signal current gain. Since noise has an effect at this first stage a low-noise transistor is used and the emitter-follower configuration must be avoided.

There is no microphone gain control, as it was found to be useless because of the rf clipping in later stages. The output is from the emitter and collector of Q_3; the balanced modulator gets the emitter signal while the collector output is rectified in a voltage doubler to operate VOX. The amplifier supplies 4 V peak-to-peak output before clipping. Heavy clipping, by talking too loud, must be avoided, but light clipping on higher voice peaks will cause no trouble. The clipping level can be varied from linear (no clipping) to 30 dB by adjustment of potentiometer R_1 in the emitter output circuit. Complete rf decoupling of the microphone amplifier is indispensable.

The VOX circuit is straightforward. Its sensitivity is adjusted by potentiometer R_3, which sets the forward-bias level at the base of Q_4 when the microphone amplifier is operating. During reception Q_4 is cut off, which in turn cuts off Q_5. Under these conditions Q_6 is saturated since it is biased for heavy conduction through R_5. The point labeled R is at nearly +12 V when Q_6 is on; this voltage operates the diode switching circuit for receive, as mentioned earlier. When the rectified VOX signal applies positive bias to the base of Q_4 this transistor saturates, turning on Q_5, which then cuts off Q_6 because the voltage at Q_6's base rises to nearly +12 V. Q_6 and Q_7 form a bistable flip-flop, and with Q_6 off Q_7 goes on, supplying 12 V for the transmit

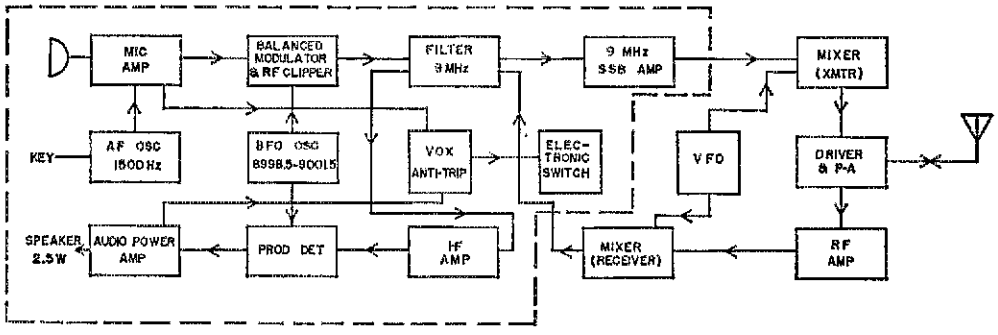


Fig. 3—Block diagram of the ssb module (part enclosed in dashed lines) together with the remaining essentials for a complete transceiver. The module includes i-f, balanced modulator, and audio circuits, and provides 9-MHz ssb output for transmitting.

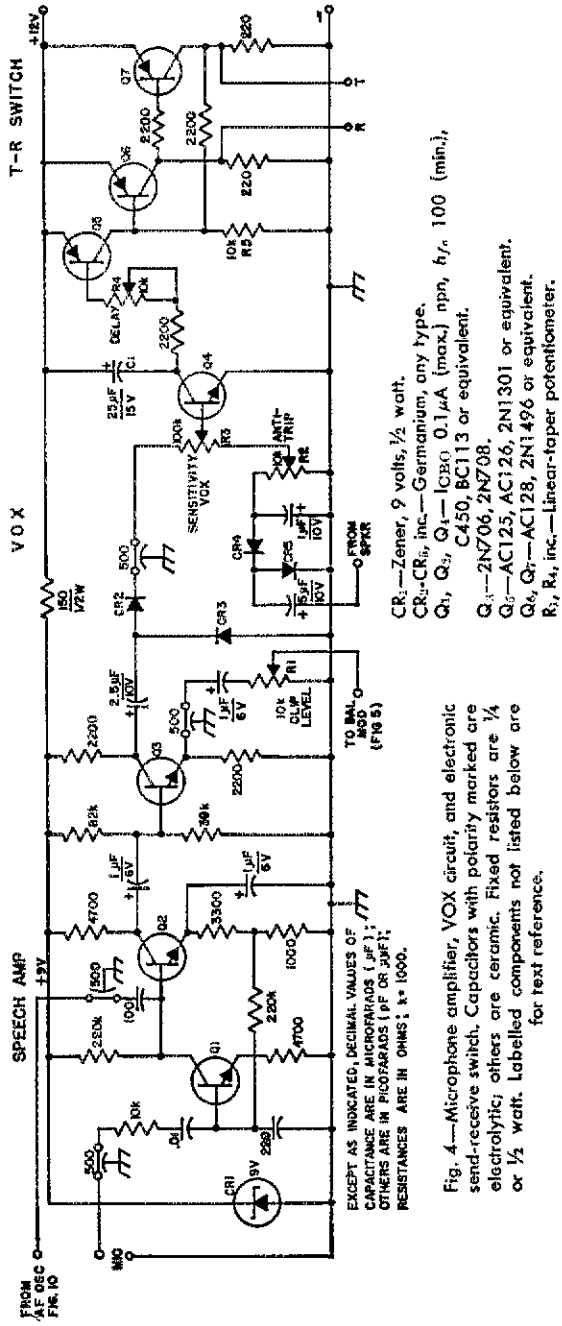


Fig. 4—Microphone amplifier, VOX circuit, and electronic send-receive switch. Capacitors with polarity marked are electrolytic; others are ceramic. Fixed resistors are ¼ or ½ watt. Labelled components not listed below are for text reference.

CR_1—Zener, 9 volts, ½ watt.
CR_2-CR_6, inc.—Germanium, any type.
Q_1, Q_2, Q_4—I_{CBO} 0.1 μA (max.) npn, h_{fe} 100 (min.), C450, BC113 or equivalent.
Q_3—2N706, 2N708.
Q_5—AC125, AC126, 2N1301 or equivalent.
Q_6, Q_7—AC128, 2N1496 or equivalent.
R_7, R_4, inc.—Linear-taper potentiometer.

circuits at point T. C_1 and R_4 hold Q_5 on during momentary pauses in speaking.

Feedback from the speaker to the microphone is avoided by means of the antitrip circuit, which also uses a rectifying voltage doubler but with the diodes connected for negative dc output voltage. Adjustment is by R_2. The three adjustments, VOX, antitrip and delay, are nearly independent.

Balanced Modulator and RF Clipper

The balanced modulator, Fig. 5, uses two varactor diodes, back-biased at 4.5 volts through potentiometer R_7, which is adjusted to cancel any mismatch in the diodes' characteristics. The 9-MHz carrier is applied to the arm of R_6, and due to symmetry, no voltage will be developed across the 9-MHz resonant circuit, L_1C_2. The audio voltage is applied to the arm of R_7, causing the capacitance of the varactors to vary in opposite directions and thus aiding each other in the unbalancing. An interesting feature of this circuit is that the input is asymmetric — i.e., single-ended — for both the high-frequency and audio signals. Also, the input impedances are much greater than those of the classical four-diode modulator.

Inductor L_1 is constructed on a toroidal core because the coupling must be purely magnetic if a high carrier-rejection ratio is to be obtained. Note that the modulator can be easily unbalanced by connecting a resistance in parallel with R_8 (point K grounded). In this way, cw or a-m signals can be produced. The a-m signal could be taken from the open secondary of L_1 with point K at ground, although this possibility of producing a-m is not used in the present circuit.

European coil forms were used throughout this transceiver so information on the number of turns would be nearly useless if different coil forms are used. The turns ratio will provide sufficient information. One can easily construct suitable coils with his own material with the help of a grid-dip meter. The requirements are:

Audio: 4 V pk-pk max.
Carrier: 1 V rms.
Carrier rejection: Better than 50 dB.
Turns ratio on L_1: $n_p/n_s = 14/4$.
Varactor diodes: $C = 20$ pF at -4 V (not critical).
Output: 200 mV pk-pk rf for 2.8 V pk-pk audio input.

Distortion seems to be less than with the four-diode modulator. It is not necessary to have well-matched varactors; their differences may be cancelled by adjustment of R_7.

RF Clipper

It is well known that speech remains intelligible even with infinite clipping; in other words, the amplitude contains relatively little information as far as intelligibility is concerned. However, keep in mind that in the absence of noise at the receiver a clipped signal will always be less intelligible than a normal signal without clipping. It is only under marginal conditions

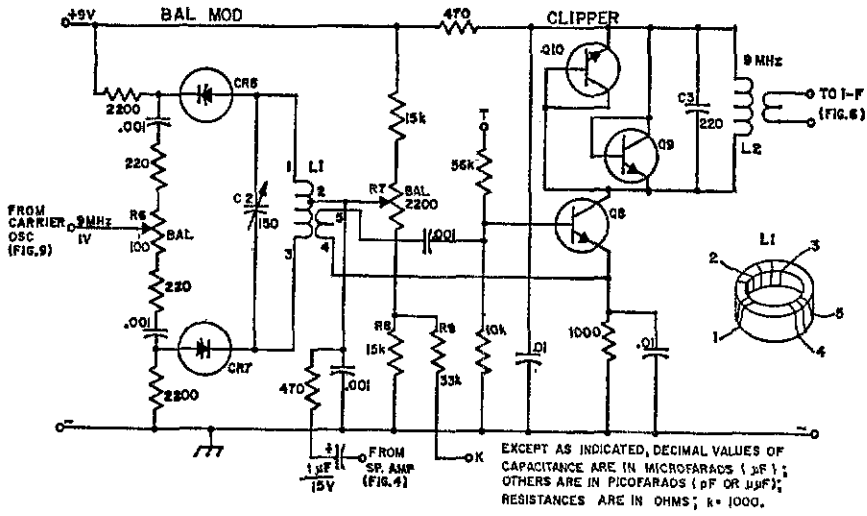


Fig. 5—Balanced modulator and r.f. clipper circuit. Inset shows construction of L_1 toroid with terminal numbers. Capacitor with polarity marked is electrolytic; other fixed capacitors are ceramic. Fixed resistors are ¼ or ½ watt. Labelled components not listed below are for text reference.

C_2—150-pF miniature variable.
C_3—Mica.
CR_6, CR_7—Varactor diode; see text.
Q_8, Q_9, Q_{10}—2N706, 2N708.
R_6, R_7—Linear-taper potentiometer.
R_9—App. 33,000 ohms; see text.
L_1, L_2—Toroid, pri./sec. turns ratio 14/4; primary to resonate at 9 MHz. with C_2 and C_3, respectively (app. 3 µH and 1.5 µH, respectively). Terminal 2 on primary is a center tap.

(high noise level) that clipping presents an appreciable improvement. Consequently, the operator must maintain control of the clipping level. Using the peak power as reference (and this is a good approach to the problem, because ssb transmitters are limited by their peak power rather than their average power dissipation) it has been found that the following degrees of improvement can be obtained:

	Amount of Clipping	*Improvement (in dB)*
Audio clipping	15 dB	4 dB
	25 dB	5.5 dB
Rf ssb clipping	10 dB	4 dB
	20 dB	8 dB

The table indicates, for example, that during marginal conditions an rf ssb clipping level set at 20 dB can have a peak power 8 dB under the peak power of an unclipped signal and maintain the same intelligibility. The table also shows that rf clipping has greater efficiency than audio clipping. This is because in rf clipping most of the spurious signals created fall outside the pass band. However, a crystal filter must always follow rf clipping in order to eliminate spurious signals near the edge of the band and to avoid transmitting an excessively broad spectrum. Unfortunately, the crystal filter is presently the most expensive item in a single-sideband transmitter. To economize, we decided to clip the dsb signal and use only one filter to extract ssb and to follow the clipping stage. But "you get what you pay for," and dsb clipping creates more intermodulation products *inside* the transmitted bandwidth than ssb clipping does.

The rf clipper is a standard clipping circuit except that two transistors in diode configuration are used instead of two diodes. The clipping action is slightly better. Two examples of rf clipping at different levels can be seen in the photographs taken at the collector of Q_8. The third picture, taken at the output of Q_{12}, Fig. 6, is two-tone test modulation with strong clipping, after passing through the crystal filter. It shows some distortion, but at an acceptable level. When using a high clipping level, note that the plate of the power amplifier must dissipate a significantly higher average power.

Crystal Filter

A commercial European filter (KVG type XF9A) was used. Its characteristics are:

Bandwidth: 2.5 kHz at −6 dB.
Pass-band irregularities: Less than 1 dB.
Insertion loss: Less than 3 dB.
Spurious response: Less than 45 dB.
Shape factor: 1/1.7, 6 dB/50dB.
Input and output impedances: R = 500 ohms, C = 30 pF.

If this low-cost German filter is not available,[1] any filter can be used with minor changes in R_{10}, R_{11}, and R_{13}.

Q_{11} provides the correct input impedance for the filter. Q_{12} is a buffer stage providing 12 volts peak-to-peak on its collector. This signal is large enough to feed a vacuum-tube mixer. If a transistorized mixer is desired, suitable matching is needed and it is recommended that a balanced mixer be used.

[1] KVG filters are available in the U.S. from VHF Communications, Topsfield, Mass. 01983. —*Editor*

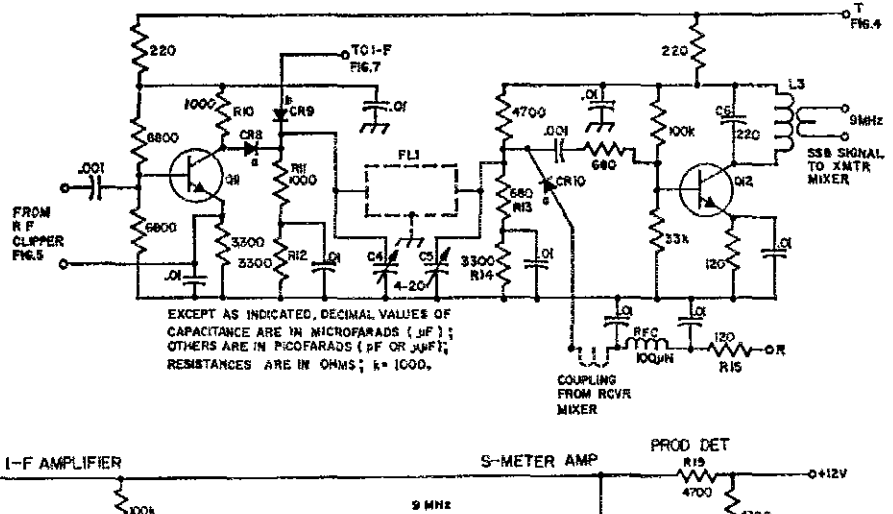


Fig. 6—Crystal filter and diode switching circuit. Fixed capacitors are ceramic; fixed resistors are ¼ or ½ watt. Labelled components not listed below are for text reference.

C_4, C_5—Trimmer, 4-20 pF.
C_6—Mica.
CR_8, CR_9, CR_{10}—Silicon, fast recovery (Fairchild FD-100).
L_3—Same as L_2, Fig. 5.
Q_{11}, Q_{12}—2N706, 2N708.
FL_1—9-MHz crystal filter, 2.5-kHz bandwidth; see text.

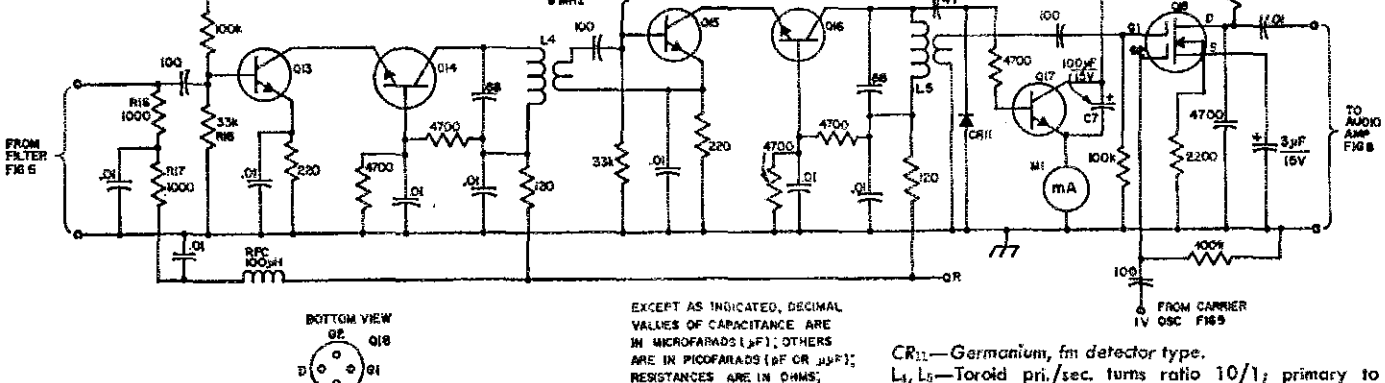


Fig. 7—I-f amplifier and product detector. Capacitors with polarity marked are electrolytic; others are ceramic. Fixed resistors are ¼ or ½ watt. Labelled components not listed below are for text reference.

CR_{11}—Germanium, fm detector type.
L_4, L_5—Toroid pri./sec. turns ratio 10/1; primary to resonate at 9 MHz. with 68 pF (app. 4.5 μH).
M_1—0-1 dc milliammeter.
Q_{13}-Q_{16}, inc.—2N706, 2N708.
Q_{17}—Same as Q_2, Fig. 4.
Q_{18}—MOSFET, 3N141.
R_{19}—App. 4700 ohms; see text.

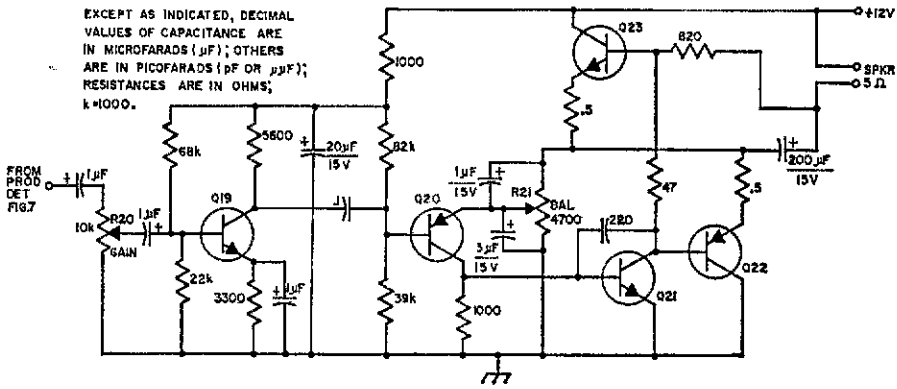


Fig. 8—Audio amplifier circuit. Capacitors with polarity marked are electrolytic; others are ceramic. Fixed resistors are ¼ or ½ watt.

Q_{19}, Q_{21}—Same as Q_1, Fig. 4.
Q_{20}—AC125, AC126, 2N1301.
Q_{22}—Pnp, 800 mW, h_{fe} 200, f_{CBO} 100μA, I_C 1A BV_{CBO} 25 V.
Q_{23}—Same characteristics as Q_{22}, but npn (complementary pair).
R_{20}—Logarithmic-taper potentiometer.
R_{21}—Linear-taper potentiometer.

Filter Switching

During transmit, point T is at 12 volts and point R is at about 1 volt. CR_8 then conducts through R_{10}, R_{11}, and R_{12}. CR_9 and CR_{10} are back-biased.

During receive, T is at about 1 volt and R is at 12 volts. CR_{10} now is forward-biased through R_{13}, R_{14}, and R_{15}. The signal from the mixer is applied to the filter through CR_{10}. CR_8 is back-biased; CR_9 conducts through R_{16} and R_{17} (see i-f schematic, Fig. 7) passing the filtered ssb to the i-f amplifier.

I-F Amplifier and Product Detector

The traditional transistorized hf amplifier (common-emitter circuit) does not respond to age as well as its vacuum-tube counterpart. The LC circuit is detuned and the Q varies when the age acts. Circuit stability may even be compromised. In Fig. 7 these troubles are avoided by using two transistors per stage in a cascode arrangement. The first transistor is stable because its load is the very low input impedance of the next transistor, which is in a common-base configuration. The second transistor is stable in this common-base arrangement, so the LC circuit is practically independent of age action. The gain of a cascode amplifier is slightly greater than that of a single transistor in the common-emitter mode. At 9 MHz the gain may be 50 dB or more per stage. Unfortunately, 80 dB cannot be obtained with one cascode stage and two stages provide too much gain. In order to reduce the gain, R_{18} must be decreased until the gain is reduced to the optimum 80-dB figure.

The age amplifier is Q_{17}, which also controls the S meter. The age dynamic range is 0 to −70 dB without distortion. When no signal is present, the collector current of Q_{17} is zero. When a signal is received, the transistor begins to conduct, causing a voltage drop in R_{19} and reducing bias current in the cascade stages. The age has a fast action and slow decay due to C_7. Q_{17} can discharge C_7 very rapidly, but the capacitor must recharge through R_{19}. The time constant is ½ second. Note that C_7 is not grounded; this prevents the S meter from responding to momentary peak currents.

The RCA 3N141 dual-gate MOSFET is a very good product detector. The high insulation between gates aided in design. As usual, the carrier must be injected at a higher level (about 20 dB) than the ssb signal to minimize the intermodulation products. For one volt rms carrier, a 100-mV rms signal gives 700 mV peak-to-peak audio, and a 10-mV rms signal gives 70 mV peak-to-peak audio.

Another I-F Circuit

An alternative i-f amplifier circuit is given in Fig. 11. Usually, successive amplifier stages are fed in parallel, but at high frequencies a series arrangement may also be used, when the load is not resistive. Only the i-f stages are series connected in Fig. 11, but an rf stage, mixer stage and product detector may be added easily.

The first stage uses an FET because our experimental model had an FET in the rf amplifier. Using the FET at the front end of the i-f amplifier resulted in a single age circuit for i-f and rf. L_1, C_1 and C_2 (and similarly, L_2, C_3 and C_4) may be regarded as a pi circuit matching the high output impedance of Q_1 (about 50 kilohms) to the low input impedance of Q_2 (about 10 ohms). Generally, in an i-f amplifier the selectivity is of paramount im-

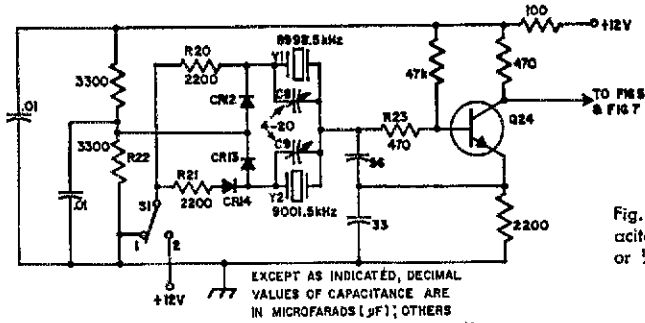
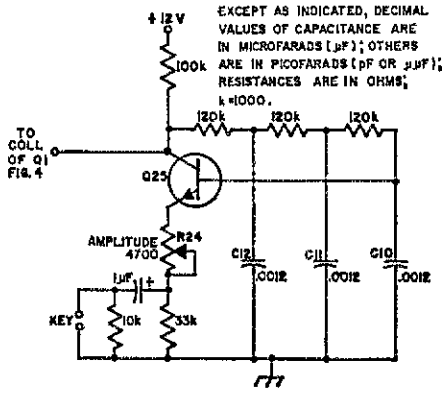


Fig. 9—Carrier oscillator circuit. Fixed capacitors are ceramic. Fixed resistors are ¼ or ½ watt. Labelled components not listed below are for text reference.

C_8, C_9—Trimmer, 4-20 pF.
CR_{12}, CR_{13}, CR_{14}—Silicon (FD-100).
Q_{24}—2N706, 2N708.
S_1—Spdt toggle.
Y_1—8998.5 kHz.
Y_2—9001.5 kHz.
(Crystal frequencies are for a 2.5-kHz.-bw filter having a center frequency of 9000 kHz.)

Fig. 10—Tone oscillator circuit. Capacitors with polarity marked are electrolytic. Resistors are ¼ or ½ watt. Labelled components not listed below are for text reference.

C_{11}, C_{12}, C_{13}—Ceramic or mylar.
Q_{25}—Same as Q_1 Fig. 1.
R_{24}—Linear-taper potentiometer.



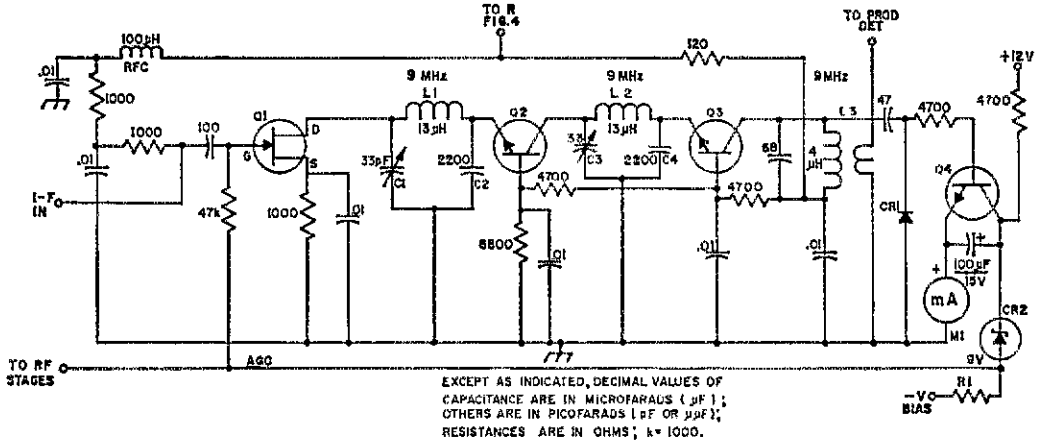


Fig. 11—An alternative i-f amplifier circuit using series-connected dc feed for the transistors. Capacitor with polarity indicated is electrolytic; other fixed capacitors are ceramic. Labelled components not listed below are for text reference.

C_1, C_2—Trimmer, 8-35 pF.
CR_1—Germanium, f-m detector type.
CR_2—Zener, 9 volts, ½ watt.
L_1, L_2—13 μH.
L_3—Toroid, pri./sec. turns ratio 10/1; primary inductance 4 μH.
M_1—0-1 dc. milliammeter.
Q_1—MPF-102 or equivalent.
Q_2, Q_3—2N706, 2N708.

portance, but here the crystal filter bandwidth has already done the job of selection.

A gain greater than 100 dB can be provided by a circuit such as this without sacrificing stability. Q_1 remains stable because of the low (500 ohms) input impedance from the filter.

The age needs a polarization voltage or bias of not less than 30 volts. A convenient source is the rf power-amplifier negative bias. The value of R_1 is determined by $R_1 = \frac{V \text{ bias}}{5.0 \times 10^{-4}}$.

The Audio Amplifier

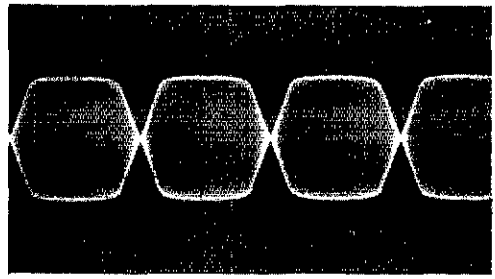
Any audio circuit which can provide the desired output from the 100-mV peak-to-peak input is, of course, suitable. A series push-pull transistor circuit such as is shown in Fig. 8 must have a power supply with very low output impedance. The point cannot be overstressed, for neither the audio output nor the other circuits can work properly otherwise. Regulation is especially important in the case of high power and low supply voltage. In the circuit presented, the feedback is applied to the emitter of Q_{20}, and not to the base as is often the case. With this configuration Q_{20} has a high input impedance.

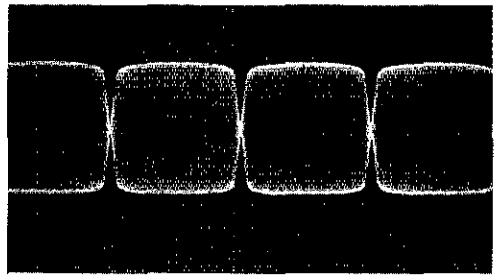
Carrier Oscillator

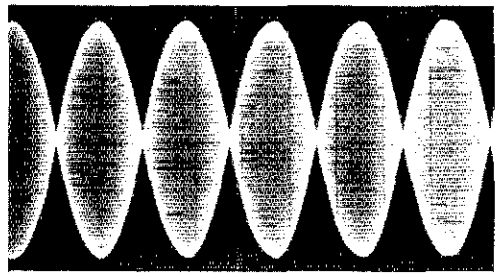
In the carrier oscillator circuit, Fig. 9, the crystals for lsb and usb are used in a parallel-resonant mode and may be pulled slightly by a parallel capacitance. Again, diode switching is used to avoid long signal leads. When the sideband selector, S_1, is at position 1, a dc current flows through CR_{12} and R_{20} to ground. Crystal Y_1 (usb) is then at ac ground through CR_{12} and C_{10}. At selector position 2, the dc passes from the +12 V input through R_{21}, CR_{14}, CR_{13} and R_{22} to ground. Crystal Y_2 is then at as ground via CR_{13} and C_{10}. The asymmetric diode CR_{14} is necessary to allow the lsb crystal Y_1 to function. Without CR_{14}, Y_1 is shunted by the two resistors, R_{20} and R_{21}, and crystal Y_2, which is near the series-resonant mode of Y_1. R_{23} is necessary to prevent heavy distortion in the output of Q_{24}. The oscillator provides an output at a level of 1 volt rms.

Tone Oscillator

CW operation can easily be obtained by unbalancing the modulator, as mentioned earlier. Another method of cw operation is keying an audio oscillator in order to keep the VOX operational; this same audio oscillator is also useful as a tuning aid before ssb operation. The circuit of Fig. 10 is a classical phase-shift oscillator. The sine-wave output may be adjusted in amplitude by R_{24}. Output is taken from the collector and sent to the microphone amplifier through a 100-pF capacitor, Fig. 4. The 500-pF feedthrough capacitor in Fig. 4 will change the frequency, as do the values of phase-shift capacitors C_{11}, C_{12} and C_{13}). Keying does not alter any dc current, thus helping to avoid key clicks.







Top: Single-tone signal with moderate clipping, measured at the input to the 9-MHz. sideband filter. Center: Same with heavy clipping. Bottom: Heavily-clipped two-tone signal after passing through the sideband filter. Post-clipping filtering restores the original modulation envelope with little distortion.

It was found interesting and helpful to set the tone to 1500 Hz and tune the carrier oscillator. In this way 8998.5 kHz and 9001.5 kHz signals can be adjusted with a 9-MHz standard (BC-221, for example).

Acknowledgments

Thanks to my friend ON4JN, whose suggestions and aid during this project were most helpful. And thanks to K9QGL and VE3BHT who helped rewrite my translation. QST

References

1 — Craiglow, Getzin and Swanson, "Power Requirements for Speech Communication Systems," *IRE Transactions on Audio*, November-December, 1961.

2 — Pappenfus, Bruene and Schoenlike, *Single Sideband Principles and Circuits*, McGraw-Hill Book Company.

3 — Perkins, "Transistor Cascode Circuit Improves Automatic Gain Control in Amplifiers," *Electronics*, June 2, 1961.

A Rugged 2-Meter Repeater Antenna

A vhf repeater has some rather special antenna requirements. Usually the site is one where exceptional ruggedness is a must. Icing and high winds are likely to be prevalent in desirable locations. The antenna design may be a factor in the receiver desensitization problem. Where separate vertical antennas are used for transmission and reception, but spacing is rather limited, an antenna having some vertical directivity is desirable.

An easily-built antenna that does fairly well on both counts is shown in Fig. 1. The materials are obtainable from any plumbing-supply house, and may be found in many hardware stores and department-store hardware counters. Ours came from the local Sears outlet.

The antenna is the familiar two half waves in phase, with a quarter-wave phasing-and-matching section at the center. The horizontal portion could be any odd multiple of a quarter wavelength, if mechanical or electrical ends are served thereby. Mechanical details are shown at the left, with a schematic diagram of the adjustable form at the right.

Our antenna was made experimentally, but the dimensions are sufficiently uncritical that you can make an antenna from the components we used, and not have to worry about adjustment. It will work from below 146 to above 147 MHz with virtually no change in SWR, which should be very close to 1:1, with 50-ohm feed.

The elements and phasing section are ½-inch copper tubing. Right-angle joints are standard castings used in plumbing and heating work. The element material can be purchased in coils, or in hard-drawn straight lengths. The latter is stronger and neater, but a bit more costly, since some has to be wasted, if it is bought in the usual short straight lengths. A 10-foot coil, on the other hand, will just do the job, with about 2 inches to spare. We used a coil, straightened out as well as we could do the job. Though it doesn't look quite so beautiful, it is still adequately strong.

The elements are inserted into the fittings to a depth of ¼ inch, and soldered with a 300-watt iron or a torch. We made the first antenna experimentally, so provided for adjustment of stub length, with a sliding short. This was a strip of flashing copper about ¾ inch wide, bent to make sliding clips at each end. The balun and coaxial line was connected with similar sliding clips. The antenna elements were held in alignment with an extra pair of cone standoffs, attached to the right-angle fittings at the inner ends of the elements. These were not needed in the final form, and are not shown in the drawing.

If you are willing to experiment with the *matching, the element lengths are not critical*, as the system can be resonated to the operating frequency by means of the sliding short. We'd recommend nothing shorter than the half-wave elements, as shown, but they can be somewhat longer. If you wish, the antenna can be made an extended double Zepp, with radiators up to about 51 inches long. The stub will then be about 14 inches long, but it should be adjusted as should the point of connection of the balun, for zero reflected power. The extended double Zepp has slightly more gain, but if used in a repeater where transmitting and receiving antennas are one above the other, it will have the disadvantage of radiating some power at high angles, which will reduce the isolation. The two-half-waves-in-phase system has better radiation characteristics for this application, so it is shown in full detail, with the dimensions arrived at experimentally.

(Continued on page 67)

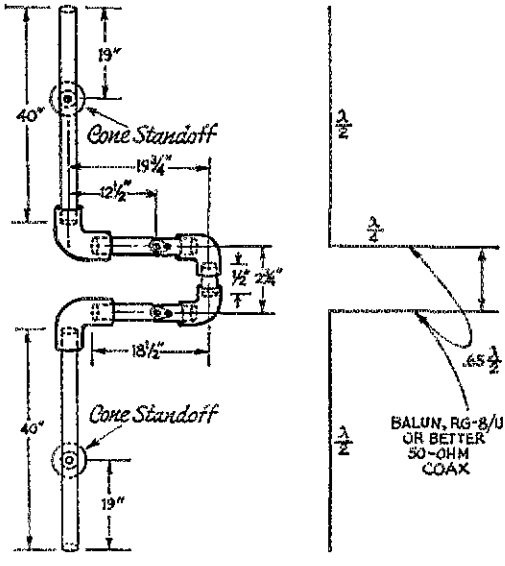


Fig. 1—Mechanical and electrical details of the 2-meter repeater antenna. Element and stub lengths are the actual lengths of tubing required. If adjustment is to be attempted, the connection points for the transmission line, and the position of the short on the stub, should be adjusted for zero reflected power in the transmission line.

Let's Talk Transistors

Part 3—The Semiconductor Diode

BY ROBERT E. STOFFELS*

In Part 2 we discussed at some length the crystalline structure of germanium and silicon, especially when these materials contained certain impurities, such as arsenic or aluminum. We introduced the concept of the "hole" — that emptiness which could contain an electron — and we assigned a positive charge to it.

We pointed out that an *excess* electron exists in our crystal when an atom of arsenic, with *five* electrons in its outer orbit, is substituted for an atom of germanium; and that a *hole* exists in our crystal when an atom of aluminum, with *three* electrons in its outer orbit, is substituted for an atom of germanium. These electrons and holes move about at normal room temperature, but unless an electric potential is applied to the crystal there is no particular direction to this motion.

Germanium containing impurities such as arsenic (i.e., with an extra electron in its outer orbit) is called n-type germanium, and these impurities are called "donor" impurities, since they would like to "donate" this extra electron. On the other hand germanium containing impurities such as aluminum (i.e., containing only three instead of four electrons in its outer orbit or, to put it another way, containing a "hole" in its outer orbit) is called p-type germanium, and these impurities are called "acceptor" impurities, since they would like to accept an electron from some other source.

Finally, we pointed out that these electrons and holes would move in particular directions under the influence of an electric potential. Any excess electrons would move toward a positive potential (remember, opposites attract) and holes move toward a negative potential.

This month we shall discuss the motion of these electrons and holes in one particular case — the semiconductor diode, or rectifier.

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When a pn junction is formed in a semiconductor crystal, conduction of current depends on the polarity of the applied electromotive force.

In order to do this we must first define the word "ion." We have previously emphasized that even though in a particular germanium crystal there are atoms that have five electrons in their outer orbits, the entire crystal is still neutral, since there is a compensating excess proton in the nucleus. If, however, this excess electron wanders about (as indeed it does) so that it is not really a part of the atom, then the remainder of the atom will, of course, be positively charged. And, the atom that contains this electron will be negatively charged. Such atoms, which have lost or gained an electron, are called ions. These ions are relatively fixed in any material, as you will recall, since they consist of the nucleus and most of the electrons of an atom.

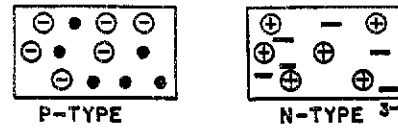


Fig. 3-1—P- and n-type germanium before joining.

The PN Junction

Now, when n-type germanium and p-type germanium are joined in the same crystal, an unusual but very important phenomenon occurs at the surface where contact is made. This contact surface is referred to as a *pn junction*.

Fig. 3-1 shows each of these two types of germanium prior to joining. Notice that in the p-type germanium there are shown several holes (black spots) and a like number of negatively charged ions. Likewise, in the n-type germanium there are shown several excess electrons (black bars) and a like number of positively charged ions. The holes and the electrons are free to wander, either in a random fashion or under the influence of an electric potential. The ions remain relatively fixed.

When these two pieces of germanium are joined we see the results in Fig. 3-2. It should be pointed out that the method by which we may implement this joining is not simple — a straightforward physical contact, or a soldering of parts, is not adequate. Rather the germanium crystal must be grown as one combined piece, so as to maintain the crystalline structure of the device.

Immediately after such a crystal is grown, the holes in the left side of the crystal rush to combine with the excess electrons on the right side of the crystal. Thus the holes and the excess electrons are completely eliminated — the electrons become part of an electron-pair bond.

This elimination of holes and excess electrons leaves their associated ions uncompensated — that is, an electron or a hole has wandered off and disappeared, and there is no means whereby the ion can acquire the proper charge to once again become neutral.

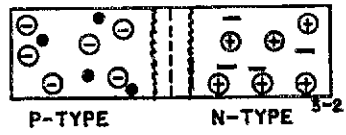


Fig. 3-2—Depletion region is formed when p- and n-type germanium are grown as a combined crystal.

Depletion Region

The uncompensated ions form a negative charge to the left of the junction, and a positive charge to the right of the junction. These charges, in turn, repel any additional negative electrons that are trying to move from the right to the left — and as a result a *depletion region* is formed. This depletion region is an area near the junction that is devoid of holes and excess electrons; it is kept this way because of the repelling force of the ions on the opposite side of the junction. The electric field set up by these ions is called a junction *barrier*, and it has an actual physical width. Note that this junction barrier exists even though the crystal is not connected to any sort of an external battery.

In essence an *equivalent* battery has been produced — the space charge, or barrier voltage, is called the *height* of the barrier, and is measured in volts. In a situation such as that described above, where no external battery is utilized, the height of the junction barrier is on the order of tenths of a volt.

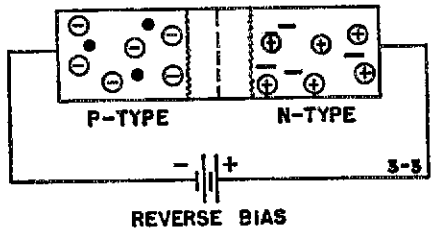


Fig. 3-3—Applying reverse potential to pn crystal enlarges the depletion region.

Fig. 3-3 illustrates what happens when we apply a reverse potential to this pn crystal. This potential has little effect upon the ions themselves, but it does affect the holes and the excess electrons. And it functions in exactly the same manner as everything electrical — opposite charges attract, and like charges repel. Thus, in this example, the positive plate of the external battery attracts the excess electrons on the right side of the crystal. Thus the depletion region, or that area devoid of holes and excess electrons, is greatly enlarged in size.

Inasmuch as the depletion region has actually been enlarged, and there is no possibility for holes and excess electrons to combine, then there can be no current in the circuit. A reverse voltage, or bias, has been applied to the junction; or, more simply, the pn junction has been reverse-biased.

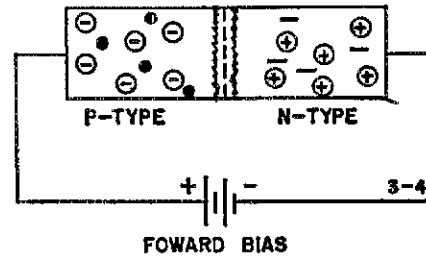


Fig. 3-4—With forward bias, electrons and holes move towards each other, reducing the depletion region.

Fig. 3-4 shows what happens when we reverse the external battery. Let us assume for the moment that the potential of this battery is very low — on the order of tenths of a volt. However small this voltage may be, it does exert influence upon the action in the pn crystal. In this case the negative plate of the external battery repels the excess electrons on the right side of the crystal, and the positive plate of the external battery repels the holes on the left side of the crystal. Thus the excess electrons and the holes move towards each other, and the depletion region is made smaller.

Conduction and Rectification

It was mentioned earlier that the height of the barrier is on the order of tenths of a volt. Consequently if we increase the potential of the external battery above this value then the size of the depletion region is made very small, and some of the holes and excess electrons combine. As each electron combines with a hole, an electron is injected into the n-type germanium from the negative plate of the external battery, thus compensating for the positive ion in this region of the crystal. In the same manner, for each hole which has combined with an excess electron, another electron breaks an electron-pair bond and heads for the positive terminal of the external battery, thus leaving in its wake a hole.

This new electron, and this new hole, both drift toward the pn junction, and this motion of electrons and holes is electric current.

The pn crystal is, obviously, a *diode* or *rectifier*. It permits current to flow in only one direction, thus exhibiting a rectifying action.

Also, it has only two leads on it, thus the term diode. We should perhaps mention that the voltage necessary to overcome the natural junction barrier voltage is about 0.25 volt for a germanium diode, and about 0.65 volt for a silicon diode. Notice that if the potential of the external battery is made too large, and if a protecting resistor is not placed in the circuit, the current will build up to a high value, excess heating will take place, and the crystal will destroy itself.

The price of diodes has greatly decreased in the past few years. A diode capable of carrying several hundred milliamps, and able to withstand a reverse potential of up to 100 volts, now sells for only about 25 or 50 cents. In many applications, diodes of this nature are replacing selenium rectifiers (which had to have disturbingly large cooling fins) and vacuum-tube rectifiers.

Diode Characteristics

Probably the most important specifications of the diode are its surge-current capacity, its average current capacity, and its peak inverse voltage (PIV). The surge-current capacity and the average current capacity are both dependent upon the heat-withstanding capability of the device, since it is heat which normally destroys a semiconductor. The peak inverse voltage, on the other hand, is the maximum voltage which may be applied to the device in the reverse direction without its "breaking down." (We might mention that although a diode is normally used in the forward direction, it will also conduct in the reverse direction if a high enough voltage is applied. Such conduction will not necessarily destroy the diode if the current is limited by, for instance, a resistor in the circuit. The Zener diode, or reference diode, specifically utilizes this characteristic, and, in fact, every diode has what is known as a "Zener," or breakdown region. We shall learn more about this phenomonum in a later article).

Before leaving the subject of diodes, we should reemphasize one characteristic: the forward resistance of a diode is not zero ohms; rather this resistance depends upon the voltage applied, and until the particular barrier potential is overcome this resistance is extremely large. This characteristic of a diode is successfully utilized in many of our circuits. It makes, for instance, a very effective limiter. For if a low voltage is applied to a wire, and if this wire is connected to ground through a diode, then conduction in the diode will occur only if the amplitude of the input voltage exceeds the forward breakdown voltage of the diode. Other applications of diodes will be discussed when we investigate actual circuits.

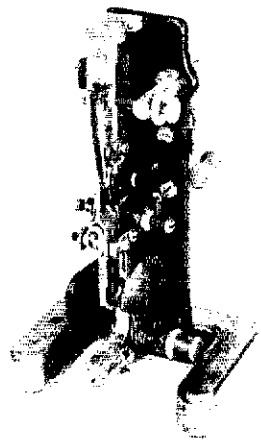
Questions:

1. *What is an "ion"?*
2. *Can a pn junction be formed by soldering a piece of p-type germanium to a piece of n-type germanium?*
3. *Does a depletion region contain any excess electrons?*
4. *Is there a depletion region in a pn crystal even when no external battery is applied? And, what voltage must be applied to overcome this barrier?*
5. *Approximately what voltage must be applied to a pn crystal in the reverse direction to cause it to conduct?*
6. *If a particular diode conducts in the forward direction when a voltage of, say, one volt is applied, then what voltage will appear across four diodes in series?*

Answers:

1. An ion is an atom which loses or gains an electron; hence it is electrically charged. As a result, it will repel objects with a like charge and attract objects with an opposite charge.
2. No. A pn junction can be formed only by actually growing a crystal as one combined piece. Only in this way will the crystalline structure be continuous.
3. No. By definition a depletion region is that region around the junction which contains neither excess electrons nor holes.
4. Yes, indeed! For most diodes something less than one volt must be applied to overcome this barrier.
5. This is a characteristic of the particular diode type, but its value is always greater than the listed PIV (peak inverse voltage) of the diode.
6. Four volts. Such a scheme has actually been used in some equipment to provide a constant voltage. QST

From the Museum of Amateur Radio



VIBROPLEX

This is an unusual type vertical Vibroplex. It occupies quite a small space on the desk. This has a very nice touch indeed and I found it difficult to imitate a "Lake Erie Swing" with it.

—W1ANA

Instant Frequency-Change Transceiving with the SB-301 and SB-401

Switch Selection of Two Transceive Frequencies

BY JOHN H. LEHMAN,* WA8MHO

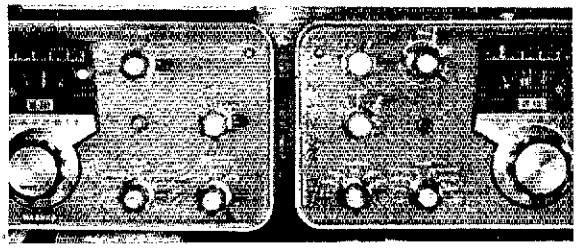
IT takes something a little special either in the way of courage or perhaps stupidity to attack a brand new, just-finished Heath SB-301-401 combination station with an electric drill, but that is what I did. As designed it has only two options of frequency control: transceive controlled by the LMO in the 301, or split operation with each unit controlled by its own LMO. Most of my operation is in transceive mode, and there are times I wish to be set on the Ohio Side band Net yet switch instantaneously to the Eye Bank Net or perhaps chase up and down looking for a clear space. It seemed a shame to have a perfectly good LMO sitting there in the 401 idle 99 percent of the time when it could also operate the two units in transceive.

A switch pattern was worked out on paper that would add the one additional mode of operation, as shown in Fig. 1. (I'll admit that other patterns are possible and that dual receive could also be obtained, but didn't wish to add it unless some lock was also added that would prevent dual transmitting.) There are switches available someplace that would do the job without modification, but we are in one of those areas where the parts houses only stock items they will sell once in two or three years, so an attempt was made to modify a switch salvaged from the junk box. By some very careful soldering an extra contact area can be added to the rotating element to make each section short two contacts as well as feed signal to them. A switch was chosen that had both feeds on a single wafer, so there would be no paralliel surfaces, as might be the case with adjacent separate sections, and therefore less possibility for capacitive feedthrough of the unused signal.

A switch was built and tried temporarily by blocking up the cabinet lids so the cables could be strung between the sets. A phono plug was placed on the cables going to the LMOs and a phono jack was placed on the cables going to the units' circuitry, so that no modification was needed to test the idea. It worked about as expected except that there is about a 300-cycle shift in frequency from transceive to split operation because of the change in loading. This shift is no worse than was observed in the original design and could be lived with, so we forged onward by adding another switch wafer to turn on an indicator light in the unit that was controlling frequency. This was a simple switch and may or may not be desired, so no circuit is shown for it.

About this time WA8RWK, who also has the same equipment, asked to help test it out. After helping check us out for absence of the unused signal or products of the combinations he offered to put one in his rig. From then on it was a dual effort, since Dick was as enthusiastic as I about its performance. Both units were installed permanently and given frequent checks by many of the other members of the Ohio Single Sideband Net.

* 746 Starlight Terrace, Mansfield, Ohio 44904



Panel additions in WA8MHO's modification include the switch, upper left on the SB-401 (right), and pilot lights alongside the tuning dials. The lights are not an essential part of the modification but are convenient for indicating which combination is in use.

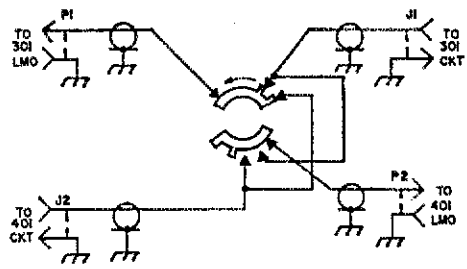
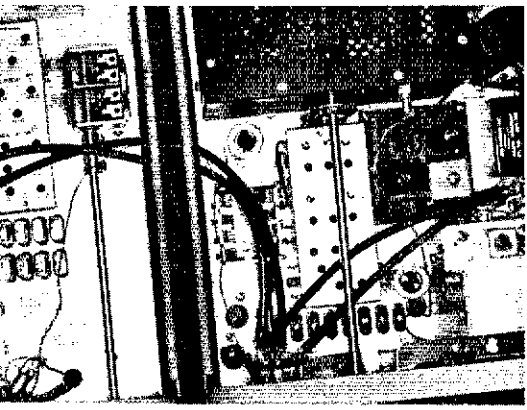


Fig. 1—Rear view of the switch layout. The switch was made from a two-circuit rotary switch wafer by soldering an extra contact on each movable ring segment so that adjacent fixed contacts are connected together. Unused fixed contacts are not shown. Phono plugs (P_1, P_2) and sockets (J_1, J_2) at the ends of connecting cables mate with existing sockets and plugs on the 301 and 401.

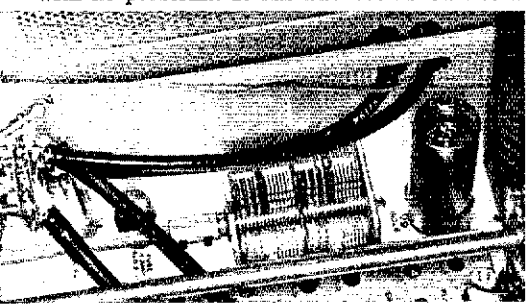
The switch is shown in position 1, with the 301 LMO controlling both the 301 and 401. In position 2, the 301 LMO controls the 301 and the 401 LMO controls the 401. In position 3, the 401 LMO controls both the 401 and 301.



The complete installation. The modification does not require changing any wire in either unit.

The permanent installation was placed in the 401 cabinet to the left of the final and above the driver controls in line with the existing knobs The indicator lamps were placed just to the left of the dial on the 401 and to the right of the dial on the 301. We chose to drill the sides of the cabinets to route cables and the indicator light lead through, rather than take a chance on longer unequal-length cables that would have to be used if the extra sockets on the backs were used. An alligator clip is used on the lead to the 301 lamp so it also can be removed.

The system has been in use here about five months and at WA8RWK about three months, with no problems. It has also been shown to a



The switch and cables in the 401. Cables to the 301 run through holes in the sides of the cabinets, thus keeping them short.

Heath engineer who suggested it should be written up and offered as an unofficial modification. They could see nothing wrong with it but of course could not approve it without extensive testing.

One word of caution: The 401 mode switch must be in the correct sideband position when using that LMO or the dial will be shifted to an incorrect indication of about 3 kHz. Of course any jump up or down the band will require its usual adjustment of receiver preselector and transmitter final as before.

I hope this modification will prove helpful to some others in extending the versitility of a very fine rig. QST

January 1945

. . . The cover photograph brings back some memories. Here is a typewriter with a strip of paper tape being pulled along from right to left. The characters of the code are depicted by the excursions the pen makes above the base line. Reading left to right, it says "meri xmas." The rig that makes the characters is a siphon recorder. A capillary tube feeds the ink from a vertical slot to paper.

. . . The Editor is looking ahead to how things will be once we get back on the air. He doesn't foresee any world-shaking changes in our situation, just better components, better antennas and better design. He strongly hints at automatic relay stations on the ultra highs. The activities of the headquarters staff meanwhile are described. Understaffed and working long hours, they have accomplished a great deal, including a revision of the *Handbook*. Work is constantly going with regard to preserving our frequencies.

. . . Cyrus Read, W9AA, visits WABD, a Dumont television station and reports on the progress of the art as seen from an amateur's point of view. He describes what goes on in a television studio during a live TV program, how the sets are painted and what color lipstick the girls have to wear. Very interesting!

. . . "A Miniature Ham-Band C.W. Station," operating on 115 vac is described by Sheldon W. Gates, W8VWK. The whole thing goes into a small vanity case. Handy for portable work. — *W1ANA*

January 1920

. . . "Dr. Radio" has the leading article on "Long-Distance 200-Meter Work." Don't know for sure just who he was, but his writing style does not conjure up the name of Hiram Percy Maxim. Anyway, he discusses the spark transmitter and gives really sound information on the antenna, size of condenser, numbers of turns in the O.T., etc. He makes out a pretty good case for the fan antenna, popular with those having a couple of tall masts in the back yard. Reading further, he describes H.P.'s spark gap (which is now in operation at W1AW, for benefit of old timers). So, it does sound like Maxim, after all. He deplores the attempts of hams to simulate the 500-cycle notes of commercial quenched gap sets and believes in high-speed, low-note rigs with some justification.

. . . S. Kruse has a jolly piece on Masts. I got a real chuckle out of it. A-frame antenna supports without guy wires. They just leaned away from each other.

. . . Louis Pacent has Part II of his "Wavemeter Construction and Operation." Some hams are still using wavemeters, you know. This was a Radio Club of America paper, originally.

. . . The first post-war trans-continental relay took place. This took place via 6EA, LF(Louis Falconi, Roswell, N.M.) 9BT, 8AD and 1AW. Guess good old Louie hadn't bothered to get a license at that time. — *W1ANA*

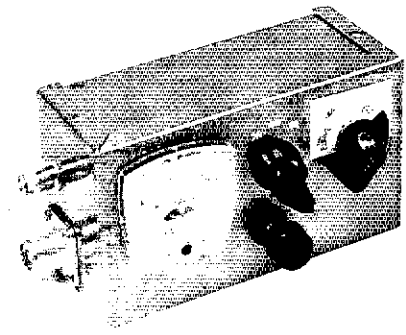
Strays

Feedback

The chart on page 20 of the November issue (Stoffels, "Let's Talk Transistors") has a zero between 10 and 10^{-1} in the resistance scale. It should have been 10^{0} — that is, 1.

A Coaxial Band Checker

BY LEWIS G. McCOY,* W1ICP



At the upper right is the tuning knob and chart for C1. The bandswitch is at the upper center and the meter sensitivity control is just below the bandswitch, at the center. The pick up loop is visible at the left.

In talking to Novices, one problem that many of them have is in the initial set up of their station. It is quite common that a Novice will set up a station, get everything tuned up, and then call and call without getting a reply to their calls. Several things could be wrong in such an installation. We have found that the Novice is nearly always ready to blame his antenna as the source of the trouble. Actually, even in a very poor location, almost *any* antenna will produce contacts. The second thing the Novice blames is low power, according to his reckoning of what low and high power actually is. Let's get one thing clear about power, it only takes a *few* watts input to produce good, solid contacts on the Novice bands, assuming everything is tuned up correctly and the power output is actually reaching the antenna.

There are two common problems for the Novice that can result in no answers to calls. One of them is the lack of power actually reaching the antenna and the other is calling on one band but mistakenly listening on another. The last seems a little foolish but believe it or not, it can happen quite easily, and often does.

Many transmitters, whether home-built or commercial, can be made to tune up on some other band than what the bandswitch says. For example, you could switch the rig to 80 meters, tune up, but actually be on 40 meters. Naturally, with such a tune up you would *think* you are on 80, and of course be listening on 80, but your signal would actually be on 40. And no matter how long you called, you would never get any answers that way!

What happens is that the coil and capacitor combination for any particular band may actually be tunable on more than one band. In addition to the 80-meter example, tuning up on 15 is even more likely to give false results. As an example, let's assume we have a pi-network tank circuit in the final amplifier stage and our tuning capacitor has a maximum capacitance of 150 pF with a minimum, including circuit strays, of 20 pF, the loading capacitor has a maximum of 1000 pF, and that our tank coil on 15 is 1 μH. When capacitors are set at maximum capacitance our circuit will resonate at 14 MHz and at minimum capacitance, well above 28 MHz. So, in addition to our 15-meter tuning, the circuit will also hit 20 and 10 meters! And don't think for one minute this doesn't actually happen. When you get your General class license and get on 20 and 10 you'll frequently hear Novices on those bands.

You'll hear Novices who have the problem of getting replies say that they know they are on the right band because they can hear their own signal on their receiver in the correct place. Let's make one thing clear: It is almost impossible to determine which is the correct frequency by listening to your own signal on the station receiver. An experienced operator, by removing the antenna and reducing the audio and rf gain controls, can sometimes make an educated guess as to which signal is the fundamental but he wouldn't want to bet his shirt on it. The problem is that it is well-nigh impossible to keep from overloading the station receiver from your own transmitter. Even a nearby ham would have problems listening to your signal and trying to determine the fundamental because of the overloading problem.

* Novice Editor.

One problem that bothers Novices, after getting their license and getting their station all set, is to call and call without getting any replies. Here is a simple device that shows you when you are on the right band and have power going to the antenna.

The Band Checker

One way around the problem of determining if one is on the right band, and if power is flowing to the antenna, is with the simple device described here. The Band Checker is simply an absorption-type wavemeter that can be inserted in the feed line to the antenna system. The unit will show you visually whether or not you are putting out on the correct band, and also give you a relative indication of power flowing through the line to the antenna.

Fig. 1 is a circuit diagram of the Band Checker. The heart of the unit is the tunable band-switching circuit, C_1L_2. Depending on the band switch position, the unit will cover 80- through 10 meters. Coaxial fittings are mounted on the ends of a 2 × 3 × 5-inch Minibox and a single wire lead is connected to the two fittings. The transmitter output is connected via coaxial line to one side of the box and the antenna feeder to the other side.

When rf flows through the line in the box, a very small amount of rf is coupled to the tuned circuit, L_2C_1. This small amount of rf is then rectified by CR_1 and the dc is then fed to the meter, M_1, where it can be observed on the meter scale. The control, R_1, is used to adjust the sensitivity of the meter.

In the first position of S_1, when the capacitor C_1 is near maximum capacitance, the circuit is tuned to the 80-meter band. When the capacitor is set near minimum capacitance, plates unmeshed, the circuit will tune to 40 meters. Therefore, in the first switch position, it is very easy to determine quickly if the rf flowing through the unit is from 80 or 40 meters.

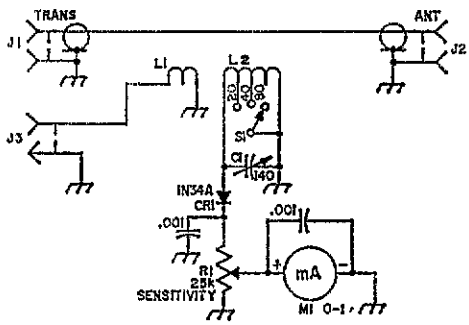


Fig. 1—Circuit diagram of the Band Checker. The 0.001 μF capacitors are disk ceramic.
C_1—140 pF variable (Hammerlund HF-140, or similar).
CR_1—1N34A germanium diode.
J_1, J_3—Coax chassis fittings, type SO-239.
J_2—Phono jack.
L_1—See text.
L_2—See text (coil is wound on Amidon Assoc.[1] toroid core, type T-68-2).
M_1—0-1 milliammeter; a more sensitive type can be used if desired.
R_1—25,000-ohm control.

[1] Amidon Associates, 12033 Otsego St. North Hollywood, Calif. 91607

The second position of the switch covers 40 meters at maximum capacitance of C_1, and 20 meters at minimum. In the third position, we have 20 meters near maximum, 15 meters near the halfway setting of C_1, and 10 meters near minimum.

To further utilize the Band Checker J_3, a phono jack, was installed at one end of the Minibox. A two-turn pickup loop can be plugged into J_3 and coupled to L_2 via a three-turn loop, L_1 that is wound on L_2. In many instances, an amateur would want to trouble-shoot a transmitter, possibly to see if an oscillator is oscillating, or if a doubler is doubling, or if a stage is amplifying, and the Band Checker can be used for this purpose. All you need do is remove the Band Checker from the feed line, plug the two-turn pickup loop into J_3, and bring the pickup loop near the coil in the stage in the transmitter that is being checked. By tuning the C_1L_2 combination it is easy to see, via M_1, if the transmitter stage is "putting out" on the right frequency.

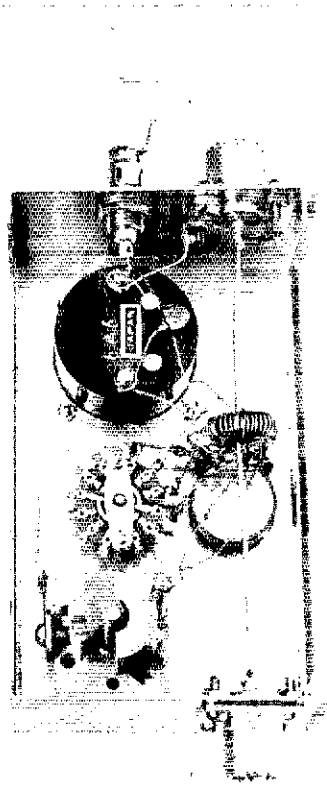
Construction Details

As can be seen from the photographs, the construction is quite simple. There are only a couple of points to be mentioned. The coax fittings are mounted at the lower corners of the box to permit clearance for the other components. L_2 consists of a total of 47 turns of No. 24 enamel wire with taps at 19 turns and 9 turns. Start off with a 42-inch length of wire, leaving 2 inches of length for the first lead. Wind 9 turns on the toroid and then make a tap lead about 2 inches long. The wire can be wound back on itself for the tap lead. Proceed with the winding until the 19th turn and then make another tap lead. Finish up the winding of 47 turns and trim off the excess to leave a lead 2 inches long. The entire coil tunes the 80-40 meter-range. Shorting out all but 19 turns provides 40-20-meter coverage, and shorting all but 9 turns gives 20 through 10-meter coverage. The link L_1 consists of 3 turns wound directly over the other coil. A ¼-inch diameter rubber grommet can be inserted inside the winding and then the assembly can be slid over the connecting line between the two coax fittings. The connecting life is a piece of No. 14 or 16 solid wire.

In making the external two-turn pickup loop use insulated wire. The loop must be brought into close proximity with coils and circuits that are operating with voltages on them, and the insulated wire helps prevent accidental contact with "live" circuits. In fact, when using the unit around transmitters or receivers for checking circuits, it is a good idea to put a ground lead on the Band Checker box and connect the ground lead to the transmitter ground (we assume that you have your transmitter chassis grounded to an earth ground). The diameter of the pickup loop isn't critical but should be ½ inch or more.

Calibrating The Units

Plug an 80-meter crystal into your rig and tune up into a dummy load, on 80 meters. With



This photo shows the internal parts of the band checker. The toroid is supported on the center lead by a rubber grommet.

the unit in the line for the transmitter output to the load, set S_1 to the 80-meter switch position. Next, tune C_1 to nearly maximum capacitance (plates fully meshed) and you should get a reading on M_1. Adjust R_1 so the meter doesn't go off scale. We used a small piece of stiff cardboard, mounted under the mounting nut of C_1, for a calibration chart. With the rig tuned up on 80, and an indication of M_1, mark this spot on your calibration chart, indicating the 80-meter band. We should point out that a wavemeter is *not* a frequency meter in that it will not provide an *exact* frequency check. It will show you the correct band, but not an exact frequency.

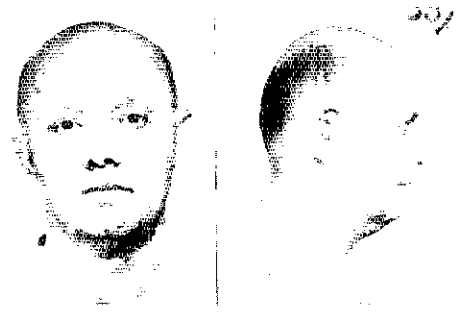
Next, with the rig tuned up on 80, tune C_1 near minimum capacitance and you may find another reading. This would be 40 meters or slightly higher, depending on the frequency of the 80-meter crystal. It would also indicate that your second harmonic is actually flowing to the dummy load. We tried two different commercial rigs and found that we could get a second-harmonic indication with the instrument. This doesn't mean that your second harmonic would be strong enough to cause problems if fed to antenna, but if you do have one showing it is a good idea to take some of the steps outlined in Understanding Amateur Radio to eliminate the harmonic.

In any event, the harmonic can be used for a calibration check if it shows up. Otherwise, you can tune up on 40 and find the indicator. With the rig tuned to 40, switch S_1 to the next position and locate the 40-meter reading near the maximum setting of C_1. The 20-meter band will be near the minimum setting. The same procedure can be used on the next band. However, be sure to use a dummy load for this setup if you are a Novice, otherwise you are likely to have a signal on a band you are not supposed to be on.

In using the wavemeter with the pickup loop, all you need do is bring the loop close to the circuit being checked and adjust the C_1L_2 circuit for an indication. This will show you where the circuit being checked is actually operating.

Earlier we said that one of the other problems in making contacts was in knowing that power was actually getting to the antenna. It should be apparent by this time that the Band Checker will also show if power is going to the antenna, and of course, on the right band. The Band Checker can of course be used as an output indicator. We always tune up a rig using an output indicator. One thing to keep in mind, the more reading indicated by the Band Checker meter, the more power going to the antenna. As long as you keep the amplifier plate current within the instruction book or tube ratings, the best method of tuning up is by maximum output, regardless of plate current dip. QST

Strays



BENJAMIN HOSKINS PADDOCK
FBI No. 4,530,829

This man is wanted by the FBI for bank robbery and escape, currently being on the FBI's list of 10 most wanted fugitives. He is 6'4", 245 lbs., large build, medium complexion. His friends call him "Chromedome," "Old Baldy," or "Big Daddy." Glib and fast-talking; has been employed as a service station operator and auto mechanic; been convicted of automobile larceny and confidence game; considered armed and extremely dangerous. QST publishes this announcement at the request of the Federal Bureau of Investigation, because under the name of Patrick B. Paddock in Tucson, Arizona, he was licensed as K7JIH from 1959 to 1964. If you have any information, notify the nearest FBI office.

Antennas for 80-Meter DX

BY PETER J. DALTON,* K2RBT/6

With the announcement of the new Five-Band DXCC award, and a decrease in sunspot activity not too far off, 80 meters is sure to play an increasing role in DX operation. In contemplating work on this band, the antenna is obviously the chief problem. Some of the types that have been found to be effective will be discussed here.

Sloping Dipoles

One simple antenna worth considering is the sloping dipole shown in Fig. 1. This antenna has proven itself for years at W1BU, W1FRR, W1IIM and other stations. Using one of these antennas after moving to California, I was able to work all continents on 75 ssb within the first three weeks of operation. Stations in Europe were worked each evening that the antenna was tried, the best signal report being 58 from CT2AT. During this period, no European stations were heard on a horizontal dipole 40 feet above ground.

The antenna slopes from the top of a 100-foot tower to a support at ground level, making an angle of about 30 degrees with the tower. Reception in Europe indicates that this angle is about optimum for DX. The antenna exhibits some front-to-back ratio — about 10 db. The wire should be sloped downward in the direction in which communication is most desired.

Sloping reflectors, as shown in Fig. 2, have sometimes been used with a sloping dipole. The exact degree of improvement has not been established, although there appears to be some. The reflector wires should each be 5 to 10 percent longer than the driven element, and may be run so as to make horizontal angles of between 70 and 90 degrees with the latter.

W1FZJ/KP4 uses two sloping dipoles as a broadside array, the dipoles being spaced ⅝ wavelength and fed in phase. (The wires run parallel, one to one side of the other.) The feeding system consists of equal lengths of 50-ohm coax cable, joined with a T connector, and then 50-ohm line to the transmitter.

I have heard tape recordings comparing this antenna with some others, and they indicate that it is one of the best. The sloping elements cause the radiation pattern to be essentially unidirectional.

Phased Verticals

An antenna that I used in New Jersey for several years, and one that can be very effective if properly installed, is the unidirectional end-fire phased array shown in Fig. 3. Two quarter-wave verticals with insulated bases are required. It needs at least 60 feet of flat ground, preferably at the top of a hill, free from surrounding objects. The two verticals are spaced ¼ wavelength (I used a spacing of 60 feet), and are fed 90 degrees out of phase.

A good ground system is an important part of the installation. I used about 20,000 feet of wire to run radials from the base of each tower, spacing the radials at intervals of about 2 degrees. Alternate radials were made 200 and 60 feet long. The wire was laid on the surface of the ground (not buried). At the base of each vertical, an 8-foot copper pipe was driven into the ground, and all radials, as well as the outer conductor of the coax feed line, were connected to the pipe.

* Microwave Associates (West), Sunnyvale, Calif. 94068.

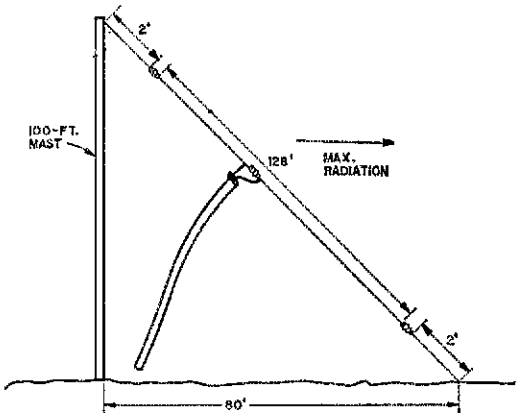


Fig. 1—Low-angle radiation from a dipole can be increased by sloping the wire in the direction of the receiving station. A slope angle of about 40 degrees appears to be optimum for DX.

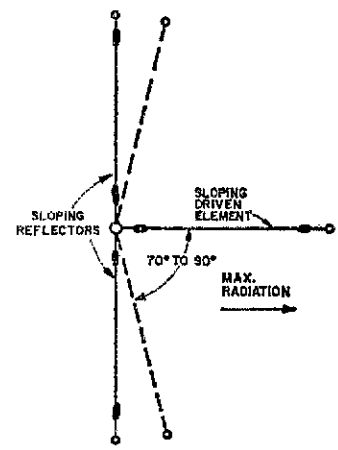


Fig. 2—Sloping reflectors may be added to the sloping dipole, as mentioned in the text.

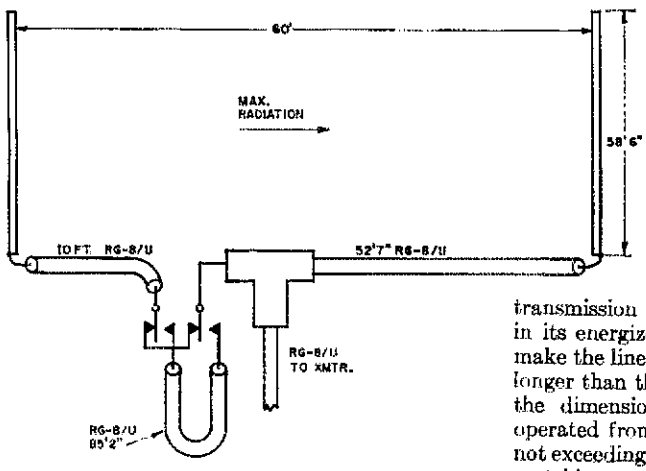


Fig. 3—A vertical end-fire array consisting of two quarter-wave elements fed 90 degrees out of phase. As shown, maximum radiation is in the direction of the arrow. The direction is reversed by switching in the 85-foot section of line. See the text for details of the phasing system.

The 90-degree phasing is obtained by making the feed line to one element ¼ wavelength longer than the feed line to the other element. The length of this phasing line can be calculated from

$$L\ (\text{ft.}) = \frac{246V}{f\ (\text{MHz})},$$

where V is the velocity factor of the cable used for the phasing section (0.66 for ordinary coax, or 0.77 for Polyfoam). In Fig. 3, an electrical quarter wave (RG-8/U) at 3800 kHz is 42 feet, 7 inches, but since the line to the left-hand element is 10 feet long, this length must be added to the right-hand side to make that line ¼ wavelength longer than the line on the left-hand side. Thus, the total length on the right-hand side is 52 feet, 7 inches.

With the relay in the normal position shown, transmission is in the direction of the arrow. For transmission in the opposite direction, the relay in its energized position inserts enough cable to make the line on the left-hand side ¼ wavelength longer than the line on the right-hand side. With the dimensions shown in Fig. 3, the system operated from 3500 to 3800 kHz with an SWR not exceeding 1.7 to 1, so further attempts toward matching were not considered necessary.

Because of its low vertical angle, this antenna has considerable discrimination against signals from stations under 2000 miles distant. There is also enough directivity to cause a noticeable decrease in noise, compared to a dipole. Since successful reception is more than half of the job, these are important considerations. While British Broadcasting was transmitting on 3953 kHz, the signals were usually completely blocked by local W2 ssb signals, when using a dipole 90 feet in the air. During lapses of QRM, the broadcast signal registered S9 to 10 dB over S9 on the S meter. Upon switching to the array, the QRM disappeared completely, and the BBC signal rose to a solid 40 to 60 dB above S9. Canadian QRM below 3800 kHz was similarly attenuated, and there was no trouble in copying Russian ssb on 3640 through Stateside cw and RTTY. When working cw, local QRM is knocked down to a level that permits solid DX copy (and W3MSK can be pretty strong in New Jersey). I made many tapes demonstrating this difference and sent them to European DXers. The common response was, "Unbelievable."

When transmitting with the dipole, I was frequently reported 40 to 50 dB. over S9 along the East Coast, while European reports were usually below S9. With the array, reports from locals dropped to S7 to S9, while the Europeans reported me 25 dB over S9. I was also reported S9 in Antarctic, and received comparably good reports from Africa and Asia. My best contact was a long-path QSO with 9M2DW during the early evening hours.

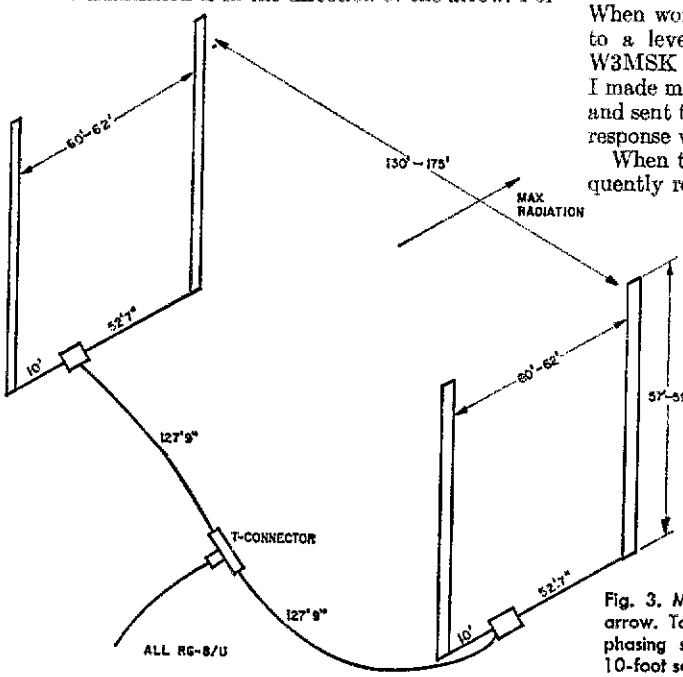


Fig. 4—This is a broadside array made up of two end-fire arrays similar to Fig. 3. Maximum radiation is in the direction of the arrow. To obtain a reversal of the pattern, 85-foot phasing sections must be inserted in series with the 10-foot sections, as in Fig. 3.

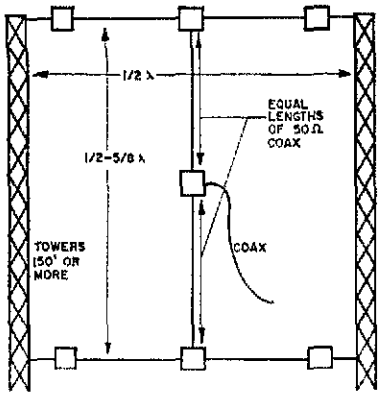


Fig. 5—Broadside bidirectional array using half-wave elements

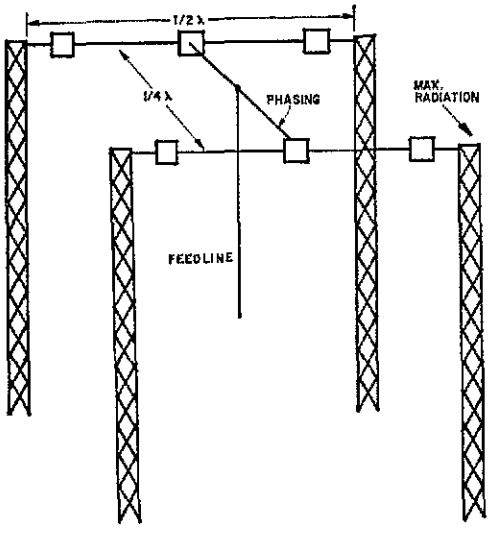


Fig. 6—Horizontal array using two half-wave elements driven 90 degrees out of phase. The phasing may be accomplished using the method shown in Fig. 3.

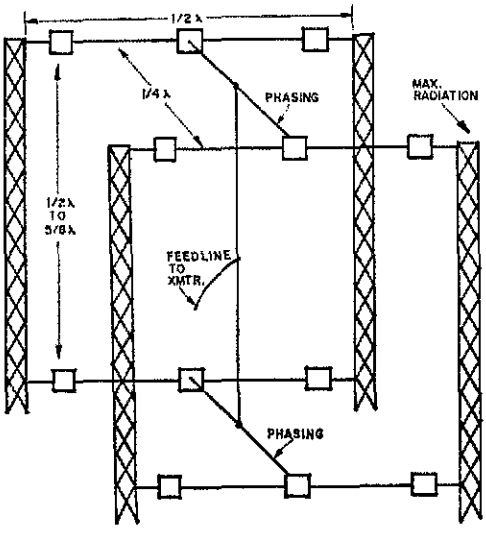


Fig. 7—Arrays similar to Fig. 6 may be stacked, as shown here.

Vertical Broadside Array

Where space permits, two arrays of the type just described can be spaced ½ to ⅝ wavelength apart and fed in phase, as shown in Fig. 4. The pattern is a cardioid with maximum radiation in the direction of the arrow. The direction can be reversed by inserting 85-foot lengths of RG-8/U in series with the 10-foot sections, as was done in Fig. 3.

In this array, the feed-point impedance is about 25 ohms. This can be transformed to 100 ohms using a matching section of 50-ohm cable an odd number of quarter waves long (¾ wavelength shown in Fig. 4). The two sides connected in parallel at the T connector then provide a 50-ohm termination for the line to the transmitter.

Horizontal Arrays

Figs. 5 through 7 show other types of arrays that may be considered if the space and necessary tower height are available. The towers should be at least 150 feet high, and preferably 200 feet.

The antenna of Fig. 5 consists of two half waves fed in phase. This antenna is bidirectional, broadside.

The arrangement in Fig. 6 is unidirectional, and is similar in principle to the vertical array of Fig. 3. The two half-wave elements are fed 90 degrees out of phase, and the phasing system may be the same as shown in Fig. 3.

The antenna of Fig. 7 consists of two arrays of the type shown in Fig. 6 stacked vertically for greater gain and directivity.

In all of these three examples, the feed-point impedance should be measured, and a suitable matching system worked out.

Before concluding, I should mention that I, as well as many others, have tried long wires (several wavelengths long), as well as parasitic arrays of the inverted-V dipole type, and the concensus is that they do not work well enough to justify the labor involved. Possibly they would do better at greater heights, although some of the inverted-V antennas tried were as high as 90 feet at the center.

For most of us, 100 countries on 80 will be the toughest part of qualifying for 5BDXCC. However, with a proper antenna, it can be done. When I displayed some of my 135 confirmations after coming to the West Coast, the typical comment was, "That's easy to do from the East Coast." Well, it isn't exactly easy from the East Coast, but W6DQ has worked 101, and W6GEN, W6RW and W6BBH have run up some impressive totals, so it seems likely that the West Coasters won't be far behind in the race. QST

Hints and Kinks For the Experimenter

USING A TV RECEIVER FOR AMATEUR FM

A "Stray" in August, 1969, *QST*, page 21, begins with the statement: "It isn't often that an error goes more than a year without detection." This prompts me to write you about another item which might require additional information to make it usable to many readers. The article referred to appeared in November, 1963, *QST*, in "Hints and Kinks," page 65, and was repeated in Volume VII of the ARRL publication of this name.

Called "Wide-Band F.M. Receiver — The Easy Way," the article is not in error, in the true sense of the word, but the receiver will not function as described. The missing information is undoubtedly the result of the author's assumption that the reader is fully familiar with the superheterodyne principle as used in TV receivers. Some newer hams might not be.

The author suggests using an old TV receiver, after discarding the picture tube, for getting on 50 MHz and higher amateur bands. This idea and the article in July, 1951, *QST*, on the use of the Standard TV Tuner[1] are excellent, and deserve more attention. My first experience on 6 meters came via this route, as the result of the 1951 article. But the "Hints and Kinks" item does not make it clear that a second oscillator must be built into the TV receiver to convert the picture i-f to the 4.5-MHz sound intermediate frequency for the system to work as described.

In a normally-functioning television receiver, this conversion takes place when the picture and sound carriers, 4.5 MHz apart, beat together to produce the sound i-f. The required oscillator can be a very simple affair, since the tuning will be done with the fine-tuning control at the front end of the receiver, when a TV tuner is used. The second oscillator could be wired into the circuit using one of the now-unused horizontal or vertical circuit tubes and its associated circuitry. — *August R. Varrus, W9BZF*

[1] Tilton, "Bandswitching VHF Converter and Harmonic Checker," *QST*, July, 1951, p. 33. Same information is given in Chapter 4 of *The Radio Amateur's V.H.F. Manual*. Conversion information applies to specific models of the Standard TV Tuner, though similar adaptations could be worked out for other TV receiver front ends.

FET CIRCUIT FOR AGC-CONTROLLED AMPLIFIERS

We needed a variable-gain amplifier that would have nearly-constant input and output impedances with changes in age voltage, relatively-large signal-handling capability, and an immunity from the usual adverse effects of automatic-gain control. Remote-cutoff pentodes and some integrated circuits were considered, but the ones we had seen suffered from major deficiencies: The pentodes used considerable heater power and demanded high dc potentials, while the integrated circuits lacked signal-handling capability and were subject to impedance variations with gain control changes.

The solution to the problem is shown in schematic form in Fig. 1. C_1 couples the signal into the circuit, and RFC_1 provides a high impedance to the signal and a low-impedance path for the age potential. C_2, C_3 and C_4 are bypass capacitors. R_3 and R_4 provide bias for the base of transistor Q_3, and L_1 and C_5 form a resonant circuit at the signal frequency. R_1 and R_2 form a resistive divider that divides both the signal and the age potential applied to the gate of Q_1 and applies the divided energy to the gate of Q_2.

The two FET's, Q_1 and Q_2, with drains in parallel, sources in parallel, and gates tied to-

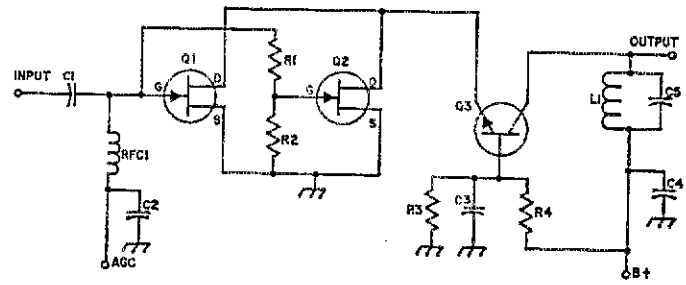


Fig. 1—Variable-gain amplifier having the desirable characteristics of a remote-cutoff pentode. Component designators are for text reference.

gether through resistive divider R_1R_2, produce a transfer characteristic that makes the circuit perform like a remote-cutoff pentode. At low values of agc bias both FETs contribute to the forward transfer admittance (similar to the transconductance of a vacuum tube). Since the signal is attenuated by the resistive divider, Q_2 does not contribute as much to the forward transfer admittance under low values of agc bias as Q_1 does. As the bias is increased, Q_1 approaches cutoff more rapidly than Q_2 because the bias applied to Q_2 is divided by R_1 and R_2. By selecting a suitable ratio for R_1 to R_2, the dc transfer characteristics of the FETs can be optimized for a smooth transition of the transfer characteristics or for remoteness of cutoff. Since the signal is divided by the resistors, for the same amount of distortion in the drain current larger signals may be applied to the input than could be if the bases of Q_1 and Q_2 were connected in parallel.

The grounded-base transistor, Q_3, provides a low-impedance drain load for Q_1 and Q_2. The comparatively-low emitter impedance of Q_3 reduces the reverse energy transfer from drain to gate of Q_1 and Q_2 and therefore, by reducing the Miller effect, reduces input-impedance variations as a function of changes in agc voltage. This reduction of the Miller effect is especially important in rf and i-f amplifiers where input-impedance variations can alter the bandwidth and center frequency of the previous stage. The output impedance of Q_3 remains high during changes in agc voltage, thus minimizing the variations in loading across tuned circuit L_1C_5 — *NASA Tech Brief 69-10322*

ELIMINATING RELAY CHATTER

In the article, "Touch Control," which appeared in the "Gimmicks and Gadgets" column of *QST* for June, 1969, it was mentioned that a 115-volt ac relay connected to the output might chatter. One solution to this problem is to connect a diode across the relay coil as shown in Fig. 2.[2] — *William Walsh, WB2QLR*

[2] An alternative is to connect a 16-μF, 150-volt electrolytic across the relay coil. The negative side of the capacitor should go to the side of the output socket connected to the anode of the SCR. — *Editor.*

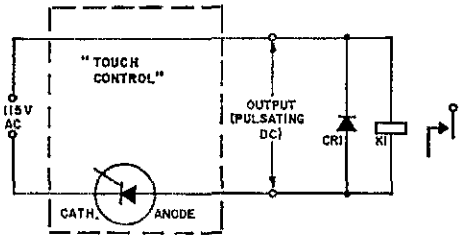


Fig. 2—CR_1, a 200-PRV, 500-mA silicon diode, prevents chatter when a 115-volt ac relay, K_1, is used with the "Touch Control."

TRANSISTOR VXO FOR VHF TRANSMITTERS

Several years ago *QST* carried an article by WIHDQ on a variable-frequency crystal oscillator for vhf transmitters.[3] I didn't want to use vacuum tubes, so I made a few changes and built the transistor version shown in Fig. 3. From all reports this gadget works like a charm. — *William M. Rowe, Jr., W4JDR*

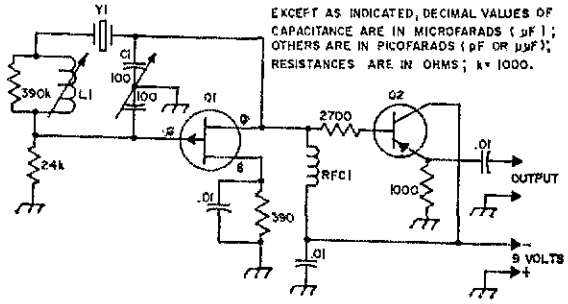


Fig. 3—Transistor VXO for vhf transmitters. Fixed capacitors are disk ceramic, and resistors are ½-watt composition.

C_1—100-pF per section split-stator variable (Hammarlund HFD-100).

L_1—16-29-μH slug-tuned coil (Miller 4407).

Q_1—U110 p-channel FET (Siliconix Inc., 1140 West Evelyn Ave., Sunnyvale, California 94086).

Q_2—2N3251.

RFC_1—2.5-mH rf choke.

Y_1—6- or 8-MHz crystal. For a greater frequency swing than is normally available with ordinary crystals, crystals especially cut for VXO use may be employed. Piezo Crystal Co., Carlisle, Pa. 17013, will supply such crystals for $7.00 each.

PILOT LAMP LIFE-EXTENDER

Do you ever get tired of replacing burnt-out 110-volt pilot lamps in your ham radio gear? Just put a 400-PRV rectifier (with a higher current rating than the lamp concerned) in series with each bulb and raise the life expectancy of your pilot lamps to near infinity. The light impairment will be minor. — *David Robinson, W1NEB*

QSL CARD HOLDERS

In an article in "Hints & Kinks" column of *QST* for October, 1969, WN4LSS stated that a QSL card holder that holds 20 cards costs 99 cents. The author has made an error; the correct price is actually 30 cents each when ten holders are bought, or 33⅓ cents each when only three holders are purchased. I know this to be true, since my concern, the Tu. Paper & Box Co., P. O. Box 198, Gallatin, Tn. 37066, is the sole manufacturer of the QSL card holders referred to in the article, and since I hold a U.S. patent on these holders. — *John B. Thomas, K4NMT*

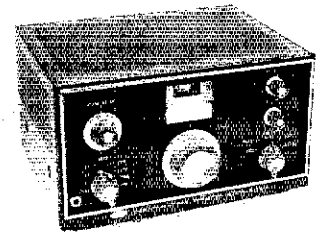
(A check with WN4LSS revealed that he was given an incorrect price quote by a dealer in the QSL card holders. — *Editor*)

[3] Tilton, "A Stable but Variable Frequency-Control System for the V.H.F. Bands," *QST*, July, 1963, p. 11. Same information is given in Chapter 6 of *The Radio Amateur's V.H.F. Manual.*

Recent Equipment

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

Allied A-2516 Receiver

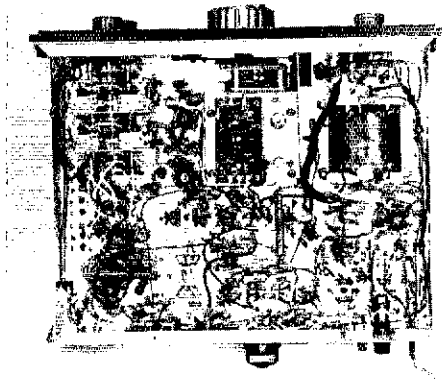


According to the 1970 edition of Allied Radio's annual catalog, the Allied A-2516 receiver is a dual-conversion superheterodyne that tunes all the amateur bands between 3.5 and 29.7 MHz, and WWV at 10 MHz. Actually, because the receiver has a VFO with a 600-kHz range, the A-2516 provides a little greater coverage. In eight bands the A-2516 tunes from 3.4 to 4.0 MHz, 6.9 to 7.5 MHz, 9.6 to 10.2 MHz, 14.0 to 14.6 MHz, 21.0 to 21.6 MHz, 28.0 to 28.6 MHz, 28.5 to 29.1 MHz, and 29.1 to 29.7 MHz.

Seven vacuum tubes, six semiconductor diodes and two bipolar transistors are used in the receiver, which measures 7 × 13 × 10 inches and weighs only 18 pounds. A diode detector is employed for a-m reception, and a crystal-controlled BFO and a triode product detector are used for receiving cw and ssb signals. The set's many features include a vernier drive on the PRESELECTOR tuning capacitor, a geared-down main tuning dial, two ceramic filters, a jack for external use of the VFO output, age, an a-m noise limiter circuit and an Smeter.

Circuit Details

Fig. 1 shows the circuit of the A-2516 in block form. Signals coming from the antenna are amplified in a 6BZ6 pentode, V_1, and then fed to the control grid of a pentode mixer, V_{2A}. Also arriving at the control grid of V_{2A} is the rf output from a crystal-controlled oscillator, V_{2B}. V_{2B} is on 12.9 MHz for 80 meters, 16.4 MHz for 40 meters, 19.1 MHz for the 9.6- to 10.2-MHz band, 5.1 MHz for 20 meters, 12.1 MHz for 15 meters, 19.1 MHz for the 28.0- to 28.6-MHz band, 19.6 MHz for the 28.5 to 29.1-MHz band, and 20.2 MHz for the 29.1- to 29.7-MHz band. To produce a first i-f of 8.9 to 9.5 MHz in the output of V_{2A}, the result of the oscillator frequency minus the signal frequency is used on 80 and 40 meters and on the 9.6- to 10.2-MHz band, and the result of the signal frequency minus the oscillator frequency is used on 20, 15 and 10 meters. Unwanted 8.9- to 9.5-MHz signals picked up by the antenna are attenuated not only by the tuned circuits of the rf amplifier, but also by a parallel-resonant trap between the antenna connector and V_1's control grid. Low-value resistors in the control-grid leads of V_1 and V_{2A} help to prevent the development of parasitic oscillations in these stages.



Underside view of the A-2516. The band switch and its associated components are at the upper left, and the power transformer is at the upper right. The VFO circuit board is at the top center. Because there is very little crowding of parts, servicing of the receiver should be easy.

The 8.9- to 9.5-MHz output of V_{2A} is fed to grid No. 3 of a pentagrid mixer, V_3. Local oscillator energy for grid No. 1 of V_3 is generated by a Colpitts VFO, Q_1, at 8.445 to 9.045 MHz. As shown in Fig. 2, the VFO is isolated from the mixer by an emitter follower, Q_2. CR_5 regulates the supply voltage for Q_1 and Q_2 at 18 volts. J_1 provides external access to the VFO output so that the VFO signal can be used (in conjunction with an oscillator and a mixer) to control the frequency of a transmitter. The output at J_1 is rated at approximately 1 volt rms.

Once again referring to Fig. 1, the 455-kHz output of V_3 is amplified by two i-f stages, V_4 and V_5. A ceramic filter is used in conjunction with an impedance-matching transformer in the input circuit of each stage. These filters provide a selectivity rated at plus-or-minus 1.5 kHz at −6 dB and plus-or-minus 6 kHz at −60 dB.

The gain of the receiver is manually controlled by a potentiometer which is wired between ground and the junction of the cathode resistors for V_1, V_4 and V_5. The receiver's age circuit, which automatically controls the gain of V_1 and V_4, is shown in Fig. 3. A fast-attack, slow-decay

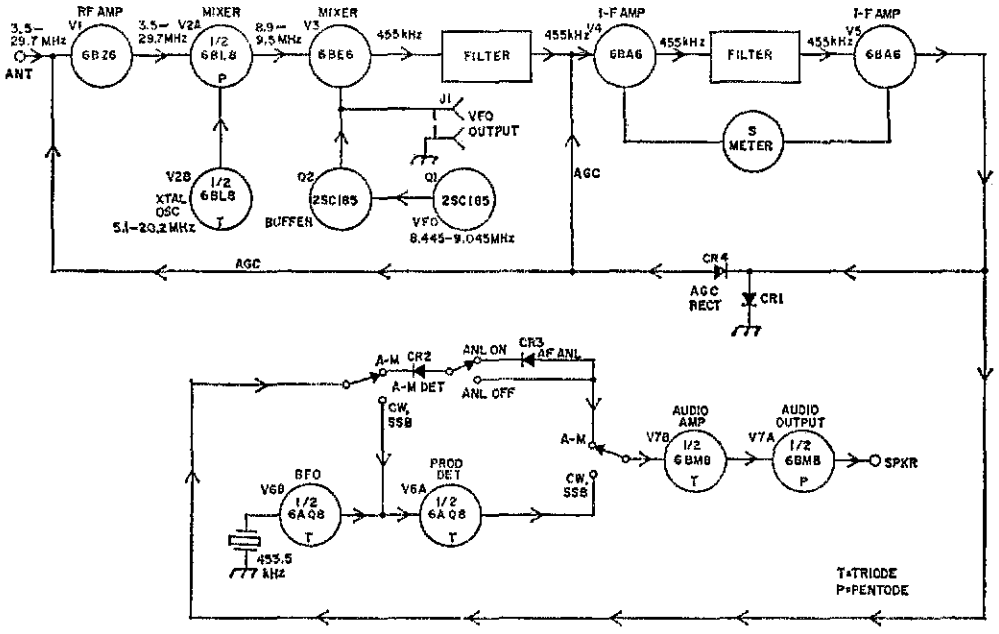


Fig. 1—Block diagram of the A-2516.

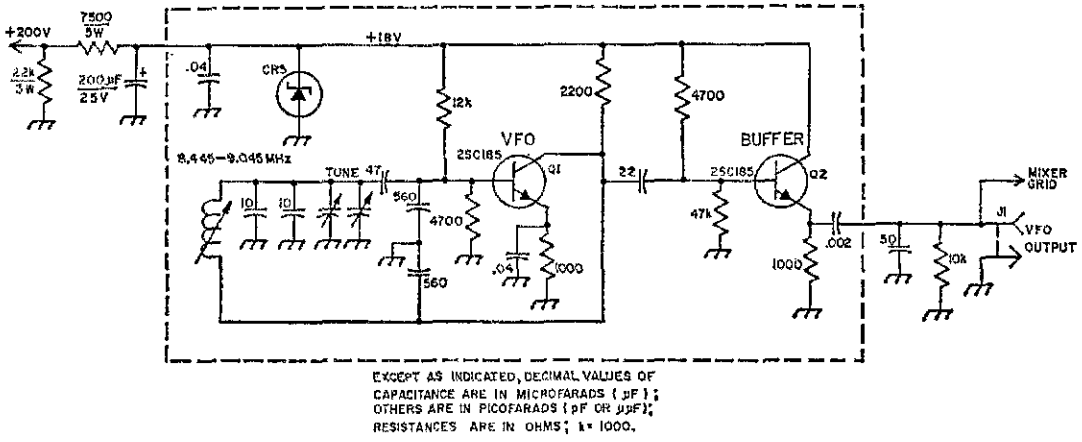
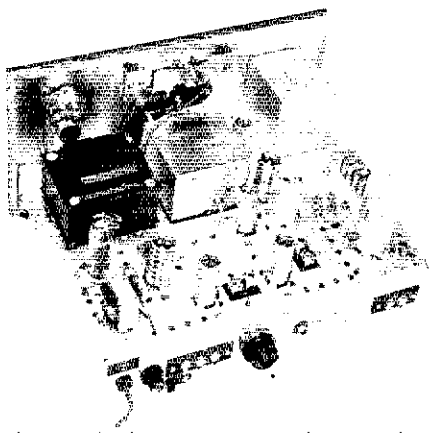


Fig. 2—Schematic diagram of the VFO used in the A-2516 receiver. Component designators are for text reference. Parts not marked with a value have no value specified in the instruction manual.

action is provided. A portion of the signal appearing in the plate circuit of V_5 is rectified by CR_1, thus developing a negative voltage from the top of CR_1 to ground. Because of the way CR_4 is situated, C_1 is quickly charged to this potential, and the gain of V_1 and V_4 is reduced. After the input signal disappears, C_1 slowly discharges through R_2, and the gain of V_1 and V_4 is returned to normal. R_1 provides a dc path between CR_1 and C_1 when CR_4 is cut off by the reverse bias developed across C_1.

In order for the receiver to be operative, Pin 3 of J_2 must be grounded. This is normally accomplished by the jumper connected between Pin 3 and Pin 1 of P_1. When a transmitter is used in conjunction with the A-2516, the receiver can be disabled by removing this jumper from P_1 and applying −100 volts of bias between Pin 3 of the connector and ground. Of course, in order for the receiver to function properly, Pin 3 of P_1 must be returned to ground when the transmitting period is over. An alternative method of disabling the receiver is provided for transmitters that don't have −100 volts of bias available. B-plus voltage for the plates and screens of V_1, V_{2A}, V_3, V_4 and V_5 can be applied or removed by using transmitter-relay contacts in place of the jumper between Pin 4 and Pin 5 of P_1. The first method of disabling the receiver is preferred, since the second method



Top view of the Allied receiver. An unused push-pull switch, which can be used to control a crystal calibrator, is at the upper left. Along the back of the chassis, from left to right, are the line cord, fuse holder, ac power selector switch, output terminal strip, shorting plug, VFO output jack, S-meter zero control, a plate covering a hole that is the right size for the installation of an SO-239 connector for coax feed, and the antenna terminal strip.

doesn't protect the control grid of V_1 from possible damage from the transmitter signal.

Returning to Fig. 1, the S meter is a low-range voltmeter placed between the cathode of V_4 and the cathode of V_5 in a balanced bridge circuit. The cathode voltage of V_5 stays constant with changes in signal level, since V_5 has no agc bias applied to it. However, because V_4 is agc-controlled, the cathode voltage of V_4 varies with changes in signal level. As a result, the bridge becomes unbalanced when a signal is received, and the meter gives an indication of the strength of the signal. A potentiometer in the cathode lead of V_5 permits the S meter to be zeroed.

Depending on the postion of the FUNCTION switch, the output of V_5 is fed to one of two detectors. In the AM position a 1N60 germanium diode, CR_2, rectifies the incoming i-f signal, and the resulting audio is sent to the grid of V_{7B}. The detection process is the same when the FUNCTION switch is in the AM-ANL position. However, in this case, the audio output of CR_2 must travel through a conventional carrier-operated, series-type anl circuit before the signal reaches the grid of V_{7B}. CR_3, the anl diode, is cut off during the time that noise pulses exceed the carrier-modulation level, thus preventing undesirable noise peaks from being sent to the audio stages. In the SSB-CW position of the FUNCTION switch, the triode section, V_{6A}, of a 6AQ8 is used as a product detector. Carrier injection to the control grid of V_{6A} is provided by a crystal-controlled BFO, V_{6B}, operating at 453.5 kHz. By offsetting the BFO frequency 1.5 kHz from the center of the i-f, the manufacturer has taken advantage of the selectivity of the i-f to provide some degree of single-signal reception. The mixing schemes used throughout the set result in optimum reception of the particular sideband most commonly used on each band: that is, lower sideband on 80 and 40 meters, and upper sideband on 20, 15 and 10 meters. As with the a-m circuits, the audio output of V_{6A} is fed to the control grid of V_{7B}.

Two stages of audio amplification are provided. The triode section, V_{7B}, of a 6BM6 is used as an audio driver, and a potentiometer in its grid circuit serves as the volume control for the receiver. The pentode section, V_{7A}, of the same 6BM6 is used as the audio output tube, and transformer-coupling is used in its plate circuit. Two output impedances, 8 ohms and 500 ohms, are provided at a connector on the back of the set. The 8-ohm output is also available at a phone jack on the front of the receiver. Plugging a phone plug in this jack disconnects the 8-ohm output from the connector on the rear of the A-2516, but leaves the 500-ohm connection as is. This arrangement permits an 8-ohm speaker that may have been wired to the rear connector to be silenced when headphones are plugged in the phone jack. A 100-ohm resistor between the output transformer's 8-ohm tap and ground protects the transformer from possible damage if the set is inadvertently operated without an audio load.

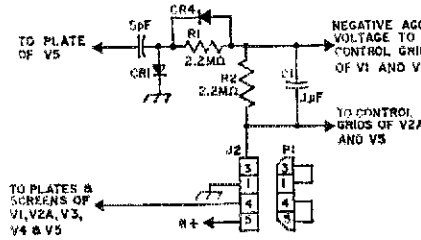


Fig. 3—Agc circuit and muting arrangement for the A-2516 receiver. See the text for details.

The A-2516's built-in power supply employs a power transformer, a half-wave semiconductor rectifier, and a capacitor-input filter. A 0.01-μF capacitor across the rectifier prevents the diode from generating hash. Because the transformer has a dual primary, the receiver can be operated from either 117 or 230 volts ac. A switch on the rear panel selects the desired input, and a locking plate prevents the switch from being inadvertently moved. For safety a 2-ampere fuse is wired in series with one side of the transformer primary.

Although a crystal calibrator isn't included in the A-2516, the receiver instruction manual gives the details for constructing a suitable unit. An unused push-pull switch mounted on the back of the rf gain control can be used to apply power to the calibrator or break the connection.

Mechanical Details

The A-2516 appears to be mechanically sound. The chassis, front panel, top cover, and bottom plate are all constructed of heavy-gauge steel. Excellent rigidity is achieved in the front panel by constructing it of two plates, bolted back-to-

back. Numerous holes in the top cover, bottom plate, and chassis provide the receiver with plenty of ventilation. Point-to-point wiring is used throughout the set, except for three areas: part of the VFO circuit and the input circuits for V_4 and V_5, which are constructed on printed-circuit boards.

A spring-loaded gear train between the main tuning knob and the VFO capacitor results in a tuning ratio of 28:1. The main tuning dial, which has a linear scale with a range of 600 kHz, is marked off in 10-kHz increments. Every 100 kHz, with one exception, the dial is labeled in red numerals and in black numerals. Starting at the same calibration mark at one end of the scale, the black numerals go from 0 to 600 kHz and the red numerals go from 500 to 0 kHz. (There are no red numerals under the black 600.) The red-numbered scale, which is used on 80 and 40 meters, is rotated counterclockwise to go from 0 to 500 kHz, and the black-numbered scale, which is used on 20, 15 and 10 meters, is rotated clockwise to go from 0 to 600 kHz. The figure appearing on the dial is added to the band figure — 3.5, 7, 14, 21, 28, 28.5 or 29.1 MHz — to determine the frequency of operation. A plate attached to the main tuning knob is marked off in fifty 1-kHz increments and is numbered every 10 kHz in red numerals and in black numerals. As with the main tuning dial, starting at the same calibration mark, one set of numbers increases in value while the other set decreases in value. Of course, with 50 marks on the plate, one revolution of the knob results in a 50-kHz change in the main tuning dial. The plate is attached to the main tuning knob in such a manner that its position can be adjusted to bring its calibration marks in line with those on the main tuning dial. In the receiver we tested, the dial mechanism operated smoothly and there didn't seem to be any backlash.

The input and output circuits of V_1 are tuned by a front-panel PRESELECTOR control. A 7:1 vernier drive makes this an easy adjustment.

Instruction Manual

The A-2516 instruction manual contains the receiver specifications, circuit theory, installation and operating instructions, maintenance details, an alignment procedure, photographs to show the location of parts having component designations, a parts list, and schematic and block diagrams. A resistance and voltage chart is not included in the manual, but important operating voltages are labeled on the schematic.

Performance

The A-2516 tested in the ARRL lab met or exceeded all of the manufacturer's specs. Although the A-2516 manual states that the receiver has a sensitivity of 2.0 μV for a 10-dB $S + N/N$ ratio, the unit we checked performed much better. Depending on the band, the receiver had a sensitivity of 0.4 μV or less for a 10 dB $S + N/N$ ratio. The set didn't seem to exhibit any cross modulation problems with signal levels that one would expect to find at most locations. Varying the PRESELECTOR control didn't affect the receiver tuning, although changing the setting of the RF GAIN control caused a maximum shift of about 200 Hz at 28 MHz. Drift seemed to be very slight after the receiver had warmed up for a few moments, and the mechanical stability of the set appeared to be excellent. Dropping the front panel about three inches resulted in no perceptible change in the pitch of a cw signal that was tuned in. Because the set's cw sideband detector has gain and its a-m detector has none, the receiver's background noise on frequencies above 14 MHz is much less when the FUNCTION switch is in the AM position than when it is in the SSB-CW position. The result on the higher bands is that a-m signals seem to pop out of nowhere on seemingly-dead bands.

Thirteen internally-developed spurious signals were found in the A-2516. However, since the strongest of these was equivalent to a 0.7 μV signal at the antenna terminals, they should normally not be troublesome. On the bands below 10 meters, spurious responses (including images) were down a minimum of 50 dB below an equivalent signal of 1 μV on the desired frequency. This was 10 dB better than the manufacturer's claim. On 10 meters the image was down 45 to 50 dB below an equivalent signal of 1 μV on the desired frequency, and a spurious response, which was the result of a signal beating with the second harmonic of crystal oscillator V_{2B} to produce the first i-f, was down 28 to 33 dB. All other spurious responses on 10 meters were down in excess of about 70 dB.

On 80 and 40 meters the receiver required about a 0.3-μV signal for an S1 reading, a 6-μV signal for an S9 reading, and a 50-μV signal for a 40 dB over S9 reading. On the other bands it took about a 2.5-μV signal for an S1 reading, a 40-μV signal for an S9 reading, and a 350-μV signal for a 40 dB over S9 reading. — *W1YDS.*

Allied A-2516 Receiver

Height: 7 inches.
Width: 13 inches.
Depth: 10 inches.
Weight: 18 pounds.
Power Requirements: 117 or 230 volts ac, 75 watts.
Price Class: $170; matching speaker: $20.
Distributor: Allied Radio Corporation, 100 N. Western Ave., Chicago, Illinois 60680.

Technical Correspondence

9TO MARK II KEYER: DOUBLE DOT PROBLEM

Technical Editor, *QST*:

About two years ago I modified my homebrew *9TO keyer* to a *9TO Mark II*.[1] To say I have been pleased with the improvement is an understatement. It is a marvelous machine. The only difficulty encountered has been the problem of occasional double dots mentioned by H. Dale Strieter, W4DQS, in *Hints and Kinks*, *QST*, October 1969. Of course I happily applied his suggested changes right away. But although there was some improvement, double dots would still occasionally occur in my keyer. This led me to renew my previously unsuccessful search for a solution, but this time armed with new perspective.

The problem of double dots resulting when only one is desired has been thought caused by failure of the dot storage flip-flop, V_5, to reset upon closure of the relay contact connected to C_5. Tending to lead to this conclusion is the remark of the author and designer of the 9TO Mark II about the problems arising from his attempt to obtain reset pulses for V_5 *from the plate of the relay switch*, V_{4A}. I am sure his observation was accurate and that this source of trouble was eliminated by obtaining reset pulses from the relay contact. Using a scope I have found that V_5 resets faithfully even when double dots *occur unintentionally*.

I have found that the real trouble, crazy as it may sound at first, is that the keyer is doing exactly what it is told to do. How so? Well, first let's examine how the dot storage works. It will store a dot any time the dot lever is closed if one is *not* already being stored, and will be reset the next time the relay contact closes. For example we can start a dash and after the relay closes to start the dash we can close the dot lever to store a dot. The next time the relay closes will be at the start of the dot we stored and that is when the dot storage will be reset. Now let's look at how the dot storage works when we make a single dot. Dot storage is made upon closure of the dot lever, and after a *very, very* short time the storage is reset when the relay closes to start the dot. The time between set and reset is so short that we probably will not yet have full thumb pressure against the dot contact. If for any reason the circuit through this contact opens and closes again after the dot storage has been reset, another dot will be stored and upon completion of the first dot the faithful, reliable, trustworthy 9TO Mark II will make another dot, just as it was told to do. Of course we didn't mean to say, "Two dots, please," but we sometimes do because of bouncing contacts, dirt, oil film, rolling or sliding of contacts — anything that might cause the dot lever circuit to open and close again after the reset of the dot storage at the beginning of our (we had hoped) single dot.

The cure for such an ailment must surely lie in somehow disabling the dot storage function for a short time after it has been reset. We would never have need of it again in less time than it takes to intentionally open and close the dot contact anyhow. There are probably several good ways of doing this, but I doubt that any could be simpler than the way I hit upon. There is some compromise involved in my method, which is to slow the charging time of C_5 without slowing its discharge rate. This I did by connecting a slightly leaky diode in series with C_5, as shown in the diagram of Fig. 1, with the cathode toward C_5. The diode used must not have too high back resistance or C_5 will not charge enough to produce the pulse needed to store a dot. It also must not be too leaky or it will allow C_5 to charge so quickly we can still get double dots.

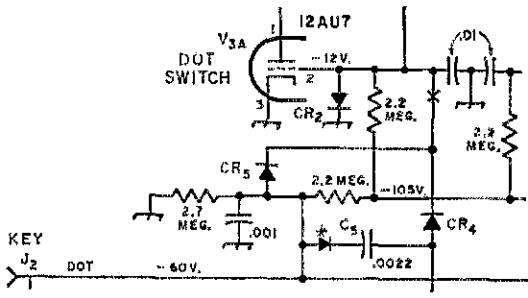


Fig. 1 — Portion of schematic diagram from the 9TO Mark II keyer. The diode marked with an asterisk (*) prevents unintentional double dots.

The diodes which I found would do the job in my keyer had the following action in these tests which anyone can easily duplicate. Using a multimeter with 20,000-ohms-per-volt dc sensitivity, switch to the 100 μA range. Put the diode, reverse connected, in series with the meter and a 9-volt transistor radio battery. Use caution, you can easily ruin your meter! The meter should indicate about ½ μA. Next, leave the diode and battery connected the same way and switch to voltage ranges. The meter should indicate about one division from zero on a fifty-division scale. This is true on any voltage scale. Switching to the R×10,000-ohms scale, after removing the battery, and with the diode connected in the direction which gives the highest resistance reading, the meter needle should barely move, perhaps the width of the needle. If it shows any less movement than this the diode will probably not work well in this circuit. The type of diode that seems most likely to work well is the "garden variety" 750 mA, 400 PIV silicon diode available in any radio supply shop. I found several that would work among the ones on hand in my junk box.[2]

The final test for the diode, of course, will be *how well it works in the keyer. It is a good idea* to use clip leads brought outside the keyer for temporarily connecting the diode under test. With the diode connected properly, turn the keyer on and try holding the dash lever closed and inject dots *with quick flicks of the thumb. Do this often*, leaving only time for one or two dashes between the stored and injected dots. If dots are still being injected after several closures of the dot lever you can be sure the diode is leaky enough to allow

[1] Lutz, "The 9TO Mark II Keyer," *QST*, June, 1967.

[2] *An alternative arrangement to searching for a* "leaky" diode is to connect a resistor in parallel with a good quality diode. The resistance value may be determined experimentally, but should be in the order of several megohms. — *Editor.*

storing dots. Now for the really acid test. Leave the dash lever open and connect a clip lead to ground on the paddle. Touch the free end of the clip lead to the dot contact in a variety of ways: quickly, lightly, slowly, firmly, etc., holding the clip lead by the wire so it will bounce and make the worst possible kind of contact. Of course you should have the keyer set for the slowest speed and must be sure you do not make contact long enough to actually command a second dot. If you manage to cause the keyer to produce double dots only once out of something like ten or twenty attempts, the odds are that you will never manage to cause them when using the dot lever. But if you can cause the keyer to make double dots with any degree of regularity, the diode you are testing is too leaky. Better try another. When one is found that will pass these tests you can solder it in place. Your double-dot days are gone! — *Eugene Lee, K8PDD, 2705 18th Ave., Parkersburg, WV 26101.*

SIGNAL GENERATORS AND RECEIVER SENSITIVITY

Technical Editor, *QST:*

I would add two small items to Mr. Hyder's excellent article.[3]

1) When using a signal generator having an internal impedance of 50 ohms, the common industrial method is to use a 6-dB attenuator pad between the generator and the receiver under test. In this manner, the receiver's sensitivity (for a given $S + N/N$ ratio) is read *directly* in microvolts from the generator's calibrated output attenuator. This is shown in Fig. 2A.

2) Mention might be made of many fine signal generators made prior to WW2 (before the coax era) which did not have a 50-ohm internal impedance. These generators were calibrated in open-circuit microvolts. That is to say, their output-attenuator calibration was accurate when looking into an infinite impedance. The internal impedance was specified by the individual manufacturer. For example, the classic Ferris model 16C had an internal impedance of 11 ohms, and an external 39-ohm resistor was inserted in series with its output when testing a 50-ohm receiver. In this manner, the receiver's sensitivity (for a given $S + N/N$ ratio) was read directly from the output attenuator. This is shown in Fig. 2B.

Note that sensitivity measurements will correlate well if made with either generator system. — *Morton Eisenberg, W3DYL, 1224 McKinley St., Philadelphia, PA 19111.*

[3] Hyder, "Receiver Sensitivity," *QST*, September, 1969.

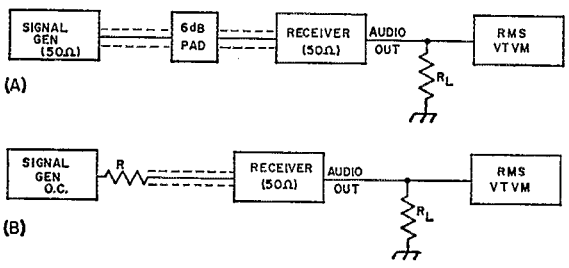


Fig. 2—Connections for reading receiver's sensitivity directly from output-attenuator calibration of signal generator.

ANTENNA NOISE TEMPERATURES

Technical Editor, *QST:*

The two recent articles[4,5] on receiver sensitivity by H. R. Hyder, W7IV, were interesting and informative. However, I should like to point out a conceptual error which appears in several places in the second article. Mr. Hyder implies that the physical temperature T of a receiving antenna is responsible for its delivering a noise power $P_N = kTB$ to the receiver input terminals (where k is Boltzmann's constant and B is the receiver bandwidth). In fact, the physical temperature of the antenna is of very little consequence; for a lossless antenna, it is of no consequence at all. The noise power delivered by an antenna to a receiver depends almost entirely on the temperature and other physical characteristics of the material lying in the antenna's field of view.

For example, a highly directive antenna operating at a frequency of several GHz and looking out into "cold space" may very well deliver only as much noise power as a resistor at a temperature of (say) 3°K. We say that the "antenna temperature" is 3°K, although the physical temperature of the metal making up the antenna is more like 300°K. If this same antenna were rotated so that it looks at the ground, which itself has a temperature around 300°K, the antenna temperature would rise to 300 degrees. This would be true even if a huge refrigerator were used to keep the physical temperature of the antenna structure down to, say, 100°K.

The physical temperature of the material in an antenna is significant only to the extent that the antenna is lossy. As an extreme case, a dummy load may be considered as an antenna with zero-percent efficiency; in that case, of course, the "antenna temperature" is simply the temperature of the resistor. — *Dr. Joseph H. Taylor, Jr., K2ITP, WA1LXQ, Dept. of Physics and Astronomy, Univ. of Mass., Amherst, MA 01002.*

SHIELDED LEADS IN THE TOUCHCODER II KEYBOARD KEYER

Technical Editor, *QST:*

Having recently built the Touchcoder II,[6] a a couple of problems developed for which other builders may appreciate the solution. The Touchcoder worked fine, except when any key was pressed it would first send four or five dashes, then the correct code for the key pressed. In the course of troubleshooting this knotty problem, it was found that the lead to Q_4, the gate of the silicon controlled rectifier, was "hot." This lead easily picked up impulses and triggered before the true sequence was initiated. By shielding the lead from the matrix to the gate of Q_4 and grounding both ends of the shield at the respective circuit boards, the trouble was cured. One-eighth-inch coaxial cable works nicely. I also added an additional heavy wire ground from the other end of the circuit board to the matrix ground, as an additional precaution.

The leads to the weight control potentiometer should also be shielded, as this circuit is also susceptable to pickup problems. With these additions, the Touchcoder II works just as described, and the layout of components is not critical. — *Howard O. Lorenzen, W3BLC, 3713 Bangor St., S. E., Washington, D C 20020.*

[4] Ibid.

[5] Hyder, "Atmospheric Noise and Receiver Sensitivity," *QST*, November, 1969.

[6] Bryant, "Touchcoder II," *QST*, July, 1969.

MORE ON PAUL THE BUNYAN WHIP.

Technical Editor, *QST*:

In the March 1963 issue of *QST*, there was an article which I wrote, "The Paul Bunyan Whip." Following the publication of this article I was inundated with correspondence. Most of the correspondents asked questions which were already answered in the article. In the latest ARRL *Antenna Book*, an abstract of the article was published. The correspondence, which had fallen off to a trickle in between these times, again built up. Hardly a week passes but what I get at least one letter. So perhaps it would be in order to take another look at this mast and fill in the apparent gaps.

The original mast has now been in service since 1957. No changes have been made in the mast. However, the Hy-Gain 3-element tribander has been exchanged for the 6-element TH6DX which has been up for two years. The feed line is now the aluminum-sheeted type. All units are satisfactory and standing up well.

Since the pipe for the mast appears to be a question for *QST* readers, Table I provides specifications, dimensions, weights, and prices for new pipe. The prices are October-November 1969 prices here in Minneapolis, Minn. These are considered to be slightly higher than in the East or West because of shipping charges. The pipe for the mast sections should be ASTM A-53 Grade B specification. This is high-strength steel which will stand up to all stresses imposed in such a mast. Standard black seamless plain-end pipe of the foregoing specification should be ordered. This can be obtained from any steel supplier.

From the weight distribution given in the table, the fulcrum should be located at 29 ft from the bottom of the tiltover portion of the mast. The fixed vertical section should be 34 ft in length with 4 ft in the ground, 30 ft above ground, and clevis locations at 29 ft. There is a slightly greater weight in the top section to facilitate letting the beam down by tilting. This extra weight, however, should not be so excessive as to necessitate a winch. Nonetheless, some provision should be made to use a line or cable to let the beam down easily and enable one to pull it up vertically again. This line should be anchored at a point to prevent the boom end of the beam from banging down when tilting. If this mast were perfectly balanced by trial and error, it could be lowered and raised with a shoestring.

I hope that this information will help to clear up some of the questions. — *Al Hubbard, KØONM, 7305 Auto Club Road, Bloomington, MN 55431.*

TABLE I

Specifications for the Paul Bunyan Whip.

Material	Price
1 — 20-ft length 3½-in. nom. (4-in. OD × 0.026-in. wall) @ $153.27/100 ft.	$30.65
1 — 20-ft length 3-in. nom. (3½-in. OD × 0.216-in. wall) @ $130.21/100 ft.	26.04
1 — 20-ft length 2½-in. nom. (2⅞-in. OD × 203-in. wall) @ $103.39/100 ft.	20.68
1 — 34-ft length 3½-in. nom. (4-in. OD × 0.226-in. wall) @ $153.77/100 ft.	52.11
1 — 4-ft length 8-in. OD (any specification)	18.00
1 — 2-ft length 1½-in. nom. (1.9-in. OD × 0.200-in. wall) @ $62.83/100 ft (extra strong Buttweld, black, *plain*).	1.25
2 — 2-ft × ½-in. × 2-in. bar stock for clevises.	2.00
Total price.	$150.73

Material	Weight
Hy-Gain TH6DX beam. (lb)	47.0
Ham-M rotator.	13.5
4-in. OD pipe @ 9.11 lb per ft.	182.2
3½-in. OD pipe @ 7.58 lb per ft.	151.6
2⅞-in. OD pipe @ 5.79 lb per ft.	115.8
1.9-in. OD pipe @ 3.63 lb per ft.	7.3
Total weight of tiltover mast section with beam and rotator. (lb)	517.4
Lower section weights and lengths	
4-in. OD pipe @ 9.11 lb per ft., 20-ft length (lb)	182.2
3½-in. OD pipe @ 7.58 lb per ft. 10-ft length	75.8
Total weight of lower section of tiltover portion of mast (from upper clevis or "fulcrum" down). (lb)	258.0
Upper section weights and lengths	
3½-in. OD pipe @ 7.58 lb per ft, 10-ft length (lb)	75.8
2⅞-in. OD pipe @ 5.79 lb per ft, 20-ft length	115.8
1.9-in. OD pipe @ 3.63 lb per ft, 2-ft length	7.3
TH6DX beam	47.0
Rotator	13.5
Total weight of upper section of mast (*from upper clevis up*). (lb)	259.4

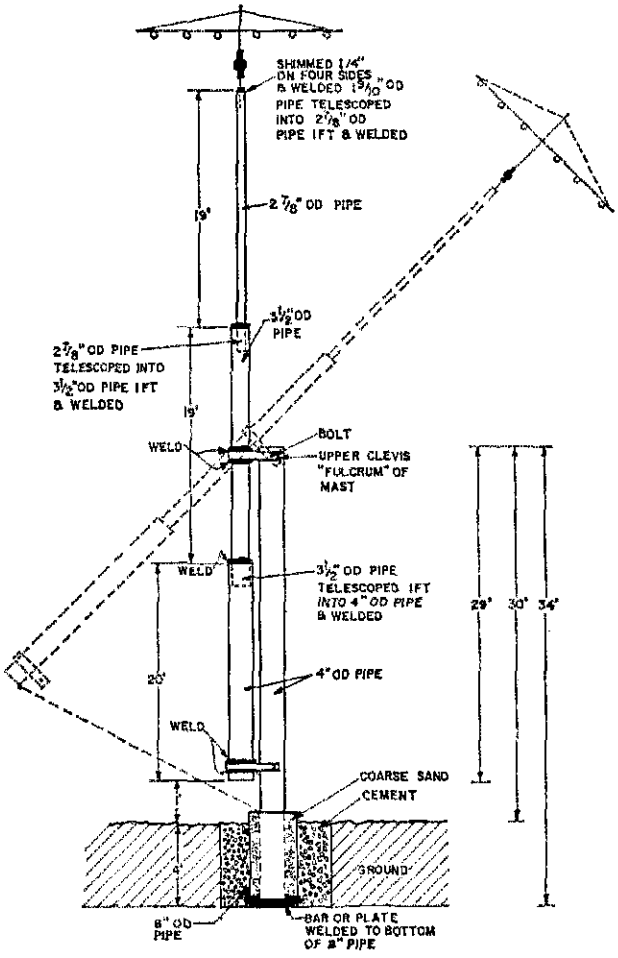


Fig. 3—The Paul Bunyan Whip. These dimensions are somewhat different than given in the original article.

Announcing the Annual ARRL Novice Roundup

February 7 through February 22

What would February be like without the Novice Roundup, a contest designed expressly to acquaint the newcomer to amateur radio with contest operating and at the same time help him improve his code speed and also QSO new states for his WAS.

WNs, this is your contest. Be sure to participate; you'll find it to be time well spent!

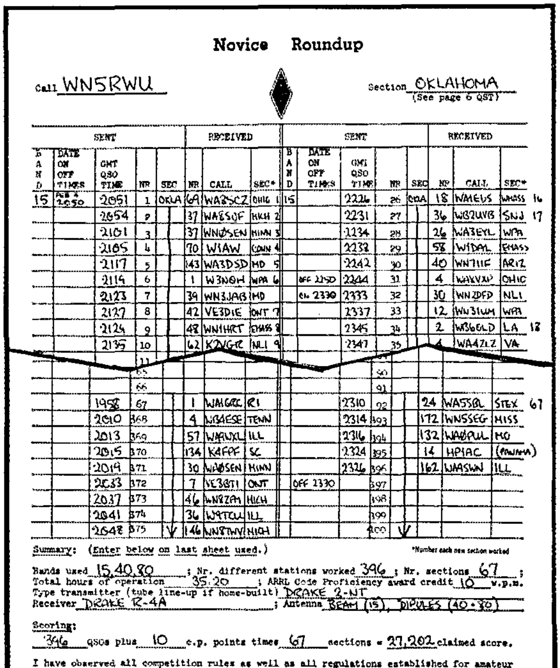
You can read the results of last year's NR beginning on page 56 of June 1969 *QST*.

Rules for the NR are simple. You may operate up to 40 hours during the contest period, exchanging a serial number and your ARRL section with other stations. Novices may work anybody; others may work only Novices. After the NR is over, send your contest log (along with comments and photos) to us here at ARRL HQ; results will appear in *QST* soon afterward. Logs must be postmarked no later than March 6, 1970.

If you finish in first place in your section, you'll receive a handsome certificate award.

How to Participate

Contest QSOs are much briefer than ordinary ragchews, and you should *not* repeat your information (call, number and section) umpteen times



Novice Roundup

Call WN5RWU — Section OKLAHOMA (See page 6 QST)

BAND	DATE ON OFF TIMES	GMT QSO TIME	NR	SEC	NR	CALL	SEC*	BAND	DATE ON OFF TIMES	GMT QSO TIME	NR	SEC	NR	CALL	SEC*
15	FEB 4 2050	2051	1	OKLA	69	WA8SCZ	OHIO 1	15		2226	26	OKLA	18	WN1EVS	WMASS 16
		2054	2		37	WA8SOF	MICH 2			2231	27		36	WB2UVB	SNJ 17
		2101	3		37	WN0SEN	MINN 3			2234	28		26	WA3EYL	WPA
		2105	4		70	W1AW	CONN 4			2232	29		58	W1DAL	EMASS
		2117	5		143	WA3DSD	MD 5			2242	30		40	WN7IIF	ARIZ
		2119	6		1	W3NGH	WPA 6		OFF 2250	2244	31		4	WA8VXP	OHIO
		2123	7		39	WN3JAB	MD		ON 2330	2333	32		30	WN2DFD	NLI
		2127	8		42	VE3DIE	ONT 7			2337	33		12	WN3IUM	WPA
		2124	9		48	WN1HRT	EMASS 8			2345	34		2	WB6ELD	LA 18
		2135	10		62	K2VGR	NLI 9			2347	35		4	WA4ZLZ	VA
			11												
			65								90				
			66								91				
		1958	67		1	WA1GEC	RI			2310	92		24	WA5SBL	STEX 67
		2010	368		4	WB4ESE	TENN			2314	393		172	WN5SEG	MISS
		2013	369		57	WA9UXL	ILL			2316	394		132	WA0PUL	MO
		2015	370		134	K4FPF	SC			2324	395		14	HP1AC	(PANAMA)
		2019	371		30	WA0SEN	MINN			2326	396		162	WA9SWN	ILL
		2033	372		7	VE3BTI	ONT		OFF 2330		397				
		2037	373		46	WN8ZAM	MICH				398				
		2041	374		36	W9TCU	ILL				399				
		2048	375	V	146	WN8TWV	MICH				400	V			

Summary: (Enter below on last sheet used.) — *Number each new section worked

Bands used 15,40,80 ; Nr. different stations worked 396 ; Nr. sections 67 ;
Total hours of operation 35:20 ; ARRL Code Proficiency award credit 10 w.p.m.
Type transmitter (tube line-up if home-built) DRAKE 2-NT
Receiver DRAKE R-4A ; Antenna BEAM (15), DIPOLES (40 + 80)

Scoring:
346 QSOs plus 10 c.p. points times 67 sections = 27,202 claimed score.

I have observed all competition rules as well as all regulations established for amateur radio in my country. My report is true and correct to the best of my knowledge.

Craig Boyer — signature; WN5RWU — call; BOX 10763 OKLAHOMA CITY, OKLA. 73110 — full mailing address

ROUNDUP PERIOD	
Starts	*Ends*
Feb. 7	Feb. 22
0001 (12:01 A.M.)	2359 (11:59 P.M.)
Greenwich Mean Time	Greenwich Mean Time

unless QRM is extremely bad. Here's the way a typical exchange might go:

CQ NR CQ NR CQ NR DE WN2CPQ WN2CPQ WN2CPQ NR K
WN2CPQ WN2CPQ WN2CPQ DE WN7IYZ WN7IYZ WN7IYZ AR
WN7IYZ DE WN2CPQ GE HR NR 27 WNY BK
WN2CPQ DE WN7IYZ R TNX HR NR 5 WASH BK
WN7IYZ DE WN2CPQ R TNX 73 $\overline{\text{SK}}$ DE WN2CPQ NR K

Begin your serial numbers (remember that NR means "number" as well as "Novice Roundup") with NR 1. If you don't know your ARRL section even after referring to Page 6 of *QST*, drop us a card and we'll help you out. Generals: *don't* call CQ NR; *answer* Novice CQ NRs.

Note that time is expressed in Greenwich Mean Time (GMT). If you're unfamiliar with GMT, remember that it's 5 hours ahead of EST, 6 ahead of CST, 7 ahead of MST and 8 ahead of PST. Better yet, send for our handy Operating Aid #14, which contains, among other goodies, a time conversion chart.

Scoring

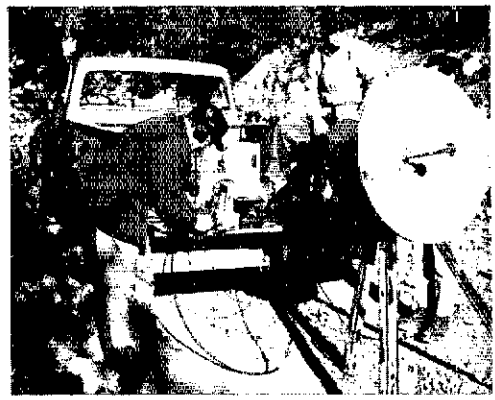
Count one point for each contact (you may work a station only once, regardless of band); add your ARRL Code Proficiency credit, then multiply by the total number of sections you worked. If you get 84 QSOs in 31 sections and have a CPC of 10 w.p.m. from W1AW or W6OWP, then your score is 84-plus-10 times 31, or 2914 points. For details on the Code Proficiency program, see Op-News of this issue. By the way, you may work DX stations for contest credit, too, although there's no multiplier involved.

Go To It!

Read the rules carefully. Keep a check-sheet of stations worked (we have Operating Aid #6 available free) so that you don't have duplicate QSOs. Log-sheets, Op Aid 6 and a map of the United States 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.** To aid us in getting these forms to you as quickly as possible, please be sure to include with each request a

(Continued on page 95)

Results, September VHF QSO Party



Here's **W7VRM** operating the 2.3-GHz station in QSO with K7AUO/7. Assisting are W7FBP and WA7GFP.

REPORTED BY AL NOONE,* WA1KQM/WB6SAZ

AURORA or bust! This is what it would take to save the day. On Sunday evening, with little or no warning, this is what we got. Otherwise, band openings were poor to fair throughout most of the USA and Canada, local groundwave activity supplying most of the QSOs.

Highlighting the September VHF QSO Party was the single-operator multi-band effort of **K3IPM.** Stan's score of 24,596 nearly doubled that of his closest competitor **K1AGB** — 13,515. **W1DC/1,** the 1200 Radio Club, turned in an outstanding score of 59,340 to lead the multi-operator multi-band class. They were closely followed by **WA2WEB/2,** the East Coast VHF Society, scoring 52,851 points. Single-operator single-band honors go to **WB8AHY** scoring 3720 while **W3KWH's** 6944 points were good enough to top the multi-operator single-band class.

Notable section returns were submitted by single-operator stations **K9HMB** — 25 on 50 MHz; **W2UK** — 24 on 144 MHz; **K3IUV** — 11 on 220 MHz; **W2CLL** — 15 on 432 MHz; and **K3IUV** — 2 on 1296 MHz and above. High multi-operator returns went like this; **WB2-GKE/2** — 34 on 50 MHz and 22 on 144 MHz; **WA2WEB/2** — 14 on 220 MHz and 15 on 432 MHz; and **K7AUO/7** — 4 on 1296 MHz and above.

Summarizing, some 307 logs were received from 56 sections. Of these, 240 were single-op and 67 were multi-op entries. Awards are scheduled to be mailed on January 15, 1970.

CU in the VHF SS.

Soapbox

"At a 6007-foot peak in the Olympic Mt. Range, with winds to 40 MPH, rain by the barrel and a howling snow blizzard. What a contest, we won though, me and the antennas!" — **K7VNU,** Wash. "Well, what can I say? — I tried! But alas, no band opening, neither North or South." **KP4DFH, W.I.** "Good ground wave, local activity but no band openings on 6 meters. Two meters was the place to be. All-in-all an enjoyable contest.—**WA3KXX,** E. Pa.

* Communications Assistant, ARRL.

"Sporadic E_s, ionospheric and meteor scatter conditions were at an all-time low. Local tropospheric conditions were the only thing that saved the day." — **K7ICW,** Nev. "I feel the change in rules that allows operators to operate any two 14-hour periods is the greatest thing to hit a VHF contest in years." — **K1PMM,** N.H. "Found plenty of activity on 432 MHz. Highlight of the weekend was my 70-mile QSO on 1296." — **K3IUV,** E. Pa. "My first contest and I learned a lot." — **WA1LIO,** Conn. "Local activity was the lowest I've ever seen, particularly on 50 MHz." — **W4WQZ,** Tenn. "I have completed a transmitter and receiver for 10 GHz and both are operational. Now all I need is somebody to work." — **WB2IRX,** NNJ. "Activity a little disappointing, especially on 432 MHz.; but, the 23 QSOs in 4 sections on 220 MHz. was very gratifying." — **W6GGV/6,** L.A. "Surprised to hear 6 meters dead during most of the contest." — **WA6CPP,** SJV. "Worked one new state for WAS." — **WA3KLF,** Md. "Not much 50 MHz. scatter, but Sunday evening's aurora livened things up on 6 and 2 meters." — **WA2WEB/2,** NNJ. "My apologies to the many stations who asked for 432 MHz. QSOs, promised equipment never materialized!" — **W3EMD/8,** WVA. "Picked up two new states on 220 MHz. and 432 MHz. The aurora was a surprise." — **W2CNS,** WNY. "Spent the entire weekend on a mountain-top in western North Carolina. Worked all the states in the 4 and 8 call areas plus Missouri and Mississippi all on groundwave." — **WB4-LDO/4,** N.C. "Got a great deal of multipliers in the last 6 hours." — **WB8BGY,** Mich. "Interesting contest, would like to see more DX from the midwest." — **WB2LGK,** NLI. "Good contest but had to QRT early." — **WB9ALZ,** Ind. "Good work, keep the contest's coming, we love em! Would like to see a power multiplier." — **WA2FUZ,** NLI. "Aurora was so strong on 6 meters that I was able to get W2CNS for a new section with only one watt output!" — **VE2HW,** Que. "Sure would help if AC power would stay on!" — **W0PFP,** Iowa. "Could find only 5 stations willing to use c.w. during the poor to fair auroral scatter opening in the closing hours, frustrating! Had a good time anyway, as always." — **W0EKB,** Nebr. "Sunday night good, especially with the aurora." — **WA0UWI.,** Minn. "It seems my 6560 mixer just doesn't have enough ooomph by itself! Will have an amplifier built for next test." — **VE7ANP,** B.C. "Glad to hear all the c.w. No west coast DX heard despite the VE3-VE6 opening. Will have a KW for the next test." — **VE3GAF,** Ont. "Picked up my 21st state on 2 meters during aurora." — **VE2DFO,** Que. "I hereby submit my score of 1 station, also heard 8 VWs, 2 Fords and a power mower." — **VE6AIA,** Alta. "Band conditions very bad except for 2 minutes at 0149 GMT on 15 September when VE3CUA was worked on 50 MHz." — **VE6AHE,** Alta. "Death to all VE2s in June!" — **VE3ASO,** Ont. "Why not give an award for multi-op regardless of number of entries?" — **W6EPL,** S. Bar. "Very poor ac-

tivity this fall, missed the Southern California mountain toppers." — **WB6KBZ/6**, SCV. "Operated with 100% emergency power from the top of Ft. Bluff." — **K4WHW/4**, Ala. "Worked 15 states with 5 watts output on 144 MHz." — **WA4ZSF/4**, Va. "Hope for better results next year." — **W4NLX/4**, E. Fla. "Rolled my own s.s.b. rig for this contest and found it worth every minute of the effort." — **K3NYG**, Del. "First time on VHF, had a great time and met some very nice people." — **WN3LAR**, E. Pa. "Contest was very enjoyable." — **WA3GSH**, W. Pa. "Just got home from out of town to catch the end of the contest and the aurora, quite a finishing touch." — **W2WGL**, WNY. "Worked a VE2 on 144 MHz, c.w." — **WA2ANI**, NNJ. "Two meters unbelievable." — **WB2TUT**, NLI. "Unusual comment heard, "Are you running phone or c.w. OM". — **K2PCQ**, WNY. "New rig sure made a difference." — **W2GTF**, NNJ. "Finally did something on 220, but hope to be really equipped for UHF in June '70." — **WB2GKE/2**, NNJ. "Last contest from R.I., hope to pop up from our new QTH come the January contest." — **WA1GFG**, R.I. "Of all the weekends to come down with a head cold." — **WA1BFD**, EMass. "Wait till January." — **WA9HHH/1**, Conn.

SCORES

In the following tabulation, scores are listed by ARRL divisions and sections. The top single-operator scorer in each section receives a certificate award. Multiple-operator scores are shown at the end of each section tabulation; in sections where at least three such entries were received, the top multioperator scorer receives a certificate award. A double asterisk indicates Novice award winner; one asterisk indicates Hq. staff member, ineligible for award.

Columns show final score, total number of contacts, section multiplier, and bands used. A represents 50 MHz; B, 144 MHz; C, 220 MHz; D, 420 MHz; E, 1215 MHz and above.

ATLANTIC DIVISION

Delaware

W3CGV 4636- 98-36-ABCDE
K3NYG 3250-130-25-AB
WA3JXU 1170- 78-15-B
WA3HWC 528- 48-11-B
WA3KDQ/3 (4 oprs.) 120- 20- 6-AB

Eastern Pennsylvania

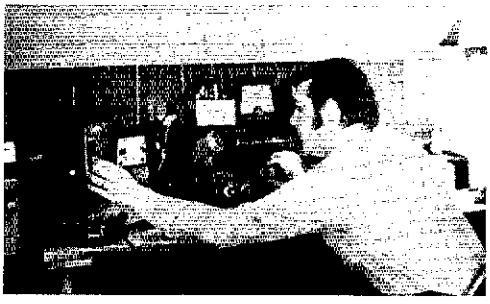
K3IPM 24,596-433-52-ABCD
K3IUV 3796- 72-26-CDE
WA3AAN 3477-183-19-A
K3PGB 2992-176-17-A
WA3FCZ 700-100- 7-AB
W3CLQ 676- 52-13-AB
W3GOA 456- 38-12-A
WN3LAR 378- 54- 7-B
WN3LYC 360- 45- 8-B
WA3KXX 196- 49- 4-A
WA3GYG 170- 34- 5-A
WA2IUU/3 6- 3- 2-B
WA3LUV 3- 3- 1-A
W3AD/3 (8 oprs.) 15,984-317-48-ABCDE
K3ZSG (K3ZSG, WA3s DNC FVK) 13,728-250-52-ABCE
K3MTK/3 (4 oprs.) 10,764-293-26-ABC
W3ARW (K3SQO W3s ARW GF) 8602-161-46-ABCD
WA3HDI/3 (6 oprs.) 4080-170-24-AB
WB2LZD/3 (5 oprs.) 3596-124-29-AB
W3AES/3 (5 oprs.) 3151-137-23-A
W2FCL/3 (9 oprs.) 2730-130-21-AB

Maryland-D.C.

WA3APQ 3024-144-21-AB
W3KMV 2431-143-17-A
W3LUL 1944-108-18-B
K3GEG 1717-101-17-A
WA3HEN 814- 74-11-B
WA3KLF 693- 63-11-A
WA3GBK 612- 51-12-B
W3HB 360- 45- 8-AB
W3MSN 306- 34- 9-AB
W3GN 288- 32- 9-B
W3QU 209- 19-11-AB
W3PGA/3 (4 oprs.) 4260-132-30-ABD
W3PZK (W3PZK, WA3LTJ, WN3LPG) 162- 27- 6-AB

Southern New Jersey

WA2EMB 5180-111-35-BCD
WB2SZK 2034-103-18-ABC
W2ZQ (K3QPF, opr.) 1904-119-16-AB



Bill, K2OWR, made 202 QSOs on 144 MHz, good enough for second place in the NNJ section. His 15 over 15 long john above must have made the difference, considering he was only running 75 watts on A-M.

DIVISION LEADERS

Single Operator		*Multioperator*
K3IPM	*Atlantic*	K3HKK/3
K9KFR	*Central*	WA9JYR
WAØUWL	*Dakota*	.....
K4IUV	*Delta*	W4EXU/4
WA8LRE	*Great Lakes*	WA8SNY/4
WB2SIH	*Hudson*	WA2WEB/2
KØTLM	*Midwest*	WAØPBO
K1AGH	*New England*	W1DC/1
W7FN	*Northwestern*	K7AUO/7
WB6CKT	*Pacific*	WB6KBZ/6
K4SUM	*Roanoke*	W3EMD/8
.....	*Rocky Mountain*	WAØSKH
W4SRX	*Southeastern*	K7JPC/4
K6YNB/6	*Southwestern*	K6QEH
.....	*West Gulf*	W5WAX
VE2DFO	*Canadian*	VE3EW/3

K2BWR (K2s BWR ZRJ) 6992-184-38-AB
WA2ETG (WA2s AXF EPG FVU) 1700-100-17-AB

Western New York

W2CNS 12,027-191-57-ABCD
K2YCO 8840-152-52-ABCD
WB2VUO 2016- 96-21-A
K2LGJ 990- 46-18-BD
K2ACQ 520- 26-10-D
WA2HYK 420- 30-14-B
W2WGL 294- 21-14-B
WA2HWC 130- 26- 5-AB
W2OW (11 oprs.) 11,520-250-45-ABC
K2ERQ (6 oprs.) 6048-168-36-AB
K2PCQ (6 oprs.) 3657-159-23-AB
WA2JOQ (4 oprs.) 1080-100-19-AB
WA2GJA/2 (K2LFB, WA2GJA) 1500- 75-20-AB
W2MAU (K2s KIR KTK, W2WZR) 1170- 65-18-B

Western Pennsylvania

W3BWU 1728-106 16-ABC
WA3HUR 966- 69-14-A
W3DJM 160- 40- 4-A
WA3GSH 112- 28- 4-A
WA3KYC 51- 17- 3-B
K3HKK/3 (8 oprs.) 19,034-287-62-ABCD
W3KWH (K3s QYR SKK) 6944-224-31-A
WA3EOQ/3 (WA3s EOQ LJR) 684- 76- 9-B

CENTRAL DIVISION

Illinois

K9HMB 6528-200-32-ABD
W9JGV 708- 59-12-B
W9ABA 425- 85- 5-B
WA9QPM 404-101- 4-B
WA9NRI 330- 66- 5-B
W9DJZ 195- 39- 5-AB
WA9ZGF 120- 40- 3-B
WA9JYR (2 oprs.) 2768-173-16-AB

Indiana

K9KFR 7210-206-35-AB
WB9AMB 182- 26- 7-A
WB9ALZ 24- 6- 4-A

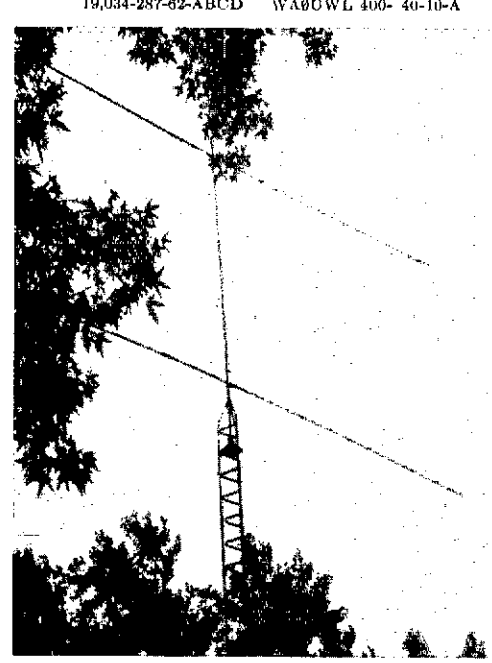
Wisconsin

WA9JCX 1980- 99-20-AB
WA9EZU 40- 10- 4-A
WA9VHT (WA9s MCC SWX) 55- 11- 5-AB
W9PJ/9 (4 oprs.) 21- 7- 3-AB

DAKOTA DIVISION

Minnesota

WAØUWL 400- 40-10-A



WAØRUE 72- 24- 8-AB
KØGYO 30- 30- 1-A

DELTA DIVISION

Louisiana

W5JFB 24- 12- 2-AB

Mississippi

WA5RMS 297- 38- 9-A

Tennessee

K4THV 1998-111-18-AB
W4WQZ 697- 38-17-ABD
W4EXU/4 (4 oprs.)
1530- 83-18-ABD
WB4IOB (K4LQO, WB4s IOB JSD)
438- 69- 6-ABD

GREAT LAKES DIVISION

Kentucky

WA8TYF/4
1771- 75-23-ABD
WA8SNY/4 (K4s QPJ WYN, WA4QVQ)
2874-117-22-AB

Michigan

WA8PIE 3000-150-20-B
K8VEX 2140-107-20-A
WB8EGY
1904-112-17-AB
W8NOH 1872-104-18-AB
K8AEM 576- 64- 9-AB
W8DBL 363- 33-11-A
WA9ULU/8
170- 34- 5-B

Ohio

WA8LRE 8388-233-36-AB
WB8AHY
3720-186-20-A
W8WEN 1127- 49-23-B
WA8YHN 962- 74-13-AB
WA8RCN 760- 76-10-A
WB8APJ 330- 66- 5-A
W8JRN 296- 35- 8-ABD
WA8YRS 196- 28- 7-A
WB8CQC 132- 33- 4-A
W8IPT 120- 24- 5-AB
K8YAH 20- 20- 1-A
W8LGI 2- 1- 1-C
K8LUC (5 oprs.)
280- 56- 5-A

HUDSON DIVISION

Eastern New York

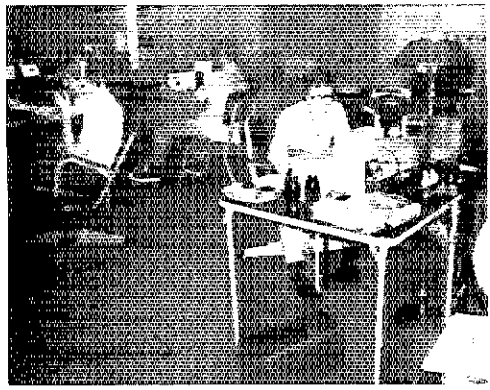
WB2SIH
12,580-338-37-ABD
K2BGU 4131-153-27-AB
WB2YQU
3074- 95-29-ABD
WA2SPL 2580- 68-30-ABCD
WA2HAQ
1458- 81-18-AB
K2CQG 1066- 41-13-D
WB2HEM 320- 40- 8-B
W2HF 270- 19- 9-BCD
W2IP 170- 17-10-B
WA2ISN 152- 38- 4-A
W2UFT (4 oprs.)
3550- 71-25-CD
K2ARO (K2ARO, WB2NPE) 1980- 84-20-BD

New York City — Long Island

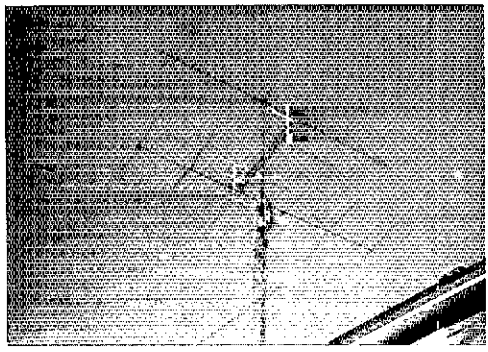
WB2MRK
40,197-292-33-ABCDE
WB2MZE
5974-206-29-AB
WB2YZV 4160-160-26-AB
WB2TUT 2002-182-11-B
WA2EDS 1976- 64-26-ABCD
WA2DPF 1664-128-13-B
WA2PMW
1332-111-12-B
WB2GWU
1092- 84-13-AB
WB2ZBV 1090-109-10-B
W2KXG 590- 59-10-B
W2LXC 108- 18- 6-B
WB2LGK 105- 21- 5-A
WA2BRF 40- 10- 4-B
WB2GYK 38- 19- 2-B
K2HGR 20- 10- 2-B
WA2FUZ (WA2s FUZ YJF)
4416-192-23-AB

Northern New Jersey

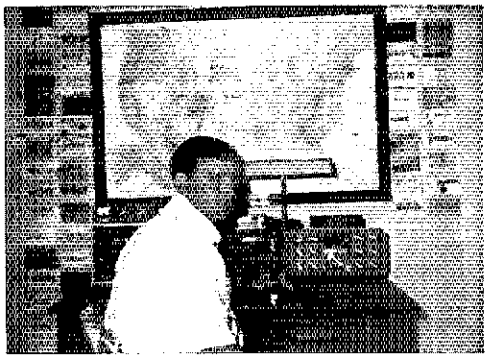
WA2AN1 6592-206-32-AB
K2OWR 3030-202-15-B
WA2VAZ 2704-104-26-AB
W2AQT 2574-143-18-B
W2CVW 2472- 94-24-ABCD
WA2UDT
2380-170-14-B
W2CLL 1980- 45-22-CD
W2UK 1824- 76-24-B
WB2GYS 1425- 75-19-AB
W2DZA 1260- 47-21-ABCD
W2AMJ 800- 45-20-B



Multi-opping **WA2ETG**, are (l. to r.) Dave, WA2FVU on 6, Skip, WA2AXF, on 2-meter phone, and Rich, WA2ETG, on 2-meter cw.



Wondering what **K1AGB** used to snag the Division Leader spot? See above. Ed promises to be in there fighting on 144 MHz during the VHF SS.



Jim, **WB4LJP/4**, operating from his shack in Alabama comments he had a lot of fun and waited for the band to open but all was in vain!

WB2MXZ 462- 66- 7-AB
WB2IRX 414- 46- 9-B
WA2FAX 182- 26- 7-AB
WB2LGJ/2
126- 21- 6-AB
WA2EUO 105- 21- 5-B
WB2ZLI 20- 10- 2-B
WA2EUI 9- 3- 3-B
WA2WEB/2 (11 oprs.)
52,851-570-79-ABCDE
WB2GKE/2 (7 oprs.)
50,094-664-69-ABCD
KH6GHL/2 (4 oprs.)
23,961-467-49-ABC
W2OJ/2 (4 oprs.)
14,448-257-48-ABCD
W2GTF (WB2s LEB MIC NRG)
11,187-339-33-AB
W2EYD/2 (8 oprs.)
4830-230-21-AB
WB2MFC/2 (10 oprs.)
2232-124-18-AB

MIDWEST DIVISION

Iowa

WØPFP 250- 25-10-A

Kansas

KH6FLD/Ø 80- 20- 4-AB
WAØLBO (WAØs PBO PKG)
301- 43- 7-AB

Missouri

K6TLM 616- 56-11-AB
WAØAUB 477- 53- 9-A

Nebraska

WØEKB 540- 45-12-A
WØJCO 360- 36-10-A
WAØMRH 342- 38- 9-A

NEW ENGLAND DIVISION

Connecticut

WA1IQJ* 2990-115-26-AB
W1VTU 2860-128-22-BD
WA1HUE 1817- 79-23-AB
W1WHL 1782- 78-22-ABC
W1AW* (K6OSO, opr.)
1472- 64-23-AB
WA9HHH/1*
656- 41-16-AB
WA1LIO 472- 59- 8-A
W1ENZ 328- 41- 8-B
K1HTV 300- 15-10-D
WA1KQM/1*
168- 21- 8-AB
W1HDQ* 160- 20- 8-AB
W1NBP 91- 13- 7-B
WN1LKM 12- 4- 3-B
K1QQX/1* 2- 2- 1-A
K1FXE/1 (7 oprs.)
27,303-433-57-ABCD
WA1IOX (12 oprs.)
23,241-331-61-ABCDE
WA1IED (6 oprs.)
15,288-268-52-ABCD
WA1GTP (WA1s EDJ FSK GTP) 898- 56-16-AB
K1TFA/1 (K1s IPT TFA, WA1GMF)
682- 62-11-B

Eastern Massachusetts

K1AGB 13,515-225-53-ABCD
W1EOJ 10,048-169-49-ABCD
K9AQP/1 935- 27-17-CDE
W1LMZ 700- 50-14-B
WA1BFD 418- 38-11-A
K1CHY 297- 25-11-ABCD
W1IFL 130- 26- 5-A
W1MX (WA2KZV, K4GGI)
5957-150-37-ABCD

Maine

W1YTW 1500- 65-20-BC
WA1CKD 120- 15- 8-AB

New Hampshire

W1AZK 2814- 76-26-BC
WA1FSZ/1
2220-111-20-AB
W1JSM 1958- 89-22-B
K1PMM 228- 38- 6-A
W1DC/1 (17 oprs.)
59,340-777-69-ABCDE
W1JJO (4 oprs.)
4805-150-31-ABC
W1SCC (K1HDO, W1SCC, K2QVV)
3488-213-16-ABD

Rhode Island

W1AJR 1045- 27-19-CDE
WA1GFG 880- 80-11-B

Vermont

K1GYT 3692-142-26-AB

Western Massachusetts

WA1HHN
5162-178-29-AB
K1JIX (W2BVU, opr.)
731- 21-17-CDE
W1BYO/1 138- 23- 6-A
W1UGB 112- 16- 7-AB
W1KZS/1 (12 oprs.)
39,712-529-68-ABCD
W1DKC/1 (W1s DKC GTO)
270- 27-10-AB
WB2RWD/1 (W1FHZ, WB2IQY) 12- 3- 3-AD

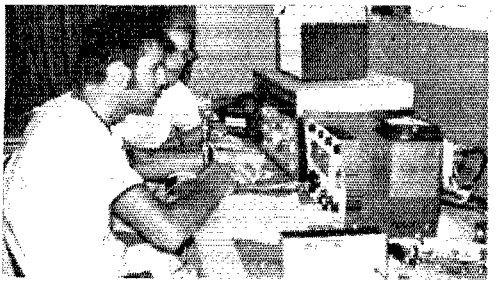
NORTHWESTERN DIVISION

Oregon

W7UDM
810- 50-10-ABCDE
WA7AWJ 192- 48- 4-AB
WA7LLL 104- 26- 4-AB
K7ZCB 76- 19- 4-AB
K7AUO/7 (12 oprs.)
1905-110-15-ABCDE

Washington

W7FN 1157- 89-13-AB
K7VNU/7 434- 62- 7-AB



WB2GKE/2 the Interstate VHF Society, took second place in the NNJ section for a multi-op entry. Shown operating is WB2UQT with WA2BAT logging.

K2LME and W2CUX holding their own on 144 MHz from **WA2WEB/2,** East Coast VHF Society club station.

W7YOZ 312- 78- 4-AB
K7IDX 60- 30- 2-AB
W7AZU/7 18- 18- 1-A
K7BBO (K7BBO, WA7MZK) 693- 99- 7-AB
W7TSS (W7TSS, WA7JBG) 138- 46- 3-AB
W7DZO/7 (K7IDX, W7sDZO YDP) 132- 33- 4-AB

PACIFIC DIVISION

East Bay

WA6JUD/6 (K6DDT, WA6JUD) 792-132- 6-B

Nevada

K7ICW 252- 28- 9-AB
WA6GER/7 1- 1- 1-B

Sacramento Valley

WA6CXB 76- 19- 4-B
W6TEE 64- 15- 4-ABC

San Joaquin Valley

WA6CPP 360- 36-10-AB
WA6BVC 68- 17- 4-B
WA6IMN/6 (WA6s EXV IMN) 120- 19- 6-BD

Santa Clara Valley

WB6CKT 1668-139-12-AB
WA6FAC 200- 50- 4-B
W6FUV 100- 20- 5-AB
WA6FYN 32- 16- 2-B
WB6KBZ/6 (K6GSS, WB6KBZ) 2280-190-12-AB

ROANOKE DIVISION

North Carolina

WB4LDO/4 1360- 80-17-AB
K4YYJ 468- 36-13-B
WB4HHR 232- 29- 8-A
K4DFI 228- 38- 6-AB
W4BNU 124- 31- 4-B
K4ROM 110- 22- 5-A
WA4BNX/4 (K4LVV, WA4VCC) 3388-154-22-AB

South Carolina

W4VHH 220- 18-11-BD

Virginia

K4SUM 4428-144-27-ABD
K4QIF 3030- 79-30-BD
WA4GLO 2552-116-22-AB
WA4YXK 1092- 84-13-AB
W4LTU 578- 34-17-B
WA4ZSF/4 (4 oprs.) 5358-137-38-ABD

West Virginia

W3EMD/8 (K4RKA, W3EMD) 7410-195-38-AB

ROCKY MOUNTAIN DIVISION

Colorado

WAØSKH (4 oprs.) 198- 33- 6-AB

SOUTHEASTERN DIVISION

Alabama

K4WHW/4 240- 60- 4-A
WB4LJP/4 135- 27- 5-A

Eastern Florida

W4OJU 94- 47- 2-AB
WB4KOM 9- 9- 1-B
W4NLX/4 (13 oprs.) 164- 81- 2-AB

Georgia

W4ISS 105- 15- 7-B
WA4OSR 100- 25- 4-A
K7JPC/4 (K7JPC, K8UQA) 176- 22- 8-B

West Indies

KP4DFH/KP4 19- 19- 1-A

Western Florida

W4SRX (K1WYS, opr.) 270- 30- 9-AB

SOUTHWESTERN DIVISION

Los Angeles

K6YNB/6 1556-249-17-ABC
W6GGV/6 2548-167-13-BCD
K6SSN 2366-163-14-ABCD
WA6TNW 645-129- 5-A
WB6PKA 605-121- 5-B
K6HXW 568- 71- 8-AB
WA6FQU 552- 92- 6-AB
WB6SAE 440-110- 4-A
W6QCV 426- 71- 6-AB

Orange

WA6FIT 784-112- 7-AB
K6IBY 585- 36-13-ABC
W6HPH 370- 25-10-BDE
WB6YXY 275- 55- 5-B
K6QEH (4 oprs.) 6417-239-23-ABCD
K6BPC/6 (4 oprs.) 2085-135-15-ABCDE

San Diego

W6NLO 2574-124-18-ABCD
W6QED 1206-134- 9-AB
WB6JLC 100- 25- 4-A

Santa Barbara

WB6QLY/6 140- 35- 4-B

(*Continued on page 95*)

Minimum Number of Sections					
	20	15	4	3	2
Band (MHz)	50	144	220	420	1215
K1AGB	18	19	10	6	
K1HTV				10	
K1JIX			7	9	1
K1PXE/1*	20	19	10	8	
W1AJR			7	11	1
W1AZK		19	7		
W1DC/1*	25	21	10	10	3
W1EUJ	18	14	8	9	
W1JSM		22			
W1KZS/1*	25	20	12	11	
W1MX*	12	18	5	2	
W1SCC*	6	7		3	
W1VTU		21		1	
W1YTW		16	4		
WA1IED*	22	16	7	7	
WA1IOX*	19	20	9	12	1
K9AQP/1			7	9	1
K2ACQ				10	
K2ARO*		13		7	
K2BWR*	20	18			
K2CQG				13	

Minimum Number of Sections					
	20	15	4	3	2
Band (MHz)	50	144	220	420	1215
K2ERQ*	17	19			
K2LGJ		15		3	
K2OWR		15			
K2YCO	24	16	5	7	
W2AMJ		20			
W2AQT		18			
W2CLL			7	15	
W2CNS	23	19	6	9	
W2DZA	3	13	4	1	
W2GTF*	17	16			
W2MAU*		18			
W2OJ/2*	15	17	8	8	
W2OW*	21	19	5		
W2UFT*			13	12	
W2UK		24			
WA2ANI	15	17			
WA2EMB		17	4	14	
WA2EUS	8	8	4	6	
WA2HAQ	1	17			
WA2SPL	11	8	5	6	
WA2WEB/2*	26	21	14	15	3

Minimum Number of Sections					
	20	15	4	3	2
Band (MHz)	50	144	220	420	1215
WB2GKE/2*	34	22	5	8	
WB2SIH	19	17		1	
WB2VUO	21				
WB2YQU	9	14		6	
KH6GHL/2*	24	18	7		
K3HKK/3*	28	21	6	7	
K3IPM	22	16	7	7	
K3IUV			11	13	2
K3MTK/3*	17	16	3		
K3ZSG*	26	17	7		2
W3AD/3*	23	16	1	7	1
W3AES*	23				
W3ARW*	14	19	8	5	
W3CGV	12	10	6	7	1
W3KWH*	31				
W3LUL		18			
W3PGA/3*	13	11		6	
WB2LZD/3*	23	6			
K4QIF		17		13	
K4SUM	8	12		7	
WA4GLO	20	2			

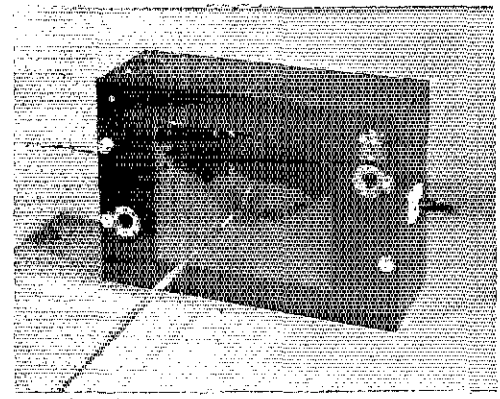
Minimum Number of Sections					
	20	15	4	3	2
Band (MHz)	50	144	220	420	1215
WA4ZSF/4*	19	16		3	
K6QEH*	10	6	3	4	
K6YNB/6	7	6	4		
W6GGV/6		6	4	3	
W6HPH		4		5	1
W6NLO	6	5	4	3	
K7AUO/7*	2	5	2	2	4
K8VEX	20				
W8WEN		23			
WA8LRE	24	12			
WA8PIE		20			
WB8AHY	20				
W3EMD/8*	14	24			
K9HMB	25	5		2	
K9KFR	22	13			
VE2DFO	15	20			
VE3EW/3*	17	18	5	2	

*Multioperator Station

Australis-Oscar 5

When to Listen

BY SHELDON A. GLICK,* WA1IUO AND WILLIAM I. DUNKERLEY, JR.,** WA2INB



Australis-Oscar 5 is shown in this official NASA photograph, in its final stage of preparation before launch.

Australis-Oscar 5 Frequencies:
29.450 MHz 144.050 MHz

WITH everything going according to plans, on January 9, 1970[1], a NASA Thor-Delta rocket will lift-off the pad at the Western Test Range, California. It will carry Australis-Oscar 5, and Tiros-M, a meteorological satellite. The rocket will head south and slightly west from its launch point, crossing the equator at an angle of 101.56° ±0.3°. At 3925.5 seconds (about 65 minutes) after lift-off, Tiros-M will be ejected from its position in the nose of the Delta vehicle — 30 seconds later Australis-Oscar 5 will be released from its resting place near the rocket's nozzle. Both will finally settle into a circular orbit about the Earth's poles, at an altitude of 790 nautical miles, ± 20 n. mi., or 909.76 statute miles.

NASA has agreed to launch Australis-Oscar 5 as a secondary payload on the Tiros-M mission. AO-5 is fitted into the Delta second stage engine compartment where previous Delta secondary payloads have been housed, and the amateur satellite uses the same mechanical and electrical arrangements as these other secondary payloads.

Australis-Oscar 5 will be in what is known as a retrograde orbit, meaning that the vehicle was launched east-to-west against the direction of the Earth's rotation on its axis. The orbit will

* Talcott Mountain Science Center for Student Involvement, Avon, Connecticut 06001.
** Assistant Secretary, ARRL

Note: The authors wish to acknowledge the assistance with orbit computation, of William Danielson of the Talcott Mountain Science Center.

[1] Listen to WIAW bulletins for possible date change and further information on the launch.

Table II
Passes near selected cities

1st Day			*2nd Day*			*3rd Day*		
Honolulu	1312	GMT	Detroit	0806	GMT	Honolulu	0036	GMT
Fairbanks	1452	GMT	Denver	1000	GMT	Dallas	0850	GMT
New York	1818	GMT	San Francisco	1156	GMT	San Francisco	1044	GMT
Dallas	2008	GMT	Fairbanks	1340	GMT	Honolulu	1242	GMT
San Francisco	2204	GMT	Detroit	1900	GMT	New York	1748	GMT
Honolulu	2354	GMT	Denver	2052	GMT	Dallas	1938	GMT
			Fairbanks	2256	GMT	Fairbanks	2144	GMT
						Honolulu	2324	GMT
4th Day			*5th Day*			*6th Day*		
Detroit	0736	GMT	New York	0624	GMT	Detroit	0706	GMT
Las Vegas	0932	GMT	Dallas	0820	GMT	Las Vegas	0902	GMT
Honolulu	1130	GMT	San Francisco	1014	GMT	Honolulu	1100	GMT
Fairbanks	1310	GMT	Honolulu	1212	GMT	Fairbanks	1240	GMT
Detroit	1830	GMT	New York	1718	GMT	Dallas	1756	GMT
Las Vegas	2022	GMT	Denver	1910	GMT	San Francisco	1952	GMT
Honolulu	2212	GMT	Fairbanks	2114	GMT	Honolulu	2142	GMT
Honolulu	2406	GMT	Honolulu	2254	GMT			

7th Day					
New York	0554	GMT	Detroit	1648	GMT
Denver	0748	GMT	Denver	1840	GMT
San Francisco	0944	GMT	Fairbanks	2044	GMT
Fairbanks	1128	GMT	Honolulu	2224	GMT

Table I

South-to-North Equator Crossings

	Orbit Number	West Longitude	GMT Time
1st Day	1	324	1222
	2	353	1416
	3	022	1610
	4	051	1804
	5	080	1958
	6	109	2152
	7	138	2346
2nd Day	8	167	0140
	9	196	0334
	10	235	0528
	11	264	0722
	12	283	0916
	13	312	1110
	14	341	1304
	15	010	1458
	16	039	1652
	17	068	1846
	18	097	2040
	19	126	2234
3rd Day	20	155	0028
	21	184	0222
	22	213	0416
	23	242	0610
	24	271	0804
	25	300	0958
	26	329	1152
	27	358	1346
	28	027	1540
	29	056	1734
	30	085	1928
	31	114	2122
	32	143	2316
4th Day	33	172	0110
	34	201	0304
	35	230	0458
	36	259	0652
	37	288	0846
	38	317	1040
4th Day	39	346	1234
	40	015	1428
	41	044	1622
	42	073	1816
	43	102	2010
	44	131	2204
	45	160	2358
5th Day	46	189	0152
	47	218	0346
	48	247	0540
	49	276	0734
	50	305	0928
	51	334	1122
	52	003	1316
	53	032	1510
	54	061	1704
	55	090	1858
	56	119	2052
	57	148	2246
6th Day	58	177	0040
	59	206	0234
	60	235	0428
	61	264	0622
	62	293	0816
	63	322	1010
	64	351	1204
	65	020	1358
	66	049	1552
	67	078	1746
	68	107	1940
	69	136	2134
	70	165	2328
7th Day	71	194	0122
	72	223	0316
	73	252	0510
	74	281	0704
	75	310	0858
	76	339	1052
	77	008	1246
	78	037	1440
	79	066	1634
	80	095	1828
	81	124	2022
	82	153	2216

also be "sun-synchronous" — the orbital plane will maintain a constant orientation relative to the sun. In order to achieve such an orbit, lift-off will occur at 1116 GMT ± 10 minutes. Based on this launch time and on the orbital parameters above, Table I presents orbital predictions for Australis-Oscar 5 for the first week following launch.

To determine which of the passes you will hear, and the reception times, consult "Australis-Oscar 5, Where It's At," page 54 of *QST* for October, 1969. The orbital information presented now, is subject to revision: listen to W1AW bulletins following launch for up-dated orbital predictions.

Australis-Oscar 5 will experience its orbital birth almost directly over Nairobi, Kenya, East Africa. The satellite will travel north by northeast over eastern Europe, and then pass over Ellesmere Island near the North Pole. At this time, about 1250 GMT, amateurs above 40° latitude on the North American continent will have their first possible acquisition of Australis-Oscar 5. But, to most, the satellite at this point will be distant, and signals too weak.

Returning toward the equator for its first orbital north-to-south crossing, Australis-Oscar 5 will pass near the Hawaiian Islands at about 1312 GMT. It will still be several hours before the satellite approaches the eastern coast of the United States.

Over the Azores at 1623 GMT, AO-5 may put in a signal to well-equipped stations along the northeast coast of the U.S. But by 1818 GMT, the satellite, now 4 orbits old, will be near New York, sending its telemetric signals to most of the U.S. and Canada. Then, it's Dallas at 2008 GMT and San Francisco at 2204 GMT. Table II gives the times at which Australis-Oscar 5 will be near selected U.S. cities. In general, you should be able to hear the satellite over points on the earth up to 2455-statute miles away from your location. QST

Strays

In recognition of the powerful force that amateur radio has proven to be in the field of international goodwill, the English-Speaking Union will sponsor certificate awards for the top scoring phone and cw single operator stations (DX and non-DX) in the upcoming ARRL International DX Competition.

The E-SU celebrates a golden anniversary this year, to be topped off by a banquet in Washington in November at which time the certificates will be presented. In addition to an expected appearance by President Nixon, many high ranking dignitaries will be present.

CONDUCTED BY GEORGE HART,* W1NJM

The Public Service Honor Roll

A new Honor Roll listing will start next month in this column, reflecting November activities reported by SCMs and/or individual stations. This listing is intended to supplement the traditional BPL and take into account the many public service functions of amateurs that are not involved in the "pieces of paper" handling of record messages. Next month's initial listing is just a starter. The exact shape, size and content will be determined by the amount of interest and participation by service-oriented amateurs.

Points toward listing in the PSHR can be claimed for checking into and participating in nets, for serving as net control station, for serving as a liaison station between nets, for handling phone patches, for making BPL, for handling real emergency traffic and for serving as a net manager. Each such creditable function has a maximum number of points per month, so that nobody can make the Honor Roll by performing a single type of function, except handling emergency traffic. Versatility in public service is encouraged and rewarded.

We are starting out with the point setup detailed in Nov. *QST* (p. 75, under "Traffic Talk"). SCMs have been instructed on initial handling of PSHR claims and a form has been provided for this purpose (CD-188), although it is not mandatory. Individual amateurs claiming PSHR listing should indicate the breakdown of points claimed for each function, list the nets involved, if any, and indicate the total points. Those totalling 25 or over will be listed. If the monthly list gets too long, the number of points required will be raised, as it was for the BPL. Unlimited *QST* space is not available, sorry about that.

There already have been a number of questions asked, and perhaps answering the more common ones herewith will serve a useful purpose. Please refer to Nov. *QST*.

What is meant by an "ARRL-registered net?" It is a net which is duly registered in the ARRL net directory card file and which is in "active" status. It does not necessarily refer to a net listed in the annual Net Directory; some nets may have registered since the directory was printed or their registrations may have expired. Thus, make sure the registration of the net concerned is current before you claim points for participation in it.

Why is participation in c.w. nets given more credit than participation on phone nets? We expect this will cause some resurgence of the claim that ARRL is cw-oriented, but this has nothing to do with it. The fact is that more skill is required to participate in a cw net or to be net control of same. In addition to proficiency with the code, the participant must be familiar with the QN signals and how to use them, and with hundreds of cw abbreviations and procedure signals. Besides, only phone stations are eligible for phone patch points; you can't do *this* by cw.

Can a net control station claim check-in points for the same net sessions in which he serves as NCS? No, he cannot. Actually, a NCS doesn't really "check in" himself. He checks in the other stations.

Can an individual station claim the maximum number of points for a cw function, then turn around and claim the maximum points for the same function on phone? Yes. Versatility is rewarded.

What do you mean by the term "regularly-assigned liaison station?" That's a sticky one. It applies mostly to NTS, most of the nets of which have liaison stations assigned by the net manager on a regular basis. However, the points are not available even to NTS nets unless the net manager makes the assignment in advance, and they *are* available to non-NTS nets if such assignments are made. No such assigned liaison is eligible for these points if it "short circuits" any NTS channels. Assigned alternates who assume the function in the absence of the regular are eligible, but stations "spot assigned" by the NCS are not. Clear? Well, this one will have to be wrestled out.

What do you mean by a "legal" phone patch? Aren't they all legal now? No, a phone patch with a foreign country could violate the third-party restriction if it were conducted between U.S. or Canada and a country with which no third-party agreement exists. The language is just to make clear that these points cannot be claimed for any such phone patching.

Wouldn't it make sense to distinguish between the different types of phone patches, awarding more points for those over longer distances, or with our servicemen overseas, or in an emergency situation? Maybe. But it would *surely* make the point compilation more complicated, and this we *must* avoid. It's complicated enough already.

* Communications Manager, ARRL.

Last month we reported that the Minnesota SEC had received a medal for his participation in the spring flood emergency. The North Dakota SEC WAØAYL also received a medal and citation signed by Lt. Gen. F. J. Clarke, chief of the U.S. Army Corps of Engineers. Here, Dave is holding the medal and certificate.

Do you mean to say that a traffic station who handles 5000 messages in a month will only get 3 points, same as one who handles only 100 originations/deliveries? That's right. The 5000-a-month man gets his reward in the BPL. Most of those who commented on the PSHR didn't want *any* credit allowed for traffic, but this didn't seem right because it *is* part of the public service function.

What is a "real communications emergency?" A good question. It's the performance of communications by amateur radio in a situation involving the life or death of an individual or group of individuals, or their welfare, or the wholesale destruction of property, in the absence or overload of commercial communications necessitating the use of amateur radio. How's that?

Not so good. Does this mean that a station can claim PSHR points only if he (it) is involved personally in such a situation? No. Let's set up an attenuation system. The station in the emergency situation can claim a point for each message handled having a precedence of EMERGENCY, P or P2. Any station handling traffic in direct contact with such a station may claim points for precedences of EMERGENCY or P. Other stations may claim a point for each EMERGENCY precedence message handled.

What kind of an award will be given to stations making the PSHR? The honor of listing in *QST*.

How about multi-op stations? We contemplate a separate listing for them, same as BPL.

Well, let's start it, see how it goes. — *W1NJM*.

W5AIR presented newly appointed EC WA5TCP with his certificate of appointment on September 28. Left to right are K5HMF, K5PFE, W5UEQ, WA5UKW, WA5SCE, WA5TCP, K5GIY, WA5GXC W5AIR, WA5NOT, WA5WEN, WN5VTP.

Traffic Talk

The Eastern Area Staff of NTS at its last meeting recommended the adoption of the symbol Q for a message precedence, to replace our present P2. Shall we kick this around a little?

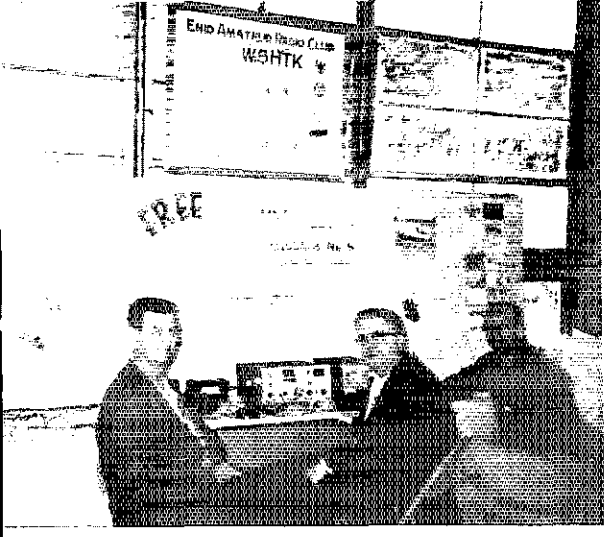
Back in the early sixties when we were wrestling with the problem of precedences, the basic principle seemed to be to *keep it simple*. The Florida boys came out with nine precedences and three emergency "conditions." Your headquarters came out with seven precedences and agency designations (doggonnit, we *still* think that was a good system!), but most practical amateurs threw up their hands at the prospects. Eventually, the precedences were simplified to three designations: Emergency, Priority and Routine. Briefly, Emergency precedence messages were described as those having the direst emergency life-and-death significance, Routine as those having no importance whatever, and Priority as all those in between.

This left a great deal of territory to be covered by the P precedence, and there was some unhappiness about it. In particular there seemed to be a practical need for differentiation between those personal messages coming into and those going out of an emergency area, since communicators made a practice (rightly so) of handling the latter first, deferring the former until conditions permitted.

The dilemma was solved by erecting a cupola on the P precedence for incoming inquiry messages and designating them P2. This has served the purpose since then, but there has been a small undercurrent of dissatisfaction with it all along. True, it kept our precedences down to a simple three in number — at least nominally — but actually we had *four* precedences, and the existence of a numerical subscript on a precedence designation caused confusion in a few isolated instances. Although the confusion was not serious, the question the EAS asked was, "why invite *any* confusion when it is so simple a matter to give P2 traffic a separate letter designation?" So they recommend Q. This will maintain the alphabetical sequence in the decreasing order of precedences, and can be thought of as in*Q*uiry traffic.

This all seems to make fairly good sense, and is now on its way to "finalization," to use an obsolete government term. But before it becomes standard, we thought we would give any objectors a crack at it. — *W1NJM*.

National Traffic System. With this month's report K3MVO is retiring as 3RN manager. Thanks for the years of service, Pres. Taking over as 3RN pilot is W3NEM. Good luck in the new job, Bob. RN6 certificates have



The Enid (Okla.) Amateur Radio Club sponsored a booth at the Fall Festival held at the Garfield County Fairgrounds in Enid. Thirty-four messages were sent from the booth. Left to right are WA5UJG, WA5ZOO and WA5UJF.

been issued to K6IBI and WA6DIL by WA6ROF. W7BQ reports that traffic has increased on RN7 with a resultant increase in rate. W9HRY says that 9RN wallpaper has gone to WA9TCC and WB4FLA. WØLGG reports rep is up on TEN and that apparently there were no problems involved with the decision to stay on 3545 in view of the turn in incentive licensing. K2KIR says conditions are good but EAN isn't being used to anywhere near capacity. WA9RAK congratulates his NCSs; all QNS reports were in Doug's hands by the first of the month.

October statistics:

Net	Sessions	Traffic	Rate	Average	Representation (%)
1RN	62	439	.348	7.1	90.8
2RN	61	430	.657	7.1	96.4
3RN	62	477	.420	7.7	99.2
4RN	52	482	.364	9.3	78.9
5RN	57	522	.366	8.4	73.7
6RN	62	935	.617	15.1	100.0
7RN	61	472	.458	7.7	41.0
8RN	61	443	.305	7.3	92.3
9RN	62	406	.346	6.5	96.4
TEN	62	495	.500	7.9	81.3
ECN	60	135	.192	2.3	93.5
TWN	47	224	.247	4.8	54.9
EAN	31	1369	1.114	44.2	96.8
CAN	31	836	.853	27.0	100.0
PAN	31	1126	.943	33.1	99.0
Sections[1]	1729	11061		6.3	
TCC Eastern	124[2]	667			
TCC Central	93[2]	641			
TCC Pacific	124[2]	1035			
Summary	2531	22195	EAN	11.0	——
Record	2930	30735	1.408	15.2	——

[1] Section and local nets reporting (54): FMTN, FPTN, QFN, GN, TPTN, VEN, WFPN, (Fla.); CN, CPN (Conn.); PFN, EPA, PTTN, EPAEPTN (Pa.); QMN, WSSB (Mich.); WIN, WSSN, BWN, WSBN, BEN (Wisc.); SCN (S.C.); QKS (Kans.); WVN (W. Va.); AENB, AEND, AENH, AENO (Ala.); RISPN (R.I.); BN, OSSB, QCEN, Franklin County (Ohio); OLZ, SSZ (Okla.); NLIPN (N.Y.); ILN (Ill.); GSN (Ga.); BUN (Utah); W. Que. VHF (Que.); MTN (Man.); NJSN (N.J.); QIN (Ind.); WSN (Wash.); NCN (Cal.); MSPN, MJN, MSN (Minn.); FCATN (Ky.); NCNL, NCNE (N.C.); MDCTN (Md.-D.C.); TTN (Tex.); WMN, EMN (Mass.).

[2] TCC schedules, not counted as net sessions.

Transcontinental Corps. W3EML says October wasn't one of TCC Eastern's better months, with 12 misses and decreased traffic. Things should be back under control now, at least as far as the schedule failures are concerned.

October reports:

Area	Functions	% Successful	Traffic	Out-of-Net Traffic
Eastern	124	90.3	1700	667
Central	93	92.4	1352	641
Pacific	124	95.9	2070	1035
Summary	341	92.9	5122	2343

The TCC Roster: Eastern Area (W3EML, Dir.) — *W7s* BJG NJM YKQ, K1ESG, *W2s* FR GKZ PU QC, *K2s* KIT RYH, *WA2s* BLV CAL HMO UWA, W3EML, K3MVO, *W4s* NLC SQQ UQ ZM, K4KNP, WA4EUL, *W8s* CHT IXJ, K8KMQ. Central Area (WØLCX, Dir.) — W4OGG, K4AT, W5MI, *W9s* CXY VAY, *WA9s* BWY RAK VZM, *W0s* HI INH LCX ZHN, K8AEM, *WA6s* DOU IAW MLE RVR. Pacific Area (W7DZX, Dir.) — *W6s* BGF BNX EOT IPC IPW VNQ VZT, K6DYX, *WA6s* BRG LFA ROF, WB6HVA, *W7s* GHT KZ, WA7-CLF, KØJSP.

Public Service Diary

On Sept. 9, a gas pipeline exploded and rocked the Greenridge North subdivision, a suburb of Houston, Tex., destroying fifteen homes. W9FZX/5 put out the emergency call at 2107 GMT and was answered by W5CWL who was mobile near the scene. The Houston emergency operations center was notified by W5CWL and W5VCE, who were on duty at the EOC, called the fire departments and other emergency services while WA5FJN took control of the growing emergency net.

Soon eleven amateurs had mobiled to the disaster scene to help out, some bringing generators and floodlights. WA5PEV was sent to the nearby hospital where K5CNU and W5CWL passed him information on the injured being sent to the hospital. The hospital staff was thereby forewarned of the patient's arrival. In all, there were about 55 amateurs active in the emergency or standing by on frequency. — *K5HXR, EC/RO Harris County, Tex.*

On Oct. 26 three amateurs aided in the search for a lost hunter near Fort William, Ont., at the request of the Lakehead Search and Rescue Unit. VE3BPZ was at the base camp on Mount McQuaig and supplied information to VE3ECR in Port Arthur and VE3AYZ in Fort William. The outcome of the search wasn't reported. — *VE3AYZ, EC Thunder Bay District, Ont.*

VE2ALE reports three automobile mishaps in which amateurs were of service. On Oct. 27, VE2BU was mobiling on the TransCanada Highway near Riguad, Que., when he saw a car suddenly pull to the side of the road and stop. The driver of the vehicle then jumped from the car and was struck by a truck. VE2BU called using the VE2RM repeater and was answered by VE2AKM and VE2JO who notified the police.

On Oct. 29, VE2BPF discovered an accident on Metro Boulevard in Montreal in which there were several injuries. Using the VE2MT repeater VE2-DIT was contacted and the police were summoned.

On Oct. 31, VE2BU was in contact with VE2ALE when he saw a car overturned in a ditch near the Ontario-Quebec border on highway 17. The police were notified and a cruiser was dispatched to the accident scene. — *VE2ALE, SEC Quebec.*

On Nov. 3, the Lakehead Search and Rescue Unit again called on amateurs for communications assistance. A hunter was lost near Dog River, Ont., about 55 miles northwest of Fort William.

VE3GOK and VE3EDC went to the search area and set up a transceiver on 75-meters. Contact was maintained with VE3AYZ and VE3EDI in

Fort William and with VE3APM in Kenora. The hunter's body was found later in the day and the search was terminated. — *VE3AYZ, EC Thunder Bay District, Ont.*

On Aug. 20, amateurs who had been participating in a West Virginia RACES drill were alerted when some flooding in the state was noted. The drill was terminated and the net was put on a standby basis. Several mobiles were available, but amateurs were not asked to enter the flooded area. — *WA8NDY, EC Upshur, County, W. Va.*

On September 20, WB8BPB, WB8BZX and WN8BPU set up an exhibit at the Wayne County (Ohio) Fair. This was the first time an amateur station had been used at the fair and it drew much interest from the crowd. About sixty messages were handled on six meters. — *WB8BPB, Assistant EC, Wayne County, Ohio.*

WA8COA, W8CHT and WA8ULF were leaving a ham club meeting on the evening of Sept. 13 and were driving on Ferguson Road in Cincinnati, Ohio, when they observed a car strike a parked car. The driver of the vehicle did not stop. W8CHT contacted WA8CKB and supplied information as to the hit-and-run driver's route while the police were summoned. The three amateurs followed the car for several blocks before the police arrived. — *WA8COA.*

Members of the Kings and Queens County (N.Y.) ARPSC were asked to supply communications for the Third Annual Schooner Race on Oct. 4. The race began off the Battery in Manhattan, proceeded to the lower bay near the Verrazano Narrows Bridge and returned to the finish line at the 69th Street pier in Brooklyn.

Three two-meter stations were used. The first was aboard the light ship *U.S.S. Ambrose,* the second was aboard the minesweeper *U.S.S. Meadowlark* which ser ed as the judge's committee boat, while the third was a roving land mobile. W2OO and *WB2s* DZC and FXN manned the stations. — *WB2FXN, EC Kings County, N.Y.*

Members of the Wayne County, Mich., AREC helped with communications for the Grand National Road Rally on Oct. 11. WA8HFV was set up at the Henry Ford Museum while *W8s* BFZ MPD VCF, K8IYZ, and *WA8s* OXK and VIF operated mobile to cover the checkpoints. Several base stations were active as well to help with relays on the two meter f.m. network. One of the 36 cars participating in the rally was involved in an accident early in the event. W8MPD and WA8HFV were able to assist in picking up the car. Fortunately, there were no injuries. A total of fourteen amateurs aided in communicating for the rally. — *W8BEZ, EC Wayne County, Mich.*

Owensboro, Ky., amateurs assisted at the annual Battle of Perryville festival on October 11. The event, which annually draws 1500 Boy and Girl Scout participants, includes marches over the two fifteen mile routes the opposing armies took enroute to the battle. Safety and administrative communications were handled by a fixed station located at each of the two starting points and the destination battlefield, while mobiles patrolled the routes and hand held units linked busy officials scattered about the battlefield area. During a battle reinactment, amateur radio scored a first as the Union and Confederate armies were linked by 2-meters to their respective commanders as WB4FLA and WB4IZY accompanied the troops into battle. Kentucky SEC, W4VYS, was general chairman of the event. Other participants were *W4s* OYI TOY, K4UDZ, *WN4s* MQR and NKJ. — *W4VYS, SEC Kentucky.*

Amateurs furnished communications for a cross country foot and bicycle race on Oct. 19. The 26 mile race course extended from Falls City, Nebr., to White Cloud, Kans. Six-meters was used with a base station set up at the high school stadium in Falls City and with several mobiles and portables along the route. As each racer passed each checkpoint, his number and time was relayed back to Falls City where the information was given to race officials. Nine amateurs took part in the event. — *WAØDFS, EC Richardson County, Nebr.*

Forty-five SEC reports were garnered for the month of September, indicating activity by 16,013 AREC members. This is the same number of reports and only slightly fewer members than was initially reported in last month's highs of the year. Since that time the Michigan SEC report has been received, elevating the August figures to 46 reports and 16,565 members. Last year, 43 SECs reported during September, indicating 15,517 AREC members. Thus there was an increase of two SECs and 496 members reported.

Sections reporting: Ala, Alta, Ariz, Ark, BC, Colo, Conn, EFla, EMass, EPa, Ind, Iowa, Kans, LA, Mar, Mich, Minn, Mo, Mont, Nebr, Nev, NMex, NLI, NNJ, NTex, Ohio, Okla, Org, Oreg, Que, SF, SCV, Sask, SDak, SNJ, STex, Tenn, Utah, Va, Wash, WVa, WFla, WNY, WPa.

Independent Net Reports:

Net	*Sessions*	*Check-ins*	*Traffic*
Metro Traffic	27	419	505
Northeast Traffic	31	357	358
Mike Farad E & T	27	318	263
Eastern US Traffic	29	62	57
Hit and Bounce	31	349	514
North American SSB	27	657	239
All Service	4	15	15
Clearing House	27	353	248
30 Meter ISSB	23	474	491

QST

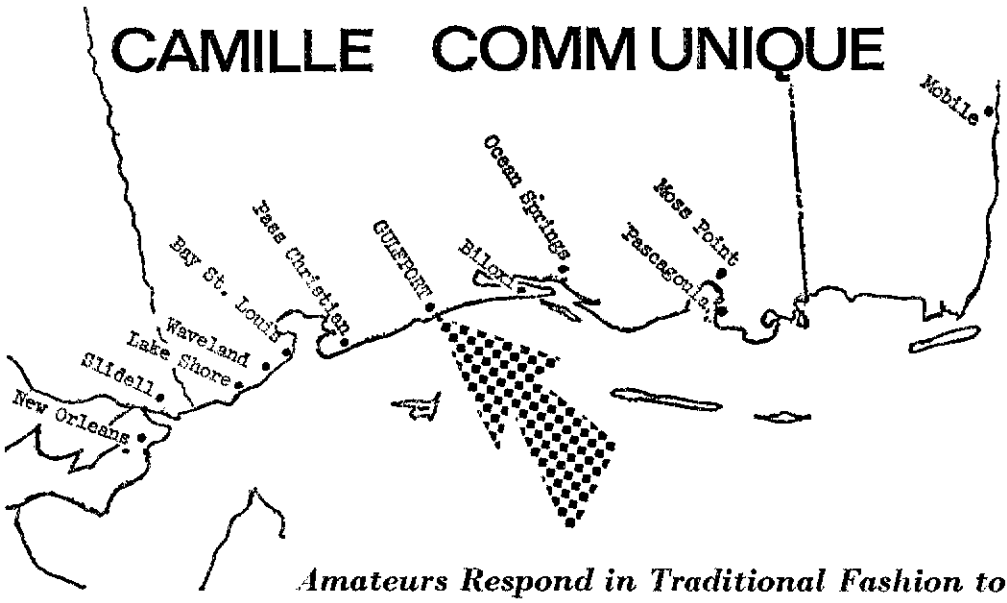
Strays

Stolen Equipment

The following equipment was stolen from Thurston High School in Detroit: Hallicrafters HT-44, serial No. 344001; Hallicrafters SX-117A, serial No. 443038; Collins 30S1, serial No. 11178; Collins ac power supply, model No. 516F-2, serial No. 19648 and a Hallicrafters ac power supply, model No. PS-150-20. Anyone with information should contact WB8BTU or Thurston High School, 26255 Schoolcraft, Detroit, Michigan 48239.

Many amateurs will be saddened to learn of the passing of Butch Corne, K9EAB. Stricken by polio at an early age, Butch operated his amateur station confined to an iron lung, totally paralized except for movement of one finger. In spite of his handicap, K9EAB excelled in amateur radio — his countries total put him on the brink of the DXCC Honor Roll, and Butch was first to earn the U.S. Counties Award!

CAMILLE COMMUNIQUE



Amateurs Respond in Traditional Fashion to Most Vicious Hurricane Yet

COMPILED BY GEORGE HART,* W1NJM and BILL REICHERT,** WA9HHH

WHAT was later described as the worst storm ever to strike the mainland United States slammed into the Louisiana-Mississippi coast on the afternoon of Sunday, August 17. After the storm had passed, left in a swath of nearly total destruction were hundreds of dead and injured and thousands of homeless persons. Several small communities just ceased to exist as gatherings of families, homes and businesses under the pressure of the 190-mile per hour winds. Hurricane Camille was no lady.

Even after progressing inland, where usually hurricanes rapidly diminish in strength and become simple weather fronts, Camille stubbornly retained enough ferocity to cause torrential rains and flash flooding along extensive sections of the James River in Virginia, thus adding to the already immense devastation of widespread areas. As might be expected, normal communication facilities were completely disrupted, or at best overloaded to the point of ineffectiveness.

Fortunately, there was adequate warning of Camille's approach. For several days before the storm came ashore, amateurs were active in such groups as the Hurricane Watch Net and were helping to supply tracking data, position reports, etc. It is unfortunate that even with the advance notice many people failed to heed the warnings. This almost certainly added to death and injury tolls making the clean-up job that much more grim.

Herein will be told the story of the amateurs' role in communicating before, during and after Camille, as best it can be pieced together from more than a hundred separate reports on activities. Certainly it will be impossible to give separate recognition to all those who deserve it; indications are that several thousand amateurs took part in one way or another. The best that can be done is to sound a blanket "well done" and to chalk up another in a long list of public services provided by the entire amateur fraternity.

* Communications Manager, ARRL.
** Communications Assistant, ARRL.

Mississippi

The area hardest hit by Hurricane Camille was the Mississippi Gulf Coast from Waveland, a small community a few miles east of New Orleans, to Biloxi. Between these points, and extending several miles to the north, the destruction was nothing short of incredible. As

Not since the Alaska Earthquake of 1964 have amateurs played such an important role in emergency communications. This compilation of reports from amateurs who were "there" should end all talk about our losing our emergency communications potential.

the eye of Camille approached, winds rose to nearly 200 miles per hour and tides were running twenty to thirty feet above normal.

Perhaps the hub of amateur radio activity from the stricken area was K5TYP, the club station on Keesler Air Force Base near Biloxi. Preparations for the storm to come began when the less stable antennas were dismantled, spare equipment was obtained and a supply of gasoline for the emergency generator was laid in. Then a period of waiting began. Contact was maintained with emergency networks all along that part of the coast.

When the winds began to rise, eight operators (K5CFQ, K3SHD, WB6AIT, K3RFC, WA4-VEY, K3QQN, WA2ICV and Airman J. T. Bassett) were still at their posts despite personal danger. When the full fury of the storm was unleashed, it appeared that K5TYP might fall victim to the killer hurricane. The switch to the emergency generator was made when normal power failed, but soon afterward the "hurricane proof" tower collapsed. In falling, the seventy-foot structure destroyed all remaining antennas.

K5TYP, however, was silenced for only half an hour. Several of the operators braved the high winds to install emergency antennas. K5TYP was lucky; had the gust that felled the tower come from another direction, the radio shack itself, and those inside, would have been crushed under several tons of steel.

During the half-hour K5TYP was off the air, virtually all the stations operating in the area had been eliminated by storm damage or loss of power. The rest of the night was spent waiting for the storm to subside and in supplying what communications were possible in view of the total black-out elsewhere.

When daylight and normal weather returned, additional repairs were made to K5TYP's antenna farm and additional operators were called in to utilize all the available facilities and help fill the increasing vacuum of communications. Outside telephone lines were down and most military communications, including air traffic control radio, were inoperable. The first emergency supply planes, dispatched from Eglin AFB, Fla., were faced with the absence of radio contact, except for short range approach control radio. Through a telephone line to base operations, K5TYP operators were able to help guide the C-124 Globemasters safely to the field. Equipment and personnel were loaned to the local RACES, police and relief agencies in areas as far removed from Keesler as Bay St. Louis. In some cases operators were airlifted by helicopter to remote locales.

As the immediate emergency situation eased, personal welfare traffic was handled in increasing quantities. A total of 2800 health and welfare messages were handled by amateurs, 1300 on MARS circuits. A week after Camille had passed, K5TYP was still operating 24 hours daily. Twenty-four additional amateurs and numerous non-amateur personnel eventually participated in the Keesler AFB operation.

Elsewhere in the Biloxi area, W5BW had a quick conference with W5SPX, the civil defense communications officer, then proceeded to the emergency operations center where he operated for the next 72 hours with an emergency antenna that had been erected. Contact was established with W5IZS at the state e.d. headquarters and a number of other points. Several priority messages requesting food, water, and blood plasma were handled.

W5OQL, a physician, set his station up at Howard Memorial Hospital. He was later joined by W4SME, another MD who flew into the disaster area from Atlantic Beach, Fla., on August 21. W5BBX, operated by W5AFD, K5SYG and WA5PPS, was active from the Veteran's Administration Center after antennas were repaired. Emergency power was used for 72 hours during which time 325 emergency and priority messages were handled. W5HTV and WA5PTE of Jackson and K5AFJ of Greenwood gathered portable equipment and generators on the morning of Aug. 18, then mobiled to Gulfport, where, after checking with Harrison County authorities, they decided to continue to Biloxi where they eventually set up in the Hotel Buena Vista, thus becoming some of the first outsiders to come to the aid of the ravaged area. They supplied lighting for some rooms of the hotel, aided WLOX in returning to the air and operated on 40 and 75 meters.

K5SVC, RO of Adams County, WA5GOH, EC of Adams County, and WA5SEV, all members of the Old Natchez Amateur Radio Club, were instrumental in mounting a relief expedition to the Waveland-Bay St. Louis area. The convoy, consisting of several trucks loaded with necessary supplies and three or four cars, left about 1830 GMT on Aug. 19. As they proceeded

A typical scene in Biloxi, Miss., after the hurricane. This is (or was) Central Beach Blvd. *(U. S. Air Force Photo)*

Trees and utility poles were stripped by the high winds along the beach, although the heavy cable survived in most places. *(Don Waters Photo)*

south more and more evidence of Camille's passing became apparent. After traveling 150 miles, the group arrived and began setting up at the Ramada Inn about 0200 on the 20th. The motel, although located only a few blocks from the ocean, was for the most part still intact and was being used as a shelter. WA5GOH/5 went on the air and began passing traffic on 75 meters.

The following morning, Aug. 20, an antenna for 20 meters was erected and K5SVC/5 began handling traffic on that band. The operation was secured the evening of the 24th when commercial power and limited telephone service were restored.

W5LLB in Biloxi returned to the air when power was restored on the morning of the 20th. His house had been slightly damaged by the high winds and a quad was destroyed, but the vertical antenna had been taken down before the storm and was only slightly damaged. By late on the 24th W5LLB had handled nearly 1600 radiograms, mostly health and welfare inquiries and replies, and several phone patches. The aid of several nonlicensed persons was enlisted in the delivering of health inquiries. The nearest working telephone was several blocks away and it was necessary to send runners back and forth with batches of inquiries and with replies for those messages that could be delivered. One of the local broadcast stations read some of the undeliverable messages blind in an additional attempt at delivery.

K8YUW/5 positioned himself at an evacuation center at Gulfport after the worst of the storm had passed and handled 450 outgoing welfare messages, as well as several official messages for Red Cross and Civil Defense. Later, when his Navy unit was activated and sent to Pass Christian, K8YUW continued operating mobile until the dc power supply failed on August 19. From then on all operation was done from an ac source available on the Navy base.

K5GEI, the RACES RO of Harrison County (Gulfport), took the bull by the horns and eventually directed most of the RACES communications along the coast, in addition to helping with rescue units and dispersal of supplies. Even after Civil Defense had decided the worst was over and ceased official RACES operation, K5GEI stayed on the job until the 25th, after eight days of nearly continuous activity.

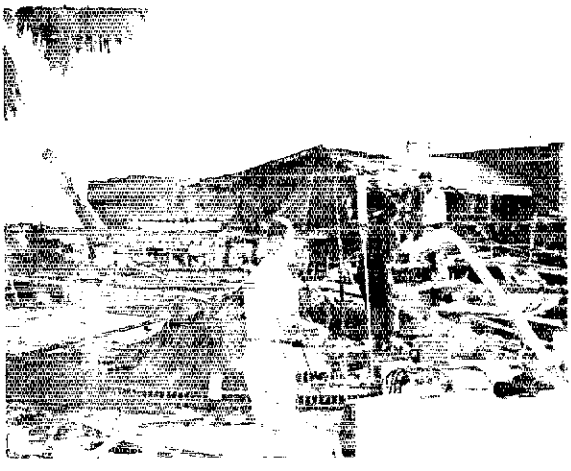
WA5KEY, Mississippi SCM, took time off from his job during the first week of the emergency to help coordinate the efforts of the state's amateurs in relieving the stricken area. Both WA5KEY and SEC WA5JWD contacted FCC and assisted in getting five frequencies cleared for emergency-only use. W5LDH also appeared on several of the New Orleans broadcast stations in an effort to secure additional amateur communications aid for the Mississippi Gulf Coast.

Louisiana

Although there was little actual damage in Louisiana, at least compared with that inflicted in Mississippi, the effect on Louisiana amateurs was probably greater than amateurs in any other state, and many journeyed to the Mississippi Gulf Coast amidst almost impossible conditions to render assistance there.

The bulk of the information on what was done by Louisiana amateurs was gathered by our energetic SCM Jack Swanson, W5PM, who sent packet after packet of reports for our "Camille" file. Let's run through the stack of reports from Louisiana amateurs, most of which were collected and sent in by Jack.

The report of SEC W5OB states that amateurs from Louisiana, Mississippi, Albama, Western Florida, Arkansas and Texas converged on the Gulf Coast and set up stations at various strategic points. The FCC engineer-in-charge of District No. 8 (W5RA) declared 3890, 3900, 3910, 3925, 3940, 3987.5, 3993.5, 7254, 14,290 and 14,320 kHz as voluntary emergency frequencies. There were 25 amateurs from the New Orleans area, 18 from the Baton Rouge area,



W5CFQ, WA2ICV and another airman rig a temporary antenna in the ruins of a motel outside Biloxi. *(U. S. Air Force Photo)*

One of K5TYP's six operating positions which were operating 24 hours a day for better than a week. This is WA1JUP handling contact with a portable unit which had been airlifted to Pass Christian, Miss. *(U. S. Air Force Photo)*

Health and Welfare traffic became a problem very early in the game at K5TYP. Here is K3QQN at work on this project, maintaining contact with the Gulf Coast Hurricane Net. *(U. S. Air Force Photo)*

and 8 from Monroe who traveled into the Gulf Coast area to set up stations at Waveland, Bay St. Louis, Pass Christian, Gulfport, Biloxi and Pascagoula, while 47 New Orleans amateurs supported them from home stations and approximately 50 Baton Rouge amateurs operated the civil defense center for seven full days. The Navy's communications van from the Shore Electronics Engineering facility in New Orleans was manned by three amateurs and other personnel and proceeded to Waveland, under the call WA5DNZ/5.

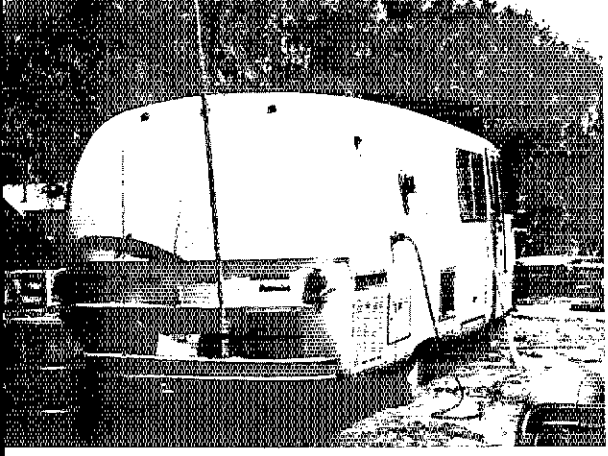
Operation proceeded through a number of nets, such as NTS's LAN (Louisiana Amateur Net) on 3615, the Gulf Coast SSB Net on 3925, the Central Gulf Coast Hurricane Net on 3935, the Delta SSB Net on 3905, the Miss. SSB Net on 3947.5. Navy MARS was also active, using amateurs in six nets outside the amateur bands. Singled out especially by W5OB for recognition were K5TYP, W5FMO, WA5DNZ/5, WA5GOH/5, W5MCC/5, WA5WMP, K5YBT and W5JHS, but hundreds of operators were involved.

Some of the details of operations by the gang from Louisiana are of interest. WA5WVJ from New Orleans says that he and W5EGH were "grubstaked" (also supplied a generator and transportation) by Kaiser Aluminum and operated from Waveland from Aug. 19 thru Aug. 23rd, mostly around the clock on 3925 kHz. "Makes me proud to be a ham," states WA5WVJ.

A division newsletter from Delta Division ARRL Director W5LDH says: "Cooperation with official agencies was excellent. Red Cross, Salvation Army, National Guard, military units and local officials all teamed up and amateur radio once again proved its value in time of disaster." He mentions especially the outstanding work of former La. SCM W5FMO, who handled messages for 18 hours a day for over a week. A separate report from W5FMO makes hardly a mention of his own work but details that of other amateurs, to wit: WA5VGB assisted in operating the Naval van at Waveland: W5IQM and W5SOJ operated the Lakeshore disaster base and were later relieved by W5MQ and W5OUD; *WA5s* OVX JFT and W5WFU helped operate W5FMO at the Metairie net control station; W5KSI operated at the Gulfport Red Cross and at Waveland; W5OB did yeoman duty from his home station; K5MDG established a station at the Divine Word Seminary in Bay St. Louis; *WA5s* RMC ATM, *W5s* JYK and IVF operated a Red Cross base station. W5UK, atop the International Trade Mart in New Orleans contributed use of its 6 and 2-meter links, W5CZJ one of the principal operators. The Metairie group operated for 10 days handling traffic, all in standard message form and properly authenticated consisting of requisitions, orders for doctors, nurses, helicopters, military business and Red Cross business. The Lake Shore Disaster Center and the Bay St. Louis station were in operation about six days.

W5CDI has high words of praise for W5GOH, net manager of the Central Gulf Coast Hurricane Net. "He quickly gathered operators and their rigs together, set our net in action and hand-in-hand with civil defense and other communications agencies rushed into the stricken area and set up in Waveland, Miss., at what was left of the Ramada Inn. From there the net began functioning, handling traffic regarding medical supplies, doctors, nurses, hospitals, coroners, etc. We feel there were many lives saved; certainly a lot of anxiety was relieved."

W5GHP spent about 58 hours of actual traffic handling most of it in LAN, from Sunday (17) through the following week. As time went on, he says, traffic out of the disaster area increased, but LAN was able to handle it all on normal schedules from Thursday on.

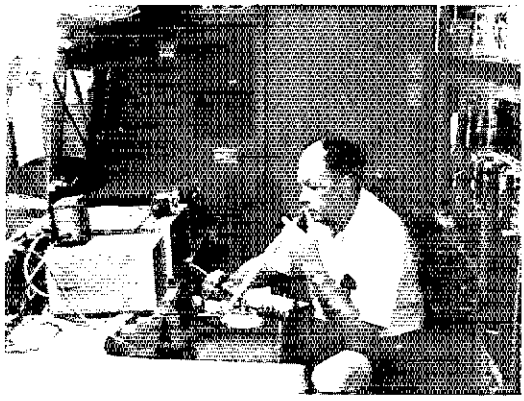


In devastated Waveland, Miss., much of the communication was handled from this Navy Communications van, using the call WA5DNZ/5. (Photo by W5FMO)

Baton Rouge RACES Radio Officer W5IQM reports that the Baton Rouge EOC (K5YBT) was on the air from 2 P.M. Sunday (17) until the same time the following Saturday, serving as net control on 3925 kHz.

WA5QVN says he got started Tuesday and got a team together consisting of six amateurs in three cars with generators, rigs, wire, food and water and all other necessities and took off for Gulfport, arriving about 0730 after an all-night drive. They operated on 75 and 20 meters for the Red Cross, handling emergency messages and later a few incoming welfare messages. Later, announcement by sound truck and over WWL generated about 260 outgoing welfare messages, which kept them busy until midnight Saturday. One of the operators set up a six-meter link from his mobile to c.d. headquarters, and later two more amateurs came from Monroe with more six-meter fm gear, later used as the governor's "command post" at the airport to county c.d. headquarters. Those in the expedition were *W5s* GQZ OPK, *WA5s* VQP VQR QVN SXU, *WN5s* YMR YGJ.

W5QWY relates his experiences at length in getting to Gulfport to assist. After many attempts to get transportation for himself and his equipment, he decided to go on his own. He installed his equipment in the back of his station wagon, complete with whip antenna and generator and arrived in Gulfport, with an unlicensed



Inside the Navy van at Waveland. That's WA5IPS at the mike. (Photo by W5FMO)

companion, about 0800 Aug. 19. First contact was made with K5USO, then K5AFU/5 in Biloxi. Later, he set up at the VA hospital in Gulfport and operated on 7260 kHz. K5DHG/5 took net control when W5QWY started to get fagged out. Other contacts were maintained with *W5s* VCE EKF and OB, W4BEA/5 in Biloxi, WA5WCG in Waveland. When the VA hospital had been evacuated, he went off the air at 1800. Aug. 19.

K5HUT submits a detailed report of activities from W5UK, the club station of the Greater New Orleans Amateur Radio Club, situated atop the International Trade Mart Building. W5UK was activated at 1100 Aug. 17, with all operators on alert and emergency equipment ready for action. Fortunately, the 80-m.p.h. winds that hit New Orleans did little damage and power was not lost. Nevertheless, on Aug. 18 the GNOARC started sending operators and equipment into the disaster area, and within 24 hours were in contact with emergency satellite stations in Bay St. Louis, Waveland, Lake Shore and Clermont Harbor. Traffic handled consisted mainly of medical demands, requests for doctors and nurses and for emergency power equipment. Welfare traffic for the disaster area started to pile up at W5UK but was held for clearance until the more important traffic had been taken care of. After 3 days, some of this traffic was taken into the disaster areas by relief operators. Four positions were manned from W5UK, on 75, 40, 6 and 2 meters. Of these, 6 was the most reliable, although most traffic was handled on 75. The 2-meter repeater worked perfectly and enabled contact with mobile units and stations on the Gulf Coast. K5HUT mentions long lists of operators active, both at W5UK and in outlying locations, some in several, while he was "all over" supervising, setting up antennas, relieving operators and acting as errand boy, waiter and chauffer. Support from the CBers was "magnificent" as was that of the YL International SSB System on 14,332 kHz.

In an interesting article prepared for *FM* Magazine, K2IEZ, one of the W5UK gang, tells of his expedition to Bay St. Louis with W5KSI and W5LHE, and of W5MCC's early arrival in the Gulfport-Bay St. Louis area to set up the first amateur radio communications link with the rest of the world. He says that until Tuesday morning (19th) W5MCC was the only communication out of the area, except for WA5UEG in Waveland, who operated day and night on 75 ssb and 146.940 fm passing traffic, giving directions to relief expeditions, supplying antennas, feedlines or whatever was forgotten or needed.

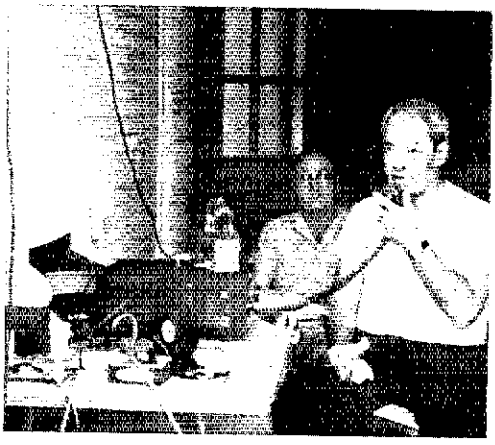
WA5YOA of Shreveport journeyed to Biloxi and, with two other amateurs, set up at the 3382nd Students Squadron at Keesler Air Force

Base, handling mostly health and welfare traffic. A letter of commendation from the Louisiana State MARS Director to him said, in part, "Your dedicated outstanding performance, at personal expense, makes you the kind of citizen we can all be proud of."

WA5PWX of Ruston, La., installed a rig in his car on Aug. 18, after listening to reports from the disaster area, and headed for Gulfport, reaching there late in the afternoon. He assisted in setting up W5MCC, then served as a liaison between a local radio station and the Red Cross, then returned to W5MCC where he set up a ground plane antenna and made contact with K5TYP at Keesler AFB.

K5AJK from New Orleans set up at Hancock Memorial Hospital in Bay St. Louis the second day after the storm and at that time was the only communication from there. He worked into the Baton Rouge CD Net and sent out requests for emergency medicines and other relief materials. He also handled consultation and other types of calls for doctors and dispatching of medical and other types of supplies to outlying areas. For two days he hardly left his equipment and was given preventive inoculations while operating.

WA5LVE and K5CSJ flew into the area independtly the day after the storm to survey the damage, decided to go back to New Orleans and load their plane with gear and return to help with communications. After a daring night landing on a darkened runway in Gulfport, they set up in a nearby airplane hangar. The assignment was coordinating communications for requests, meeting and unloading of relief materials. They were also instrumental in getting help in unloading arriving shipments; the "call for help" was sent back to New Orleans, relayed to a broadcast station and transmitted back into the disaster area, and soon volunteers started arriving at the airport. Nice job by WA5LVE and especially K5CSJ, who spent several days at the hangar.



The station operating from Lakeshore, Miss., was manned by W5MQ (at mike) and W5OUD. *(Photo by W5FMO)*

Here's the setup at Bay St. Louis, operating under the call K5MOG/5. *(Photo by W5FMO)*

WA5SXD sends in a chronological report of his operation from his home station in Norco, La., west of New Orleans. He and his XYL WA5RHP logged a total of about 78 hours of assistance to nets and stations both within and outside the disaster area, over a span of seven days. Most of the operation, particularly during the latter stages, was in the Central Gulf Coast Hurricane Net on 3935 kHz.

The Ozone Amateur Radio Club's bulletin *QRM* (Slidell, La.) gave a pretty good rundown of activities of its members during Camille. Some of the gang were set up in an unofficial net as early as Sunday morning, with W5PFT as NCS. As the storm increased in intensity, one by one they started going off the air. WA5CKJ signed out at 1447 with the words "I'm gonna bail out before the water gets over my power supply," and subsequently his home was completely destroyed. Amateurs from the Slidell area, led by W5PFT, set up in a back room of the Pass Christian fire station, left filthy with mud and debris after four feet of flood-water had swept through it. Traffic in civil defense emergency and priority messages was so heavy that the generator ran for 36 hours continuously, refueling while in operation. About ten amateurs kept this vital operation in motion. Accepting much of the traffic out of Pass Christian were K5AGI and WA5TTH, who managed to stay on the air, substituting for Slidell's c.d. station after its antenna blew down. After the c.d. station was put back on the air W5FSA, W5RBT, and WA5BHM did most of the operating. The Pass Christian operation began on Tuesday (19th) and continued through the following Sunday. During this time, many amateurs came and went from Slidell and Baton Rouge to Pass Christian, bringing new operators and equipment, replacing generators and supplies for the stricken areas, and hand-delivering welfare traffic for addresses which no longer existed.

Virginia

After Camille had finished with the Gulf Coast, she continued northward, eventually turning to the east on a journey that would end in the North Atlantic more than a week later. The storm system was no longer classified as a

hurricane but the driving rains the front carried continued on a pillaging course, drenching the countryside with a downpour that caused serious flooding in the upper valley of the James River in Virginia.

It was early Wednesday, Aug. 20, when authorities began to realize the extent of the disaster that had occurred. Communications were in a shambles; amateurs were asked to help.

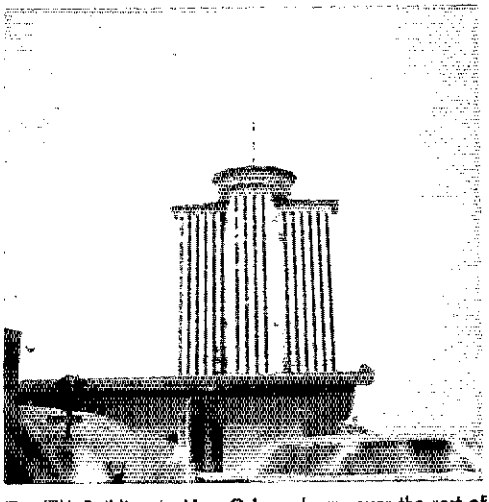
Virginia SEC K4LMB was out of the state when the disaster struck. In her absence WA4PBG took over as acting SEC for the flood emergency. A three-way telephone conference among W4KFC, Roanoke Division Director; W4SHJ, Virginia SCM; and WA4PBG was held to decide how amateurs could be of best service in the situation.

By the evening of Aug. 21 WA4YFJ had managed to mobile to Buena Vista and was operating on the Virginia Sideband Net (VSBN), with the other section nets, VN and VSN, operating in support. Later that evening K4KPT was also enroute to Buena Vista, but since communications had been established there, he was diverted to Glasgow, since there was traffic destined for that city with no outlet available.

The following day WA4DFE, WA4GMN and WA4ZMT, all residents of Buena Vista, were able to assist WA4YFJ. As soon as the highway to Glasgow was cleared, WA4DFE mobiled to that location to relieve K4KPT who had to depart.

Contact was made with the Red Cross to determine if amateurs could be of help with communications for some of the smaller hamlets that lie in the Blue Ridge Mountains of Northern Virginia. Although no direct communications aid was requested, the Northern Virginia Radio Club did prepare two generators and kits of light bulbs, extensions, etc., to be used by Red Cross in the disaster area.

WA4VQC reports, in an article that appeared in the *LARC Bulletin*, that after the C & P Tele



The ITM Building in New Orleans looms over the rest of the city. W5UK, including the repeater used so widely during Camille, is located at the top.

Jury-rigging an antenna at the Bay St. Louis station (Photo by W5FMO)

phone Company requested amateur communica tions aid, WA4RWP was flown to Lovingsto by helicopter, equipped with a 2-meter fn walkie-talkie to be used through the WB4HCX repeater. K4KJN was set up at the telephon company office in Lynchburg and necessary in formation was supplied directly to telephon line repair crews. Thursday and Friday, Aug. 2 and 22, communications were supplied for rescu crews and evacuation teams fighting their wa to the isolated communities of Tyro and Massie Hill. W4GCE placed a remote control station i operation to help with the additional traffic load

Some problems arose when, during the evenin hours, skip lengthened on the 75-meter band Stations operating from the Gulf Coast, usin the same general frequencies as VSBN, wer coming through, causing mutual interference Contact was made with the Virginia Fone Ne manager and it was agreed that VSBN woul QSY to the VFN frequency where the two net could operate as one, thus alleviating the QRM problem.

Miscellaneous

The Apricot Net of Cleveland set up quite system for handling Camille traffic. K8ONA sends us a sheaf of clippings, letters receive from grateful people who were served, and som expository material detailing the operation. Th work began on Monday (18th) at 2245Z, whe 14 priority messages arrived on the net. Activitie of one kind or another in support of relie operations in the affected Gulf area continue through the end of the month, and our repor from K8ONA says "our jobs are still not fin ished." Which only goes to show that the wor only barely gets started while the wind is sti blowing, and continues far past the time whe "normal" communication is restored.

A nice report from WA2GPT details some of the activity on the Interstate Sideband Net on 14320. K4RHL and several others did the net controlling and much traffic was handled having to do with medical supplies, food, generators, FAA dispatches and plane and personnel information. Two other controls on this net were KP4CB and HC1MF. On Thursday, WA2GPT took net control on 14,290 kHz, an assigned emergency frequency, for several hours.

W6MLZ's column "Calling CQ — Ham On Air" for Aug. 23rd contained a good writeup of amateur efforts during the storm. He lists 3987.5, 3993.5, 7254, 7268, 14,290 and 14,320 kHz as emergency frequencies and K3HHY, WB4BHW, K4CRU, K4AF and K5GEI as outstanding net control stations. The column reports monitoring of amateur radio messages from K5TYP at Keesler AFB giving approach and landing instructions to airplanes coming into the darkened runways, appeals for shipment of emergency generating equipment, including a fifty-kilowatt plant for Howard Memorial Hospital in Biloxi, a phone patch from a 68-year-old lady who had swum to safety in swirling flood waters, to her son in Pasadena, a report from WA5PMZ outlining some of the damage in New Orleans and environs, information from K5GEI in Gulfport on the incredible devastation in that city. "Citizens of this country," winds up the column, "can be thankful for amateur radio when disaster strikes."

Linn County (Iowa) Radio Officer WØLJJ reports that when inquiry traffic swamped the Red Cross Chapter of Marshalltown, the traffic was transferred to the Linn County municipal c.d. office where it was recorded and passed to operators at WØWSV, the c.d. amateur station. It was then put into the Iowa 75-Meter SSB Net and the Iowa Tall Corn Net, both operating at NTS section level, for relay to destination. Over 40 such messages were involved, all with HXB-48 (cancel if not delivered within 48 hours, and advise originating station) in the preamble. No replies were received.

A packet of information from W5JAH, La. State MARS Director, directs attention to especially-meritorious services performed by SMSgt. L. G. Frost, WA5SPL, at Keesler AFB. Frost traveled from Barksdale AFB (La.) to Keesler AFB, along with WA5OQC and WA5YOI, at their own expense and set up operations at that point using their own amateur gear, with complete approval and assistance of the Keesler authorities.

A clipping provided by WB4NGR tells us of activity in the nation's capital during Camille. On hearing of the disaster, he activated the club station at Georgetown University (WA3FXJ), where he is a graduate student, and began relaying disaster messages, continuing for many hours through Tuesday. Other amateurs in the area were active at the National Institute of Health, Public Health Service.

Much of the travel into the Miss. Gulf Coast Area by amateurs from Louisiana was in response to a widely-publicized appeal by ARRL Delta Division Director W5LDH. The appeal was issued late Monday when it appeared that communications with the stricken area were virtually nonexistent and amateur assistance obviously needed.

Eastern Florida SEC W4IYT sends us a batch of clippings which tell the story of widespread participation of Florida amateurs in Camille communications. Spared from the brunt of this one, for a change, amateurs in Florida have ample sympathy for the plight in which Miss. Gulf Coast amateurs found themselves after Camille and, accustomed to the type of operation involved, acquitted themselves in an orderly and capable manner.

The calls K4CRU and K4RHL appear frequently in the writeups. These two stations were mainstays of the Hurricane Alert Net on 14,320 kHz.

One story has it that K8YUW/5, operating from Gulfport from his car during the storm, lost all his car windows when the storm hit and crawled under a truck for protection; but next morning he was back on the air.

Western Florida amateurs were active during Camille, reports SCM W4RKH. The Western Florida Phone Net (WFPN) was in emergency session for 96 consecutive hours, handling in excess of 600 messages, most of it through WA4EVY at Pensacola. During the "scare" prior to the time the hurricane continued its path northward into the Mississippi Gulf Coast instead of veering to the northeast as was expected, amateurs provided local communications on 2-meter fm, with NCS at the c.d. center, and long-range communications on 75 phone and 80 cw via individual stations. After the storm, several teams of amateurs went to Mississippi; one team went to Pass Christian and stayed two days (*WA4s* LBM, IMC, K4VFY,

W5UK, station of the Greater New Orleans Amateur Radio Club, operating atop the International Trade Mart Building in downtown New Orleans, controlled a scattered network of stations in the disaster area manned by club members.

W9CTA/4) and another went to North Biloxi for four days (*WA4s* EVU WAX, *WB4s* EQU HEQ). Both groups provided the first communications available out of their areas. Still another group from Pensacola ventured into Mississippi to assist, but details are lacking.

A separate report by Western Fla. PAM W4MWW indicates that WFPN was in operation before Camille hit land and operated long afterward in an organized and efficient fashion showing ample evidence of intense training beforehand. WA4ECY operated 24 hours a day and W4TYH spent long hours at the NCS throttle. WA4VHM and WB4AQZ of Memphis, although not net members, also made significant contributions by handling many priority messages.

Publicity

Perhaps more so than in any recent emergency communications operation, amateur radio reaped a rich reward of favorable publicity for its overall performance in the aftermath of Hurricane Camille. While some amateurs swelled with justifiable pride and others offered just-as-justifiable criticism of what had been accomplished, the public press and other news media as well as served agencies, organizations and individuals were extravagant in singing the praises of amateurs. "Local (amateur) nets did yeoman service all over the United States," said an editorial in the Denver *Post*. "It isn't likely it will ever be known how many or who helped out. Yet again 'hams, well done.'" "Radio Amateurs were a tower of strength," reads an editorial headline in the New Orleans *Times-Picayune*. "When the full story is told of the quiet, unobtrusive dedication of volunteer workers . . . too much credit cannot go to the army of amateur radio operators who provided sorely needed communications in the stricken Gulf Coast area." "If and when the final story on Camille is written," editorializes a correspondent of the Mobile (Ala.) *Press Register*, "it is now a matter of record that amateur radio is helping build a better tomorrow, through public service to someone, somewhere, today."

Disclaimers

Generally speaking, the only way to write a summary article on such an emergency as Hurricane Camille is to condense and paraphrase a half dozen or so of the major reports from the field, then build from this point. This was the procedure followed above. It does not result in the most concise or chronological account, but it has a better chance of being complete than any attempt to piece together a chronological or expository story of what the amateurs did. Even so, we have no doubt that many amateurs who participated will not have been included, even by inference, in the above story; at least, this has always been so in the past. Some of the minor reports have had to be omitted for lack of space, but all individuals who were reported as being active will eventually be the recipients of ARRL Public Service Awards, one of only two awards in our portfolio which is not asked for, worked for or expected. Any amateur who took part but does not receive such an award (better give it a couple of months) should drop us a line briefly stating his activity, so it can be included in the ARPS column and an award issued.

Conclusion

Well, that's that. But it isn't quite all. The critique still remains. While all the nation sings the praises of what the amateurs did in Camille, fame is a fleeting thing and our public service activities can quickly be forgotten by a fickle public. The biggest award in a public service is satisfaction of a good job well done, and the feeling that it is appreciated by those who benefited from it; but what we did in the past, however recent, is no more important than what we can do *now*, and what we shall be able to do in the future. We amateurs all know that amidst all the self-satisfaction and praise, our performance in Camille was not flawless. The critique will make an attempt to examine what was wrong and exemplify what was right and seek for an even better performance "next time." And we all know there *will* be such a time, as much as we may piously hope not. QST

RULES FOR LIFE MEMBERSHIP

1. Life Membership is granted only by the Executive Committee, upon proper application from a Full (U. S. or Canadian licensed) Member.
2. The Life Membership fee is twenty times the annual dues rate, or currently $130.
3. An applicant may choose an alternative time-payment plan of 8 quarterly instalments, $16.25 each. In such instance he will be provided an interim two-year Full Membership certificate. Upon completion of the payments, Life Membership will be granted.
4. Life Memberships are non-transferable and dues payments are non-refundable. In the event an applicant is unable to complete payments on the instalment plan, he will be given a term of membership, at the annual dues rate, commensurate with payments received.
5. Other licensed amateurs in the same family, and at the same address, of a Life Member may retain or obtain Family Membership upon payment of the annual dues of $1, but without receipt of *QST*. The dues of the Family Member may be prepaid for any number of years in advance, but there is no special rate.
6. Application forms are available upon request from the Secretary, ARRL Newington, Conn. 06111.

In the public interest, convenience, necessity

Announcing the Twenty-fourth ARRL

Simulated Emergency Test

January 24-25, 1970

My oh my. Is it that time of year already? Yes, friends, the dates of the 1970 SET are getting closer and closer, and now that the Christmas and New Year holidays will soon be history for another year, all public service minded amateurs' thoughts will be turning to that weekend of boundless fun.

After last year's great showing ("We did fine in '69") we'll have to go some to improve our marks. Amateur radio can do it, though it may take a bit of hard work.

This year's test will be pretty similar to those in recent years, although as usual a few minor changes will be tried. After all, the purpose of SET is to demonstrate our abilities and to point out weaknesses in our methods; if changes are never made to plug the gaps, no purpose is really served.

The Local SET

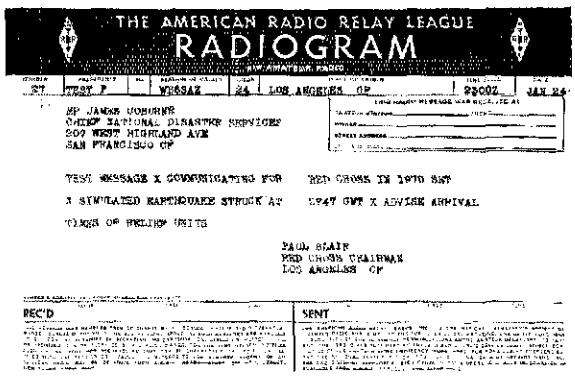
Actually, two separate but closely intertwined SETs are being held. The first of these is the test of our emergency preparedness on a community-to-community basis. Participation in this part of the test is mainly by AREC and RACES groups, under the direction of their leaders, the Emergency Coordinator and the Radio Officer, respectively.

These are the people to contact if you'd like to take part in the SET but have never done so before. Names of Emergency Coordinators can be obtained from the Section Emergency Coordinator of your section, whose address is listed on the facing page, or directly from ARRL Headquarters. When inquiring the identity of the EC for your area, please include, in addition to your regular address, the name of the county in which you reside.

If there is no EC, the name of the RO can usually be obtained from the civil defense office serving your locale. If there is neither, you do have a problem — but take heart, all is not lost. Contact the SEC and ask him for an EC application form. It'll probably be too late for 1970, but you should be able to get your AREC group organized by '71!

Anyway, the EC and/or RO (in many cases they are the same person), if he plans on holding an exercise, will dream up some kind of a simulated emergency operation (last year the simulated emergencies ranged from fires, floods and storms to the crash of a rocketship) in which his group furnishes the communications for served agencies such as Red Cross, Fire Department, Sheriff's Office, etc. Depending upon the situation, there will be traffic to handle, people to evacuate and other agencies to serve, all in simulation, of course. Each SET participant is urged to originate two messages during the test: one to the SEC of his section and one to a friend at a distant point.

For further details, contact the EC or RO, or get your own plans rolling for SEC. But hurry, there ain't much time left.



Here is the proper form for SET messages. Note addition of the word "TEST" in the precedence, and TEST MESSAGE in the text. Routine messages need not carry the "TEST" in the precedence.

The National SET

The second part of SET is to test our long-haul traffic facilities. Hopefully, each EC and RO will make provisions for having his area represented in the section nets of the National Traffic System so that medium and long distance traffic coming to and from his locale can be handled efficiently.

NTS will begin functioning at 2 P.M. local time, Saturday, January 24, for an eight hour period in which six complete cycles of NTS meetings will occur. The same procedure will be followed on Sunday, January 25. Although several alternate schedules were suggested, all were rejected for one or more reasons. Thus, for this test at least, we'll stick with the old one that has served fairly well in the last few years. It is hoped that all local tests will be held during the periods in which NTS is in emergency operation, although for scoring purposes, tests held anytime during the months of January and February will be counted.

(Continued on page 67)

Section Emergency Coordinators of the Amateur Radio Emergency Corps

The Section Emergency Coordinator is appointed by the SCM to take charge of the promotion of the Amateur Radi Emergency Corps organization throughout the Section. He acts as the SCM's executive in the furthering or provisions fo emergency amateur radio communications in every community likely to suffer in case of a communications emergency. On of the duties of the SEC is to recommend the appointment of Emergency Coordinators for the various communities in h *Section. Does your locality have an EC? If not, recommend the name of a likely prospect to the SEC. The SEC invit* your questions concerning the status of the AREC in your Section.

ATLANTIC DIVISION				
Delaware	W3DKX	Roger Cole	345 E. Roosevelt Ave.	New Castle 19720
Eastern Pennsylvania	W3JCC	Harford F. Drexler	P.O. Box 311, Cherry Ln.	Penns Park 18943
Maryland-D.C.	W3LDD	Walter Chrr	RD 2, Box 193	Havre De Grace, Md. 2107
Southern New Jersey	W2LVW	James Peck	810 Indian Trail Ave.	Deptford 08096
Western New York	W2KOF	Clara Reger	435 Best St.	Buffalo 14208
Western Pennsylvania	W3KPJ	Henry T. Schneider	1808 Water St.	Wesleyville 16510
CENTRAL DIVISION				
Illinois	W9KYU	Harry J. Studer	705 Hillcrest Rd.	Milan 61264
Indiana	W9BUQ	William C. Johnson	3838 Hillside Ave.	Indianapolis 46218
Wisconsin	W9NGP	Sherman C. Carr	756 W. Washington Ave.	Hartford 53027
DAKOTA DIVISION				
Minnesota	WAØMZW	Harley Hicks	11316 Harrison Rd.	Bloomington 55431
North Dakota	WAØAYL	*David E. Beach*	*Apt. 7, 1116-19th Ave., S.*	*Grand Forks 58201*
South Dakota	WAØFUZ	Claude V. Kaplan	RFD 1	Hot Springs 57747
DELTA DIVISION				
Arkansas	W5PBZ	Joe Bartelt	P.O. Box 412	Rogers 72756
Louisiana	W5OR	John L. Robertson	2609 Halsey Ave.	New Orleans 70114
Mississippi	WA5JWD	Gene McGahey	404 Highland Drive	Indianola 38751
Tennessee	W4WJH	Mike Jaquish	300 Old Fort St.	Tullahoma 37388
GREAT LAKES DIVISION				
Kentucky	W4VYS	William G. Willis	6302 Apex Dr.	Louisville 40219
Michigan	W8MPD	Stanley J. Briggs	1885 Pinetree Rd.	Trenton 48183
Ohio	W8OUU	James W. Benson	3463 Kingspath Dr.	Cincinnati 42631
HUDSON DIVISION				
Eastern New York	W2KGC	William L. Stahl	Shirley Ave.	Elshkill 12524
N.Y.C. & Long Island	K2OVN	John S. Brandau	1659 East 46th St.	Brooklyn 11234
Northern New Jersey	K2KDQ	Jack D. Wilk	P.O. Box 1175	Passaic 07055
MIDWEST DIVISION				
Iowa	KØLVB	*Gregg D. Miller*	*R.R. 4*	*Marshalltown 50158*
Kansas	KØEMB	Norman Stackhouse	1409 Willow Rd.	Newton 67114
Missouri	WØBUL	Charles O. Gosch	711 South Oakland	Webb City 64870
Nebraska	KØODF	Lynn Bilyeau	406 Henkens Dr.	Chadron 69337
NEW ENGLAND DIVISION				
Connecticut	W1HHR	John C. Sullivan	Whitney Rd.	Columbia 06137
Eastern Massachusetts	W1AOG	Donald F. Guptill	17 Park St, Ct.	Medford 02155
Maine	K1CLF	Allen E. Schark	42 Maple St.	Presque Isle 04769
New Hampshire	K1RSC	John E. Johnson	P.O. Box 116	Rye 03870
Rhode Island	K1LII	Chester P. Tammany	119 Owen Ave.	Pawtucket 02860
Vermont	W1VSA	Harry A. Preston, Jr.	RFD 1	Charlotte 05445
Western Massachusetts	W1BVR	*Percy C. Noble*	P.O. Box 5	Lanesboro 01237
NORTHWESTERN DIVISION				
Alaska	KL7FNX	William D. Crowl	Box 4407	Anchorage 99503
Idaho	W7ZNN	Donald A. Crisp	3408-8th St. F.	Lewiston 83501
Montana	W7RZY	Harry Roylance	P.O. Box 621	Harlowton 59036
Oregon	W7HLF	Dwight J. Albright	1678 Orchard Home Dr.	Medford 97501
Washington	W7UWT	Raymond H. McCausland	*2812 Hayton St.*	*Bremerton 98310*
PACIFIC DIVISION				
East Bay	WB6DHH	Paul J. Parker	2236 Whyte Park Ave.	Walnut Creek 94595
Hawaii	KH6QGW	J. Patrick Corrigan	99-1154-B Aiea Hts. Drive	Aiea 96701
Nevada	WA7BEU	L. L. "Mike" Blain	560 Cherry St.	Boulder City 89005
Sacramento Valley	W6KYA	John F. Minke III	6230 Rio Bonito Dr.	Carmichael 95608
San Francisco	W6WLV	Hal Littlefield	1319 Hearn Ave.	Santa Rosa 95401
San Joaquin Valley	W6JPU	Ralph Sarovan	6204 E. Townsend Ave.	Fresno 93702
Santa Clara Valley	W6VZE	Charles E. Glidden	1037 Capuchino Ave.	Burlingame 94010
ROANOKE DIVISION				
North Carolina	W4EVN	Herschel H. Haney	Box 935	Lumberton 28358
South Carolina	W4PED	Charles N. Wright	711 Merriwether Drive	North Augusta 29841
Virginia	WA4PBG	Montie F. Cone	317 Van Buren St.	Falls Church 22046
West Virginia	W8EV	Robert F. Johnson	Rt. 7, Box 525	S. Charleston 25303
ROCKY MOUNTAIN DIVISION				
Colorado	WAØHLQ	Clyde O. Penney	1626 Locust St.	Denver 80220
New Mexico	W5PNY	*Harry McGavran, Jr.*	*2506A 35th St.*	*Los Alamos 87544*
Utah	W7WKF	McCarroll Petersen	4815 Yorktown Drive	Salt Lake City 84117
Wyoming	K7NQX	Glen R. Blackburn	P.O. Box 164, 1739 E. 22nd	Cheyenne 82001
SOUTHEASTERN DIVISION				
Alabama	K4KJD	Bill S. Crafts	Route 3	Athens 35611
Canal Zone	KZ5JC	John S. Catanzaro	Box 487	Balboa
Eastern Florida	W4IYT	Andrew C. Clark	41 Lenape Drive	Miami Springs 33166
Georgia	WA4WQU	Jack Garrison	2529 Blueberry Dr.	Augusta 30906
West Indies (P.R.-V.I.)	KP4CO	José Medina-Hernández	Box 1480	Mayaguez, P.R. 00709
Western Florida	W4IKB	G. D. McKechnie	1000 N. Sixth St.	Chipley 32428
SOUTHWESTERN DIVISION				
Arizona	K7GPZ	Elmer Olson	5733 N. 41st Place	Phoenix 85018
Los Angeles	WA6KZI	*Harvey D. D. Hetland*	*2008 Cedar St.*	*Alhambra 91801*
Orange	WB6CQR	Billy C. Hall	320 E. St. Andrews	Santa Ana 92707
San Diego	WA6KHN	Duane Walters	8380 Krenz Street	San Diego 92123
Santa Barbara	K6GV	Frederic L. Patterson	P.O. Box 115	Simi 93065
WEST GULF DIVISION				
Northern Texas	W5LR	L. E. Harrison	1314 Holly Glen Drive	Dallas 75232
Oklahoma	WA5FSN	Leonard Hollar	710 So. 10th St.	Kingfisher 73750
Southern Texas	K5QQG	E. Wayne Smith	3118 Stanton Street	Houston 77025
CANADIAN DIVISION				
Alberta	VE6AFR	Hugh C. Lapp	391 Acadia Drive	Calgary
British Columbia	VE7FB	Harold E. Savage	4553 West 12th Ave.	Vancouver 8
Manitoba	VE4IA	*John D. Fellows*	*259 Glenwood Cr.*	*Winnipeg 5*
Maritime	VE1HJ	F. R. Fraser	12 Albert St.	Dartmouth, N.S.
Ontario	VE3EWD	Ed W. Doyle	301 Lacasse Blvd.	Tecumseh, Windsor 30
Quebec	VE2ALE	Joseph Unsworth	98 Galt	Dorion
Saskatchewan	VE5CU	W. H. Parker	1008-10th St. E.	Saskatoon

Simulated Emergency Test

(Continued from page 65)

The suggested message format shown in the accompanying cut should be followed. Make sure TEST MESSAGE appears at the beginning of the text of each SET message. It can easily be seen what a furor could be raised if the message in the example came through without the TEST MESSAGE.

Nevertheless, someone will forget and omit TEST MESSAGE. In that case, the word TEST before the precedence of P and EMERGENCY test messages will be the tip-off. EMERGENCY traffic, whether it is TEST or not, should be a net stopper. If no TEST is indicated, the delivering station should try to establish whether such a message is authentic before delivery, at the same time avoiding delay. Each station will have to scrutinize each such message very closely before accepting it as actual emergency.

Planned or Unplanned?

Many people confuse the terms "unplanned" and "unannounced." For reasons that have been enumerated in the past, an unannounced SET just isn't practical. Certainly an unannounced SET would be the ideal test for amateur radio, but how many amateurs would be willing to give up personal plans to participate in a test? Just who would decide when this unannounced test was to be held? How would word about the test be disseminated? These are all questions no one could answer favorably.

So someone came up with the idea of an announced but unplanned SET. Everybody knows when SET will be held, but nobody knows what kind of simulated emergency will be involved nor who is going to do what in communicating for the test.

Actually, at the local level, this has been done for some time. The EC or RO makes an SET plan but keeps details under his hat so the grass roots amateur will not know exactly what to expect.

But in NTS, common practice has been to schedule weeks or months in advance of SET just who will be doing what NCS or liaison function at what time. Some net managers have felt that this is all wrong, since in a real emergency no one will know in advance what he will be doing. So we suggest to the NTS managers that they try it either way, at your own discretion. It is understood that the Connecticut Nutmeg Net (CN, the Connecticut section cw net) and 1RN managers are planning "unplanned" SETs. It should be interesting to observe how the unplanned nets make out.

So, to recap, let's get the emergency power sources ready, the mobiles ready to go and let's make a whale of a showing in 1970. Remember, "Amateur radio exists because it qualifies as a service." — *WA9HHH*

Use your Zip code when writing ARRL. Use ours, too. It's 06111.

Gimmicks and Gadgets

(Continued from page 24)

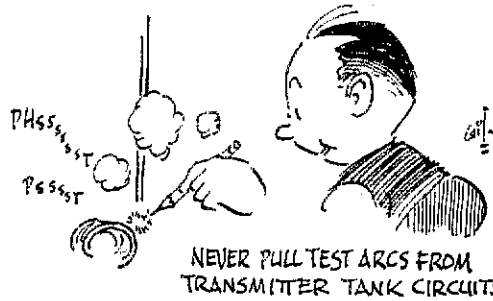
How the antenna is mounted will depend on individual installations. Ours was to be atop a wooden mast, so it was fastened to a 2 by 2-inch piece of seasoned wood about 8 feet long. If the antenna must be mounted on the side of a metal tower, the elements should be a quarter wavelength or any odd multiple thereof out from the tower. The tower will tend to act like a reflector, so the antenna should be on the side toward the area where maximum signal strength is desired. The midpoint of the stub closure, at the junction of the two right-angle fittings, is the zero rf-voltage point, and it can be grounded to the tower if desired. The balun and feedline should preferably come off in this direction, running horizontally for a quarter wavelength or multiple thereof, before dropping down for the vertical run to the station.

The cone standoff insulators are also at zero-voltage points on the antenna elements. This is not a critical dimension, but somewhere near the element midpoints is desirable. A good three-point suspension utilizes the two element centers, as shown, and the midpoint of the closed stub end. Star lugs under bolts that are threaded into the two halves of the stub make connection points for the 50-ohm balun and transmission line.

A convenient way of adjusting the antenna, if you want to be sure that the antenna is matched the best that it can be, is to suspend it in a horizontal position, about 80 inches above ground. With an SWR bridge in the coaxial line, preferably at a point an electrical half wavelength or multiple thereof down the line from the antenna, adjust the position of the short and the points of connection of the balun, for zero reflected power. Once this spot has been found, solder the permanent short in place, and drill and tap the holes for the transmission-line connections. — *W1HDQ*

Strays

Floyd Fellows, WA8FLE, will send to anyone interested, a free copy of his song, "Cigarettes," a jingle concerned with the hazards of smoking. Drop him a s.a.s.e. at 1673 Cedar Ave., Apt. 209, Cincinnati, Ohio 45224.



Happenings of the Month

Election Results
Gridley Case Settled
ARRL Seeks Counterpart Calls
ARRL Asks New Privileges for Techs
Special Board Meeting Minutes

ARRL ELECTION RESULTS

Three new directors and five new vice directors were chosen by ARRL members in mail balloting during October and November; two incumbent directors were reelected.

Great Lakes voters picked incumbent **Alban A. Michel, W8WC/W8SMQ,** by 1568 votes to 1477 for Leonard M. Nathanson, W8DQL, and 729 for Louise Rippe, W8HDB. Al's second term, like the others to be listed here, begins on January 1, 1970 for two years. In the Midwest Division, **Sumner H. Foster, WØGQ,** was reelected to a third term, garnering 1508 votes to 650 for C.W. Wade, WØINH.

The new director from the Atlantic Division is **Harry A. McConaghy, W3EPC,** of Bethesda, Maryland. Connie outpolled eight-term incumbent Gilbert L. Crossley, W3YA and four other candidates, in a race that finished like this:

Mr. McConaghy	2189
Mr. Crossley	1034
George W. Hippisley, K2EIR	846
Henry A. Blodgett, W2UTH/FRL	698
John F. Wojtkiewicz, W3GJY	322
Paul D. Mercado, W3FBF	192

Connie, who is 59, has retired as a registered engineer (electrical, mechanical, and electronic) and now owns and operates the H. R. Rudolf Company, providing marine engineering services. A Life Member of ARRL, he's just finishing a term as vice director from the Atlantic Division (which he represented at the 1969 Annual Board meeting in May, due to Director Crossley's illness at the time). He's also vice president of QCWA's Washington Chapter. First licensed as W3EPC in 1934, he currently uses cw, RTTY, ssb, am and fm variously on all the bands from 80 through 2 meters.

In the Delta Division, where incumbent Philip P. Spencer, W5LDH/LNX, chose not to run, the new director is **Max Arnold, W4WHN,** of Nashville, Tennessee. Max got 546 votes; Harry A. Phillips, K4RCT, 481; Dr. Thomas H. Raymond, W5NJD, 348; and Dr. Myrias B. Matthews, W5VAE, 163. The new Delta representative is 51 years old, and works as an estimator for Clarence Sutherland Company, which does architectural millwork. Max has been vice director of the division since 1966 and was an assistant director the two previous years. He's a trustee, director, founder and past president of the Radio Amateur Transmitting Society, and a founder of Explorer Post 15, BSA, specializing in radio, which he serves as advisor (i.e., adult leader). A member of the A-1 Operator Club, Max has been licensed since 1952.

H. Dale Strieter, W4DQS, is the choice of Southeastern Division members, who gave him 1359 votes to 915 for Albert L. Hamel, K4SJH, and 368 for Richard M. Jones, W4BTM. Dale lives in Cocoa Beach, Florida, is 42 years old, and toils at Cape Kennedy where he is supervisor of G.E.'s Engineering Equipment and Operations Group, furnishing X-band radio guidance to Atlas missiles. A Charter Life Member of ARRL who was first licensed as W8DJN in 1947, Dale is a past president of the MSU Radio Club; past director, Central Michigan Amateur Radio Club; past president and past vice president of the Florida DX Club. He's in AREC, RACES, and the A-1 Operator Club. He's listed in the DXCC Honor Roll at 318/327, and has earned the Brass Pounders League medallion.

Governor Scott of North Carolina inaugurates amateur radio week by reading a message on 3920 kHz over W4OKR/4 set up in the Capitol, and then chatted with several hams who called in: poor propagation killed a sked with W1AW. Watching the governor are (left to right) Calvin Dempsey, WA4UQC, SCM; Harry Thompson, WB4HHI, *Ed Alderman, WA4PEN, president, Raleigh* ARS; John Fried, W4WWD; Bill Hudson, WA4KVR; Bill McDowell, K4CIA; Stuart Meyer, W2GHK; and Dick Thompson, W4IJZ. *(Tom Alexander, WA4OTA took the picture)*

In vice director elections, Atlantic members picked **Jesse Bieberman, W3KT,** of Malvern, Pennsylvania, for the post he held in 1966 and 1967. The tallies:

Mr. Bieberman	2086
Harold C. Smith, WA2KND	1311
George S. Van Dyke, Jr., W3HK	1028
Allen R. Breiner, W3ZRQ	833

Jesse was an assistant director from the Atlantic Division, 1963–1965 and 1968–1969; is a past president, past vice president and past secretary of the Frankford Radio Club; and has been serving 3rd call area amateurs as ARRL QSL Bureau manager since 1947. His call is on the DXCC Honor Roll (319/345) and in the A-1 Operators Club roster. A retired school teacher, Jesse started hamming in 1920.

Larry J. Shima, WØPAN, of Bloomington, Minnesota, outscored incumbent John M. Maus, WØMBD, 502 to 332 votes to become vice director in the Dakota Division. Larry is 31 years old and is an accountant/systems analyst for Honeywell, Inc. Larry has been serving this year as an assistant director and is SCM of Minnesota for 1969-1971. He's a past secretary-treasurer, Northern Iowa Amateur Radio Club, past Phone Activities Manager for Hawaii, and holds DXCC under two calls. He's an OPS and a member of AREC, RACES and the A-1 Operator Club. He enjoys DX chasing, traffic work and contests, and holds the rank of Lt. Commander in the active Navy Reserve.

In the Delta Division, **Franklin Cassen, W4WBK,** has returned to the vice directorship he held in 1964–1965. He took 884 votes to 648 for John H. Sanders, WB4ANZ. Frank, who is 65, lives in Memphis and works as a design engineer for Harland Bartholomew & Associates, on Interstate highway lights, signs and the like. He handled a short trick as acting SCM for Tennessee in 1967 and formerly served as RACES radio officer. He's vice president, past secretary, past treasurer and past director of the Mid-South Amateur Radio Association, holds appointments as ORS and OO, and is a member of AREC. A Charter Life Member of ARRL, he was first licensed in 1919.

A four-cornered race in the Great Lakes Division resulted in the election of **Currin L. Skutt, W8FSZ/K8EPT,** as vice director by this tally:

Mr. Skutt	1255
James L. Russell, W8BU	1048
Henry F. Zimmerman, K4FU	995
Walter S. Gibbemeyer, WA8PRR	473

A 52-year-old resident of Lansing, Michigan, Currin is a machinist for its Board of Water and Light. He's past president, past vice president, past treasurer and past director of the Central Michigan Amateur Radio Club, Inc., and former editor of its paper, *The Scope*. He was chairman of the ARRL 1968 Michigan State Convention and holds OPS appointment. He is an active member of RACES, supplying the link between 2 meter fm and 75 meter ssb nets, and has been licensed since 1950.

Phil Wicker, W4ACY, vice director from the ARRL Roanoke Division, received the 1969 Roanoke Division ARRL Service Award at the division convention in Huntington, West Virginia. *(Photo thanks to Charles Wright, W4PED)*

The incumbent Southeastern Division director, **Charles J. Bolvin, K4KQ,** was not a candidate for reelection, but did consent to run for vice director and was successful — there were 1464 votes for him and 1179 for Larry E. Price, W4DQD. Chuck needs no introduction here, having been vice director in 1964–1965 and director since then.

Directors Noel B. Eaton, VE3CJ of Canada; Charles G. Compton, WØBUO of Dakota; and J. A. Doc Gmelin, W6ZRJ of Pacific; vice directors A. George Spencer, VE2MS, of Canada, Ralph V. Anderson, KØNL and Hugh Cassidy, WA6AUD of Pacific were earlier declared elected as the only nominees for their respective offices.

MARITIME MOBILE ON 7 MHZ.

The Federal Communications Commission has issued a report and order in Docket 18506 which will allow stations on shipboard or aircraft in international waters to use 7.0-7.1 MHz when in Regions 1 and 3, effective December 31, 1969. Prior to that date, the band could only be used while in Region 2, the Western Hemisphere.

At the same time, FCC denied maritime and aeronautical mobile use of 3.5-3.8 MHz. In its order, it said in part:

By international agreement, in all regions, the 3.5–3.8 MHz band is allocated for shared use by Amateur, Fixed and Mobile Services. As stated in the Notice, the operation by amateurs aboard ships of the United States could significantly increase the possibility of causing harmful interference to certain stations using this frequency band in accordance

with the Geneva Radio Regulations and prior notification to the International Frequency Registration Board. Mr. Ackerman's [Dick, WA4FIJ, who originally requested the rulemaking] reasons in support of this allocation are not persuasive. They fail to take into account the unpredictability of amateur station location and propagation in geographical areas not under the jurisdiction of the United States and the likelihood of these amateur stations causing harmful interference to foreign radio stations in other radio services which are now successfully sharing the use of the frequencies in this amateur band. The same reasons militate against any trial period for the use of these frequencies in Region 2.

Section 97.95 (b) (2) has been amended to read:

"(2) When outside the jurisdiction of a foreign government, operation may be conducted within Region 2 on any amateur frequency band between 7.0 Mc/s and 148 Mc/s, inclusive; and when not within Region 2, operation may be conducted only in the amateur bands 7.0–7.1 Mc/s, 14.00–14.35 Mc/s, 21.00–21.45 Mc/s and 28.00–29.7 Mc/s." The regulation continues with a note outlining the exact boundaries of Region 2; those interested may find the text in any recent edition of the *License Manual*.

GRIDLEY CASE SETTLED

Ansel Gridley, W4GJO, is "off the hook" on that TVI suit in which Lee H. Eggers, a former neighbor, sued "Grid" for a million dollars for "electronic invasion of privacy" — without paying a nickel in damages. At the same time, Grid will drop his countersuit for harassment against Eggers. The courts accepted an agreement between the two parties and dismissed both cases "with prejudice" — i.e., the same matters cannot again be brought into court. From the outset of the case, W4GJO's attorney was in frequent contact with the League's General Counsel and waged a strong and effective defense. The successful outcome of this case will be most gratifying to the many hams who provided support and assistance, individually and through their clubs.

1970 EXAMINATION SCHEDULE

The examination schedule for FCC offices and field points for the first half of 1970 is essentially the same as the schedule shown on page 94, October *QST*. These changes have been made:

The **Baltimore** office is now in the new Hopkins Plaza downtown, Room 819 of the Federal Building, zip code 21201.

The **Atlanta** office has moved across the street, Room 1602 Gas Light Tower, 235 Peachtree.

A new quarterly examination point has been established at **Albany, N. Y.**, for March, June, September and December, replacing Schenectady, under the jurisdiction of the FCC Engineer in Charge at New York City.

The semiannual exams at **Fairbanks, Alaska,** will be in April and October, instead of May and November; register in advance with the Engineer in Charge at Anchorage.

ANTENNA RULES EASED

The Commission has changed the amateur rules concerning antenna heights so as to conform to revised Part 17 of its own rules and to regulations of the Federal Aviation Agency, on whose behalf the requirements were originally adopted some 18 years ago.

The principal benefits to amateurs will come, not only from a doubling of antenna heights as against distance from a runway, but even more important, from recognition of the "shielding" concept which the League unsuccessfully advanced nearly two decades ago — that amateurs live primarily in built-up areas where there are many trees and buildings taller than the average ham antenna structure, and thus the amateur skywire couldn't pose a new threat to aviation.

§ 97. 3(h) *Antenna structures.* The term antenna structures includes the radiating system, its supporting structures and any appurtenances mounted thereon.

2. Section 97.45 is revised to read as follows:

§ 97.45 Limitations on antenna structures.

(a) Except as provided in paragraph (b) of this section, an antenna for a station in the Amateur

WHO THE DEVIL IS WHO?

20th in a Series of Call Conversion Charts

Here are additional calls of amateurs taking advantage of new rules which allow Extra Class licensees licensed 25 years ago or longer to acquire two-letter calls. If you should be listed here, let us know by post card right away.

Now	*Was*	*Now*	*Was*	*Now*	*Was*	*Now*	*Was*
W1LP	W1JYV	W3YO	W3DMK	W7OF	W7CNM	W9HE	W9WEN
W1MU	W1FGL	W3YQ	W3JET	W7PT	W7HPE	W9HJ	W9WFS
W1OM	W1MHU	W4LK	W4ADWQ	W7QE	K7GXO	W9HN	W9ZMP
K2AD	W2JYY	K4LQ	W4FQX	W8IO	K8VCW	WØJD	WØHBT
K2BM	W2BRV	K4LW	W4YLD	W8JE	W8UBD	WØJW	WØDAO
K2BQ	WA2PBX	K4MC	W4FDV	W8JU	W8WHD	WØKL	WØEXV
K2BV	W2KBK	K4MJ	W3MCB	W8KD	W8KDC	WØKD	WØGEA
K2CA	W2ARF	W5PW	W5CHI	W8CK	W8NSJ	WØLP	WØOWH
W2FS	W2FCT	W5RR	W5KAE	W9FF	WØJTM	WØLQ	WØPTV
W3UK	W3FDO	K6NC	WA6IWM	W9FO	W9CYJ	WØLR	WØCXN
W3UV	W3AMK	K6PM	K6YRF	W9GB	W9CKH	WØLV	WØFHV
W3WZ	W3NMP	K6QH	W6NUD	W9GP	WA9YNP	WØLY	WØYWO
W3YL	W3KOI	W7MN	W7JFU	W9GQ	W9NKT		

Radio Service which exceeds the following height limitations may not be erected or used unless notice has been filed with both the FAA on FAA Form 7460-1 and with the Commission on Form 714 or on the license application form, and prior approval by the Commission has been obtained for:

(1) Any construction or alteration of more than 200 feet in height above ground level at its site [§ 17.7(a) of this chapter].

(2) Any construction or alteration of greater height than an imaginary surface extending outward and upward at one of the following slopes [§ 17.7(b) of this chapter]:

(i) 100 to 1 for a horizontal distance of 20,000 feet from the nearest point of the nearest runway of each airport with at least one runway more than 3,200 feet in length, excluding heliports and seaplane bases without specified boundaries, if that airport is either listed in the Airport Directory of the current Airman's Information Manual or is operated by a Federal military agency.

(ii) 50 to 1 for a horizontal distance of 10,000 feet from the nearest point of the nearest runway of each airport with its longest runway no more than 3,200 feet in length, excluding heliports and seaplane bases without specified boundaries, if that airport is either listed in the Airport Directory or is operated by a Federal military agency.

(iii) 25 to 1 for a horizontal distance of 5,000 feet from the nearest point of the nearest landing and take-off area of each heliport listed in the Airport Directory or operated by a Federal military agency.

(3) Any construction or alteration on an airport listed in the Airport Directory of the Airman's Information Manual [§ 17.7(c)].

(b) A notification to the Federal Aviation Administration is not required for any of the following construction or alteration:

(1) Any object that would be shielded by existing structures of a permanent and substantial character or by natural terrain or topographic features of equal or greater height, and would be located in the congested area of a city, town, or settlement where it is evident beyond all reasonable doubt that the structure so shielded will not adversely affect safety in air navigation. Applicants claiming such exemption shall submit a statement with their application to the Commission explaining the basis in detail for their finding [§ 17.14(a) of this chapter].

(2) Any antenna structure of 20 feet or less in height except one that would increase the height of another antenna structure [§ 17.14(b) of this chapter].

(c) Further details as to whether an aeronautical study and/or obstruction marking and lighting may be required, and specifications for obstruction marking and lighting when required, may be obtained from Part 17 of this chapter, "Construction, Marking, and Lighting of Antenna Structures." Information regarding the inspection and maintenance of antenna structures requiring obstruction marking and lighting is also contained in Part 17 of this chapter.

ARRL SEEKS COUNTERPART CALLS

At one time, FCC followed the informal practice of issuing "counterpart" calls to amateurs who changed call areas. For instance, if W4XYZ moved to California, and W6XYZ was vacant, it would automatically be issued to him when he filed an application for modification of license. At the November 1 special meeting of the ARRL Board, the directors decided the League should ask FCC to reestablish the practice. The text of the request to FCC follows:

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

In the Matter of	
Amendment of Section 97.51 of the Rules Relating to Assignment of Call Signs to Amateur Stations	RM-

PETITION FOR RULE MAKING

The American Radio Relay League, Incorporated, by its General Counsel, respectfully requests that Section 97.51(a) of the Commission's Rules and Regulations be amended to add the following as subsection (3):

(3) A specific unassigned call sign may be assigned to the previous holder of a call sign having the same two or three letter suffix in another call sign area. This provision shall not be available to previous holders of two letter call signs in call sign areas in Alaska, Hawaii, Puerto Rico, and other areas outside the continental limits of the United States.

Adoption of the requested subsection will require renumbering of subsections (3), (4) and (5) to (4), (5) and (6), respectively.

In support whereof, the following is submitted:

For many years, the Commission followed the practice of assigning upon request to an amateur moving from one call sign area to another an unassigned call sign having the same two or three letter suffix as previously held. For example, W7XYZ moving to the third call sign area could be assigned, upon proper request, either W3XYZ or K3XYZ. However, the holder of a two letter suffix in Alaska, Hawaii, Puerto Rico, the Virgin Islands and other areas outside the continental limits of the United States was not automatically eligible for a call sign having a two letter suffix when moving to one of the ten call sign areas of the continental United States. This informal practice was abandoned in 1958. The present language of Section 97.51(a) was adopted by the Commission in its Report and Order in Docket No. 15928, 9 FCC 2d 814, 11 RR 2d 1563.

The movement of residents of the United States from one section of the country to another is so well known as to require little comment. A most substantial percentage change residence not once but a number of times during their life-time. Amateur radio operators are no exception. In fact, because of their interest and experience in electronics, their services are in demand by industry and the military and their movements are probably more frequent than the average resident.

The Commission is well aware of the practice of amateurs to identify themselves in off-the-air as well as on-the-air communications by the suffix of their call signs. For example, W7XYZ is called

"XYZ" as long as he holds that call sign. However, if another suffix is issued when he moves to another call sign area, he loses that identity. Others become attached to particular words and phrases when giving their call signs phonetically. This practice tends to continue and increase interest in amateur operations and activities.

The use of a computer for storage of call sign information makes the check of availability as well as the assignment of a specific call sign both easy and rapid. In fact, even considering all direct and indirect expenses, the cost is substantially less than the $20.00 filing fee imposed by Section 1.1115(a) of the Commission's Rules. In addition, the number of such requests on a daily, weekly or monthly basis will be so small as to not require the addition or the reassignment of the duties of a single employee of the Commission.

In conclusion, it is respectfully submitted that the benefits which will flow from adoption of this proposal will be of substantial benefit to the Amateur Radio Service, the Commission, and the Government.

WHEREFORE, the premises considered, the Commission is respectfully requested to issue an appropriate notice of proposed rule making looking toward modification of Section 97.51(a) of its Rules as suggested herein.

THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED

ROBERT M. BOOTH, JR.
November 20, 1969 *Its General Counsel*

ARRL ASKS NEW PRIVILEGES FOR TECHS

Pursuant to decisions at the regular and special meetings of the ARRL Board, General Counsel Booth has filed a petition for rulemaking which would open the whole two meter band and 200 kHz of the ten meter band to Technician Class *licensees, and restore the dual holding of* Novice and Technician which was possible prior to January 24, 1969.

The Board felt that in the 18 years since creation of the Technician Class to accommodate experimenters, licensees of that Class had evolved into communicators — like the rest of the fraternity — and therefore a new look at the privileges accorded to Technicians was in order. In support of this point, the ARRL filing mentions the important communications work by amateurs of this class in the Alaskan earthquake and Hurricane Camille disasters. Here is the full text:

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

In the Matter of	
Amendment of Section 97.7(c) of the Commission's Rules relating to frequencies available to the Technician Class licensees	RM-

PETITION FOR RULE MAKING

The American Radio Relay League, Incorporated, by its General Counsel, respectfully requests that Section 97.7(c) of the Commission's Rules and Regulations be amended as follows so as to permit operation by Technician Class licensees in the frequency bands 29.5 to 29.7, 144.0 to 145.0, and 147.0 to 148.0 MHz in addition to the bands now authorized:

(c) *Technician Class.* All authorized amateur privileges on the frequencies 29.5–29.7 MHz, 50.1–54.0 MHz, and in the amateur frequency bands above 144 MHz.

It is further requested that Section 97.9(f) be amended by deletion of the last sentence, which reads: "The Novice Class license may not be concurrently held with any other class of amateur radio license." Section 97.9(f) then would read as follows:

(f) *Novice Class.* Any citizen or national of the United States, except a person who holds, or has held within the 12-month period prior to the date of receipt of his application, a Commission-issued amateur radio license.

In support whereof, the following is respectfully submitted.

Background

The Technician Class operator license was proposed by the Commission in a Notice of Proposed Rule Making of April 21, 1949, and was established by the Report and Order of the Commission in Docket No. 9295, adopted January 29, 1951. In its Report and Order the Commission said, in pertinent part:

"The technician class is designed for the experimenter or technician and the holder of the license is permitted to operate only on the higher frequency bands. Accordingly, it is believed that persons desiring this class of license would primarily be those who are truly interested in the radio art and who, because of the nature of their interest, are likely to be in fact qualified for the technician class of license whether examination for such license was conducted by an employee of the Commission or a volunteer examiner."

Operation in all amateur bands above 220 MHz band was authorized. The Technician Class examination, which could be given by mail, included a beginners code test of five words per minute (the same as for the Novice Class) and "general amateur practice and regulations involving radio operation and apparatus and provisions of treaties, statutes, and rules affecting amateur stations and operators" (the same as for the General and Conditional Classes).

Over the years a number of modifications of the privileges of the Technician Class have been proposed. Some have been adopted and others rejected.

In a Report and Order in Docket No. 11157, adopted March 9, 1955, the Commission amended its rules to permit Technician Class operation in the entire 50 MHz band.

The 145.0–147.0 MHz sub-band was made available to Technicians by a Report and Order in Docket No. 12728, adopted July 15, 1959, in which it was noted that the advantages included participation in civil defense and emergency communications.

The wisdom of the Commission in opening up the 145.0–147.0 MHz sub-band Technicians has been most strikingly illustrated in recent years by the growth of FM operations in the band, often using surplus commercial equipment removed from service in the 152.0–174.0 MHz mobile band, and by the development of "repeater" operations in many sections of the United States.

Proposals to expand privileges of the Technician Class to permit operation in the 28.0–29.7 MHz amateur band (RM-273 and RM-319) were denied by a Memorandum Opinion and Order of the Commission adopted July 3, 1962. The Commission said:

"The Technician Class of amateur operator license was established in Docket No. 9295, adopted January 29, 1951. 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 Commission's policy has not changed in this regard although there appears to have been considerable misunderstanding of the role of the Technician Class in the past. 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. Further, the 28.0–29.7 Mc/s band is of limited use for communications because of the sun spot cycle. While it is, of course, possible that meritorious experimentation could be conducted in this band, the resulting additional congestion would cause undue detriment to those amateurs now endeavoring to communicate on these frequencies.

The Report and Order in the lengthy incentive licensing proceeding, Docket No. 15928, adopted August 24, 1967, noted the receipt of proposals for "reduction of frequency operating privileges for the Technician Class licensee" (RM-389) and for "extension of Technician Class privileges to the entire 144–148 Mc/s frequency band" (RM-464). The Commission denied the latter proposal with the explanation that it was "inconsistent with the reduction of the Technician Class privileges adopted herein." Effective November 22, 1968, Technicians were precluded from operation in the 50.0–50.1 MHz sub-band. A withdrawal of the sub-band 50.1–50.25 MHz, effective November 22, 1969, was cancelled by an Order adopted September 24, 1969.

In a rule making proceeding involving the Novice Class, Docket No. 18266, the Commission, by a Report and Order adopted December 12, 1968, amended Section 97.9(f) to discontinue the practice of concurrent holding of the Novice and Technician Class licenses with the following explanation:

"There was objection to this limitation in a few of the comments, including the one submitted by the American Radio Relay League, Inc. (ARRL), based upon the contention that the Technician Class licenses would be denied the opportunity to obtain code speed practice for advancement to higher class licenses. However, it does not appear that such advancement is dependent upon the holding of a Novice Class license. Technician Class licensees are able to utilize some of their assigned frequencies for on-the-air code speed practice. Alternatively, use can be made of code tapes, records, ARRL conducted code practice transmissions, and commercial station transmissions. The Commission finds, therefore, that eliminating concurrent availability of these two license classes is appropriate."

With this background of the Technician Class, we turn now to the instant proposal.

Expansion to 144.0–148.0 MHz

The 144.0–146.0 MHz band is an exclusive amateur band world-wide and the 146.0–148.0 MHz band is available for amateur use throughout Region II under the 1959 Regulations of the International Telecommunications Union. In recent years, the interest of radio amateurs in space communications has been evidenced by the four OSCAR satellites placed in orbit and by additional satellites under construction by amateur groups in a number of countries. The design, construction and operation of space and ground equipment falls squarely within the original intent and purpose for the Technician Class. Unfortunately, the present restriction of Technician operation to 145.0–147.0 MHz closes just one-half of the world-wide portion of the 144 MHz band to these licensees. Opening up 144.0–145.0 MHz will enhance the value of and contributions by Technician Class licensees.

At the special Board Meeting: Treasurer Houghton, Communication Manager Hart, W1NJM.

The Commission is fully aware of the recent growth of FM operation in the 144.0–148.0 MHz band and the development of equipment and operating techniques for both mobile and repeater or relay operations. Much of this work has been conducted by Technicians, with the perhaps undesirable result that the operations have been restricted largely to the 145.0–147.0 MHz band. Expansion of these and other operations into the 147.0–148.0 MHz band will be increasingly desirable as the occupancy of the 145.0–147.0 MHz band grows, and overall efficiency of frequency usage will be improved. This is but another reason for requesting the removal of the restrictions from the Technician Class.

Even though the Technician Class was intended originally to encourage experimentation with equipment and in techniques in the VHF, UHF and higher frequency bands, the Commission recognized as long as ten years ago that Technician Class licensees can and do make most valuable contributions as communicators in times of emergency. The prediction in the Report and Order in Docket No. 12728, adopted in 1959, that Technicians would be invaluable in time of emergency and disaster has been amply fulfilled. In numerous disasters in the last ten years, including the Alaskan earthquake in 1964 and the recent Hurricane Camille, the contributions of Technicians in providing internal communications have been valuable beyond estimation. Participation by Technicians in the League's Amateur Radio Emergency Corps (AREC) has grown over the years. The evolution of Technicians as communicators as well as experimenters in the nineteen years since the class was established must be recognized.

Expansion to 29.5–29.7 MHz

As noted above, a proposal to permit Technician Class operation in the 28.0–29.7 MHz band was

denied in 1962 largely because the Technician Class "was not established as a communicators service and should not be regarded as a stepping stone between the Novice and General operator classes." (RM-273 and RM-319). In the seven intervening years, the average Technician Class licensee has become increasingly interested in communicating, particularly by voice. With the growth of single side band suppressed carrier telephony (SSB) into the 50 and 144 MHz amateur bands, much of the equipment, both commercially manufactured and "home-brewed," is capable of operation on one or more of the amateur bands below 50 MHz. The ability to operate on at least one HF band may have the practical effect of increasing SSB operation in the VHF bands.

Some of the serious experimentation by Technician Class licensees has involved long distance propagation characteristics of VHF and UHF frequencies, both terrestrial and space. Frequently it is desirable, and sometimes necessary, to have available at least one channel for long distance communication if such experiments are to be successful. For example, in the space experiments of radio amateurs, the reception and transmission of orbiting, tracking and operating information are most important. With all operations restricted to VHF and higher frequencies, which are most useful and widely used for short distance line-of-sight operations, Technician Class licensees are severely handicapped in fulfilling the mission for which that class was created initially. This is yet another reason why access to at least one HF amateur band is most desirable.

One of the problems of the Citizens Radio Service which has plagued the Commission since that service's inception has been the desire, as well as practice, of licensees to engage in "hobby" type operations, communications and experimentation. The granting of limited privileges for Technician Class operations in the 29.5–29.7 MHz may have the practical effect of attracting newcomers to the amateur radio ranks.

The Novice Class is generally considered to be the lowest class of amateur radio license. Substantial portions of the 3.5, 7.0 and 21.0 MHz amateur bands are available for Novices in communicating with other amateurs around the world. The same code test is used for both Novices and Technicians. The same written examination on "general amateur practice and regulations involving radio operation and apparatus and provisions of treaties, statutes, and rules affecting amateur stations and operators" is used for the Technician, Conditional and General Classes. Nevertheless, only the Technician Class licensee is excluded from the HF bands even though he has established a minimal code proficiency and a significant knowledge of theory, equipment, and operating practice.

These are just some of the reasons why, in the League's opinion, Technicians should have access to at least one HF band. Because of its propagation characteristics, including the eleven year sunspot cycle, the 28.0–29.7 MHz band is the least dependable of the HF bands available to amateurs for long range communications.

Undoubtedly other interested amateurs will advance additional reasons in support of a proposal to permit Technicians Class licensees to operate in the 29.5–29.7 MHz band. The Commission is respectfully requested to invite such comments by the issuance of a notice of proposed rule making at an early date.

The Technician Class Generally

It is readily apparent from the various pronouncements of the Commission over the years and from the present interests and operations of Technician Class licensees that the purposes for which the Technician Class was established nineteen years ago require review. It is respectfully suggested that any notice of proposed rule making invite comments and suggestions for major revision of the Technician Class license.

Concurrent Holding of Technician and Novice Class Licenses

As noted above, the Commission discontinued the practice of concurrent holding of Technician and Novice Class licenses by its 1968 amendment of Section 97.9(f). It is respectfully submitted that some of the incentive for a Technician Class licensee to strive for a higher class of license was removed. Although on-the-air code contacts may be held on the frequencies now available to Technicians, the thrill and pleasure of contacts with amateurs hundreds and thousands of miles distant, many in other countries, is lacking and the incentive to obtain a General or Conditional Class license so as to continue such contacts upon expiration of the non-renewable Novice Class license is non-existent. It appears that any administrative inconvenience to the Commission by the concurrent holding of Technician and Novice Class licenses can be minimized by proper programming of the Commission's computer. The issuance of different call signs for the Technician and Novice Class licenses can be avoided by simply providing by an appropriate rule that the letter "N" be included in the prefix of the call sign when A1 operation is being conducted in the HF bands under the Novice license.

Wherefore, the premises considered, the Commission is respectfully requested to issue an appropriate notice of proposed rule making looking toward modification of Sections 97.7(c) and 97.9(f) of its Rules as suggested herein.

THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED

ROBERT M. BOOTH, JR.
Its General Counsel

November 19, 1969

Incidentally, in our reminder last month about no dual holding of Novice and Technician (page 74 of December *QST*), we had a "goof" — the second sentence of the second paragraph should read, "Now a Novice qualifying for Technician loses his Novice Class License."

AMATEUR RADIO WEEKS, ALREADY

Toronto, Ontario, observed amateur radio week November 10–15, 1969, in conjunction with the annual convention of the Radio Society of Ontario. Mayor William Dennison mentioned in particular the work of RSO in support of "Operation Whitecane" with the Canadian National Institute for the Blind.

North Carolina had its statewide amateur radio week November 17–23, 1969, initiated by the Raleigh Amateur Radio Society. The proclamation by Governor Robert W. Scott highlighted amateur emergency work, the medical net which centers on Duke University, communi-

cations for servicemen overseas, and the reservoir of technically oriented personnel for business, industry and the military which amateur radio comprises. The governor even got on the air and "hammed it up" a bit; see the photo elsewhere in this department.

February 1 to February 8 will be observed in Nevada, coinciding with the annual "SAROC" Convention February 4–8 in Las Vegas. Governor Paul Laxalt picked up the same points as Governor Scott.

Except where local conditions override, amateur groups seeking declaration of amateur radio week during 1970 should consider the week of June 21–27, which will be listed in *Chases' Calendar of Annual Events* and which coincides with Field Day, June 27–28, 1970.

CHANNEL 9 TO BE CB "EMERGENCY"

As a matter of interest only, we mention Docket 18705, in which FCC proposes to reserve CB channel 9 for "emergency" communications only, involving the immediate safety of life, protection of property or the rendering of assistance to a motorist in difficulty. Though comment deadline was December 10, it is likely that later comments will be accepted.

SPECIAL BOARD MEETING MINUTES

"League Lines" last month reported briefly on actions taken in a special ARRL Board Meeting November 1, 1969. Here are the official minutes of the meeting. The photos scattered herein are by Ed Metzger, W9PRN, Central Division vice director.

MINUTES OF THE 1969 SPECIAL MEETING OF THE BOARD OF DIRECTORS

The American Radio Relay League, Inc.
November 1, 1969

1) Pursuant to due notice, and in accordance with a decision made at the annual meeting in May, the Board of Directors of The American Radio Relay League, Inc., met in special session at the Shoreham Motor Hotel, Hartford, Connecticut, on November 1, 1969. The meeting was called to order at 9:05 A.M., with President Robert W. Denniston, WØDX, in the Chair, and the following directors present:

Roy L. Albright, W5EYB, West Gulf Division
Charles J. Bolvin, K4KQ, Southeastern Division
Robert York Chapman, W1QV, New England Division
Victor C. Clark, W4KFC, Roanoke Division
Charles G. Compton, WØBUO, Dakota Division
Gilbert L. Crossley, W3YA, Atlantic Division
Harry J. Dannals, W2TUK, Hudson Division
Noel B. Eaton, VE3CJ, Canadian Division
Sumner H. Foster, WØGQ, Midwest Division
J. A. Gmelin, W6ZRJ, Pacific Division
John R. Grigga, Southwestern Division
Philip E. Haller, W9IUG, Central Division
Alban A. Michel, W8WC, Great Lakes Division
Carl L. Smith, WØBWJ, Rocky Mountain Division
Philip P. Spencer, W5LDH, Delta Division
Robert B. Thurston, W7PGY, Northwestern Division

Director Albright, W5EYB and Honorary "Veep" Handy, W1BDI chat in Hartford.

Also in attendance, as members of the Board without vote, were Wayland M. Groves, W5NW, First Vice President; R. O. Best, W5QKF, Vice President; and John Huntoon, W1LVQ, General Manager. Also in attendance, at the invitation of the Board as non-participating observers, were Atlantic Division Vice Director Harry A. McConaghy, W3EPC; Central Division Vice Director Edmond A. Metzger, W9PRN; and Roanoke Division Vice Director L. Phil Wicker, W4ACY. There were also present Treasurer David H. Houghton; Honorary Vice President F. E. Handy, W1BDI; General Counsel Robert M. Booth, Jr., W3PS; Technical Director George Grammer, W1DF; Public Relations Consultant Don Waters; Assistant General Manager Richard L. Baldwin, W1IKE; Communications Manager George Hart, W1NJM; and Senior Assistant Secretary Perry F. Williams, W1UED.

2) At the request of the Chair, the assembly stood in a moment of silence in memorial tribute to the late Herbert Hoover, Jr., W6ZH; Harry M. Engwicht, W6HC; Bigelow Green, W1EAE; and Quayle B. Smith, W3KDR.

3) The Chair designated General Counsel Booth as Parliamentarian for the meeting, and Mr. Booth outlined briefly the procedure applying for the special meeting.

4) On motion of Mr. Foster, unanimously VOTED that the regular order of business is suspended.

5) Moved, by Mr. Albright, that the first formal report of the VHF Repeater Advisory Committee, together with appended minority report, if any, be published in *QST* and that concurrent with publication, comments be requested from the field, these comments to be forwarded to the Advisory Committee; and further that should FCC request comments regarding proposed rule making with respect to repeater operation or regulations, that the General Counsel prepare and present comments to the FCC in accordance with recommendations contained in the latest Advisory Committee interim report furnished the Board liaison director by the committee majority. After discussion, moved, by Mr. Gmelin, to lay the matter on the table; but the motion to table was rejected, 5 votes in favor to 11 opposed; Mr. Thurston requested to be recorded as opposed to tabling. On motion of Mr. Bolvin, after discussion, VOTED (Canadian Director Eaton abstaining) to amend the motion by

Directors Dannals, W2TUK; Clark, W4KFC and Compton, WØBUO.

striking all text beginning with the words "and further." The question then being on the motion as amended, the same was ADOPTED.

6) The Board was in recess from 10:25 A.M. to 10:35 A.M.

7) On motion of Mr. Spencer, after extensive discussion, VOTED (Canadian Director Eaton abstaining) that the requests to be submitted to the Federal Communications Commission concerning changes in the operating privileges of Technician Class licensees pursuant to Minutes 14, 53 and 55 of the last annual meeting of the Board of Directors note the increased communication interest and activities of the Technician Class licensees since that class was first established and the General Counsel be directed to file our request immediately.

8) On motion of Mr. Clark, unanimously VOTED (Canadian Director Eaton abstaining) that the General Counsel be instructed to petition the Federal Communications Commission to amend the regulations so as to provide for assignment, upon request of an applicant, payment of the fee provided therefor, and subject to its current availability, of an amateur call sign having a counterpart suffix to one previously held by that applicant in the same or another call area.

9) At this point General Manager Huntoon reported on the progress of Board actions in Minutes 39, 41, 44, 68, 69 and 87 of the May meeting, and Communications Manager Hart reported similarly on actions in Minutes 15, 18, 33, 47, 18, 49, 59, 64, 65, 75, 82, 83 and 88. Discussion followed.

10) The Board was in recess for luncheon from 12:05 P.M. to 12:40 P.M.

11) On motion of Mr. Foster, after discussion, unanimously VOTED that in view of the implementing of Phase 2 of the phone regulations by FCC, that occupancy studies be implemented by the Planning Committee to determine the effect of those regulations on the various band segments.

12) On motion of Mr. Foster, after discussion, unanimously VOTED that the Communications Manager institute studies as to operation of phone traffic and emergency nets under disaster conditions and the limitations of FCC Phase 2, and report his recommendations at the May 1970 meeting.

13) Moved, by Mr. Foster, that after study of the effects of FCC Phase 2 phone regulations on emergency and disaster communications nets, the Communications Department report to the Planning Committee the desirability of setting aside certain frequencies where such nets containing both General and Advanced Class amateurs could operate to provide maximum public service. But, after discussion, Mr. Foster withdrew the motion.

14) On motion of Mr. Eaton, after discussion, unanimously VOTED that $55,000 of funds currently in the Deposit Administration Account of the ARRL Pension Plan be transferred to equity investments through Connecticut General Life Insurance Company Separate Account A; and that future annual contributions be apportioned as directed by the Finance Committee.

15) On motion of Mr. Foster, after discussion, unanimously VOTED that on behalf of the 9 district directors and with the approval of the Merit and Awards Committee, an award in suitable form be issued to WØDMA, Alva M. Smith, for his outstanding service to amateur radio in his handling of the W9 and WØ QSL Bureaus during the past 30 years.

16) On motion of Mr. Chapman, after extensive discussion, unanimously VOTED that the President appoint a special committee, directed to submit to the ARRL Board of Directors for adoption, a proposed constitution and set of by-laws for the American Radio Relay League Foundation pursuant to Minute 28 of the 1969 Board actions.

17) On motion of Mr. Clark, after extensive discussion, unanimously VOTED that the recommendations of the General Counsel for amendments to the Articles of Association and By-Laws to provide for two meetings of the Board per year be taken up as an item of business at the May 1970 Board meeting.

18) The Board was in recess from 3:01 P.M. to 3:10 P.M.

19) On motion of Mr. Chapman, after discussion, unanimously VOTED that the Federation of Eastern Massachusetts Amateur Radio Association (FEMARA) application to hold a national ARRL convention in the city of Boston, Mass., on 25–27 September 1970, be approved by the ARRL Board of Directors this date, November 1, 1969.

20) On motion of Mr. Griggs, after discussion, unanimously VOTED to approve the request of the Associated Radio Amateurs of Long Beach (Calif.) for the presentation of a national convention of the ARRL in 1971 aboard the Queen Mary in Long Beach, California.

21) On motion of Mr. Clark, after discussion, VOTED that a special committee be convened by the President for the purpose of reviewing and

Vice President Best, W5QKF and Director Thurston, W7PGY.

evaluating Board meeting procedures and preparing discrete recommendations for any improvements deemed necessary. Messrs. Chapman, Gmelin and Griggs requested to be recorded as voting opposed.

22) Moved, by Mr. Griggs, that the Board of Directors does hereby direct the General Manager to effect the periodic publication in *QST* of names and addresses of television and related home entertainment equipments who either incorporate in their designs, or furnish free to their customers, high-pass filters and other interference rejection devices. But, after extensive discussion, on motion of Mr. Compton, VOTED to lay the matter on the table. Messrs. Griggs, Haller and Spencer wished to be recorded as voting opposed to tabling.

23) Moved, by Mr. Griggs, that the Board of Directors does hereby instruct the General Manager to offer technical aid and cooperation to consumer-oriented rating magazines in determining the interference rejection characteristics of various TV receivers and related home entertainment equipments. After discussion, on a roll-call vote, the matter ended in a tie, 8 votes in favor to 8 opposed. Voting in the affirmative were Messrs. Chapman, Clark, Dannals, Gmelin, Griggs, Smith, Spencer and Thurston; voting opposed were Messrs. Albright, Bolvin, Compton, Crossley, Eaton, Foster, Haller, and Michel. The Chair cast his vote in the negative, and the motion thus was lost.

24) Moved, by Mr. Griggs, that the Board of Directors does hereby authorize the attendance of Vice Directors at one Board meeting, the first if possible, during each term of office, with all expenses incident thereto to be paid from League funds. After discussion, on motion of Mr. Chapman, unanimously VOTED to amend the motion to add: "the attendance at Board meetings by the Vice Directors will be subject to approval by the division director and expenses accrued will be chargeable to the division allotment." After further discussion, the question being on the motion as amended, the same was ADOPTED, 10 votes in favor to 6 opposed. Messrs. Gmelin and Griggs wished to be recorded as voting in favor.

25) Moved, by Mr. Smith, that a statement of the duties and responsibilities of the Director, Vice Director and the Section Communications Manager, be prepared in brief but concise summary form and to be supplied to each such nominee for elective office. After discussion, by Mr. Spencer, to amend the motion to provide for publication of the material in *QST*; but there was no second, so the motion to amend was lost. After further discussion, moved, by Mr. Crossley, to amend the motion to provide that the material would be mailed to a nominee as soon as his perition was declared valid; but there was no second, so the motion to amend was lost. After further discussion, moved, by Mr. Albright, to amend the motion by striking the text and substituting therefor the following: "That the General Manager furnish each nominee a summary of the existing regulations pertaining to the office for which he is nominated;" but there was no second, so the motion to amend was lost. After further discussion, the question then being on the original motion, the same was unanimously ADOPTED.

26) Moved, by Mr. Dannals, to take from the table Mr. Griggs' proposal concerning interference problems; but the motion was rejected, 6 votes in favor to 10 opposed. Messrs. Griggs, Haller and Spencer requested to be recorded as voting in favor.

27) On motion of Mr. Groves, the following resolution was unanimously ADOPTED: WHEREAS, the Honorable Rosel H. Hyde retired as Chairman of the Federal Communications Commission on October 31, 1969, and WHEREAS, Mr. Hyde had served for twenty-three years as a Commissioner, a record unmatched by any other, and WHEREAS, Mr. Hyde earlier served with distinction as attorney, hearing examiner and general counsel of the Federal Communications Commission, a total of forty years' devoted government service, and WHEREAS, Mr. Hyde has, throughout his career, built a reputation as a man of integrity, courage and wisdom, NOW, THEREFORE, BE IT RESOLVED, by the Board of Directors of the American Radio Relay League, in special meeting assembled at Hartford, Connecticut this first day of November, 1969, do hereby express their gratitude for Mr. Hyde's contributions to the art of radio, and wish him well in his future endeavors.

28) Whereupon, on motion of Mr. Groves, the Board adjourned, *sine die*, at 6:05 P.M.

29) (Total time in session, 8 hours, 6 minutes)

JOHN HUNTOON W1LVQ, *Secretary* QST

Seasons Greetings From the Hams of the ARRL/QST Staff

Roland B. Bourne	W1ANA
Doug DeMaw	W1CER
Jean DeMaw	W1CKK
Bob Rinaldi	W1CNY
Laird Campbell	W1CUT
R. L. White	W1CW
George Grammer	W1DF
Carl E. Smith	W1ETU
Bob Myers	W1FBY
E. P. Tilton	W1HDQ
Lewis G. McCoy	W1ICP
R. L. Baldwin	W1IKE
J. A. Moskey	W1JMY
Doug Blakeslee	W1KLK
Al Noone	WA1KQM
John Huntoon	W1LVQ
George Hart	W1NJM
A. M. Wilson	W1NPG
Jerry Hall	K1PLP
Murray Powell	W1QIS
Chuck Dean	K1QQX
R. E. Anderson	K1TVF
Perry F. Williams	W1UED
C. R. Bender	W1WPR
Walter Lange	W1YDS
Ellen White	W1YYM
Miriam Y. Knapp	W1ZIM
Lillian M. Salter	W1ZJE
Bill Dunkerley	WA2INB
Bill Smith	KØCER
Louise Moreau	WB6BBO
John Troster	W6ISQ
James P. Hill	K6OZL
Rod Newkirk	W9BRD
Bill Reichert	WA9HHH
Maxim Memorial Station	W1AW
ARRL Headquarters	W1INF
Operators Club	

I.A.R.U. News

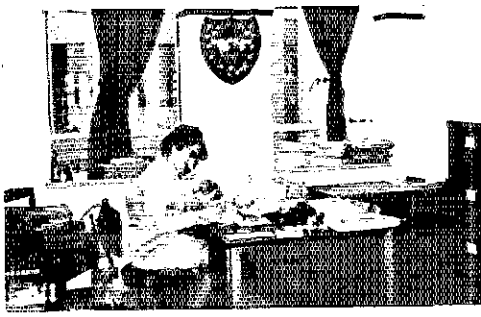
INTERNATIONAL AMATEUR RADIO UNION, THE GLOBAL FEDERATION OF NATIONAL NON-COMMERCIAL AMATEUR RADIO SOCIETIES FOR THE PROMOTION AND CO-ORDINATION OF TWO-WAY AMATEUR RADIO COMMUNICATION

SPECIAL W-VK 3rd PARTY AGREEMENT

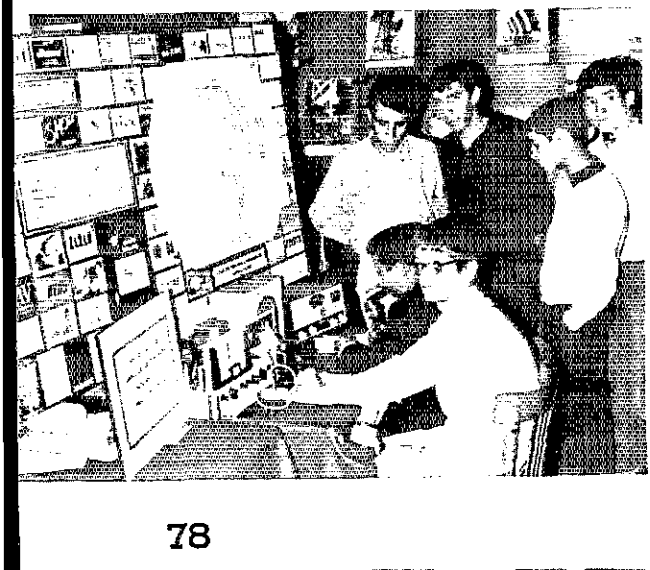
In connection with the Australis-Oscar 5 amateur satellite experiment, third-party communication has been authorized between United States amateur stations and Australian amateur stations on matters relating to satellite experiments. These arrangements, which are effective immediately, will continue for a period ending four months after the satellite ceases to transmit. Australian amateurs wishing to participate in the exchange of such third-party traffic must first notify the *Wireless Institute of Australia*.

IARC PROPAGATION RESEARCH COMPETITION

The International Amateur Radio Club (4U1ITU) announces sponsorship of the 1970 Propagation Research Competition. The objective of the contest is to work as many stations in as many different CPR zones as possible. The contest period is for cw and RTTY, 0001 GMT, February 28, to 2400 GMT, March 15; for phone, 0001 GMT, March 28, to 2400 GMT, April 19. Any amateur bands can be used; several entry classes will be accepted; and, certificates will be available for high scorers. SWL participation is also encouraged. For further information and log forms, write the International Amateur Radio Club, 1211 Geneva 20, Switzerland. All contest logs must be mailed before June 1, 1970 to L. M. Rundlett, Chairman, IARC Contest Committee, 2001 Eye St., N.W., Washington, D.C. 20006.



Here is a general view of the front office of the *South African Radio League* in Cape Town. Above, QSL Manager ZS1AW and Connie van den Bosch are busy with their weekly chore of sorting QSL cards. Below, is Ella Otto, in another part of the office, attending to *SARL* affairs. The society has a total membership of 1600—of which 1400 are licensed amateurs. These photos are from *Radio ZS*, the League's official publication.



VK REPEATER INTEREST

Because of enthusiasm over vhf fm and repeaters, the *Wireless Institute of Australia* has formed a Federal Repeater Secretariat. An initial task is to establish contact with groups known to be interested in repeaters, both in Australia and overseas, and to plan policies for future repeater systems in Australia. At the moment there is only one experimental repeater in operation in Australia; in addition, five repeater license applications are before the Post Office for consideration. QST

On the occasion of ITU's (International Telecommunication Union) World Telecommunications Day in May, 7X2ARA was operated, as shown above, by the *Amateurs Radio Algeriens*, and IARU society with 220 members, representing Algeria in the Union.

Tentative dates for major **1970** *ARRL operating activities.*

January	February	March
8 Qualifying Run, W6OWP	4 Qualifying Run, W6OWP	5 Qualifying Run, W6OWP
10–11 VHF SS	7–8 DX Test, phone	7–8 DX Test, phone
14 Qualifying Run, W1AW	7–22 Novice Roundup	13 Qualifying Run, W1AW
17–18 CD Party, cw	12 Qualifying Run, W1AW	21–22 DX Test, cw
24–25 Simulated Emergency Test CD Party, phone	14 Frequency Measuring Test	
	21–22 DX Test, cw	

April	May	June
8 Qualifying Run, W6OWP	7 Qualifying Run, W6OWP	3 Qualifying Run, W6OWP
11 Qualifying Run, W1AW	9 Frequency Measuring Test	10 Qualifying Run, W1AW
11–12 CD Party, cw	12 Qualifying Run, W1AW	13–14 VHF QSO Party
18–19 CD Party, phone		27–28 Field Day

July	August	September
2 Qualifying Run, W6OWP	5 Qualifying Run, W6OWP	3 Qualifying Run, W6OWP
11–12 "Open" CD Party, cw	14 Qualifying Run, W1AW	11 Qualifying Run, W1AW
16 Qualifying Run, W1AW		12 Frequency Measuring Test
18–19 "Open" CD Party, phone		12–13 VHF QSO Party

October	November	December
7 Qualifying Run, W6OWP	5 Qualifying Run, W6OWP	2 Qualifying Run, W6OWP
10–11 CD Party, cw	7 Frequency Measuring Test	10 Qualifying Run, W1AW
13 Qualifying Run, W1AW	14–15 SS, phone	
17–18 CD Party, phone	18 Qualifying Run, W1AW	
	21–22 SS, cw	

Arizona — The Amateur Radio Council of Arizona is sponsoring the second annual Winter Hamfest in Phoenix on February 1. This will be a pot-luck picnic and all hams in the area are invited. For more information write ARCA, Box 6602, Phoenix, Arizona 85005.

Nevada — The SAROC for 1970 is scheduled for February 4–8 at the Stardust Hotel Convention Center, Las Vegas. Advance registration is $8.50, after February 1, $9.50 per person. Free ladies luncheon program ticket with ladies advance registration. Men's luncheon ticket is $3.00 with advance registration. Technical seminars, meetings by ARRL, fm, MARS, QCWA, and much more. Room reservation request to Stardust Hotel. Send s.a.s.e. for advance registration blank and additional information. Southern Nevada ARC, P.O. Box 73, Boulder City, Nevada 89005.

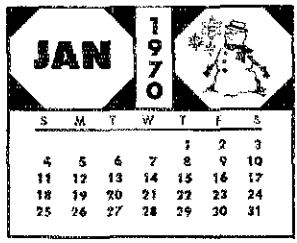
New Jersey — The annual Raritan Bay Radio Amateurs Christmas Party will be held at "Buddies," Johnson Lane, Sayreville, New Jersey, January 17, at 7:00 P.M.

SOUTHEASTERN DIVISION CONVENTION

Miami, Florida **January 17–18**

Throw down that snow shovel, get away from the cold; come on down to the land of sunshine where the balmy breezes blow.

The ARRL Southeastern Division Convention/Tenth Annual Tropical Hamboree will be held Saturday and Sunday, January 17 & 18, at the Miami Bayfront Park Auditorium. Every ham should be able to find something of interest, as the schedule of activities will cover DX, FM, SSB, MARS, VHF, NTS, ARPSC, QCWA and others. Presiding over the ARRL meeting will be our newly elected S.E. Div. Director Dale Strieter, W4DQS, and Vice-Director Chuck Bolvin, K4KQ. Headquarters representatives participating are Bob White, W1CW and Ellen White, W1YYM. The Dade County ARPSC will have a station on-the-air for those wishing to make a contact or two. The swappers will



S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

drool over the giant swap area and bargains galore. Leading manufacturers will be represented with exhibits of the very latest equipment off the assembly line.

The Saturday night banquet will be the ever-popular smorga-style "feast" that has become a tradition at the Hamboree. The after-dinner program will be for general interest.

Headquarters hotel is The Everglades at 244 Biscayne Boulevard; special rates are $11.00 single, $15.00 double, no deposit required. Requests for reservations should include arrival date. Convention registration is $1.50 and banquet tickets are $7.00. For tickets and hotel reservations write to Dade Radio Club, P.O. Box 73, Biscayne Annex, Miami, Florida, 33152.

COMING A.R.R.L. CONVENTIONS

January 17–18 — Southeastern Division, Miami, Florida.
May 15–17 — Pacific/Southwestern Division, Fresno, Calif.
June 19–21 — Oregon State, Bend.

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.

PODUNK CENTER SOLD

¶ This letter is to inform you that Podunk Center, Iowa (p. 16, May *QST*) has been bought out by a widow from Cleveland who purchased the entire community for $12,500. Podunk's population is now a healthy zero, since Homer Weeks was burnt in an accident and decided to move to a place where there might be something more going on. Podunk consists of a general store and cafe with living quarters in the back, gas pumps, a four-room hotel, a root cellar and a windmill.

I recommend that ARRL purchase Podunk and thereupon convert it into either an ARRL Headquarters or a rest home for tired DXers and traffic operators (if the combination would work). — *Murray Lampert, WA9VZS/VE3, Toronto, Ont.*

1 X 3 CALLS

¶ I commend the League's Board on their efforts to amend Section 97.51 to permit the issuance of a three-letter call sign with a single-letter prefix to an Amateur Extra Class licensee regardless of how much time he has been an amateur.

It is an excellent idea and would provide even more incentive to the younger group coming along who could gain that 1 x 3 call as well as the privilege to use the Extra segments. — *Ray Voigt, WB6IGI, Clovis, CA.*

¶ I oppose any issuance of "special call letters." Why should the KH6s and KL7s be discriminated against? There are, of course, several other 2x prefixes under FCC cognizance. I don't see anything wrong with the issuance of 2 x 3 calls as there are lots of KH6s, KL7s, etc., who can never go 1 x 3 due to the nature of the call. Besides, if you got an Extra Class, what's another letter as far as saving time is concerned? Figure out the baud rate. I don't think it is worth the extra expense in FCC time (aren't they already short-handed?). — *Wallace K. Izuo, KH6BWT, Honolulu, Hawaii.*

HELPING HAND

¶ After 36 years in ham radio, it suddenly strikes home! With one eye under surgery, and the other one on the way, I know what ham radio means to those under a handicap. I'll get better, according to my doctor, but now I realize how important our hobby is to those less fortunate.

Here's one ham who will always be ready to offer a helping hand, and my sincere thanks to those who knowingly or otherwise brought me through those rough weeks when they kept me in touch. — *B. N. (Bert) Hovey, VE3ESH, Kingston, Ont.*

WORDS IN WRITING

¶ I have read a copy of another radio magazine and see that there is a controversy over the League and also the incentive licensing. I have had my Novice ticket just two months, and thus have little experience. But I also come to the matter without prejudice. With that introduction, let me give you my views.

The editorial I read in the other mag would have better made a speech. When you put your words in writing, you allow the person addressed to give the words careful consideration. With little knowledge of radio, a careful reading of the editorial indicated that the real thrust of the person was that another organization is a little jealous of the position of the League and its status among amateurs. The comments of the writer indicate that what I lack in knowledge of radio, he lacks in knowledge of politics, taxation, international agreements, the law, and human nature.

The editorial called for a mass resignation from the League. My own reaction is that I am working for my General ticket, and saving my money for election to Life Membership in the League. — *William H. White, WN6KOM/2, New York, N. Y.*

FCC SWEATSHIRTS!

¶ Down in Washington, D. C. they have something called Federal City College. It was organized last year, and is just now starting to roll.

I suppose before long the students will be displaying the school's letters on sweatshirts, bumper stickers, windshields and maybe even beanie caps. Now that will be something to shake up the visiting mobileer (or wayward CBer). I look for an improvement in mobile operating procedures, log keeping, etc.! — *William L. Smith, W3GKP, Spencerville, MD.*

HERTZ

¶ Cancel my membership. . . . Since I can not further read your *QST* without constantly encountering the gut-rending deletion of "cycles-per-second," and, since the ARRL will not stand up to be counted, one way or the other, on such basic changes as that of "cycles-per-second" to "Hertz," I have no further use for your publication or the ARRL. I am going fishing. That makes more sense. — *Arthur E. Pagenhardt, K6DTE, San Jose, CA.*

TOUGH-TO-FIND PARTS

¶ I have all of the books that you publish and several of them contain "how to make" items that list components that no doubt were available at the time the books were originally written, but can not be found now in any of the supply concerns, or at least the better known ones. I'm sure it is time that such books are re-edited for such things and save the unsuspecting would-be Novice from all the troubles of finding it out after he has most of the components, which are no good without all of them. — *Jas. "Art" Wilson, Vero Beach, FL.*

[EDITORS NOTE: It's difficult to keep up with the constant change in the electronic component manufacturing industry. If you have difficulty finding a particular component, drop a note to Hq.]

HANDBOOK

¶ Your 1969 *Handbook* is the best of all 46 editions. Congratulations! — *Robert M. Richardson, W4UCH, Vice President, ITT Navigator Systems, Inc., Rockville, MD.*

[EDITOR'S NOTE: Thanks, but wait till you see 1970!]

OUCH!

¶ Forget it, you bunch of back-stabbers.

Due to the recent ARRL-supported fiasco of incentive licensing and the repeated discourtesies of W1AW in completely ruining three QSOs that my husband and I were involved with, I do not wish to be in any way affiliated with ARRL.

Regardless of what you people think, the manner of implementation of incentive licensing is doing more to discourage higher class licenses among the general population of amateurs than to encourage it. I had every hope of obtaining an Extra Class, but now that the ultimatum has been issued I frankly don't give a damn. The congestion and discourtesy on the ham bands is bad enough without cramping us all together more. As for W1AW, with it's signal width of 8 kHz on each side and its acting without asking if the frequency is in use — I hope your ops get laryngitis. What gives you the right to walk right over a QSO without breaking for permission to use the frequency? If a regular ham did that they'd get a severe reprimand and possibly a *ticket*.

But, money talks and you guys have all the money. Tax free, yet. As far as the majority of hams is concerned, you should pay taxes like the rest of us.

It won't make much difference, but if my license depended on a $6.50 membership in one of the most dictatorial organizations in the world — I'll burn my license first. And the next time W1AW busts up a QSO that my husband and I and some other ops are having I'll personally tell the lid that operates your precious station what I think. And you'd better check your cw operation. My one year-old daughter sends a clearer signal with a spoon and a pan. — *Claude A. Beare, WA6GJT & Cathy M. Beare, WA6KYW, Covina, CA.*

¶ Incentive licensing is not the worst boo-boo in ham radio. It is the Novice system that puts these test-pest idiots on the bands. Don't you ever listen on the cw portions? You can't be on one freq. for 10 min. without a test-pest jamming the freq. What is the matter with you people? — *R. J. Anderson, WSJX, Midland, Mich.*

¶ Keep up the good work back there, during these days of ignorance and criticism we sometimes become confused. I am for you 100%. — *A. L. Ellington, WØFDY, Garden City, KS.* QST

Etched-Circuit Board

(Continued from page 15)

6—Kepro silk-screen kit, No. SC-601. Contains all materials for making silk screens up to 7 × 9-inch size, plus silk and film emulsion for making two additional patterns ($35 each).

Manufacturers and Suppliers

The first place to look for circuit-board materials is at your local ham radio store. Some hobby stores also carry circuit-board components. Here is a list of firms from which supplies and kits are available by mail. Their catalogs will give up-to-date prices, and should be consulted before orders are placed.

Kepro Circuit Systems, Inc.
(supplies and custom boards)
3630 Scarlet Oak Blvd.
St. Louis, Mo. 63122

Vector Electronic Company, Inc. (supplies).
1100 Flower St.
Glendale, Calif. 91201

Amidon Associates (supplies).
12033 Otsego St.
N. Hollywood, Calif. 91607

Allied Electronics (supplies).
100 N. Western Ave.
Chicago, Ill. 60680

Newark Electronics Corp. (supplies).
500 N. Pulaski Rd.
Chicago, Ill. 60624

Radio Shack Corp. (supplies).
Branch and main stores.

Stafford Electronics
(custom boards and materials).
427 S. Benbow Rd.
Greensboro, N. C. 24701

Foto-Etch Co. (custom boards made).
3311 Citrus Ave.
Walnut Creek, Ca. 94598

Concluding Remarks

It is hoped that the information given here will offer the reader the basics needed for getting started on that first circuit board project. With a little practice you should be able to design and build first-rate circuit boards. The information is here, so let's get that project started! QST

"It Seems To Us . . ."

(Continued from page 9)

with 21 Senators as co-sponsors, which would permit immigrants having declared their intention to become citizens to acquire an amateur license. Hearings were expected to be held late in 1969. Canadians remained saddled with a $10 per year license fee, but did get rid of the $6 "amendment" fee. New trial rules for repeaters went into effect. The name of the regulatory agency changed from Department of Transport to Department of Communications, but at working levels the same personnel continued to handle amateur affairs.

On the world scene, the Administrative Council of the International Telecommunications Union (presided over by VE3NR) settled on June, 1971 for the Administrative Radio Conference on Space and Radio Astronomy. The U.S. continued its preparations with release of a fifth Notice of Inquiry soliciting comment on various earlier proposals. The League endorsed the proposal to drop mention of space activities on 144 MHz in favor of a plan to include space work in the basic definition of the amateur service.

Indonesia (freshly off the "banned" list), Sweden and Guatemala entered into reciprocal operating agreements with the U.S. Thailand notified ITU in Geneva that it no longer objected to amateur communications, leaving only Vietnam and Cambodia on the U.S. interpretation of the banned list. A Region 1 Congress of IARU was held in Brussels with 27 societies present or voting by proxy; its decisions mainly dealt with internal matters such as rotating sponsorship of a European DX contest and the like. Membership in the IARU reached 83 societies with the election of the ham associations in Western Samoa, Hungary and Trinidad & Tobago.

Here at home, the big news probably was ARRL's production of a color film on ham radio starring Barry Goldwater, K7UGA, Arthur Godfrey, K4LIB and Bill Leonard, W2SKE, of CBS News. The film is making a good impression on television watchers, service-club audiences, and high-school students all over the land. A new Radio Amateur Satellite Corporation — Amsat for short — was formed and took over the task of getting Australis-Oscar launched on a NASA project, in close cooperation with both Project Oscar, Inc. and the League. New ARRL advisory committees were appointed for contests and for vhf repeaters and promptly went to work. The contest committee has sifted several suggestions for changes in the rules, and the League has adopted on a trial basis the recommendation of the Committee that power multipliers be eliminated from Sweepstakes scoring. The repeater group closely examined conflicting views within the fm fraternity over what shape the first formal rules for repeaters ought to take. The ICAO alphabet became the official ARRL phonetic aid. Eight amateurs qualified for the new five band DXCC in its first year, and other amateurs set their sights on the five band WAS which starts on January 1, 1970. The feeling in some circles that the League needs two Board meetings a year to carry out its business effectively culminated in a special Board meeting at Newington six months after the Annual Meeting, held this year at New Orleans. Technicians became newly eligible for EC appointments. Nearly 900 members held — or were paying dues toward — Life memberships, while about a thousand 25-year and 17 50-year pins had been issued to qualified members. The League cooperated with the Boy Scouts of America at its National Jamboree, KF7-BSA, and with the Boys Clubs of America on a new project to start youth radio clubs in inner-city areas.

The League noted with sadness the passing of many prominent amateurs during the year: former ARRL president Herbert Hoover, Jr., W6ZH/K6ZH; Leon Deloy, ex-8AB of France, whose station handled the eastern end of the first transAtlantic QSO; John Clarricoats, G6CL, secretary of IARU Region I and formerly secretary of RSGB; former ARRL director Harry Engwicht, W6HC; New England vice director Bigelow Green, W1EAE; Bert Osborne, W4MF, past president of the Old, Old Timers Club; F. Cheyney Beekley, ex-W1GS, former advertising manager of *QST*; Quayle B. Smith, W3KDR, formerly of the late General Counsel Segal's office — to mention only a few.

The sad news aside, the Moving Finger "writ quite a tale" for 1969 — now make way for 1970! QST

Strays

Mr. and Mrs. Gerard Bunge, K7SPH, of Tucson, Arizona, accept a Certificate of Achievement from Brig. Gen. I. R. Obenchain, Jr. for their assistance in the completion of more than 10,000 patches from U.S. personnel in Vietnam. The certificate is signed by General Creighton W. Abrams, Commander, U.S. Military Assistance Command, Vietnam.

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

How:

Bidding adieu last month to the wondrous '60s we listed the single-sideband boom as the past decade's number one DX development. A spin of any transceiver dial can confirm this. Statistics are equally convincing.

Throughout the 1950s and early '60s W/K/VE radiotelegraph entries in ARRL's annual International DX Competition regularly outnumbered voice entries as much as two to one, year in and year out. Increasing application and availability of ssb equipments began to narrow the gap a few years ago. In the 1969 ARRL DX Test U. S. and Canadian voice logs outnumbered code logs roughly 850 to 750, an historic first indeed!

This trend is not reflected on the overseas scene, however. As in the past, entries continue to run about 2 to 1 in cw's favor, the spread actually increasing last year. Possibly this is because the transceiver flood hasn't yet sufficiently soaked the foreign market. Then, too, there's always the language barrier working in favor of cw, even for simple contest exchanges.

We're usually tempted to try some crystal ball reception whenever we enter a new bunch of DX years, but frankly we wouldn't know where to start. One angle strikes us, though. It's rapidly getting cheaper to travel than to stay at home, manufactured apparatus keeps growing smaller and lighter, and tourist-type ham permits are becoming easier to obtain. On the other hand, grandiose government overseas projects seem on the wane, at least temporarily. All this should mean increased DXpeditioning in years to come, less DX of the permanently-stationed G.I. variety.

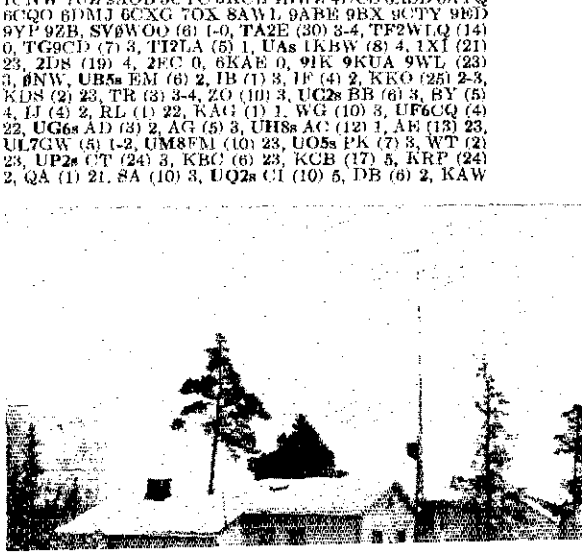
Any prophets out there care to volunteer more daring DX predictions for the superseventies?

What:

The short-term 1970s propagation outlook of course, is for souring conditions on the higher bands, particularly on 10 and 15. You don't need a quartz sphere to be quite sure of this — any ten-year-old ham station log will do. Conversely the lower frequencies become more interesting and populated. We'll start the new DX year with a spectrum inspection of 3.5 through 7.3 MHz, a range of great interest to seekers of ARRL's highly coveted Five-Band DX Century Club certification. . . .

40 CW, reported to "How's" by **Ws** 1DAL 7BE 8YGR 9EY, **Ks** 2JWZ 8DHT, **WAs** 1FHU 1JKZ 2BHJ 3GYT, **WBs** 4LAL 6VVS and **VE3GHO,** is full of **CEs** 1DR 3ABY (7017 kHz) *2800* 4MT, 8FG (16) 1 9AF (3) 6, **CM2s** FR (5) 1, FV (11) 5, HA (3) 23, ZV (19) 4, **COs** 2BB 5, 2DC 2KW/4 (4) 4, 2VQ (5) 3, 3BU 6PH (11) 4, 6PP (7) 23, 8SM (3) 8, **CRs** 6AI (5) 20, 7IC (1) 4, **CTs** 1UW (27) 8, 2AT (4) 8, 3AS C30) 6, **CXs** 1BBV (6) 10, 2CZ (4) O, 8CZ (8) 1, abundant DK-DJ-DLs, **DMs** 2AEF (36) 3, 2AFM (37) 8, 2CZL 2BJD 3BB (7) 4, 3GL (4) 22, 3UTA (12) 2, 3UE (18) 4, 4ADC (10) 4, 4TG (21) 4, 4YEL (13) 9, 4ZQM (6) 22, 5DL 6SAK (1) 2, **EAs** 3HM 4IS (27) 5, 5HM (10) 0, 6BH (1) 23, 7GI (23) 8, 8FF (25) 6, 8FF (30) 1-2, 8FJ (5) 7, 8FO (12) 0, 9EJ (19) 2-3, **EIs** 5BW (9) 23, 7BZ (10) 9, **EP2BQ, ET3USA** (18) 1-4, a dozen **Fs** including 2CB/FC (22) 6, 8CD/FC (18) 6, **FG7s** TG (1) 13, XX (31) 0, **FP8s** CS (30) 0, DA, plenty of **Gs, GC2FMV** (4) 23, G3s JEX (2) 6, JXS (2) 22, OLJ (7) 1, PKY (21) 23, 8SR (19) 6, **GM3s** CFS (7) 2, XUV (1) 0, **GW3s** ASW (4) 23, BQY (13) 6, FSP (2) 23, JI (3) 22, KUY (5) 0, MPR (12) 6, OAY (3) 15, TOW (12) 23, UUZ (4) 4, WRE (9) 8, **HAs** 1SB (9) 6, 3KMA (9) 2, 5DL (27) 3, 5DZ (11) 4, 5HA (24) 3, 5HS (27) 3, 5KAP (8) 1, 5KCR (26) 2, 5KFZ (18) 23, 5KLG (9) 2, 7LU 7MD (2) 4, 8DB (7) 1, 8KUX (22) 5, 8UD 8VM (1) 21, **HB9s** AAQ (10) 3, ADD 4, AGC 3, G (18) 3, KC (16) 4, MD 4, NL (20) 3, PQ (24) 0, QA 4, QN SJ (5) 3, XL (2) 6, Z 3, **HCs** 2GC/1 (6) 2, 2RZ 8FN (72) 8, **HIs** 7JMP (4) 12, 8DAF (35) 4, **HKs** 3BKU (8) 5, 4EX (6) 23, 5ARR, **HM1ES** 20, **HP1IF** (5) 5, **I1s** ALU AMD (1) 11, ASE BAY (1) 22, PIS (6) 4, ROA (31) 4, SCI (20) 2, VAT (8) 23, ZRV (33) 2, IT1AGA (8) 2, **JAs** 1AEA 1CJF 1QAX 1SNA (6) 9, 1WWI (11) 12, 3BVG 3UJ 8KUX, **JD1YAB** (8) 7, **JH1BEK** (12) 12, **JX8IL** (2) 22, **KH6s** AD AM (6) 9, BA (26) 3, EBQ GSE (15) 10, QR (10) 9, **KL7s** AKE (6) 6, IR 5, **KP4s** AN (8) 10, CA (10) 10, CRT (27) 23, DFA (7) 2, DWE DW (23) 1, **KV4FZ** (8) O, **KZ5s** DE 3, FC JI (5) 1, IS (40) 11, JG (10) 5, KN (27) 9, **LAs** ZB (13) 23, 5Q (1) 23, 6CL (19) 21, 7EJ (11) 6-7, 7Y (1) 5, 8AD (3) 3, **LU6ADU** (18) 1, **LZs** IDB (30) 2, 1KAH (2) 1, 1KML (11) 5, 1KRB (8) 23, 1KSN (5) 0, 2KDL (6) 0, 2KGO (11) 5, 2KSC (7) 2, **MP4TAQ** (7) 2, **OA4s** ZF (5) O, ZF, **OD5**LX (4) 1-4, **OEs** 1GFW (23) 12, 4SZW 2, 4VP 5GM (21) 22, 5MIL (24) 3, 6KZ (6) 4, **OHs** IAD 2AC (14) 1, 2MS (4) 23, 3XZ (3) 23, 8SE (3) 4, 5UX (8) 1, **OKs** IALQ (11) 2, 1AOC (10) 4, 1AQY (10) 2, 1ATL (24) 2, 1ATZ (10) 4, 1AWQ (13) 2, 1BP (22) 23, 1DBM (20) 2, 1FAI (15) 2, 1FAU (3) 21, 1MAD 1MDK (10) 5, 1NB (10) 4, 1TA (26) 1, 1VQ (5) 2, 2BIT (5) 3, 2BOB (8) 5, 2SFS (15) 2, 2ZU (3) 1, 3BO (24) 4, 3BT (1) 5, 3CED (10) 4, 3CGI (4) 1, 3KAG (23) 4-5, **ONs** 4IE (2) 7-8, 4NQ (5) 4, 5FG (4) 21, 5KP (10) 4, 5OV (6) 0, 5VW (2) 5, 8DW (50) 1-2, **OZs** 1W (14) 22, 2UX (23) 12, 2UN (1) 2, 3PO (11) 5, 5CV (7) 1, 5DX (3) 1, **PAGs** ABM (12) 6, AUV (3) 23, RE (5) 4, RRA (16) 23, TA (66) 20, **PJ2PS** (19) 5, **PYs** (DDY (18) 23, 1DIN (5) 0, 1DMQ 0, 1GD (23) 23, 1SJ (2) 3, 1NFW 2AHE (6) 0, 2DFR (5) 23, 2EFU 2ESR 2EXD (12) 3CFD (11) 23, 3CGE 3CLG 3MQ (1) 23, 4ROC (2) 1, 4BQO (1) 0, 5CEK 7ABY (5) 3, 7AGM (7) 1, 7APD (5) 4, 7ASP (6) 1, 7AW (24) 1, 7AWB (3) 22, 7AWD (3) 23, 7AWE (5) 9, 7AZQ (14) 4, 7AZR (40) 3, 7AZW (5) 23, 7BBX (10) 8, 7BDX (15) 5, 7EC (5) 4, 7PO (3) 0, 7RY (6) 0, **PZIs** AV (32) 9, DD, **SKs** 3BP (20) 3, 6AR (3) 3, 6AW (21) 3, **SMs** 2CXL (6) 6, 4AIQ (3) 23, 5UU (3) 3, 6ES1 (3) 20, 7BEM (8) 23, ØEVK (6) 22, ØKY (23) 1, **SPs** (and 3Zs) 1CNV 1CNW 1UZ 2AOB 3CTC 3KCL 4BWZ 4DCS 6ASB 6AYQ 6CQO 6DMJ 6CXG 7OX 8AWL 9ABE 9BX 9CTY 9ED 9YP 9ZB, **SVØWOO** (6) 1-0, **TA2E** (30) 3-4, TF2WLQ (14) 0, TG9CD (7) 3, TI2LA (5) 1, **UAs** 1KBW (8) 4, 1XI (21) 23, 2DS (19) 4, 2FC 0, 6KAE 0, 9IK 9KUA 9WL (23) 3, ØNW, **UB5s** EM (6) 2, IB (1) 3, IF (4) 2, KKO (25) 2-3, KDS (2) 23, TR (3) 3-4, ZO (10) 3, **UC2s** BB (6) 3, BY (5) 4, IJ (4) 2, RL (1) 22, KAG (1) 1, WG (10) 3, **UF6CQ** (4) 22, **UG6s** AD (3) 2, AG (5) 3, **UH8s** AC (12) 1, AE (13) 23, **UL7GW** (5) 1-2, **UM8EM** (10) 23, **UO5s** PK (7) 3, WT (2) 23, **UP2s** CT (24) 3, KBC (6) 23, KCB (17) 5, KRP (24) 2, QA (1) 21, 8A (10) 3, **UQ2s** CI (10) 5, DB (6) 2, KAW

* 7862-B West Lawrence Ave., Chicago, Ill. 60656.



OHØNI offers your QTH of the Month, a widely worked ham outpost in the misty, snowy islands of Aland. Sigurd regularly rolls up whopping ARRL DX Contest scores from these remote diggings. (Photo via WA1KQM)

(1) 21, KWN (2) 4, MR (5) 3, OC (8) 1, **UR2s** QQ (10) 5, ZN (27) 5, **UT5s** AC (2) 0, BL (4) 2, DI (17) 22, KCT KCU (7) 5, PK (10) 3, RF (1) 1, SY (1) 9, **UVs** 3QA (1) 2, 9CO 9CQ 9KAG (7) 22, **UWs** 3ZW (6) 21, 6LB (1) 8, 6NQ (5) 1, **UY5s** DV (1) 21, OB (3) 0-2, TN (21) 3, **VKs** 1SS (5) 9, 2APK (2) 11, 2BKM 2GW (20) 11, 2HK 2HW (7) 10, 2PA (13) 10, 2RJ (15) 9, 2SA (15) 9, 2VN (5) 10, 3APN (47) 9, 3AUT (4) 9, 3OP (11) 10, 3RP (10) 9, 3VJ (12) 10, 5MY (11) 12, 5NO (7) 10, 7GK (6) 11, **VPs** 2GHE (23) 0, 2LZ (2) 1, 2MQ (1) 2, 2VI (1) 3, **7NQ** (32) 3, 8JT (16) 6, 9AT (3) 3, 9GJ (4) 2, **VQ8s** CU (3) 2, CPR (26) 23-0, **VS5PH** (5) 13-14, **VU2BEO**, **Ws** 1NU/**VP9** (8) 4, 1UEB/mm (27) 4 aboard icebreaker *Manhattan*, 5QFZ/**KP4** (1) 8, **XEs** 1AAG 1CE (13) 5, 1RV 6, 2CCG 2FA (5) 6, 21 (24) 21, 2LLP (10) 10, 2MM 2MNZ (25) 8, 3BL (6) 2, **YA2HWI** 23, **YBs** 6HK (10) 11, 6AAB, **YN1CW** (4) 4, twenty-one YOs, **YSs** 1O (3) 4, 1RT (5) 4, 2SC, thirty-odd YUs, **YVs** 1AEN (199) 13, 1EU (5) 23, 4AU 4ID 4IO (2) 4, 4BN (23) 2, **ZD8AK** (28) 2, **ZLs** 1AUA (21) 11, 1BN (5) 8, 1RO 2ANX (34) 9, 2CD (12) 11, 2GX (4) 10, 3GQ (2) 12, **ZPs** 5KA (15) 9, 8BE (3) 0, **ZSs** 1A (5) 5, 1WK (11) 4-5, 2HI (10) 2, 3AW (1) 5, 4AC (5) 22, 4DC (1) 23, 5OV (75) 3, 6BT (2) 21, **3V8NG** (8) 3, **4U1ITU** (2) 5, 4X4s CJ (7) 5, MR (12) 3, **5H3KJ** (3) 0, **5Z4KL** 3, **6W8s** XX (2) 8, ZZ (12) 7, **6Y5AR** (26) 4, **8P6s** AG (9) 10, AN (33) 1, BU (16) 2, **9H1s** BL (21) 1, BZ (10) 23, **9J2DT** (5) 22, **9V1OY** (3) 12, **9Y4s** AA and DS (27) 10.

40 phone produces more and more goodies as indicated by mail from **Ws** 3HNK 4YOK 8YGR and WA1-JMR: **CEs** 2SB 7, 6AE (220), CN8CS, CO2DC 7, CP1GN, **CR6s** GO 0, LV, **DJs** 6QT/**CT3** 20, 7UX, **DK3NA**, DU1FH, **EAs** 6BN 20, 8EI, **EL2s** AK BQ, **EP2BQ** 23, **ET3USA** 22, F8AEG, **FG7s** TI/FS7 6, XX (224) 7-8, **FK8AZ** (80) 8, **HCs** 1NCF 2GG/1 (78) 7, 2HM (95) 6-7, **HKs** 1BWC 6, 3WO 4GG 6, **HP1JC** 6, **HP1ERB** (242) 9, **JA6YB** (91) 20, **KC4s** USP (240) 13, U8V, **KG4s** DS (240) 5, DV (240) 15, **KJ6CF** (265) 9, **KP4AMI** (258) 10, **KR6JT** 1, **KV4FZ** 1, **KZ5s** DA EQ (90) 6, II RF 5, **LA5KG**, **OA4NLM** 6, **OHs** 2BHU 6AM 6, OY9LV, **PAs** (and PD3s) FR GD GMM HHV LX, **PJ0DX** 6, **PYs** 6VZ 7BBD, **PZ1BX** (225) 9, SK6AB, SV1CG, **TG9NP** 5, **TIs** 2CAP 2HP 5-7, 8PE (225) 4, **UA9s** KAX OH 0, UJ8KAA 0, UT5KTH, **UW9s** AF (77) 2, K1D,, **VKs** 2AVA 3OZ (90) 11, 7AZ, **VPs** 1CP 7, 1FR 1PG (225), 2DAN (240) 8, 2GAL (225) 2, 2GAP (227) 11, 2KF 2LA (225) 1, 2SU (227) 11, 2VP 5, 5AA (225) 1-2, 9BK 2, **VS6s** DR 20, VU2DK 20, **XEs** 1BR (95) 7, 1CE (78) 7, 1J (70) 7, 1WS 6-8, 1YM 7, 3AF, YN6GAF 4, **YVs** 1BI 1BL 4TI (295) 6, ZL2BCG, ZP5CF, 4X4WP, 4Z4HF, **5H3KJ** 0, 6Y5GB (225) 3, 8R1Q (227) 11, 9Y4s AA 6, AR CR 7, LA and LD.

80 GW strikes the DX fancy of **Ws** 1SWX 9EV, **KS** 6KA 8DHT, WA1s EHU and ENJ because of CE8CF, **CO2s** DR KW 4, **CT2AT** (3503) 0800 GMT, **DJs** 2FA 2SE (11) 3, 5DI (7) 5, 5DT 7ST (8) 3, 9GU (1) 6, 9HA, **DK2UG** (6) 3, **DLs** 1AY (1) 6, 1RK (2) 4, 2MK (40) 4, 8CM (9) 4, **DMs** 2AND 2BJD 2BOG (1) 4, 3BE (7) 4, 3OBG (1) 2, 3SJG (10) 5, 3XHF 3ZN (8) 5, 4FQN 4RFM 4SPL (25) 4, 4WPL (2) 3, 4XNA (10) 6, 5KBK (7) 5, 6SAK (6) 3, **EA9EJ** (19) 3, EI9J (7), **Fs** 2VT/**FK8** 3DM (5) 5, 5CT (1) 6, 8OB (7) 4, 8TM (14) 4, 9VN/**FC** (3) 22-23, **FG7XX** (22) 6, **Gs** 2DC (2) 6, 2DCY (5) 3, 2FIX 2MJ (2) 6, 3HVL (29) 8, 3LP (7) 4-5, 3PJW (2) 3, 3SVK (7) 6, 3SSO (5) 4, 3TLX 8XZN (7) 8, 5SK (1) 7, 8TD (2) 4, **GCs** 2FMV (7) 6, 5AGA, **GDs** 3FBS (3) 5, 8SF, **GIs** 3 JEX (1) 7, OLJ 8KH (5) 6, **GW3s** PEA (7) 6, TOW (3) 0, **HAs** 3GF (3) 4, 5KDP, **HBs** ADD (8) 5, CM NL (10) 1, **HC2GG/1** (2) 2, **HI7JMP**, **HPIs** IE (11) 3, XHG (9) 0, **HZ1AB**, **JAs** 1VTT 4BVH, **JD1YAB** (5) 14-15, JH1JPS (5) 11, JX4YM (2) 1, **KG4AL** 5, **KP4AN** (13) 10, KV4FZ (12) 10, KX6HC (9) 9, **KZ5s** EQ (3) 2, JQ (15) 4, **LAs** 3X1 (4) 2, 6U (1) 5, 7Y 9CG (8) 5, 9YF (1) 7, **LUs** 1BB (61) 1, 3DSI 3EL, LXs 1EB 20-21, 2BG (8) 3, **LZis** KAA (2) 3, KPG (7) 4, **MP4BEQ** (7) 1, **OA4s** DX KF (25) 5, PF, **OD5LX**, **OHs** 2YV 3XZ, two dozen OKs near the low edge, **ON5s** VW (7) 2, WV (5) 3, **OZs** 2X 5DZ (2) 3, **PAfs** AAC BRM COL LV OIK SLT ZEZ (6) 6, **PJs** 2CC (21), 3CE 6AA 7VD 7VL (8) 3, **PYs** 1BTX 2BJH 2DTV 7AWD, **PZ0AA** (9) 3, **SM5CUN**, **SPs** 3AKR 3CDD (5) 5, 3DQF 5PAU (5) 6, 6AKK 6CDP 6CRD (8) 4, 9KHX (54) 4, 9YP, **TA2E** (26) 3, TI2WR (12) 6, **UA2-DM** (3) 5-6, **UB5s** KDS KDV KKO (2) 3, UG2RI, (1) 3, **UD6BW** (5) 1-2, **UF6CQ** (1) 3, UG6AO, **UH8s** BX (25) 20, CQ DC (5) 1, **UL7GW** 0, **UP2s** KBA (8) 3, KDA (23) 5, **KNP** (2) 3, UQ2GW (1) 6, **UR2s** AL (1) 6, AO (7) 6, KAY (7) 4, KBQ ZN (1) 3, **UY5UW** (9) 4, **VE8RX** (14) 7, VKs 2BKM 2EO 2NS 2QL 2VN 3ARR 3AUJ 3AUT 3APH 3MR 3OP 3XB 4AIY 4FA 4YP 5KO 7GK (5) 10, **VPs** 1DW (90) 0, 2GTL 2LZ 2MQ 2VI (1) 4, 8JT 9GQ (2) 3-6, 9KJ 9LQ, **VQ8CP**, **VR2IDK**, **VR5MH** (4) 12, XE1WS (13) 6, YN1CW (3) 3, **YOs** 2ANZ (2) 5, 4WW (3) 4, 9EM, YS1RT (3) 5, YUs 1GTU (2) 3, 2REC 3IBC (18) 3-5, 3IDKS 3IMU (8) 3, YVs 1AVI 2, BPG (12) 5, CKR 2, ZB2BO (4) 6, ZC4AK (3) 1-2, ZF1AA, ZD9BE, **ZLs** 1AH (10) 6, 1AIR (11) 2, 1AX 1AXB (9) 11, 1BAS 1HY 1IB 2AON (3) 10, 2PS (12) 6, 2VN 3GQ (2) 7, 4HG 4IE (1) 7, ZS3AW (2) 4, 3V8NC, 4U1ITU (10) 23, 4X4WN (6) 3, 5A2LR (1) 4, 5H3KJ, 6W8XX (1) 6-7, 6Y5BQ, 8R1J (4) 3 and **9H1MN**.

75 phone, with most DX tidbits hanging out near 3800 and/or 3700 kHz, enables **WAs** 1FHU 1JMR 5IIS and clubmen to reel in CE1AP 6, CN8HD, CP1GN 6, **CRs** 4BB 4BC 6, 6IV, **CT2AT** 22, CW3BH, D36QT/**CT3** 4, DK3OX, DM2CZL 5, **EAs** 2HX 6BD 22, 6BG 6, 8EX, EL4A, **EP2BQ** 23, ET3USA 23, F0RS/**FC**, FG7s TI/**FS7** 5, XX 4-6, **FP8AP** 9, **GMs** 2BMJ 3DWS 3VNW, **HCs** 9BY/HR1 7, 4S8 6, **HK3WO** 6, **HP1JC**, HR2PEV 3-4, **IS1s** EP7, PPB 7, **JWs** 1CI 22, 3XI 22, 3YK 5, 7UH 23, JX3XI, **KGs** 4AL 4DV 0, 6AL 6, KH6EBQ, **KP4CL** 11, KV4FZ 6, **LAs** 3S 6OJ, LX1s BW DW 22, **OAs** 1BT 8, 4OS 4-6, OD5s BA 0, BU 22, OH0s AM 2, NU, Ok5RAR 0-1, OX3WX 23, OY1X 0, OZ3FO, **PJs** 1AA 4-9, 2RC 5, PZ1BX 9, **TF3s** BT MA 21, PP 8T, TI2HP 5, **UA9KAX**, VE8RX 6, VK9DJ 8, **VOs** 1FB 1FG 1FX 21, 2AC/1, **VPs** 2EUU 4, 2VP 5-9, 5AA 9BK 1, W1FZJ/**KP4** 7, **XEs** 1KB 6, 1W8 6, 1WX 10, 3AF, YA2HWI 22, **YNs** 1CW 2JS, YS1s FSE 6, XEE, **YVs** 1SA 3OR 3RP 5CIL 4, 5CIZ 4, 5CKR 3, 7VA, ZG4GM 0, **ZLs** (and ZMs) 2AGJ 2AWH 2BCG 2RHU 2MC 2QK 4AK 4LM 4NH all 6-7, **3A2MJC** 20, 4U1ITU 4, 4X4NO 22, **4Z4DZ** 0, **5H3s** KJ 21, LV 21, 5Z4KL 22, 6Y5EM, 8P6AH 3, 9G1DY 22, 9H1s BL K, 9J2DT, **9M2DQ**, 9X5SP 22, **9Y4s** LA MM 5-10 and VT. The party's getting lively!

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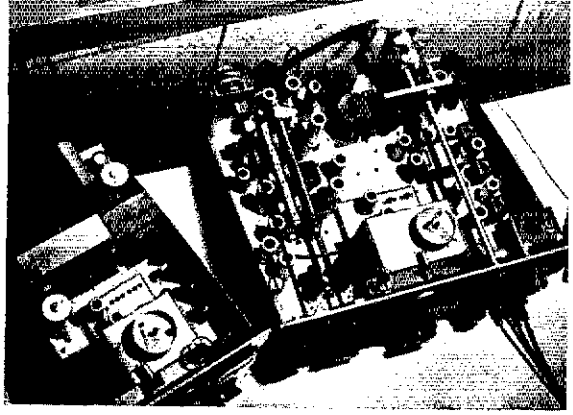
We'll get on with other bandchecks next month with the help of "How's" correspondents (15 ew) **Ws** 1ARR 1DAL 1OTY 3HNK 3JZJ/5 4LQC 4YOK 5BZK 7BE 7EKB 8BQV 8YGR 9BF 9LNQ, **Ks** 5MHG/6 8DHT, **WAs** 1FHU 1JKZ 2FOS 3GYT 3KSQ 9SQY 0JYJ, **WBs** 2DZZ 2JAE 4KZG 4LAL 4LIL 9BUV, **WNs** 2DRS 2FQF 2HPB 2JAM 4JYB 5YMV 5YMW 6JUU 8D8F 9VJG 9WOW, 1IER, **VEs** 2DKJ 3GHO; (15 phone) **Ws** 1ARR 1VRK 2DY 3HNK 4YOK 6YRA 8YGR 9BF 9LNQ, K4TWJ, **WAs** 1FHU 1JHQ 1JKZ 2BHQ 2FOS 6EQW 9SQY, **WBs** 2DZZ 2GVE 4KZG 4LIL; (10 ew) **Ws** 1DTY 3HNK 3JZJ/5 4YOK 8YGR, **Ks** 3CUI 5MHG/6 8DHT, WA1-FHU, **WB4s** EPJ KZG; (10 phone) **Ws** 1DAL 3HNK 4YOK 8YGR 9LNQ, **WAs** 1FHU 4ZZU 6EQW 9SQY, **WBs** 2DZZ 4KZG; (20 ew) **Ws** 1DAL 4YOK 8YGR, K5MHG/6, **WAs** 1FHU 9SQY, WB4KZG; (20 phone) **Ws** 3HNK 4YOK 8YGR 9LNQ, K4TWJ, **WAs** 1FHU 4ZZU, **WB4KZG**; (160) W1BB and K8DHT. Don't forget to make your 28-MHz DX hay while those sunspots shine, OMs.

Where:

ASIA — Iran's QSL bureau now does business under the address Radio Society of Iran, % Capt. R. Harris (WA5VKJ), Signal Branch Box 1000, APO, New York, 09205 . . . . . OD5LX QSL aide K4TSJ specifies, "Ted's logs are on hand for QSOs from January 1, 1969." Tom also assists with OD5AP's QSLing . . . . . In addition to the direct address in the listings to follow, HL9VL can receive QSLs via his XYL, Jill Anton, W7KS/D7, 10 N. 4th, Cheney Wash., 99004. "S.a.s.e. (self-addressed stamped envelopes) from W/Ks will be appreciated." . . . . . W6ANN takes over my duties as W6DLE/4X QSL agent because I'm going to Japan," writes W6EIF . . . . . "I receive HL9-UZ's logs five days or so after QSOs," says WA2FRW. "S.a.s.e., or s.a.e. with IRCs (International Reply Coupons) will get reply upon receipt." . . . . . "Although we get behind at times we do QSL 100 per cent," assures WA9-DGM, operator at KAs 2NY and 7DM . . . . . In G. Watts's *DX News-Sheet* VS6AL decries a measly 900/145 sent/received Stateside QSLs return. Fellers!

OD5LX, long a Lebanon DX landmark, lately entertains Five-Band DXCC hunters near 3507, 3527, 7003 and 7027 kHz, also on the low ends of higher bands. Ted already has 33,000 U.S.A. contacts in his log.
(Photo via K4TSJ)



UB5WJ is a consistent DX performer from the Ukraine with impressive homemade apparatus. George prefers sideband or cw on 15 and 20 meters with a 3-element quad. (Photos via K4CFB)

OCEANIA — "Please list me as QSL manager for VK9BM from June 21, 1969," requests K6TWT. S.a.s.e., or s.a.e. with IRCs, for optimum results . . . . . "Kindly notify your readers that I am not VK9KJ's QSL manager," instructs W4HJE at the receiving end of many missent cards . . . . . Long Island DX Association's *DX Bulletin* reveals C21JW's fondness for stamps — hint, hint . . . . . West Coast *DX Bulletin* reports that KH6NRJ/Kure personnel discovered a flock of KH6EDY logs on the island, records that could help turn out some long overdue Kure confirmations.

SOUTH AMERICA — "Effective September 1, 1969, I am QSL manager for VP8s KR and KM, son Ray and mother Gladys, of Port Stanley," records K7RDH. Bob's correct address appears in the spring '69 *Callbook* and thereafter . . . . . WA1FHO points out that Uruguay now hearkens back to its old CW prefix occasionally. E.g., CW3BH equals CX3BH. DX veterans of the 1920s will enjoy a familiar ring . . . . . Venezuela's 4M prefix still wrinkles many a brow. QSL via RCV unless otherwise clewed.

EUROPE — GC8HT says Radio Society of Great Britain's G2YS talks up a possible prefix pattern for Channels differentiation. GJ might represent Jersey, Les Ecrehous and the Minquiers, while GU could go for Guernsey, Herm, Alderney, Sark, Jethou, Lihou, Brechou, Burhou, Ortac, the Casquets and Douvre Rocks . . . . . "No more cards via me for LJ2X," pleads W4NJF. "No logs for over a year." . . . . . "VE1ASJ is *not* managing JX2BH QSLs," clarifies VE1ACU. "Andy previously offered his services but received no log transcripts." . . . . . "I'm doing QSL chores for K2IXP's European travels," confirms K2MME . . . . . "SL3ZO apparently is willing and able to dig up rare old U.S.S.R. QSLs," observes K4CIA. "Sven helped me resurrect a UN1AE card for a 1960 QSO I had given up on years ago. For his troubles SL3ZO will accept old *Callbooks*, QSL directories, etc., which seems quite reasonable." . . . . . Boy Scouts used special Finland prefix OI3, as in OI3BUF, during October's Jamboree, according to *DX News-Sheet*.

HEREABOUTS — Caribbean call sign complexities are cropping up. W3EVW testifies, "KV4FZ, for whom I am QSL manager, still holds a valid license for the call VP2VI. It has, however, been reissued to a new owner who has not answered my offers to manage QSLs for him. Thus I will answer cards only for QSOs during April, 1969, the period for which I have logs." *DX News-Sheet* tags the new VP2V1 as J. Bushby, P.O. Box 75, Tuctola, Br. V.I., and formerly MP4BHK . . . . . W1SWX forwards a note from VE3EVW stating he was assigned the call VP2MJ in January of '68. The first or previous VP2MJ, still listed in recent *Callbooks*, can be reached through K3HGX . . . . . Too rapid shuffling of VP2 labels also is reflected in other listings. For example, a new VP2KQ appears in the catalog to follow . . . . . "As of November 6, 1969, K9GZE is my QSL manager for W/K/VE/VOs only," affirms VP7NH . . . . . "My local bureau received a batch of waterlogged QSLs from England's RSGB, all glued together and illegible," notifies YS1XEU-HU1P. "They cannot be answered, so I request each user of RSGB's service who has sent but not received a card from me to send another. QSLs can go via my manager, WB4BOJ, or direct to USAF Section, APO, New York, N. Y., 09889, or (for non-W/K/VE/VOs) c/ U.S. Embassy, San Salvador, El Salvador, U.S. postage is okay so please use s.a.s.e., and give QSO time in Greenwich Mean only. I've logged more than 20,000 QSOs in two years, so Fraa and I are often a little behind in our QSL chores." . . . . . Yes, pity the poor QSL tender. W7JAC received a blood-specked s.a.s.e. back from WB8ABN with the comment, "Just about cut off my tongue sealing your envelope. Yuu-uuk!" . . . . . From VE1ACU: "While I was VO2AW-3B2AW in Labrador I acted as ARRL's VO2 QSL Bureau. Goose Bay Amateur Radio Club does the job now as listed in *QST*, but I still receive cards for other VO2s via my old address. By the way, I have plenty of VO2AW-3B2AW QSLs for those still in need." . . . . . Northern California DX Club now runs the ARRL QSL Bureau branch for Sixmen. W6s AOI ESI NTQ, K6s KQN YGS, WA6s AHF UFW, WB6QDC and K4BVD/6 are directly involved in the avalanche. Hurrah for the San Diego DX Club gang, too, for their recent stout labors on that front. Do you support *your* local bureau with sufficient s.a.s.e.? . . . . . "QSLers of the Month" CR3KD, CT1OF, DJ1QP, DL8 IAM IYA øBZA, EA2HW, EI9BG, F8TC, GC7XX, G3s HZL XSA, GC5AET, GW6s NX YQ, HB9s XVR XVW, HL9KQ, HP1IE, JA1VX, JH1s CXQ VOE, EG6ARO, KH6SP, KL7JDO, KP4BBN, LA9AF, OK8s IALG IAIQ IXW 3EQ 3KGJ, PZ1AU, SM5BUI SVICH, TF2WLS, TG9AA, VP8s 2VI 5TH, Ws 4VPD/KC4 8IZO/KL7, YA2HWI, YO8s AAJ QO, ZL1AH, ZM8s 2APZ 3GQ, Z8s IPH 3AW 5OF, 3V8NC, 4U1ITU, 6W8GE and 8P6CG, together with QSL aides Ws 2CTN 3HNK 5OB, WAs 3HUP 3KSQ 5GFS 5KPB and WB8ABN, are saluted in "How's" correspondence from Ws 1DAL 1SWX 8YGR, K8DHT, WAs 1PHU 9SQY and VE3GHO for QSL punctuality above and beyond the line of duty. Any potent pasteboard pushers puted out yourr way? . . . . . 'Alp! W5BZK can't run down the TF2WKO of a few years back, WA3JZR wants data on FL9C/mm, and VE2DKJ needs news on 6W8GE and 9H1BM. Any 'alp? . . . . . WAs 2VWG and 3HMK volunteer to perform as QSL managers for busy boys at the DX oud.

PY2BJH sweated out QSOs with at least one U.S.A. Novice in every state and shows us these QSLs to prove it. "I very much enjoy working WNs on 21-MHz cw," writes Hercilio. "Novices should watch for me almost nightly at 2300-0100 GMT on 21,125 kHz. I tune the whole band for answers to my calls." (Photo via W1YYM)

GC8HT keeps Guernsey isle handy via voice and code on 3.5 through 28 MHz with this potent layout at St. Peter Port.

AFRICA — A2CAF's QSL representative as of September 22, 1969, is W4NJF, s.a.s.e. or s.a.e. with IRCs requisite. Gay discontinues as QSL manager for 7Q7LC because of liaison loss . . . . "Logs on hand for EL2J-EL5J date from June 9, 1968, to February 14, 1969," apprises WB2WOU . . . . Those 9I5s were 9J2s celebrating Zambia's fifth state anniversary, suffixes unchanged. That is, 915RB is 9J2RB . . . . Before checking out the month's individual address recommendations we ought to point out to DXing newcomers: When patronizing QSL managers, for direct reply include s.a.s.e., or s.a.e. with IRCs when appropriate. This is only fair when seeking postal response from anyone, for that matter. So far as "How's" postal info is concerned, we normally have space only for data not available in the *Callbook*. Listings may be repeated every six months or so when evidence to hand indicates the information still valid. Keep in mind, too, that we cannot vouch for an item's being necessarily complete, accurate and "official". . . .

CE9AF, Box 151, La Cisterna, Santiago, Chile
CX6DJ, P.O. Box 966, Montevideo, Uruguay
DL4VA, MatComEdr (USMO), APO, New York, N. Y., 09052
DL9s RC RCA (via DJs 2TK or 6AP)
ex-DX1AAV-SVØWP, L. Eisler, W4AAV, 9821 SW 158th St., Miami, Fla., 33157
EA6BN, Box 34, Palma de Mallorca, Balearic Is.
FR7ZO, G. Zitte, Box 4, St. Clotilde, Reunion Is.
HL9VL, CWO P. Anton, Hq. & A Co., 4th Maint. Bn., APO, San Francisco, Calif., 96358
HR6JB, Roatan is., Honduras
HU1P-YS1XEE (see text)
IT1SEZ, S. Amenta, via Nebrodi 44, 90144 Palermo, Sicily
JH1VOE, K. Nakamura, 6-23-7 Honkomagome, Bunkyo-ku, Tokyo, Japan
K2BUI/CE6 (via WA3HUP)
K2IXP/FØ/HB/PX (via K2MME)
ex-KA2JB, J. Barkow, 249-B Grand av., Long Beach, Calif., 90803
ex-KX6GH-CN8GH, W. Theeringer, W8PEY/1, 98 Bigelow St., Marlboro, Mass.
MP4s TCE TCS, via BRS-26222, 1 Grove rd., Lydney, Glos. GL25 5JE, England
OH3KW/OH0 (to OH3KW)
OX3WO, % P.O. Box 73, 5800 Nyborg, Denmark
PJ2PS, Box 283, Curacao, N.A.
PZ1DH, Box 1918, Paramaribo, Surinam
TU2CO, B.P. 1813, Abidjan, Ivory Coast
ex-VO2AW-3B2AW, D. Welling, VE1ACU, 36 Sherwood dr., E. St. John, N.B., Canada
VK9BM (via K6TWT; see text)
VP2s DAN DAO VP (via VE3DLC)
VP2KQ, Royal Signals Radio Society, BFPO 643, GPO, London, England
VP2s MJ VI (see text)
VP9ED, Box 69, Governors Harbour, Eleuthera, Bahamas
VP8s KM KR (via K7RDH)
W6IZO/KL7, Bea Hood, % USCG Radio, Ketchikan, Alaska, 99901
WØVRN/KS6, G. Johnson, Dept. of Education, Pago Pago, U.S. Samoa, 96920
WA1JIV/KL7, 5205-D Kodiak st., APO, Seattle, Wash., 98737
WA2IKP/KS6, J. Cerar, P.O. Box 788, Pago Pago, U.S. Samoa, 96920
WA5VYJ/mm, J. Terry, SS *Sue Lykens*, P.O. Box 19453, New Orleans, La., 70119
WP4DHV, Box 3623, Ponce, P.R.
WV4GJ, Box 789, Christiansted, St. Croix, V.I.
XE2PIS, Box 407, Mexicali, B.C., Mexico
YA1CJ/mm (via WA7LFP)
YN1MG, Al, Swink, P.O. Box 2988, Managua, Nicaragua
4X4s CW GY QL SK SO UL VG WP (via WB2WOU)
4Z4s AQ HF HG (via WB2WOU)
5V4JS, P.O. Box 703, Atakpame, Togo

A2CAF (via W4NJF)
C31CO (via K2MME)
CP1GF (via W6AFI)
CP5FE (via CP5FB)
GW3BH (see text)
CX4CR (via RCD)
DJ6QT/CT3 (via W2GHK)
DJØVI (via K2MME)
G5ANX (via WA2MEQ)
GB3SB (via GI3OLJ)
GD5APJ (via F2QQ)
HC8MP (via HC8FN)
IT9ETN (via AR1)
IT1PLT (via W3AIZ)
KC4USX (via K2BPP)
KG4DS (via VE3BYN)
LJ2X (see text)
MI1 (via IIGAD)
ex-MP4BHK (see text)
OD5AP (via K4TSJ)
OI3SUF (via OH3NY)
PJØCW (via W1FJJ)
TA1NC (via DJØUJ)
ex-TA2BK (to DJ0UJ)
TF2WLN (to WA3BZO)
TF2WLS (via WA5RTB)
TR8MG (via W2YY)
VP2EUU (to VE3EUU)
VP7NH (see text)
W6DLE/4X (via W6ANN)
ZS4DC (via DK3PM)
4M1A (via W2GHK)
4M6A (see text)
5A1TA (via G3VCT)
5B4ES (via I8WLI)
5Z4KO (to G3SLN)
ex-**5Z4SS** (via K9KLR)
7Q7LC (see text)
915RB (see text)

Dragnet for the preceding tidbits was Ws 1BIH 1CW 1DAL 1SWX 2CJX 3EVW 4YOK 5BZK 6EIF 6GSV 8VGR 9DV 9LNQ, Ks 3CUI 4IX 4TSI, WAs 1OHU 8NDL 9SQY, WBs 2GVE 4EPJ 4LIL 9CJS, F2QQ, VEs 1AOU 3GHO, Columbus Amateur Radio Association *CARAscope* (W8ZCQ), DARC's *DX-MB* (DL3RK), *DX News-Sheet* (G. Watts, 62 Bellmore rd., Norwich, Nor. 72.T, England), Far East Auxiliary Radio League (MI *News* (KA2ULL), Florida DX Club *DX Report* (W4FRO), International Short Wave League *Monitor* (A. Miller, 62 Warward ln., Selly Oak, Birmingham 20, England), Japan DX Radio Club *Bulletin* (JA3UD), Newark News Radio Club *Bulletin* (J. Heien, 3822 Marshall ct., Bellwood, Ill., 60104), North Eastern DX Association *DX Bulletin* (K1IMP), Northern California DX Club *DXer* (Box 608, Menlo Park, Calif., 94025), Southern California DX Club *Bulletin* (WA6GLD), UBA's *On the Air* (ON4AD), *DXpress* (PAØs FX LOU TO YDV WWP) and West Coast *DX Bulletin* (WA6AUD). Got something we missed? Ship it along, OM.

Whence:

EUROPE — The new year's contest parade is off with a bang! REF (France) invites your pleasure in the 1970 French Contest to run (cw) from January 31st to February 1st at 1400–2200 GMT, and (phone) February 28th to March 1st, same times. Exchanging the usual RS or RST001, RST002, etc., serial, three points are earned per contact with French or French territorial stations, these QSO points to be multiplied for final score by the number of band-departments and band-DUF-countries collected (Fs append department and DUF numbers to their callsigns). Work 24 of the 32 hours available, breaking up the remaining eight hours into no more than three rest periods. For possible performance certification ship your results to REF, Boulevard de Bercy 60-75, Paris 12, France, as soon as possible or sooner. We see that W2MEL and F2YS/W2 led U.S. entries in the '69 French affair on cw and voice respectively. VE2AFC turned in a spectacular phone log, too. F3CW earned top homeland code honors, F3KW the same on voice . . . . "Bear island's JW1CI is working with an FT DX-500 on cw and ssb," confirms his QSL rep, LA9BL . . . . DJ1QP racked up more than 2500 W/K contacts on various bands and modes while signing GC5AET on Guernsey last summer . . . . "EA6BP *must* be a new DXer," concedes W9DY, "Says I was his first W." . . . . K8TRF learns that Alex of LZ2KBI was rowing champion of Bulgaria in the early '60s, participating in several international competitions . . . . GM3POK hunts for San Francisco friends with a 350 and 2-element rotary on 21-MHz ssb . . . . WA1FHU visited OH2BR/mm's seagoing ham shack when the latter docked at Boston. Lari also hears by mail from YU2PG, another merchant mariner who goes for QRQ cw rag chews. Other Continental cullings from WA1FHU's notebook: GI3JEX manned promotional exhibition station GB3SB at Hollywood, England, recently. . . . GB2FOC was a special club banquet installation in London with W4ZM, K1SIB, OD5LX and YO3RF among those attending. . . . GW6YQ DXperiments successfully on 20 cw with loop antennas. . . . G5RV tried some QSOs at HK3RQ's QTH. . . . Ex-YU3EZ now signs YU7BZC. . . . Oldtime Hungary QSL manager HA5BU joined Silent Keys. . . . SVØWOO has a new 2NT, and SVØWNN rigs a mini-beam to go with an on-order SB-200 . . . . WB2IBD was lucky enough to raise a few Swedes while SM5BMJ was visiting his shack in October . . . . W3HNK's friend CT1UE looks for California

QSOs around 21,315 kHz at 2000 GMT or so . . . . . Small DX world, indeed. G3MKR's Med cruise ship tied up alongside *88 Hope* in Tunis last summer. The latter's radioman turned out to be K2*M K R* whom Bernard had QSOd a couple of years earlier . . . . . "That Jan Mayen photo in September '69 *QST* certainly brings back memories," muses WA7BGZ. "I spent 370 consecutive days there in 1963–'64 standing watch on a 300-kW Loran-C transmitter. That's probably some sort of record for an American. The code course I took on J.M. resulted in my becoming an amateur." Bill jumped from the icebox into the oven — he now writes from Thailand . . . . . Holland's VR2A, Post Box 190, Groningen, offers a Worked All Dutch Provinces certification to DXers who can prove just that. There are eleven with a wild deuce . . . . . Quite a yarn on the principality of Sealand in the September 15th Wall Street *Journal* called to our attention by K3NPC. That's the country owned and operated by one Roy Bates, a man-made concrete and steel "nation" just off England's east coast. Roy's unofficial broadcast station is widely known but we haven't yet heard him on 20.

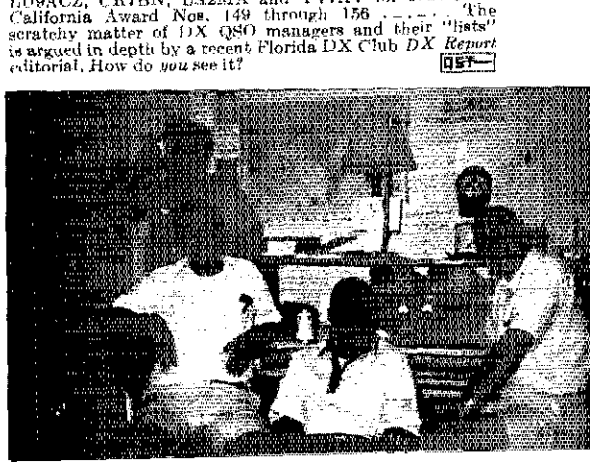
OCEANIA — C21JW, CR8AI, FO8BS, Ks 5M4WZ/KH6 7JCA/KH6, KC6s CT JC RT, KG6AQI, KH6s AA ABQ AFN BZF EEU FQB FQE GHC DJJ GKD GKV GLU GPM SP, KJ6CF, KS6CA, KX6FJ, KW6CJ, KZ5KN, VKs 2BFI 3AKP 3JW 4UC 6OV 7KJ 7KW 7PA 9KS, VRs 1L 2CC 2FT 4EK, YJ8RG, ZLs 1QW 1TZ 2ACP 2NV 3QN, 5W1s AU AR and AS are among those listed on the Pacific DX Net roster. Net secretary KH6GLU welcomes check-ins Tuesdays and Fridays, 0600–1000 GMT, on 14,265 kHz, and don't forget Pac-DX Net's QSO party on the 3rd of this month, 0400–1000 GMT, between 14,260 and 14,270 kHz . . . . . ZKs 1AA and 2AE sked temptingly on 3860 kHz with carrier a-m at 0830 GMT . . . . . ZM1BN/a is said to be a multiband possibility from Snares isle.

ASIA — "KA2NY is operated at present by WA8FTA and myself," pens WA9DGM. "We use 20, 15 and 10 mostly, with some 40-meter operation during the winter. A variety of brand-name gear feeds a 7-MHz dipole, a 12-element log-periodic and TH-6 for higher bands. I expect to be in Japan for another two or three years, Bruce for another year or two." . . . . . "Within the next couple of weeks improvements will be made in receiving and transmitting equipment here," informs HL9VL. "I'll be quite active on 15." . . . . . "YA1CJ/mm is on the Kyoto-Saigon run," finds WA7LFP. "Igor works his DX with 100 watts and a vertical." . . . . . "G3JFF expected to be back in Singapore by Christmas," reports W1HGT. "Mike hopes to reactivate his former 9V1HU and 9M2MA calls while spending most of 1970 in the orient." . . . . . "VS6AL is said to be winding up Hong Kong affairs for return to G-land," mentions W8YGR . . . . . WB4EPJ observes, "The average power of all those JAs on 10 cw seems to be about 20 watts. JH1VOF has a real blockbuster, though, the strongest Japanese signal I've heard on the band so far." WA9SQY says Kojiro is just as potent on 15 and seeks only New Mexico to wind up a quick WAS . . . . . Eastern addenda courtesy literature of clubs and groups: JD1YAA's JA8KV departs Minami Torishima (Marcus) but a replacement should be workable on 20 cw. . . . VS6DR still aims at the Spratleys, and AP2MR threatens more E. Pakistan action. . . . KR8s AG DE UK AX RL EI BU BY and BV trail KR8EA's 199/185 countries in that order among the Okinawa Radio Club DX pack. KR8s AG EU and DU run one-two-three in 5B-DXCC scores. . . . New or renewed Far East Auxiliary Radio League memberships go to KA2s BD (W2OCJ), FL (K5LLK), HP (K7VYR), IJ (KH6IJ), MU (W7CMU), RC (WA3ION), SB (WA8-RBI), WM (WA8SRY) and W6VOM.

AFRICA — "ZD3K expects to be in the Gambia for two years," cheers K4TWJ. "Phil runs 180 watts and puts through a good signal near 21,300 kHz around 2100 GMT." . . . . . "Spent a recent afternoon and evening at TU2BA," says W4FRU. "Had a ball surprising the Stateside gang with Ivory Coast answers to their CQs." . . . . . EL9B, who hails from Curacao, brought a Cygnet back to Liberia from his European vacation. "Enjoyed working 62 countries and many W/Ks as PA9HH." . . . . . As a result of friendly liaison over the years W5QPX finds himself a member of SARL's Johannesburg branch . . . . . 5Z4SS moves to Kampala early this year and tells K9KLR, "I'll try to see what can be done concerning possible licensing as a 5X5." . . . . . F2QQ (3V8AA) lists 3V8AL as very active on 20, 3V8AB likewise for a year or so. Ex-TU2AF also is stationed in Tunisia awaiting 3V8 credentials . . . . . Worked All South West Africa is a fresh diploma available to DXers who can prove contact with hve ZS8s. ZS3BS urges a specs check with Branch Secretary, South African Radio League, P.O. Box 1100, Windhoek, S.W.A. . . . . Via the clubs press we learn that FR7s ZQ and ZU are mentioned in conjunction with Europa isle radiations, FR7s ZP and ZL with Bassas da India action, and FR7ZG with Comoros doings. Also that FH8CD enjoys the holidays home at F2JI, and that Supergus, W4BPD, plans doing his annual spring thing, another VQ8-VQ9 swing.

SOUTH AMERICA — Radio Club of Ocana province, Colombia, helps celebrate the 400th anniversary of Ocana city's founding with a 10-through-40-meter radiotelephone test activity on January 30th through February 1st. Most of the sport will be in Spanish. Those interested can zip s.a.s.e. to Club de Radioaficianados de la Provincia de Ocana, Apdo. Aereo 19, Ocana, N. Santander, Colombia, for complete details. CRPO's officers include HK2s NF pres., NC v.p., BRO treas. and BQJ secy. . . . . PY2BJH works all those cw W/K/YEs with an HT-32, T4-X, R4-A and center-fed tuned doublet . . . . . "VP8KR is workable on 10, 15 and 20-meter cw and ssb," declares K7RDH. "Ray's mother is VP8KM but not too active." They're Falklands folk . . . . . "CP1GF of La Paz is popular with the 5B-DXCC crowd on 40 and 80 with an inverted Vee, HT-46 and SB-200," says W6AFI. "Direk also has a TH-3 and two-element quad on 10, 15 and 20." . . . . . WA1FHU hears that PY2DEH (ex-HA6CO and, LU4BCO (ex-HA2G) meet for an old-fashioned Hungarian eyeball QSO now and then . . . . . CE3HG still gets over to Juan Fernandez occasionally sans QSOs . . . . . In NCDXC's *DXer* we see that 9Y4AA (W6BHY) zooms as high as 225 QSOs per hour during contest mayhem.

HEREABOUTS — Any and all DXers are invited to zero in on this year's West Coast DX Convention billed for January 31st and February 1st in Fresno, an annual DXplosion sponsored jointly by Northern and Southern California DX Clubs. Chairman W6AUA already has lined up a star-studded program with much more in store. Check immediately with Frank or SCDXC treasurer W6CS for full attendance info . . . . . Clipperton island, North America's answer to Europe's Albania, waxes ever hotter as a DXpeditionary topic. France continues to play her cards close on this one, potential tourist trade notwithstanding. W4EWS/mm tells W4YOK that a French ham puts out cw signals there for a growing government installation . . . . . "I'll be active from Greenland for two years," promises OX3WQ (OZ5WQ). "My rig is an HW-100, my antenna a 12-AVQ plus dipoles for 3.5 and 7 MHz." . . . . . VE1ACU records, "HP9FC/mm, VE1ASJ operating, is research vessel *Vema* in the eastern north Atlantic heading slowly toward South Africa. Andy should be back in New York by summer." . . . . . Ex-DX1AAV-SV0WP-W3JTC, now W4AAV, retires to a Florida antenna farm after 33 years with Uncle Sam . . . . . "I'll be back on 80 c.w. from Montserrat again this year," guarantees VE3EYW in lines to W1SWX . . . . . K7WUR and KL7JDO polished off WA9SQY's WAS. Dave credits a good number of foreign amateurs with better command of English than many of the W/Ks they QSO. And not only the Gs . . . . . Chiller of the Month via W3HNK: "KV4EY's QTH was struck by stray lightning while he was on the air. Knocked out his antenna, gear, etc. and nearly did Les in. He's recovering but still off the air." . . . . . WA1FHU, despite lack of optimal skyhooks on 40 and 80, isn't too far from 5B-DXCC status. How's *your* frustrating 500 coming along? . . . . . K6AO okayed JA1ERB, 487DA, 9M2LN, VR3DY, LU9ACZ, CR7BN, LA2MA and YV7AV for NCDXC's California Award Nos. 149 through 156 . . . . . The scratchy matter of DX QSO managers and their "lists" is argued in depth by a recent Florida DX Club *DX Report* editorial. How do *you* see it? QST



KX6DC is the bustling headquarters station of Roi-Namur Amateur Radio Club on Kwajalein atoll. Shown here, left to right, are members K3NCB (KX6HA), WB2SXP, WA3NFS and WA3LTY (KX6GZ). Their DX chasing usually takes a back seat in favor of priority phone traffic exchanges with the mainland, a service highly appreciated by Marshalls nonham personnel far from home.
(Photo via W8PEY/1)

A Night To Remember—
And a Morning-After, Too

BY JAMES G. (BUNKY) BOTTS,* K4EJQ

VHF DX enthusiasts watch the weather maps closely. Conditions looked right on Sunday, Oct. 5, 1969. A large cool air mass covered Eastern USA, from the Great Lakes eastward to Maine. A warm low was advancing eastward behind and riding over the fair, cold high. Rain was falling along the boundary several hundred miles west of our location. Around Bristol, Tennessee, the weather was typical early fall: cool, with mostly fair skies, and some high scattered to broken layers of cirrus and cirrocumulous clouds, later in the day.

Upon reaching our Holston Mountain site, which happens also to be our place of employment with a local TV station, I checked vhf conditions as soon as I could. A radar reported to be somewhere in the Detroit area, is a good tropo indicator. Normally it is just over the noise on 432, when its antenna comes around toward me. Today it was S9, and when it swung away reflections of the signal could be heard. A careful listen on 144 and 432 turned up no ham signals — par for the course in these parts at noon on a beautiful Sunday. So I spent the next several hours puttering with an antenna relay for my 1296-MHz rig, which I hope to have ready by next spring.

I checked the radar signal again at 5:30 EDT, and found it S9-plus, and another, even stronger coming from the northeast. Several uhf TV signals were coming in from the north, along with familiar "beacons" and MARS vhf repeaters. Still no answers to long CQs on 144 and 432, until 6 P.M., when I joined a couple of locals in a 2-meter phone ragchew. This went on until 6:15, when W8QLO, Livonia, Michigan (420 miles!) broke in to say that the band had been open to the east from the Detroit area all day. In fact, he told me that some W2s were calling me down the band a ways right then!

I moved down the band, swung the beam northeast and with one short call brought the band alive with stations calling me. In working several 1s and 2s in the next few minutes I asked for checks on 432, but heard nothing but strong radar, until K3IPM, Philadelphia, called on 144 to let me know he was going to 432. We worked right away with good signals, but no more was heard other than the ever-present radar. So, back to 144, and several contacts with the Norfolk area, and more pleas for tries on 432. This must have worked, for at 8:15 I worked W2BLV, for my first New Jersey 432 contact. Apologies to Al, K2UYH, with whom I've been keeping a 432 sked without success since early summer!

I worked 15 stations on 432 in the next hour, including K1HTV, Meriden, Connecticut, very likely the first 432 communication between our two states. He reported that W1VTU was also hearing me. These fellows are about 600 miles distant, and new DX for me on 432.

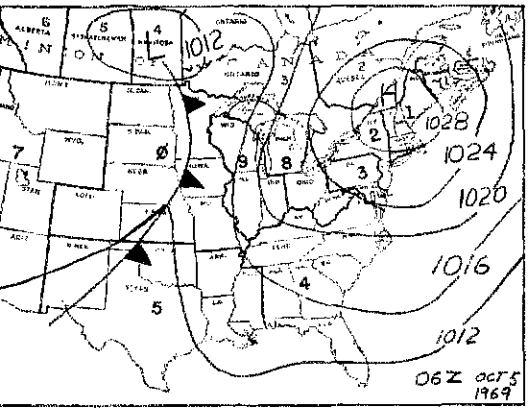
Switching back to 144 at 9:15, to catch up on the backlog of callers there, I worked about 20 stations in 6 call areas in the next 30 minutes keeping one ear on 432, all the while. Seeing that band getting hotter I came back at 9:45, to work VE2LI, Montreal, my first Canadian on 432, and still my DX for that band, 780 miles. Also, several New York and New Jersey stations not previously heard. Someone warned me to watch for WA1JTK, in New Hampshire, a rare catch down this way on any band.

Still more stations were waiting for me on 2, so I went on phone to work another batch. It should be stated here that these fellows, while anxious not to miss a chance at new states, were courteous and helpful, standing by for QRP stations to get a shot at me. It sure beats what one hears on the hf bands when rare DX pops up!

Back to 432 at 11 P.M., I worked VE2LI again, with much stronger signals than before, and then W1AJR, in Rhode Island, another new state. Then finally WA1JTK for New Hampshire, and what must be some kind of miles-per-watt record for 432 on an overland path. Jim was running less than 2 watts output to his 44-element W1HDQ Yagi array. Who says it takes power to work DX on 432? Jim peaked 569, or better, over more than 700 miles!

Back on 145-MHz phone, for another pack of 1s and 2s, and then to 432, for K2UYH, at last. Having run skeds with Al for so long, I tried to phone him earlier when I heard the strong radar, but my phone was out of order. It was after midnight, now, but activity hadn't thinned much. VE3DSE (first from that call area) came up for a short QSO, and then on to 2 again for a string of QSOs with old friends like K1ABR, W1JSM, W1VTU and W1FJH, who had been worked long ago by the meteor-scatter route. This was something quite different — which seems to prove that good things come to those who wait. (And *stay active!*) Around this time W1MEH was so strong on 2 that his signal

* Route 2, Box 72, Bristol, Tennessee 37620. OVS Report for October, 1969.



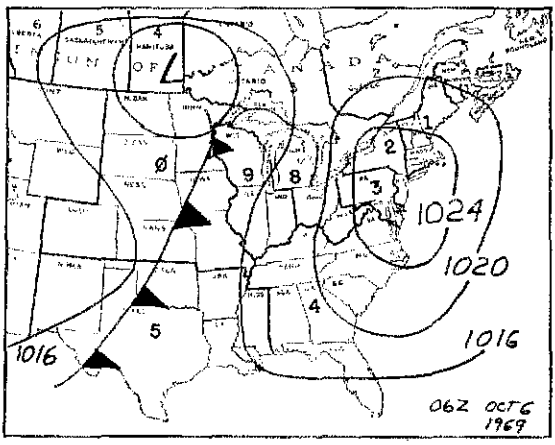


Fig. 1—Simple weather maps of the type commonly used in televised weather forecasts show the typical surface conditions for long-distance vhf propagation. At the left a large high-pressure area covers the northeastern portion of the country, with a weather front lying along a north-south path west of the Mississippi. East-west communication on 144 and 432 MHz was possible over distances up to 700 miles or so soon after this map was made, early in the morning of Oct. 5. Conditions after 24 hours, right, show only slight eastward movement, but the high was stretched out to almost the entire length of the Atlantic Seaboard, where it was to remain, almost motionless for two more days.

leaked through the coaxial switch I use to switch converter outputs between the 432 and 144 converters!

At 3 A.M., K2DNR showed up, someone having gotten him out of bed to let him know I was coming through. We'd had many tries before without success, so Sam didn't feel too badly about the rude awakening for this one!

By 3:30 A.M. there was not much left on either band, so I quit, but not before Barry, operating W1MX, had made a trip up to the roof to switch feedlines to try me on 432. No luck, so still no Massachusetts on 432.

Up again to sign on the TV station at 6:30 A.M., I found the northeast radar still strong, but no amateur signals until W1VTU was worked at 7:02. I asked him about Massachusetts activity — and the next station heard was K1BFA, in that state. K1HTV called me again, even stronger than the night before. I mentioned that my phone was out of order, and he called the telephone company for me. How's that for emergency traffic on 432?

On 2 at 7:45, I found many stations still looking for me. I suspect that there were some "sick calls" that morning, as I had many good ragchews. On a contact with Carl, W2AZL, we set up a noontime check, and I continued to work 2s and 3s until about 10, when signals began to weaken, and I closed down to catch up on my work. At 12:15 I called W2AZL on sked, and back he came, only slightly weaker than he had been four hours earlier. Some of his cronies were around, so I spent a few minutes with them, excusing myself at 12:45 to make one last check before leaving for my other job with a broadcasting station.

W4JFU, Onancock, Va., answered my last CQ. Carl and I had worked several times on 144 and 432, so we had some notes to compare. At 1 P.M. I had to leave, and regrettably pulled the switch, with 2 meters still open. How much longer this state of affairs held on I don't know, though the rain didn't reach here until about noon of the 7th.

While it lasted — and it lasted a very long time — this was all quite an experience for one who is often hard put to it to find anyone to work, on either 144 or 432!

—···—

Weather Data, Courtesy of KIHTV

The superb conditions lasted much longer than K4EJQ knew, the great inversion running on for several more days and nights. Here is more information supplied by Richard Zwirko, K1HTV, with weather data from the Travelers Weather Service, Hartford, Connecticut. Rich is an engineer on the staff of WTIC, the pioneer broadcasting station operated by the Travelers Insurance Company.

A storm system started to form off the Southern New England coast on Friday, Oct. 3. By the 4th it was centered over Nova Scotia, and growing in intensity. Moving in behind this storm was a ridge of high pressure, coming down from the Hudson's Bay region to the Great Lakes and the Ohio Valley.

The surface weather map for early on Oct. 5, Fig. 1, left, shows the cool dry high building down over the whole northeast quadrant of the nation. The map is the simplified form commonly used in Travelers Weather Service forecasts over WTIC-TV and in many other TV weather programs. Though pressure distribution and frontal conditions portrayed do not guarantee long-distance vhf propagation, it is unlikely that really good vhf tropo occurs without them. The map for the 6th, right, shows only minor differences.

Such maps provide only clues; the real business is done at temperature and humidity disconti-

nuities along air-mass boundaries in the lower atmosphere. Radiosonde data taken around sunrise on Sunday, Fig. 2, show temperatures in the 2000 to 5000-foot region running up to *20 degrees higher* than at the surface, from Central New York State westward to Michigan. At Albany there was a relatively mild inversion at about 2000 feet, and a sharper one at 4000. Huntington, W. Va., Buffalo, and Flint, Michigan, show pronounced low-level boundaries, with temperatures up to 10,000 feet still not down to surface readings. This is the classic fall inversion pattern, responsible for the east-west opening reported to K4EJQ by W8QLO. Many Michigan and Ohio stations worked into New England on 432, the night of the 5th.

The typically stable fall weather held almost unchanged for days. Monday morning's radiosonde data show so many inversions that they cannot be plotted on any graph that can be reproduced easily. High-level discontinuities were found at Huntington (above 4000 feet), Hatteras, N. C. (6000 to 7000 feet), and Athens, Ga. Lower-level inversions were in evidence all the way from Albany to Peoria. Pittsburgh showed a double inversion, with bases near the surface and at 3800 feet. Peoria showed three discontinuities, warm-over-cold, at roughly 1000, 2000 and 4300 feet.

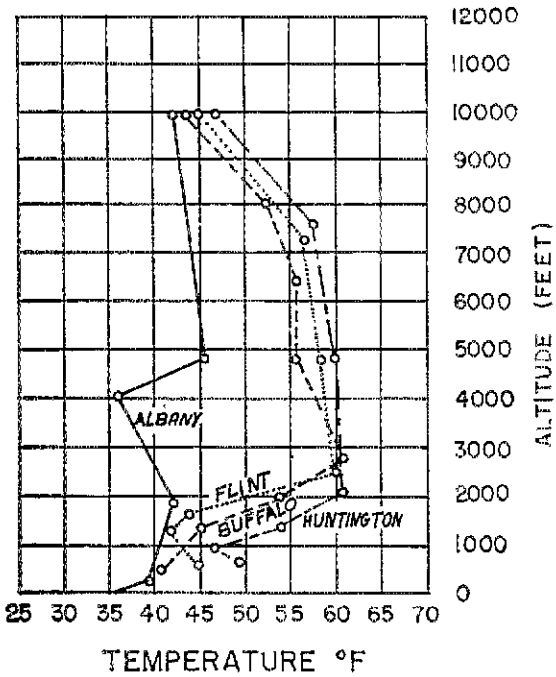


Fig. 2—Stratification of air masses in the region below 10,000 feet, shows in radiosonde temperature observations at Albany, N. Y., Flint, Mich., Buffalo, N. Y., and Huntington, W. Va., around sunrise Oct. 5. Note the marked reversal of the normal decrease in temperature with altitude. Abrupt changes in the dielectric constant of the atmosphere associated with these conditions keep vhf and uhf waves following the earth's curvature for hundreds of miles. Maps and data courtesy of the Travellers Weather Service, Hartford, Conn., and K1HTV.

Visually, some cloudiness existed Monday evening in coastal areas from Southern New Jersey to Florida. Skies were generally fair to partly cloudy over the entire Appalachian chain, with a warming trend and little wind.

In the next two days the big high moved eastward with only slight changes in shape. By evening of the 8th it was out over the Atlantic, but most radiosonde charts show well-defined inversions through the 9th. Excellent coastal conditions prevailed through the night of the 8th. K1HTV has a fine tape of the 144-MHz signals of W4ISS, Augusta, Ga., made during a QSO the night of the 7th, and of W4HJZ, Raleigh, N. C., and K4SUM and W4API, just south of the Washington area, all worked on 432 just before midnight the 8th.

The question of tropospheric skip often comes up during widespread openings like this. While tropo probably never shows the clearly-defined skip of ionospheric F_2-layer propagation on lower frequencies, every experienced vhf man has seen periods when 144 MHz and higher have something approximating a skip zone. On Monday, Oct. 6, for example, K1HTV reports signals from as far south as Florida being heard and worked from Southern New England on 144, yet stations in New Jersey, only about 100 miles southwest, failed to turn up any sign of them.

The many examples of two-layer and three-layer inversions seen in the Travellers Weather Service data for the period lend credence to the idea of signals being trapped aloft for part of their long journey, and leaking down through the base of the inversion to return to earth at some extraordinarily distant point. How distant? It would take a better man than the undersigned to set a limit, or to track the factors down in fine detail — and who among us would say for sure that we know the absolute limits of vhf DX? — *W1HDQ*

Strays

Stolen Equipment

On Tuesday, November 18, my car was broken in to and my Clegg 66'er 6-meter transceiver was stolen. The serial number of this rig is 2100-099. The microphone and some crystals were also stolen. Anyone with information please call or contact Stanley Szwed, WA8AOY, 16990 Gross Drive, Parma, Ohio 44130.

Feedback

Here are some additional calls that were not listed as Certificate Winners in the 1969 Armed Forces Day Communication Test reported in *QST*, November 1969: W3JXH, K4AT, K4BN, W4NZP, W4UX, WA5WMJ, WB6BKR, W6CBF, W6CLB, W6CUF, WB6CWL, K6HDJ, W6RXT, W6TWE, W9IDY, WØTDH.

The World Above 50 Mc.

CONDUCTED BY BILL SMITH,* KØCER

'69 Review, Outlook '70

EACH year at this time we reminisce about the year just past and prognosticate about the year just beginning.

On the vhf scene, 1969 was very productive. Here's a sampling of what happened.

In January, K6MYC and KØMQS worked via the moon on 2 meters using, for the first time, ssb and amateur-built antennas. In addition, K6MYC had two moonbounce (EME) contacts with SM7BAE for the first U.S.-to-Sweden two-way on 144 MHz. On six meters, *F*-layer propagation entertained South American, Caribbean and southern U.S. DXers with a good selection of contacts between the continents.

A solar flare on February 2 touched off an excellent auroral opening on 50 through 432 MHz, and on six meters, also most every known type of *F*-layer propagation from backscatter to *TE*. And to prove intercontinental DX isn't just a 50-MHz game, K6MYC again worked SM7BAE on EME.

March came in with a roar — or better yet, echoes from the moon which set a new world's record for 144-MHz DX. SM7BAE and ZL1AZR worked one another on the 4th over an earthly distance of 11,055 miles. Their contact was the first on EME not involving an U.S. station on at least one end of the circuit. There were also several good auroras during March, but the one on the 23rd was a dandy. Dozens of buzz contacts were made through 432 MHz and on 50 MHz, the magnetic storm provided contacts between the two Americas and into the Pacific. The month ended with SM7BAE and ZL1AZR again contacting on 144-MHz EME.

In April, another first on 144 MHz. KØMQS and ZL1AZR completed the first contact between the U.S. and New Zealand on 2 meters. Not to be outdone by their lower-frequency colleagues, WB6IOM and G3LTF completed a U.S.-to-England EME contact on 1296 MHz establishing a new DX record on that band, 5492 miles. Tropo on 432 found Virginia stations working south to Florida over a new path on that band. 50 MHz continued to dish-up good DX, including the often-heard, and sometimes-worked signal of ZK1AA on Cook Island in the Pacific. Among the lucky ones were Florida's WA4MHS and W4GDS, a 5000-mile path. Other stateside stations blessed with lower-latitude locations found South American DX frequently workable.

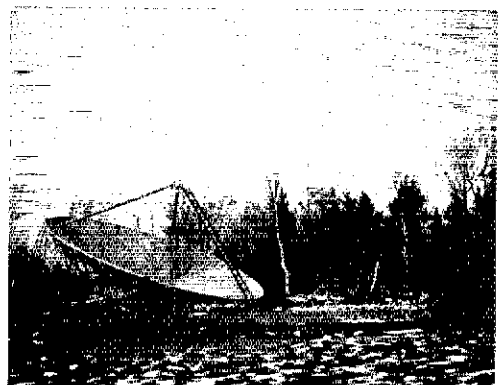
May was relatively quiet. While some *F*-layer was still workable on 50 MHz, the *E* season was slow in starting. On the higher bands, tropo was above average on a few days.

Activity picked-up in June with the usual assortment of *E*-openings on 6 and on 144 and up, the seasonal increase in favorable tropo conditions throughout the country. One day of note was the 21st when KØRZJ, Colorado, worked Texans K5PTK, K5WXZ and W5GVE over a 1000-mile path on 2 meters. Such tropo from the high Colorado mountains is extremely rare — or was it tropo?

Tropo really came to life in mid-July. A number of outstanding contacts were made, topped by the one on 432 between K2CBA, New York, and WØDRL, Kansas, bettering the previous earth-bound 432 DX record, setting the distance at 1185 miles. That will be difficult to beat! During the same opening, W4FJ became the first to work 20 states on 432, but he was to be bettered before the year ended.

August was highlighted by meteor scatter, a number of fine contacts being made during the reliable Perseids shower. Of particular note is the ms work of K2UYH and WØDRL on 432 MHz. They proved wrong the so-called experts who said that 432 ms was impossible. Although they didn't complete a two-way, WØDRL heard a strong, 11-second burst with complete calls from K2UYH. Also during the Perseids, W6GDO worked KL7GMB for the first 144-MHz contact between their respective states.

September found tropo conditions once again excellent. The 20th to 23rd allowed many 700- to 800-mile contacts on 144 along the eastern



K2CBA used this 28-foot dish for his November 2 moonbounce contact on 144 MHz with W1FZJ/KP4. In the background is Jud's 220-MHz array of sixteen 6-element Yagis. He is holding tests with WB6NMT looking for the first EME contact on 220.

* Send reports and correspondence to Bill Smith KØCER, ARRL, 225 Main St., Newington, Conn. 06111.

seaboard from Nova Scotia to the Carolinas. Similar paths were likewise covered on 432, but this was just a prelude to October. Also on 144, W1QXX worked W1FZJ/KP4 via the moon. And an aurora on the 29th saw 144-MHz signals traversing 1100-mile paths. K2RTH logged 102 stations in 23 states during the buzz session. Six-meter DX returned with contacts between California and ZK1AA.

On to October and tropo conditions the likes of which have seldom been seen. Beginning the 4th, and lasting through the 6th, outstanding DX was worked on 144, 220 and 432. The three-day session produced 600- to 700-mile contacts for 3-watt triplers on 432. K2ACQ reached 23 states worked on our lowers uhf band. Three other stations, plus W4FJ, ended 1969 with 20 or more states on 432. While tropo was underway on the lower bands, W3GKP was trying EME on 2300 MHz and getting the first audible echoes on cw *and* ssb, and W1FZJ/KP4 worked SM7BAE and K6MYC on 144 EME.

At the time of this writing, in mid-November, we can not detail the remainder of the year. However, in early November W1FZJ/KP4 worked K2CBA on 2-meter EME, as Sam continued regular periods of operation on 144 moonbounce. The November Leonids meteor shower, an outstanding performer in 1966 and 1967, produced few contacts. The most notable was a 1400-mile plus haul from WØLER, Minnesota, to W4CKB, Florida. There were periods of fair tropo in the midwest and 50 MHz saw at least one *F*-layer opening between Florida and California.

What will 1970 produce? Most likely two more moonbounce firsts in the form of the EME contacts on 220 and 2300 MHz. I'd speculate that K2CBA and WB6NMT will be involved in the 220 effort, and that W3GKP will be on one end of the 2300-MHz contact. And who can guess what Sam, W1FZJ/KP4 will do with his 100-foot square reflector on 144 through 1296? 432 will receive even more attention, building up states worked totals on that band, and WØDRL will continue towards the first 432 meteor scatter contact. This spring, there will be South Americans to work on 50 MHz, mostly from the lower latitudes of the United States, and West Coast DXers will likely work more Pacific DX before the current sunspot cycle 20 fails at v.h.f. frequencies.

To all of you, thanks for your support of this column during 1969. It takes much "input" to get the "output!"

Benjamin F. Hudson, W5MCC

The vhf fraternity was shocked in late October when word spread of the death of Ben Hudson, W5MCC. He was shot to death in the front yard of his Galliano, Louisiana home, allegedly by a neighbor, who at last report, was jailed without bond on murder charges. Details of W5MCC's death are not entirely clear. The shooting apparently came after a dispute, which, in part, was over a television interference complaint.

Besides being active on 2-meters — Ben had worked 29 states, many during 144-MHz *E* sessions in the summer of 1968 — he was also active in Civil Defense and Coast Guard communications. During the Hurricane Camille disaster on the Gulf Coast last summer, W5MCC made his way to Gulfport, Mississippi and established the first outside communications for that hard-hit city. Ben, who was a marine electronics engineer, likewise aided the Coast Guard through communications during many search and rescue missions.

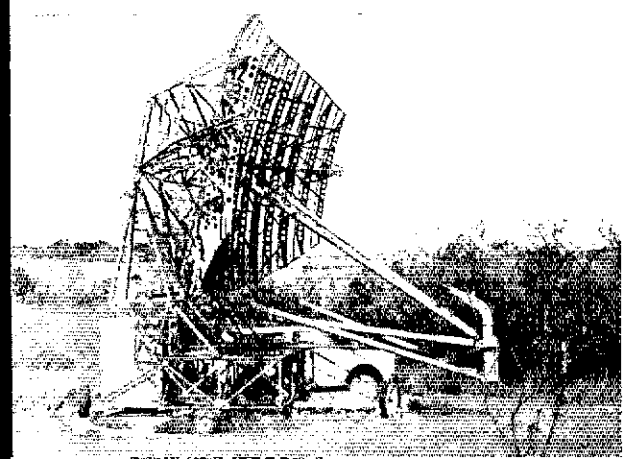
Amateur radio has lost a good friend.

OVS and Operating News

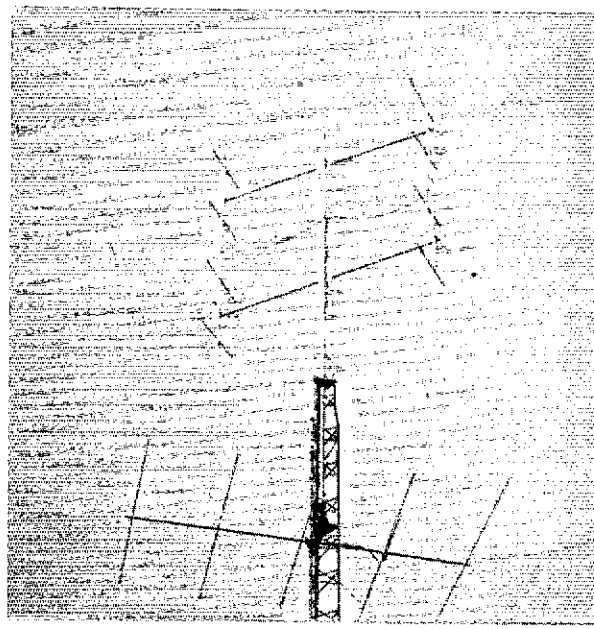
50-MHz has been slow the past three months judging from the lack of DX reports. There have been no new openings between South and North America reported, other than a letter from XE1PY who reports, "we have had the usual *TE* and F_2 into South America and quite a few openings out ZK1AA way." VE2DFO passed word of an *F*-layer opening November 11 between Florida and California, but we have not heard from the people involved. In the more northern latitudes, the muf has seldom exceeded 40 MHz this fall. This is according to what I've heard on the 40- to 50-MHz police and service band.

VE3EVW says he will again this winter be active as VP2MJ on Montserrat in the Caribbean. Monty vacations there each winter and is active on 50.1, looking state-side for evening *TE* openings. He's also a good bet on backscatter. Monty says he will arrange schedules, hoping to add to his 10-country, 5-state total from VP2MJ.

VE6AHE reports *Es* on September 30 to W1, VE2 and 3. K7ICW worked *Es* on October 2, 10 and 11 and adds there was excellent ionospheric and meteor scatter activity October 4 when he worked K6ODV/WA7GCS, Oregon, and K7BBO and W7FN, both Washington. WA1DPX, Mass., noted good *E* opening to Florida, October 11, when he worked five stations in the Sunshine State. On the 18th, Ray worked more 4s and a 5 and heard WA9THB.



W8YIO acquired this surplus radar antenna for use on 432. In the first 90 days of operation, Lew worked nine new states to now lead W8s on 432. The dish can be rotated the full 360 degrees and next spring Lew will add elevation control.



VE2DFO has become very active on 6 and 2 meters within the past year and has made an impressive showing. This 40-element collinear for 144 and the 5-element Yagi for 6, plus kilowatts and a good operating technique have been responsible. Watch this young man in the future!

Scatter continues to be a popular morning and weekend sport. WB6NMT says he has worked W7FN 52 times since mid August. Louis says more Swan 250 and SB-110 operators would be successful on scatter, both ms and ionospheric, if they would use specific calling sequences like those employed by 2-meter ms operators. In Oregon, WA7GFP says he works ms into California most mornings and evenings. At Fruita Valley, Colorado, ex K9EEK is signing WØMTK and finding scatter workable from his Rocky Mountain valley location. Bill runs a Swan 250 and stacked 4-element Yagis, but plans an array of four similar beams. Bill, WØMXA and WAØTHA have regularly been working 635 miles over the Rockies into Los Angeles. WA6AKM, K6ODV and K6PYH are the most frequently mentioned in Bill's report. What's happening elsewhere around the country on 6-meter scatter? Come on you scatter types, give with the reports!

144-MHz moonbounce is definitely coming into its own. W1FZJ/KP4's recently activated 100-foot square dish has much to do with the increased activity — and will have more in the future. In addition to Sam, KH6NS is on with a single-layer 700-foot rhombic, ZL1MO is a new EME station in New Zealand, VE7BQH is completing an 80-element collinear array, and K6HCP is using a 10- by 30-foot array of 8 Swan-type Yagis.

220- and 420-MHz. STANDING

220 MHz.

W1HDQ	13	5	450	K3IUV	16	5	720
K1JIX	12	4	600	W3RUE	14	7	585
K1BPA	8	3	225	W3UJC	9	4	400
K2CJA	17	5	1090	W4FJ	20	7	995
W2UWJ	15	5	740	K4QIF	19	7	1085
K2DNR	13	5	600	W4HJZ	13	5	560
W2SEU	12	5	325	K4EJQ	12	5	550
K2RTH	12	4	600	W4VHH	12	4	750
W2CRS	10	4	440	K4SUM	11	5	420
				K4NTD	9	2	835
W3IJG	14	5	480	K4GL	7	2	—
W3RUE	10	5	480				
K3IUV	10	4	310	W5RCI	19	6	880
				W5ORH	12	4	700
K4IXC	3	2	1090	W5AJG	7	3	1010
K4GL	3	2	—	W5UKQ	6	2	590
				W5AWK	3	3	222
W5RCI	10	5	910				
W5AJG	3	2	1050				
W5LO	2	2	660	W6DQJ	4	2	360
W8WSQ	4	4	945	K7ICW	4	2	225
K7ICW	4	2	250	W7JRG	2	2	420
W7JRG	2	2	959				
W8PT	11	6	660	W9YIO	19	7	650
				K8DEO	20	7	676
WØEYE	9	4	910	K8REG	20	7	700
				W8HVX	16	8	660
VE3AIB	7	4	450	W8MNT	13	7	600
				W8RQI	10	6	425
420 MHz.				W8CVQ	10	8	400
K1HTV	15	4	610	WA8VHG	8	6	625
K3EAV	14	6	700	W8EWF	7	4	450
K1BFA	13	5	710				
WA1JTK	11	4	715	W9WCD	19	7	825
W1QVF	10	5	400	WA9HUV	17	7	780
K1JIX	10	4	460	W9AAG	14	5	800
W1HDQ	10	3	250	WA9NKT	12	6	560
				K9AAJ	12	5	425
K2ACQ	23	8	925	K9CNN	12	5	—
K2CBA	20	8	2670	W9UIY	10	5	550
WA2EMB	18	6	720				
K2UYH	17	6	840	WØDRL	18	6	1185
W2BLV	17	6	732	WØLER	8	3	709
W2CLL	17	6	693	WØLCN	8	3	700
W2CNS	14	6	525	WØEYE	7	3	703
W2DWJ	13	4	330				
K2YCO	9	6	525	VE2HW	4	3	750
K2ARO	9	5	580	VE3DKW	12	7	940
WA2EUS	9	4	260	VE3EZC	7	5	510
K2RIW	9	3	—	VE3AIB	5	4	450
W2SEU	6	4	220				

Most of the recent activity came October 28–29. Mike, K6MYC, says W1FZJ/KP4 worked SM7BAE on the 28th and then K6MYC the following day. During that test, KH6NS heard Sam, Mike and K6HCP. K6HCP has also been heard by ZL1AZR, VK3ATN, W1FZJ/KP4 and had a near contact with SM7BAE. Recently, W1FZJ/KP4 has also worked several East Coast stations, including W1QXX and K2CBA, the latter on November 2.

For those wanting to listen to, or attempt to contact, W1FZJ/KP4, you may calculate the approximately 15 days each month that the moon crosses Sam's window over Puerto Rico and listen on 144.032. Sam tunes for replies between 144.00 and 144.01.

K6MYC also reports that ZL1AZR and SM7BAE have completed several more contacts via EME. They share the EME DX record of more than 11,000 miles on 144 and because of their geographical locations, that record will be difficult to better.

Early indications are that the 1969 Leonids meteor shower was not too productive, the number of meteors being similar to pre-1965. It was in 1965 and '66 that the Leonids put on a fantastic show. This past November there were frequent loud pings, but bursts of long enough duration to use were infrequent. At this writing it is too early for a complete list of contacts, but we know WØLER, Minnesota, worked W4CKB, Florida, over a path of more than 1400 miles. That contact was made the morning of November 16, a day before the shower's expected peak. On November 15, KØMQS, Iowa, worked W2CUX in New Jersey on a 90-second burst. KØMQS said the burst had tropo characteristics. KØCER, South Dakota, ran unsuccessful schedules with K1ABR, Rhode Island, W1FJH, Mass., and W1VTU, Conn., but all were 1300-mile plus paths. Numerous pings and short bursts were heard from W3BHG, Delaware, and VE2DFO, Quebec, but not enough to complete a contact. Using random meteors on November 9, K7NII, near Phoenix, worked KØCER on a number of short bursts. K7NII keeps tabs on the meteors by viewing KWWL-TV, channel 7, in Waterloo, Iowa. Tom says meteor activity shows up well, no pun intended. W1VTU has a similar technique. John monitors the fm broadcast band for stations in the same area as the station he is scheduling. John notes a positive signal correlation between the two.

2-METER STANDING

W1JSM	35	8	1400	W5LO	28	7	1254
K1ABR	34	8	1478	W5HFV	27	10	1285
W1AZK	34	8	1412	K5PTK	18	6	1330
K1HTV	33	8	1310				
K1WHT	31	8	1300	W6GDO	18	5	1326
K1UGQ	30	8	1370	W6WSQ	15	4	1390
K1WHS	29	8	1300	K6HAA	13	4	1380
W1VTU	29	8	1298	W6NLZ	12	5	2540
K1BKK	28	7	1275	K6UYO	12	4	1240
W1FJH	27	7	1100	K6RMS	11	4	1258
W1HDQ	24	7	1040				
K1MTP	20	7	1225	W7JRG	27	6	1320
K1JLX	18	6	800	K7NII	24	5	1290
K1RJH	17	7	1450	K7ICW	16	4	1246
				K7VTM	8	5	950
W2NLY	37	8	1390	W8PT	41	9	1260
W2CXY	37	8	1360	K8AXH	38	8	1275
W2ORI	37	8	1320	W8YIO	38	8	1100
W2BLV	36	8	1150	W8UDT	35	8	1160
W2AZL	36	8	1380	K8DEO	32	8	---
WA2FGK	33	8	1340	W8UDU	27	8	1150
K2RTH	33	8	1215	W8NOH	26	8	1165
WA2CJK	31	8	1160	W8TIU	24	8	1000
W2CRS	28	8	1270	K8ZES	22	8	675
K2DNR	24	7	1200	WA8VHG	15	6	540
W2CN8	23	8	1150				
W2DWJ	23	6	860	K9NGD	42	9	1300
WA2EMB	23	8	1335	WA9DOT	41	9	1303
WB2SIH	21	6	950	K9AAJ	41	9	1200
WB2FXB	21	6	915	K9UIF	41	9	1150
K2YCO	20	7	750	W9AAG	39	9	1200
WA2PMW	19	6	1000	W9YYF	36	8	1050
				W9IFA	33	8	1060
W3RUE	36	8	1100	W9PBP	32	8	820
W3KWH	35	8	1335				
W3GKP	32	8	1108	KØMQS	45	10	8008
W3BHC	29	8	1140	WØBFB	45	10	1380
K3CFA	25	8	1200	WØNXF	14	10	1369
W3BDP	25	8	1100	WØDQY	41	9	1300
W3HB	22	8	1310	WØLFE	40	9	1100
K3CPY	21	7	950	WØLER	37	9	1440
K3OBU	21	7	930	WØEYE	35	9	1380
W3TPA	20	8	1342	WØENC	35	9	1360
W3LHF	19	6	700	WØEMS	33	9	1320
WA3GPL	19	6	625	WØLCN	28	8	1000
				WØDRL	25	9	1295
W4HJQ	39	9	1150				
W4WNM	38	9	1350	F8DO	1	1	5100
W4HHK	38	9	1280	KH6UK	2	2	2540
K4EJQ	37	8	1125	OH1NL	1	1	5850
K4IXC	36	8	1403				
K4GL	36	8	1325	VE1AUC	7	2	500
W4CKB	35	8	1440	VE2DFO	27	7	1340
K4QIF	35	8	1225	VE2BGJ	17	6	975
W4FJ	34	8	1150	VE2HW	11	5	800
W4VHH	33	8	1100	VE3EZC	33	8	1283
W4AWS	29	8	1350	VE3BQN	31	7	1250
				VE3AIB	29	8	1340
W5UGO	43	10	1398	VE3ASO	28	8	1285
W5RCT	42	9	1289	VE3EVW	25	8	1100
K5WXZ	36	10	1450	VE7BQH	6	2	1248
W5HFV	36	10	1285				
W5AJG	33	9	1360				
W5UKQ	29	8	1150	VK3ATN	3	3	10417

The figures after each call refer to states, call areas and mileage of best DX. Revised January, 1970.

During the October Orionids shower, VE2DFO and K4IXC, Florida completed another contact on the 19th. It was their third, the other two being made earlier on random meteors. The path distance is 1340 miles. VE2DFO says pings and short bursts are heard every time they schedule. On the 21st, VE2DFO worked K9IMX/4, Alabama, on a 30-second burst at 3 o'clock in the morning. Don says that appears to have been the peak of the Orionids because K2RTH and W2CUX had schedules on either side of VE2DFO's time slot, but K9IMX/4 heard nothing from W2CUX and only pings and short bursts from K2RTH.

K4GL reports a random meteor contact Oct. 5 with W1JSM, New Hampshire. Jack has also completed several random ms contacts this past summer and fall with W1AZK, also N. H. K4GL keeps nightly schedules with WA9DOT, K9UIF and W8NUB checking on ms and tropo conditions.

One final ms note, XE1PY writes W1HDQ he has finished building what he calls a "super stovepipe". It is a coaxial tank circuit built around a 5CX1500A. Rusty says he'll soon be running ms tests with W5ORH and W5RCT.

Tropo conditions are near their seasonal low, but the eastern stations are still talking-up the openings in late Sept. and early Oct. An article by K4EJQ on the opening appears elsewhere in this issue.

W4ISS has sent his report on the October 5–6 session in Georgia. Frank worked six new states as far north as Massachusetts, and on October 21, he caught another opening with strong signals over 300-mile paths. WA3MLK, Maryland, picked 5 new states from the October 5 QRM. Alan has 19 states worked without the aid of meteors. He says he hasn't tried ms yet, but will schedule anyone needing Maryland. He runs 150 watts and a stacked array. K2DNR added two new ones, South Carolina and Tennessee. We welcome two newcomers to the states boxes from the second call district, WA2CJK, who enters with 31 states, and WB2SIH with 21. Others being listed this month are K7VTM, Wy., W8YIO, Mich., and WØEMS, Neb.

K7ICW says tropo in the southwest was excellent during October. K7NII and W7GVL (ex K6RIL), both Arizona, put consistent signals into Las Vegas over rough terrain. At Boulder, WØMOX says conditions were terrible — and that 42 inches of snow during October didn't help his antenna project. Also at Boulder, WØEYE is back on 2 meters, after replacing wind-destroyed antennas.

During the first 10 days of November, tropo conditions were fair in the midwest, along mostly north-south paths. The best days were the 9th and 10th. WØNXF, Nebraska, worked K5WXZ, Texas, about 600 miles, and W5HFV, Oklahoma. KØCER heard both stations weakly in South Dakota, but couldn't raise them. WØEYE worked KØCER over a 500-mile path, and KØCER heard WAØCHK, Bowling Green, Missouri calling CQ East on November 9, but not looking for western stations. We'll work some other night, John.

The single-band activity nights seem to be catching on. W1AZK reports 13 stations from Nova Scotia to Maryland active on November 2. I also received two logs, both apparently from 2s, but neither with their own call noted (?). One listed nine stations worked. Upcoming activity nights are Jan. 3 — 144, Jan. 10 — 220, and Jan. 17 — 432. There are obviously more stations taking advantage of these operating nights than report their results. Most of us dislike letter writing, which leads me to another comment. I hear much good vhf news being passed on 75-meter vhf nets that doesn't get reported to this column. Would it be possible for each net to rotate a secretary who could report the items?

Finally these two items. VE6AHE has completed a solid-state converter for the upcoming Oscar. The Oscar shot has suffered a series of delays due to problems with the launch vehicle. NASA clearance for the Oscar has been received to ride into orbit along with the Tiros-M weather satellite. So when you hear the Tiros is aloft, start looking for the Oscar beacon on 144.05. And finally, KØMQS is preparing for big doings from his new Delta, Iowa site — including the erection of a *160-foot* tower.

220-MHz news this month features moonbounce and it all comes from WB6NMT. Louis says he and K2CBA are scheduling. K2CBA's array is pictured elsewhere in this column. Louis is using an array fixed for K2CBA's EME window. WB6NMT lists these other possibles for 220 moonbounce work: WIQXX, W1FZJ/KP4, W1BU, WA2SPL, W2JKI, WAØRJL, WAØQLP and KØMQS. Louis is sure trying to stir up 220 EME activity, writes to him: Lt. Louis Anciaux, 138 Marquette Ave., Vallejo, California 94590, telephone 707-643-0258.

432-MHz DXers are still talking about October 5-6. W4VHH, South Carolina, jumped to 12 states. He says also that W4LSQ is active in Alabama and K7JPC/4 in Georgia. W2CLL, New Jersey went to 17 states, while neighboring K2ARO is building at Hyde Park, New York. Gus will build a 500-watt final this winter. W8YIO enters the states boxes — at the top of his call area — with 19 states. He sneaked up on ole K8REG and K8DEO.

On November 11, the Gulf path between Florida and Texas opened. On 144, W4ZCB worked a number of 5s while the fm boys on 449.1 were also crossing the Gulf.

W4UWH worked another fm station, whose call I don't have, in Corpus Christie. These are 700- to 900-mile paths.

WØPHD, at Warren in northwestern Minnesota, reports he, KØAWU, Grand Forks, North Dakota, and VE4MA, Winnipeg, alive and well. 'Tis not often we hear from that part of the country. KØAWU runs a 4X150 driven by a varactor tripler, WØPHD uses a 4X150 tripler driving a 4X150 final. While they continue to improve their equipment, they are wondering what will happen to 432 when the nearby ABM site with its radar equipment is completed.

1296 and Up activity continues to center around EME plans. On the island of Guam, KG6ASC has completed a WB6IOM ring amplifier and the exciter multiplier chain to get to 1296 — and the converter. His next project is a 20-foot dish. This news from K1LPS/KG6 who is also building 1296 equipment while serving a Navy hitch on Guam.

Bill, W3GKP, continues to refine his 2304 MHz EME system while receiving consistent cw and ssb echoes from the moon. Bill says K2GRI, New York, recently worked W1AJR, Rhode Island on 2300 MHz tropo! And in Florida, K4NTD is at work on a 2300 MHz converter.

Atlanta Two-Meter Repeater

Visitors to the area around Atlanta, Ga. will find an fm repeater in operation from Stone Mountain, a local tourist attraction just east of the city. Sponsored by the Alford Memorial Radio Club, WB4NST operates with 146.34 MHz input and transmits on 146.76 MHz. This output frequency was chosen to avoid interference with local 146.94 traffic. The power output, 40 watts, provides excellent coverage of the entire metropolitan area. A special feature of the system is the automatic identifier, which also includes the time of day — given by an attractive female voice. QST

Novice Roundup Announcing

(Continued from page 48)

self-addressed and stamped envelope containing: your full name, call and mailing address complete with Zip code. We suggest a minimum of 12¢ postage attached. This will assure your receiving 3 log-sheets (enough for 300 QSOs), 1 Op Aid 6 and a WAS map (if desired). Using this as a guideline you can adjust the postage according to the number of logs you anticipate needing.

B C N U in NRI

Rules

1) *Eligibility:* The contest is open to all radio amateurs in the ARRL sections listed on page 6 of this *QST*.

2) *Time:* All contacts must be made during the contest time indicated elsewhere in this announcement. Time may be divided as desired but must not exceed 40 hours total.

3) *QSOs:* Contacts must include certain information sent in the form as shown in the example. QSOs must take place on the 80-, 40-, 15-, or 2-meter bands. Crossband contacts are not permitted. Cw to phone, cw to cw, phone to c.w. contacts are permitted. Novices work any amateur stations; non-Novices work only Novices. Valid points can be scored by contacting stations not working in the contest, upon acceptance of your number and section and receipt of a number and section. A station may be worked only once, regardless of band.

A Novice may operate in the Novice portion of the competition until he *receives* his General Class License, then *must* operate as a non-Novice entry.

4) *Scoring:* Each exchange counts one point. Only one point may be earned by contacting any one station, regardless of the frequency band. The total number of ARRL sections (see page 6 of this *QST*) worked during the contest is the "section multiplier." Yukon-N.W.T.(VE8) also counts as a multiplier. A fixed scoring credit may be earned by entrants who hold ARRL Code Proficiency certificates. If an entrant does not hold a CP award he can apply for credit by attaching to his Roundup report a copy of qualifying run from W6OWP, January 8 or February 4, or from W1AW, January 14 or February 12. CP credit equals the w.p.m. speed indicated on the latest certificate or sticker held by the entrant. The final score equals the "total points" plus "Code Proficiency credit" multiplied by the "section multiplier."

5) *Reporting:* Contest work must be reported as shown in the sample form. Reporting forms and a map of the United States will be sent free upon request. Indicate starting and ending times for each period on the air. All Roundup reports become the property of ARRL and must be postmarked not later than March 6, 1970.

6) *Awards:* A certificate award will be given to the highest-scoring Novice in each ARRL section. Multioperator stations are not eligible for awards.

7) *Disqualifications:* Failure to comply with the contest rules or FCC regulations are grounds for disqualification. ARRL Contest Committee decisions are final. QST

Results V.H.F. QSO Party

(Continued from page 49)

W6EPL (WB6EPL, WB8WKC) 68- 17- 4-B

WEST GULF DIVISION

Oklahoma

W5WAX (K5WVX, W5WAX) 1302- 62-21-AB

CANADIAN DIVISION

Quebec

VE2DFO 4200-120-35-AB
VE2HW 1062- 59-18-AB
VE2DFE 315- 63- 5-AB

Ontario

VE3CRU/3 2475- 93-25-ABCD
VE3DSE 528- 34-12-ABC
VE3EVW 504- 32-14-BD
VE3GAF 364- 28-13-A
VE3AQJ 102- 17- 6-AB
VE3DNR 75- 25- 3-B
VE3AQT 6- 6- 1-B
VE3EW/3 (5 oprs.) 8946-195-42-ABCD
VE3SAU (8 oprs.) 4170-139-30-AB

Alberta

VE6AHE 32- 8- 4-A
VE6AIA 2- 1- 1-A

British Columbia

VE7ANP 12- 6- 2-A

QST

Strays

Many readers will be distressed to learn that Fred Schnell, W4CF, formerly Traffic Manager of the ARRL and remembered for his many important "firsts" in amateur radio, including the first two-way contact across the atlantic and the famous cruise of NRRL to Australia in 1925, proving the value of short waves to the U.S. Navy, has suffered a series of long illnesses and is now living at the Grovemont Convalescent Home, 210 West 21st. Ave., Bradenton, Fla. 33505. Fred would sure appreciate cards or QSLs from his many friends.

YL news and views

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

The New Year—Plan Ahead!

ONE phrase often used to describe women is *that "she is involved," and the meaning is* not the euphemistic definition that is so popular, where involvement could mean anything from a passing interest to complete absorption. When we are involved we are head over heels, deeply immersed, and we are all involved in our homes, family, church, many clubs, friends, hobbies, and we find time to do all of it, and do it well. When we decided to become amateur radio operators, we had to become completely wrapped up because that is the effect of radio — it becomes a part of us. If it didn't, then we'd never spend all the time required to learn about it, or endure that nail-biting session with the FCC.

Many of us find we are fascinated by building our equipment, and getting that thrill of thrills when it really works. This is a part of involvement, for what else can make the time pass so rapidly as that period we spend over a hot soldering iron seeing the development of a pile of parts and a schematic into a new addition to the shack? Not all of us care for building, for our activities range over the broad scope of the amateur service, but no matter what we choose as our pet form we find we cannot do it in a detached manner. Instead we learn that it is like eating peanuts, the more we get, the more we want, we are not only involved, we're "hooked."

January is the time when we make all sorts of *ambitious statements about what we are going* to accomplish during the year ahead. We talk of adding new gear to the station, we begin the pre-birthday gift "war-of-nerves" with broad hints about new receivers or antennas. We inventory our certificates, check the contest calendar and resolve to really clean up this time. As we leaf through the *Radio Amateur's Handbook*, weighing the possibilities of new improvements to the shack, we might think of other forms of upgrading, ones that are a lot easier to acquire — our operating habits. None of us is *perfect — it would be a dull world if we all were* — but the goal of perfection in operating is as easy as checking the first pages of the *Handbook*, and comparing the six points of the Amateur's Code to ourselves.

Do we remember to be courteous in contests and pile-ups, and realize that there are others who want that rare prefix as much as we? As control station of our net do we respect the fact that we don't own the frequency, and take a pleasant attitude that will work a lot of magic with those interfering signals?

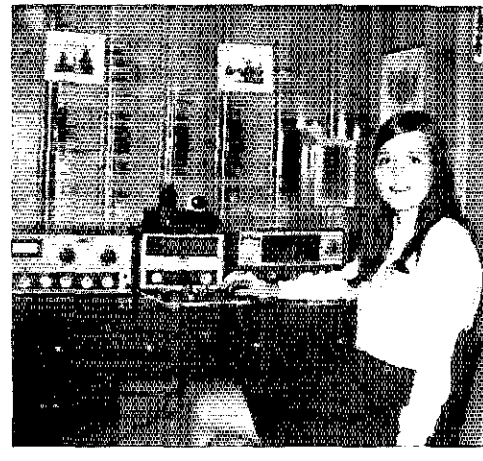
How involved are we? Are we so deep that an ARRL Official Appointment is a part of the collection of "wall paper?" Are we just an aye-and-no member of the radio club, or do we accept an office, contribute to the program, hunt new members, assist with the club bulletin, and give a *little more than our presence?*

No matter whether our station is a decorator's dream or the corner of the bedroom, is it in order? Are we employing the safety rules of good housekeeping?

Do we spend our on-the-air time for our own selfish enjoyment or have we found the pleasure in assisting the beginners by working with them, *using the approved procedures so that they learn* by doing the right way?

We all get so involved in our pet phase of amateur radio that some of us forget that official statement that we have our hobby because it is a public service as well. It doesn't take much out of our operating time to become a part of the Public Service Corps so that when our community needs us we will be ready to lend our skills.

We YLs are very careful about our grooming *when we are appearing in public; we make sure* that everything is just so, in order that we can appear at our best. Adherence to the Amateur's Code is nothing more than good grooming on the air. With that in mind 1970 can find us really involved in the literal definition of the term.



WN5YAM, Carol Behling.

* YL Editor *QST*, Please send all news notes to WB6BBO's home address; 1036 East Boston St., Altadena, Calif. 91001.

1970 YL-OM Contest

Phone:

Start: Saturday, February 14, 1970, 1800 GMT.
End: Sunday, February 15, 1970, 1800 GMT.

Cw:

Start: Saturday, February 28, 1970, 1800 GMT.
End: Sunday, March 1, 1970, 1800 GMT.

Eligibility: All OM and YL operators throughout the world are invited to participate.

Operation: All bands may be used. Crossband operation is not permitted. *Net contacts do not count.*

Exchange: QSO number; RS, or RST report; ARRL Section, or country. Entries in log should show band worked at time of contact, time, date, transmitter and power. ARRL Section list is available in any issue of *QST*, on page 6, or send s.a.s.e. to the YLRL Vice President.

Scoring:

A. Phone and cw contests will be scored as separate contests.

B. One point is scored for each station worked YL to OM, or OM to YL. (OM to OM, YL to YL do not count.)

C. A station may be contacted not more than once in each contest for credit.

D. Multiply the number of QSOs by the number of different ARRL Sections, and/or countries worked.

E. Contestants running 150-watts input, or less, at all times, may multiply results of (C) by 1.25 (low power multiplier). Ssb contestants running 300 watts PEP, or less, at all times may multiply the result of (C) by 1.25 (low power multiplier).

Logs: Copies of all logs showing cw, and phone claimed scores, and signed by the operator, must be postmarked no later than March 23, 1970, and received no later than April 13, 1970, or they will be disqualified. Please remember to file separate logs for each section of the contest.

Send copies of logs to: Audrey Beyer, K5PFF, YLRL Vice President, 6202 Reed Road, Houston, Texas, U.S.A., zip 77017.

Awards:

First Place Phone — OM, cup; YL, cup.
First Place cw — OM, cup; YL, cup.

The winner of the phone cup is also eligible for the cw cup. Certificates will be awarded to the high score phone and cw winners in each ARRL Section and country.

No logs will be returned.

Be sure the copy of your log is legible.

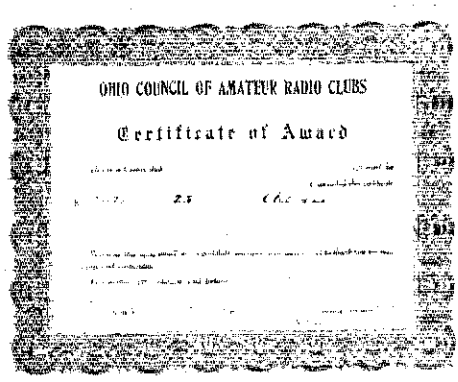
Please note postmarked deadline no later than March 23, 1970.

Caution, remember the frequency allocations for your own class of license. Don't let a citation spoil the excitement of a contest.

1969 YLRL Howdy Days Results

Top Score YLRL member: VE3BII, 74 points.
Top Score Non-member: No non-member participation.

Logs submitted by: VE3BII, 74 points; WA5JFZ, 86 points; WA2GPT, 47 points; WA8ARJ, 45 points; WAØFSK, 39 points; WA2WHF, 35 points; K8ONV, 30 points; WA7FLC, 28 points; WAØMVO, 27 points; WA3ATQ, 23 points; WA8FSX/8, 19 points.


OHIO COUNCIL OF AMATEUR RADIO CLUBS

Certificate of Award

Ohio Council of Amateur Radio clubs certificate for contacting 25 or more Ohio YLs.

Those Contest Results

One of the many duties of the Vice President of YLRL is the setting of the contest dates, and the receiving, checking, and tabulating the results of the YLRL contests. These lists, as officially approved by the Vice President, are then sent to the YL Editor for publication in *QST*. "YL News and Views" has no record of any contest, other than that sent in by the YLRL contest chairman, and we cannot publish any corrections unless they are first officially approved by YLRL. If for some reason your name or score is omitted from the published results please check with the current Vice President of YLRL, the only person who can make any changes. For 1970 she will be: Audrey Beyer, K5PFF, 6202 Reed Road, Houston, Texas, Zip 77017.

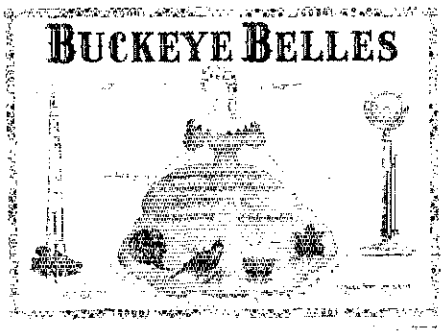
Working Girls' Net Change

To facilitate the gals who have not yet acquired the higher license privileges, the Working Girls' Net has changed frequency to 3933 kHz. The net meets on Thursdays at 0500 GMT. W6CEE is Net Control, and every gal who can check in is welcome.

Plan Ahead

If you had fun in Toronto in 1969, then start planning now for the next Mid-West YL Convention. It will be held June 19, 20, 21, 1970, at the Ramada and Voyager Inn, 401 Detroit Street, Flint, Michigan. To whet your appetite we are told that there will be a Friday night snack and evening of fun to start things, the Luncheon and Banquet are scheduled for Saturday. If the OM wants to come along he will be welcomed. So start planning now for this always delightful affair.

For relaxation just before diving into the YL-OM contest, the annual SAROC meeting, February 4 through 8, 1970 will have a ladies' program including a luncheon and style show. KØEPE will be in charge of the YLRL Booth. So, if the glitter of Las Vegas is tempting, the place will be the Stardust Motel. This is the first time that YLRL will be there with a booth, drop in and meet the other gals who will be there.



Buckeye Belles certificate.

Meet the Club — The Buckeye Belles

They organized in March 1962 at a meeting in Worthington, Ohio, with K8ITF, W8LGY, K8HGD, and W8OTK at the first officers. Two years later they were the hostesses of the YLRL Convention, and that is how the Buckeye Belles began.

The Buckeye Belles are the amateur radio licensed women of Ohio. The purpose is to promote good fellowship, and develop proficiency in the art of radio, and to welcome new YLs to the bands. Shirley, K8MZT, first introduced the idea of an Ohio YL club during a 40-meter contact during the early part of 1961. With her initiative and the help of a dozen other gals the idea took root rapidly. Many ideas and suggestions were considered for a name, and in 1961 an informal meeting was held in Dayton, Ohio, during the Hamvention. An emblem of a sophisticated YL was introduced to accompany the "Belle" in the name. Any licensed YL in Ohio was welcome to join and representatives were selected from different parts of the state to publicize the club and recruit new members. It wasn't too long before the number of members was over 200 and still growing. The club bulletin, known as the *Buckeye Burr*, edited by K8MZT, began in June 1961.

The club certificate is an achievement award for 12 contacts with members for those living in the state of Ohio, 10 contacts for those living out of the state, and for DX people seeking the award there must be proof of 4 contacts. The little Belle emblem on the certificate was designed by Marge, K8ITF, who is the certificate custodian of the club.

The Buckeye Belles have recently added a new "division" to their club, the Buckeye Beaus. This is the OM auxiliary of the YL club established in 1969 to "to permit wives to keep tabs on their husbands during meetings, and to make sure the OMs are around for the heavy work."

Strays

VE5DZ advises that the following were omitted from the 1969 YL-OM contest results, for the OM cw contest.

IT1AGA	425* points
KH6GQB	378 points

The following errors in the listings, YU1BPG should be YV5BPG. HL9KG should be HL9KQ. Both errors were made in the OM Phone contest listings. QST

Silent Keys

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

K1BPJ, David Budreau, Woburn, Mass.
ex-W1CIC, Louis G. Frank, Scituate, Mass.
W1EJS, Fred O. Ripley, Rockland, Me.
W1ESA, Bert W. Gowell, West Dennis, Mass.
WA1IAU, John Cameron, Springfield, Mass.
W1JNC, Norman A. Chapman, Concord, N. H.
W1OX, Andrew P. Petersen, Winchester, Mass.
W2ARB, John J. Kulik, Clifton, N. J.
W2FQI, Nicholas Tropas, Rahway, N. J.
WA2MIW, Charles C. Brandau, Seaford, N. Y.
WB2SPD, Pio M. Accation, Teaneck, N. J.
WA3BEC, Luke E. Sawyer, Beaver Falls, Pa.
W3BVR, Theodore Leaf, Upper Darby, Pa.
W3BXR, Norman A. Reeser, York, Pa.
W3YIT, Lilliam K. Klingensmith, Pittsburgh, Pa.
WA4BGV, Lorne D. Beggs, St. Petersburg, Fla.
WB4EVA, Maj. John T. Clark, Jr., USAF, Asheville, N. C.
K4GGV, Harold Lami, Mobile, Ala.
W4HJ, Capt. James C. Hargreaves, USN, Pensacola, Fla.
K4IVB, John DeMougin, Englewood, Fla.
W4MWX, Marion F. Galloway, Henderson, Ky.
W4PRS, Carl F. Bouler, Mobile, Ala.
W4PWZ, Samuel Sydorick, Miami, Fla.
W4SPD, Samuel L. Newberry, Gray, Ga.
W4TNW, Harold W. Dean, Rossville, Ga.
K4YBL, John W. Hornor, Jr., Ft. Lauderdale, Fla.
W4ZPF, William McClintucheon, Holly Hill, Fla.
W5ABN, Walter V. Jennings, Dallas, Texas
W5KKI, Dewitte D. Hall, Shreveport, La.
W5MCC, Benjamin F. Hudson, "Ben," Galliano, La.
WN5VNY, John Schuhmacher, Bryant, Ark.
ex-W6CXW, Henry Youenzo Sasaki, Rolling Hills, Calif.
W6CYS, Welton E. Swain, Stockton, Calif.
K6HK, Richard Bartholomew, Riverside, Calif.
W7AEC, Henry Summers, Pinedale, Wyo.
K7AUI, Wallace Cramond, Cheyenne, Wyo.
W7FR, George M. Brown, Seattle, Wash.
K7JMP, John N. Clark, Spanaway, Wash.
K7KRO, Albert W. Clinger, Shelley, Idaho.
W7QFC, Carey B. Raymond, Everett, Wash.
W7RVN, George C. Henriken, Newman Grove, Nebr.
W7YAC, W. Walter Lotteridge, Boise, Idaho.
W7ZL, Anton Ray Tingstad, Marysville, Wash.
W8DHL, Hugh P. Williams, Fostoria, Ohio.
WA8GZE, Kenneth B. Bucher, Girard, Ohio.
W8STQ, John Cloyd, Hamilton, Ohio.
W8VUD, Irving S. Cromie, Sturgis, Minn.
W9BB, Virtus R. Elmore, Marion, Ill.
WA9DLL, Joseph J. Tanney, Lemont, Ill.
K9EAB, Charles Cliff Corne, Jr., "Butch", Peoria, Ill.
W9GTR, William Lindberg, Rockford, Ill.
K9JTO, W. Maurice Patterson, Indianapolis, Ind.
K9KIP, Frank Herrick, Norridge, Ill.
W9OEM, Gordon B. Robbins, West Lafayette, Ind.
W9PHE, Russell O. Deck, Sr., Woodhouse, Ill.
WN9UIX, Harold A. Wallander, Manitowoc, Wis.
WØBDR, Russell Marquis, Marshalltown, Iowa.
KØLJV, George Huff, Outing, Minn.
WØTGG, Paul Cooper, Eldon, Mo.
KØWB, D. H. Hiebert, Denver, Colo.
WØYXR, Donald Erickson, Potter, Nebr.
KL7FGJ, William S. Nicholson, Laredo, Texas.
VE1AL, George Crowell, Sydney, N. S.
VE2DIH, Peter Fisher, Montreal, P. Q.
VE3AJS, J. C. L. Patterson, Pembroke, Ont.
VE3IJ, A. H. Blevis, Toronto, Ont.
VE5OP, Fred Ward, Moose Jaw, Sask.
VE7KD, C. Fred Hearsey, Vancouver, B. C.
HP1ME, Manuel Espinosa, Panama City, Panama
YS1ME, Miguel Angel Sol, San Salvador, El Salvador.

Operating News

GEORGE HART, W1NJM,
Communications Manager

ELLEN WHITE, W1YYM,
Deputy Comms. Mgr.

DXCC: ROBERT L. WHITE, WICW
Training Aids: GERALD PINARD

Administration: LILLIAN M. SALTER, W1ZJE
Public Service: WILLIAM O. REICHERT, WA0HHH

Phillips Code. Apropos of abbreviation devices in general and November *QST*'s unfortunate mention of the use of the letter N for the numeral 9, some of the old-time telegraphers have been giving us a hard time. To begin with, we now learn (and should have known before, apparently) that the N for 9 is not an abbreviation arbitrarily adopted by contest men to make the frantic contest exchanges more frantic, but part of an accepted set of abbreviations for numerals which has been used by commercial operators since time immemorial and is recognized internationally. The procedure is to substitute a single dash for any numeral in which there is more than one, and the rule is to use such procedure only where it is understood between operators that the numeral, not the corresponding letter, is intended. Thus a 1 becomes A, a 2 becomes U, a 3 becomes V, a 7 becomes B, an 8 becomes a D, a nine becomes N and a 0 becomes T. The numerals 4, 5 and 6 remain as is, since they are short enough already (although sometimes the letter E is substituted for a 5), and there you have it.

We mention this only in passing, because a wrong assumption was made regarding its origin, not to recommend that we amateurs forthwith start taking advantage of it. It would take some getting used to, and would cause a whale of a lot of confusion if we plunged into it quickly. For the time being, then, we won't criticize the users of N for 9, or T for 0, but let's break into the other abbreviations gradually, if at all.

Pretty much the same kind of philosophy applies to Phillips Code, a system of standard abbreviations used by commercial telegraphers since 1879 which has never been adopted by amateurs, probably because most of us (obviously including the undersigned) have no commercial, only amateur experience. For the first time, we hear our "standard" amateur abbreviations referred to as a "hush" code and the inference made that ARRL has been lax in not more vigorously promoting Phillips in the amateur bands.

Well, hmphh! Let's be properly indignant for a moment, but then let's climb down from our indignation and see what Mr. Phillips has to offer. According to OT W6BG, it is "a highly efficient and proven system of shorthand adapted to the rapid telegraphic transmission of intelligence. In addition to having 21 one-letter meanings, and some 433 2-letter meanings for the most commonly used words, it also has numerous 3 and 4-letter contractions, many of which are used to convey various phrases. The plural is indicated by the addition of the letter S, the past tense by the letter D and the participle by the letter G."

"The use of this standard of abbreviation," Bill continues, "would most certainly pay off in the resulting brevity of any cw or RTTY com-

OPERATING EVENTS (Dates in GMT)
ARRL-IARU-SCM-Affiliated Club-Operating Events

January	February	March
8 **Qualifying Run, W6OWP** 10-11 VHF SS, p. 64 Dec. 14 **Qualifying Run, W1AW** 17-18 Louisiana QSO Party, p. 106 Connecticut QSO Party, p. 120 17-19 CD Party, cw* 18 VE1 Contest cw p. 146 24-25 SET, p. 65 Wisconsin QSO Party cw, p. 105 24-26 CD Party, phone* Arkansas QSO Party, p. 106 25 VE1 Contest phone, p. 146 31-Feb. 1 Wisconsin QSO Party phone, p. 105 OOTC QSO Party French Contest cw, p. 86 * League officials and appointees, only.	4 **Qualifying Run, W6OWP** 7-22 Novice Roundup, p. 45 7-8 DX Competition phone, p. 62 Dec. *QST* 14 Frequency Measuring Test, p. 102 14-15 YL/OM Contest phone, p. 97 QCWA Party 21-22 DX Competition, cw, p. 62 Dec. *QST* 28-Mar. 1 Vermont QSO Party, YL/OM DX Contest cw, p. 97 French Contest phone, p. 86 28-Mar. 15 IARC DX Contest, cw/rtty	5 **Qualifying Run, W6OWP** 7-8 DX Competition cw, p. 62 Dec. *QST* 13 **Qualifying Run, W1AW** 14-15 Virginia QSO Party 21-22 DX Competition cw, p. 62 Dec. *QST* 28-Apr. 19 IARC DX Contest, phone

NOTE: Possible W6OWP Qualifying Run "alternate" (same schedule) is W6ZRJ.

The word is go! Only QSOs made on or after January 1, 1970 count for this new 5BWAS Award. Full rules appeared on page 51 of October 1969 QST.

munication. This . . . would alleviate the crowding on the various bands, giving the other guy an occasional chance to get a word in edgewise. Many of the amateurs are unnecessarily conscious of their lack of speed, while others try to send beyond their capability. What may sound impressive to the laity frequently is nothing more or less than accent on noise. What is of far greater importance is the matter of moving a maximum of intelligence between any two given points in a minimal space of time. This is best done by a moderate gait in sending, together with the correct abbreviation."

"This is what Phillips Code accomplishes in a precise manner, the abbreviations or contractions having but one definite meaning and, for the most part, being readily understandable even to the uninitiated. The frequency of occurrence of the more commonly used contractions, tied in with the text, makes it easily understood."

A conservative estimate of the transmission time saved, says Bill, is 33⅓% and, very frequently, more. How about it? Want to hear more?

How About That 5BWAS? By the time most of you receive this issue of *QST*, you wil already be several days late in getting started on your 5BWAS award. It started on Jan. 1, 1970, y'know. Only contacts made subsequent to that date can be counted.

A cut of the plaque award is reproduced on these pages. Of course the real article is in full color, and when a sample was exhibited to the Board of Directors at its recent meeting one director was heard to remark: "That American flag sure will look good on the walls of foreign amateur stations." Won't it, though?

So, let's get going. Remember, WAS certificates and endorsement are available in a multitude of specialties, but there is only one 5BWAS plaque award, and this is a "start from scratch" thing which will result in a scramble for low serial numbers. Who will be No. 1?

Official Observer Responses. Not so long ago a letter was received from an irate amateur who received a friendly notice from one of our more energetic midwestern OOs. The notice referred to an operation during which the amateur concerned was not on the air, and the letter figuratively demanded the OOs head on a platter. "What kind of OO do you appoint," he demanded, "who can't copy cw?" It wound up demanding an apology from the OO and pointing out that calling an operation illegal *is* a condemnation, even though the card says it isn't.

Well, we made a copy of the letter and forwarded it to the OO concerned (standard practice in such cases, which fortunately aren't too numerous) and at the same time wrote the complainant a letter asking him how come he was such an old grouch, or words to that effect. A few days later we got another letter from Mr. Grouch. It seems he had received the apology he had demanded "and it made me feel like a skunk. If a public apology for sounding off will help, please use this letter as you see fit."

The point to be made is that most recipients of OO notices who react indignantly probably eventually feel kind of sheepish about it (although not many are big enough to admit it), especially if they have written headquarters,

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for September Traffic:

Call	Orig.	Rec'd.	Del.	Del.	Total
K6BPI	4898	2543	2002	591	10034
W4CUL	444	3195	2764	402	6808
WA5PPF	236	1167	840	327	2570
W7HA	4	891	828	58	1781
K5BNH	8	756	693	18	1475
W3VR	121	674	814	21	1430
K9FZX	7	645	639	5	1296
K9ONK	115	552	526	18	1241
WA4SCK	31	597	593	4	1225
W6LGX	3	628	528	27	1184
W8UPH	12	567	483	81	1143
K5TEY	1	561	558	2	1122
WA8OXE	81	429	399	138	1047
W6HSY	13	363	250	113	739
K7RQZ	39	333	307	26	705
W3EML	52	352	258	0	662
W6VNQ	18	318	322	2	680
K9ZSQ	0	324	0	324	648
WA8ETX	31	262	272	12	577
WA4RQR	3	281	272	5	561
W3MPX	158	228	126	38	551
K1BCS	149	196	147	28	520
W1PEX	38	255	197	29	519
WA2FRZ	173	118	168	45	504

Late Reports:

WA5PPF (Sept.)	158	1685	1296	389	3528
WA8WZF (Sept.)	7	359	345	14	725
K9LNE (Sept.)	10	347	315	9	681
K9ZSQ (Sept.)	11	271	0	270	541
K9LNE (Oct.)	12	350	309	9	680
WA8WZF (Oct.)	14	285	310	7	616

More-Than-One-Operator Station

K4BV	645	0	0	0	645

BPL for 100 or more *originations-plus-deliveries*

W7AXT 230	WAØVAS 151	W2OE 112	
W8MLF 193	W3TN 141	W8QCU 112	
WB8BZX 166	WA8DWL 118	WA6BYZ 109	
VE3EMQ 162		W6KYA 105	

More-Than-One-Operator Station

K6USA 218	W3CWC 121

BPL Medallions (see July, 1968 *QST*, p. 99) have been awarded to the following amateurs since last month's listings: W7KZ.

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.

their director and/or the FCC on the subject. But OOs are people — hams like you and me — and have a right to be wrong once in a while. If you get an unjustified notice from an OO — one that doesn't check with your log and which you know does not apply to you — for goodness sake forget it! Nobody likes to be told his signal is lousy or that he is off frequency or that his operating procedure is illegal — especially if it's true! But the purpose of the OO program is to help, not to accuse, not to castigate. If it does help, drop the OO a line and let him know. If it does not, or if it's an error, don't make a "federal case" out of it. Let's not drive our OOs away; we need more and better, not fewer, of them. — *W1NJM*.

No. 1 W4QCW
No. 2 DL7AA
No. 3 W1EVT
No. 4 W8GZ
No. 5 W8BT
No. 6 W4IC
No. 7 W1AX

5BDXCC NEWS

DX CENTURY CLUB AWARDS

From October 1, 1969 through October 31, 1969, DXCC certificates based on contacts with 100-or-more countries have been issued by the ARRL Headquarters to the amateurs listed below.

New Members

W8JQ	302	W3SS	149	SP3AUZ	114	JA8MS	104
PY2DSE	224	W2FPM	137	OK2BEW	112	SM7PD	103
PY2RW	213	JA4SZ	135	W3ADO	112	WA3DSZ	103
JA3FDA	197	KR8AG	132	PJ5MQ	111	YU2RAM	103
DL1JF	182	WA9WKW	132	DJ3HH	110	DJ2JU	102
KR8EA	182	WB2SIH	128	W8FLO	110	G3IMK	102
JA8JL	175	K2SEK	127	ZS6LB	109	K2KGB	102
9M2LN	171	KR8DE	123	K1AGB	108	K0IKZ	102
DJ9KH	159	W0NJA	120	DL2RH	106	WA3UUV	102
LZ1KPG	154	JA0ADY	118	K6IR	106	KW6EK	101
PY2DGB	153	WN8ZCC	117	F6ABD	104		

VO2GD	101	K6TWE	100				
W2DRG	101	VE2PK	100				
W3LIE	101	WA2BHJ	100				
W3YSH	101	W3YJK	100				
WA3JRA	101	WA6TAX	100				
W5UOX	101	WB6SKJ	100				
FP8CQ	100	W8BJ	100				
K1UCA	100	WA8ONE	100				
K1WJB	100	W9CV	100				
K6CLV	100	YO5KAD	100				

Radiotelephone

W8JQ	282	K4TTA	138	W9DE	122	JA6IUR	105
PY2DSE	207	WB6RJG	138	HR1WSG	117	WA7HOX	105
VE7AHD	202	PY2DGE	132	WA0PVW	112	ZL2VN	105
JA3FDA	197	PY9AI	132	ZS5LB	109	EA3SA	102
DJ9KH	153	PY2DWA	130	VK3LC	107	9M6AWD	102
W3SS	147	WA0WKW	128	W1DYE	106	VE3FOY	102

W2GKA	102	K6IR	100				
W4JPI	102	WA1HOT	100				
W0UCK	102	W2EHB	100				
WA3EGG	101	WB2SIH	100				
WA4CCW	101	W8GGJ	100				
DJ7JO	100						

Endorsements

Endorsements issued for confirmations credited from October 1, 1969 through October 31, 1969 are listed below. Endorsement listings from the 120 through the 240 level are given in increments of 20, from 250 through 300 in increments of 10 and above 300 in increments of 5. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

325
K6DC
W5PWW
W0NVZ

310
W6ABA

305
DL7AB
K6QM
W7CSW
W0QAQ

300
K3HHY
VE1AFY

290
DJ7CX
K8JWC
SM3AGD
W6BYB
W6KYJ

280
K1JHX
W2GRY
W4BRB
WA4LXX
W6BIL

270
DJ5DA
K5KBH
W4DRK

260
G2IO
JA4XW
PY1WJ
W6DOD
W9TKR

250
OZ1LO
WB2NXL
W8DCR
W8ELE
WA8HFN
W9HQF

240
DL1MD
JA6AK

K1NIE
VE3XK
WA1DG
W4FPW
WA9LZA

220
DJ6RX
DL3AR
K6ZIF
SP8HR
VE3EU
VE5KG
VE5XJ
W4HHN
W6MUM
W8QG
W8WUO
W9CVZ

200
DJ3FW
DL8UP
HZ3TYQ
K1KNQ
K4RTA
LA8LG
OZ3PO
W2GA
WA2CCF
WA2QYQ
W5QIX
W6QTE
WR0Q
WR4XQ
W9VCQ
ZL1AV

180
K8UHB
VE3BXY
VE3GHL
WA2BEX
W6DR
W6JNM

160
DJ8FF
DK1HA
K3OLG
K4ORQ
K5GUZ
SP8ABQ
VE3FYP
W1STW
W2DKM

140
DK2BI
DL8TG
DL8XA
K2PTU
K4LRL
K6DYQ
K6GAK
VE6ARG

WB2HNO
W3ZUH
W4LXA
W6DL
WB6FRD
W7BE
WA8VFK
W9IU

120
DJ2IW
JA3BSD
K4MRZ
K8BGZ
K0YVH
OE1CEW
W4AST
W7FCD
W7LVH
W7RI
W7VSE
WA7ABO
WA7GQA

W1DAL
W2GWT
WB2EUU
W4IA
W4PLM
WB4AMT
WB4JCV
W6EIF
W6MTP
W8JJA
W8QQL
WA8TYF
W9MCR
WA9WJE
W0YVA/4
W0JAS

WA6LWE

Radiotelephone

320
W6EL
W8DMD

315
W9LNM

310
CT1PK
W2FGD
W5JWM

305
K4JC

300
PY4KL
W0NVZ

290
W3JK

280
EA7GF
K3HHY
W2GRY
W4PJG
W6KYJ

270
W4TRG

W8DE

W9DNE

260
HAT

250
HZV
PY1WJ
W4DRK
WB2NXL
WA8HFN
W9ABM

240
WA1DJG
JA1MIN
K1BDP
W1FXD
W6VNH

220
DL1MD
XE1OOL

200
DJ5DA
DJ7CX
G2MI
K4RTA
PY2QT
WA2CCF
WA6DOB
W9KRU
VE5KG

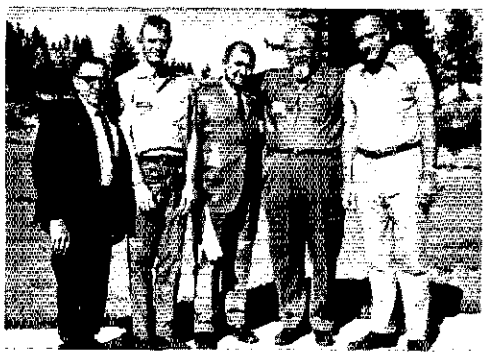
180
VE3GHL
VE3GNM
W2IOO
W6LDH

160
G3WGS
LA8LG
WA1DJG
W4WVF

140
DK2BI
K1IYD
OA6BW
WA3IWM
W4JFW
W4RKN
WB4JCV
W0VCQ
W6KG

WA8VFK

120
DL7FP
K6GAK
K9HDZ
W2ORA
W4AST
W6DOD
W6FKD
W8JJA
W0VCQ



The Scene, Sierra Hamfest. *The Date*, August 23, 1969. *The Sponsor*, a 10-year ARRL affiliate—the Nevada Amateur Radio Association. *The Cast*, 5 elected officials (L-R) W7PBV SCM Nevada, WA6JDT SCM Sacramento Valley, W6ZRJ Pacific Division Director, W6KW Southwestern Division Director, W6VZT SCM Santa Clara Valley.

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 c.w. frequencies at 0230 GMT January 14. (In converting, 0230 GMT January 14 becomes 2130 EST January 13.)

W6OWP (W6ZRJ, alternate) will transmit a qualifying run on 3590 and 7129 kHz. 0500 GMT January 8. (In converting, 0500 GMT January 8 becomes 2100 PST Jan. 7.)

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. PST } SnTTh 6:30 P.M. PST } Sat	0230 MWFSn
"	9:00 A.M. EST MWF	1400 MWF
"	6:00 A.M. PST	
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	

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 hst 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 November *QST*.
Jan. 16: *It Seems to Us*, p. 9
Jan. 22: *The Collinear Yagi Quartet*, p. 11
Jan. 28: *Transmission Line Sections . . .* , p. 49
Feb. 3: *Amateur Radio Public Service*, p. 74

Date Subject of practice text from *Understanding Amateur Radio*, First Edition
Feb. 6: *Tools for Metal Fabrication*, p. 120
Feb. 9: *Drilling the Chassis*, p. 122

FREQUENCY MEASURING TEST FEBRUARY 14

ARRL invites every amateur to try his hand at frequency measuring when W1AW transmits signals for this purpose February 14, 1970, according to the procedure explained in the following text. *CAUTION*: Note that since the date is given in Greenwich Mean Time the early run falls on the evening previous to the date given by local time. Example: 0230 GMT February 14 becomes 2130 EST February 13.

Individual reports will be sent **only** to ARRL Official Observers who take part and submit entries. When the average accuracy reported shows error of less than 71.43 parts per million, or falls between 71.43 and 357.15 parts per million, participants will become eligible for appointment by SCMs as Class I or Class II OOs, respectively. Class I and II OOs must participate in at least two FMTs yearly to hold appointments. SCMs also invite applications for Class III and IV observers, good receiving equipment being the main requirement.

Although OOs only will receive individual reports, any amateur may submit reports for *QST* Honor Roll listing. In addition, fast comparisons may be made by listening to W1AW for the official readings. W1AW will transmit the results via a special bulletin on or about February 26. Thus, for OOs to qualify for an official written report, results must be received at ARRL Hq. no later than February 25, 1970.

FMT Procedure

1. Do some listening an hour or so *before* the test, to get an idea of band conditions and consequently of which band or bands will be best for measurement purposes.
2. The FMT transmission will start with a general call (QST) at exactly 0230 GMT, February 14.
3. Transmissions for measurement, *sent simultaneously on all frequencies*, consist of 15-second key-down periods interspersed with W1AW identification.
4. The three periods for measurement will start at 0237 (80 meters), 0245 (40 meters) and 0253 (20 meters); for the "late run", 0537, 0545 and 0553 respectively. Each period will last for five minutes, including a series of dits at the end of it and identification before the start of the next period. We suggest you make your measurements in that order to coincide as closely as possible with those of the umpire. The table herewith shows the approximate frequencies which will be used.

Feb. 14, 1970	Starts 0230 GMT	Starts 0530 GMT
First 5 min.	3527 kHz.	3569 kHz.
Second 5 min.	7043 kHz.	7045 kHz.
Third 5 min.	14,018 kHz.	14,072 kHz.

5. Your percentage error is calculated on all the measurements you submit, so we suggest you omit any readings in doubt. Watch out for careless mistakes in arithmetic, typing and other simple operator errors which can throw your percentage off. Submit more than one reading on each transmission and, if possible, measure more than one frequency, so we can strike an average.

No entry consisting of a single measurement will be eligible for *QST* listing of top results. Listing will be based on overall *average* accuracy, as compared with readings made by a professional lab.

• 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. On behalf of all the Delaware ARRL appointees, I wish you the best of holidays and may the New Year bring you plenty of DX. Renewals: W3DKX as PAM, K3GKF as OO, W3RDZ as OO. WA3IID is working as a DJ at WNRK. W3HKS enjoyed the CD Party. W3ZNF is on 20-meter mobile. The Delaware Six-Meter Net is in need of check-ins. Look for them every Tue. night at 9 P.M. local time. The First State ARC is busy getting on 52.4 f.m. mobile. The club also is holding 2-meter bunny hunts. WN3LWB and WN3LWC are preparing for 2-meter operation. WA3DYG has developed an f.m. adaptor for an a.m. transmitter. Check with John if you are interested. Net report: DEPN, QNI 66, QTC 8; DTMN, QNI 26, Traffic: W3EEB 50, W3DKX 36, WA3GAY 20, WA3DUM 16, W3TRC 12, WA3GSM 8, K3NYG 2.

EASTERN PENNSYLVANIA—SCM, George S. Van Dyke, Jr., W3HK—SEC: W3ICC, RMs: W3EML, K3MVO, W3MPX, K3SLG, WA3GLI. V.H.F. PAM: W3FGQ. OO reports were received from K3HNP, WA3IUV, W3KEK, K3RDT, W3NNC; ORS reports from WA3JKB, W3ID, WA3EEC, WA3IHV, W3CBH, WA3AFI; OVS reports from WN3LYC, WA3BJQ, WA3JWL, WA3IAZ, WA3EMQ, K3VAX, WA3EEC. BPLers are W3CUL, W3VR, W3EML, W3MPX.

Net	*Freq.*	*Operates*		*QNI*	*QTC*	*RM/PAM*
EPA	3610	Daily	6:45 P.M.	318	309	W3MPX
PTTN	3610	Daily	6:00 P.M.		200	W3MPX
PFN	3960	Mon.-Fri.	5:30 P.M.			K3SLG
EPAEP&TN	3917	Daily	6:00 P.M.		253	WA3GLI
ENTN	3726	Daily	7:30 P.M.	81	117	WA3IHV
VHF (6)	50.64	Mon.-Fri.	7:00 P.M.			W3FGQ
VHF (2)	145.35	Mon.-Fri.	8:00 P.M.			W3FGQ

New Officers for 1970: Penn Wireless Assn.—WA3KTK, pres.; K3PHJ, vice-pres.; K3JQH, treas.; K3HNP, rec. secy.; W3MJH, corr. secy. The Mobile Sixers ARC—K3FYX, pres.; W3BBC, vice-pres.; WA3KFT, secy.; K3QMK, treas.; W3GS, WA3HFL, directors. W3CUL reports RTTY is a big help in traffic-handling. W3EML reports the TCC load is slowing a bit. W3MPX is on a.m. for awhile. K3MVO had to give up 3RN because of the work load. WA3JWL reports the v.h.f. nets need some live traffic to build morale. WA3LAK is using old ARC-5 on the c.w. nets. WA3BNR is back on the nets. On the sick list: The XYL of W3GM and K3QPS. WA3EMQ worked his first CD Party. WA3EEC reports school is cutting into his ham time but he is active at school station W3YR. WA3EWV is collecting information on Lehigh ARS. W3AEQ. If you have any, contact him. WA3CKA reports a new harmonic at his QTH. Net information: Penn Wireless has reactivated its net on 29.4 Mc., 2100 Wed. and 2100 Sun. The Mobile Sixers welcomes anyone on its net on 50.55 Sun. 9 P.M. K3WEU invites anyone to check in or just listen to his Book Review Net Tue. at 8 P.M. 50.2 Mc. The recent FMT results showed W3BFF 0.3 p.p.m., W3NNC 0.4 p.p.m., K3HNP 0.6 p.p.m., W3JET 0.3 p.p.m. and K3EMA 62.1 p.p.m. W3ICC still needs help with ECs. Here is our present standing: WA3LVN Berks Co., WA3KTK Bucks Co., K3YRM Cumberland Co., W3FGQ Delaware Co., W3RLT Lancaster Co., WA3BYH Lehigh Co., WA3CNM Montgomery Co., WA3HIT Phila Co., K3FOB York Co. We have possibles W3ZAT for Chester Co., and W3VAP for Lackawana Co. Remember, in an emergency your willingness to help will be of little value if you don't know *how* or *where* to give it. Traffic: (Oct.) W3CUL 6806, W3VR 1430, W3EML 662, W3MPX 551, K3MVO 280, WA3EXW 151, WA3IHV 141, WA3JWL 128, WA3LAK 127, WA3JZB 118, WA3JGN 111, WA3LCV 111, WA3IUV 103, K3PIE 102, WA3MKQ 97, W3HK 80, W3HNK 80, WA3ATQ 72, W3RNR 70, WA3LVR 66, K3OIO 57, W3DTK 54, WA3AFI 51, WA3GLI 50, W3NNL 46, WA3GUK 44, WA3JKB 31, WA3IYC 30, W3VAP 30, W3FPC 25, K3HKW 12, K3KTH 12, W3VA 12, K3FOB 11, W3CBH 8, WA3LMU 8, K3HNP 7, WA3JRY 7, W3JSX 7, W3BUR 6, W3YR 6, WA3JKO 4, W3KCM 4, WA3BJQ 3, W3OY 3, WA3EEC 2, WA3EMQ 2, WA3IAZ 2, WA3CKA 1, W3EU 1, WA3EWV 1, W3ID 1, W3KEK 1, W3OML 1, W3YPF 1. (Sept.) WA3GAT 1.

MARYLAND-DISTRICT OF COLUMBIA—SCM, John Munholland, K3LFD—SEC: W3LDD.

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QTC*	*QNI Ave.*	*Mgr.*
MDD	3643	0000Z	Daily	38	313	10.3	K3JYZ/RM
MDDS	3643	0130Z	Daily	31	50	4.1	W3CBG/RM
MDCTN	3920	2300Z	STTS	17	123	19.5	W3ATQ/PAM
MEPN	3920	2300Z	MWF	22	67	23.7	K3IAG
		1800Z	SS				
M8TN	50.400	0100Z	M				WA3EOP
MTMTN	145.206	0200Z	T-S	22	14	8.4	W3IFW
CVTN	145.620	0300Z	TFSu	23	8	4.2	WA3JPI

New appointments: K3ORW as EC Carroll County; WA3IHW as EC, Washington, DC. Endorsements: WA3IJR as OPS, K3NCM as OPS, W3MVB as OO, WA3ERL as OPS and K2TNO/3 as OO. QTA the word in last month's column about W3LDD resigning—he's still at the mike as SEC for MDC! W3CBG is going v.h.f. on 2 meters with a TDT. W3TN had the pleasure of welcoming 5 college stations to MDD sessions in Oct.: W3YA with WA3CFK at the key, W9YT operated by K3OAE, W1MX with K3QDD pounding the brass, W3EAX with WA3IAQ at the console and WA3GAY with a Delaware U. operator. W3ECP says K3DML and K3PUI got Advanced Class tickets and W3VUH is back from overseas. Your SCM is pleased to hear from WA3JPI that CVTN still is going strong on 2 meters in Cumberland Valley. WA3LWT is shooting for ORS. Our thanks to WA3IHW and K3ORW for accepting EC appointments. W3JPT, world traveler, attended the International Navigation Congress on Aeronautical and Maritime Satellites in Hamburg, Germany. WA3NDS reports AMSAT heard a talk by WØDX, ARRL pres., at its Oct. meeting. W3CDQ still is hamming despite a chest cold. We need a volunteer to ask W3GEB's loss to let him off once in awhile to QNI MDD. W3CWC made the BPL handling traffic at the Scouarama in Hagerstown. "Thanks and well done" to the RMs, PAMs, ECs, station appointees and other amateur operators who responded in a real fine way to a surprise SET for MDC on the evening of Oct. 11. W3LQY/EC and her Anne Arundel ARECers provided plenty of traffic to handle and the section nets, MDD and MEPTN, took care of it handsomely. W3ZNW expects to be operational with RTTY on h.f. *and* v.h.f. before it's springtime in Calvert County. Who wants an RM appointment for setting up and maintaining a section RTTY net? Time now for putting the final touches on preparations for the 1970 SET. Traffic: WA3LJR 447, W3TN 334, W3ATQ 251, W3CBG 179, W3DYA 175, K3LFD 143, W3CWC 127, K3GZK 85, W3LQY 81, WA3HEN 75, WA3LWT 59, WA3GUI 52, WA3IHW 41, WA3IYS 40, W3ECP 37, K3LFN 36, W3FA 31, W3EOV 30, K3QDC 28, K3ORW 24, WA3GXN 23, W3ZNW 21, K3FQF 13, W3ZSR 13, K3TEZ/3 9, WA3CFK 7.

SOUTHERN NEW JERSEY—SCM, Edward G. Raser, W2ZI—Asst. SCM: Charles E. Travers, W2YPZ. SEC: W2LVW. RMs: WA2KIP, WA2BLV. PAMs: WA2UVB, W2ZI. A very successful Annual Dinner of the NJEPTN took place at Barrett's Restaurant in Trenton on Sat. Oct. 25. Among the members present were Russ and Helen Conrow, better known as W4YLR of Deltona, Fla., and formerly of Asbury Park, N.J. Russ reports many of the stations on the net as strong signals at his Florida QTH. It is interesting to note that the DVRA made a two-hour TV broadcast from club headquarters to Princeton and Richboro, Pa., with out-

standing signal reports. WB2APX is now Army MARS station AL2APX. Bob took part in the recent MARS emergency exercise. OBS K2ARY reports transmissions of five Bulletins during Oct. Officers of the Cherry Hill High School West Amateur Radio Club are WB2ZPB, pres.; WA2DRI, vice-pres.; WA2BPL, secy.-treas. Walt Grove, a net member of many years, is spending several weeks in Florida. A new work schedule prevents W2ORS from keeping regular schedules. A change in work schedule has taken our net member, WA2ANL, to the upstate New York area as of Jan. 1, 1970. Particular commendation goes to WB2VEJ. Bill leads the pack with a report of 183 messages for the month of Oct. on n.w. Bill is one of our "younger" operators at 84 years of age. Traffic: (Oct.) WB2VEJ 183, WB2DRG 53, K3RXB 43, W2PU 27, W2BLM 23, W2JJ 22, W2UNF 20, W2IU 20, K2SHE 18, W2ZI 14, W2ORS 13, W2YPZ 13, WA2-ANL 10, WA2BPL 7, WB2SFX 7, WB2APX 6. (Sept.) WA2BJV 206. K2RXB 25, W2IU 6, WB2APX 3.

WESTERN NEW YORK—SCM, Richard M. Pitzeruse, K2KTK—Asst. SCM: Rudy W. Ehrhardt, W2PVI, SEC: W2RUF, RMs: K2KIR, W2MTA, W2FR, W2RUF, PAM: WB2VSL. The listing of section nets appears in June *QST*. Appointment renewals are WA2BSG as OVS, K2DNN as EC and ORS and WB2FPG as ORS. WB2-FPG graduated from Worcester Tech, and has settled in Vestal. Barry has a new 500C. The Chautauqua County Amateur F.M. Assn. has repeater WA2UWK on the air. K2TXB lauds the increased 2-meter activity in his area. Welcome to new ARRL affiliated clubs, the Kodak Amateur Radio Club and the Webster Explorer Radio Post. WB2VYZ continues work on his 2-meter s.s.b. transceiver, the project now nearing completion. New officers of the Limestone Radio Society are W2SBI, pres.; W2YRH, vice-pres.; W2ACM, secy. WB2YEE anxiously awaits the results of his Extra Class exam. WB2FAW is the new Herkimer County EC. W2RUF is in need of volunteers as EC and in the AREC program in several counties in the section. Clara deplores the lack of reports received by some of the current EC's. The Chemung County AREC Assn. elected WA2TCZ, pres.; WA2FJJ, vice-pres.; WA2ZBD, secy.-treas.; K2-DNN, EC/trustee. WA2PZD/WB2NNA is back at Rochester Tech, working on his Master's degree. The ONY Chapter of the QCWA held its Annual Dinner Banquet at the Hotel Oneida Nov. 1. WA8ZXU is now WA2LPB. The Lakeshore Amateur Radio Club elected WB2OKM, pres.; and WB2VKL, tech. mgr. WA2ANE continues very active in club work. W2MSM has QSYed to a new QTH in Rochester. WB2WGF has 3 new elements on 15 meters. WB2VUO has applied for OVS. It would be a great help to me if *all* traffic addressed to me routed through NYSPTEN or NYPON was given to W2PVI. W2RQF is back at his winter QTH. NYS reports 468 messages cleared with 540 check-ins for Oct. The Black River Valley ARC elected WA2NND, pres.; and W2NOQ, secy.-treas. WB2DIV is the proud father of a new quad for 10 meters. K2DTQ meanwhile lost his 2-meter beam in a storm. WA2AIV is very active with his new OO appointment. Traffic: (Oct.) W2FR 310, W2OE 307, WA2CAL 282, W2MTA 223, K2KQC 213, W2RUF 195, K2KIR 110, WB2SMD 107, WA2REX 89, WB2VND 68, WB2HLI 49, W2HYM 48, WB2WGF 38, WA2ICU 25, WA2AIV 22, W2MSM 22, K2KTK 19, K2-UIR 19, WA2DHS 17, K2DNN 14, W2CFP 12, W2PRY 12, W2RQF 12, WB2FHS 10, K2IMI 10, W2PVI 10, W2PZL 10, WB2RWR 10, WA2ANE 9, WB2YEE 8, K2-DTQ 5, WA2PZD 4, WA2GLA 3, W2EMW 2. (Sept.) W2PRY 36. Total 2310. Last year 3048.

WESTERN PENNSYLVANIA—SCM, John F. Woitkiewicz, W3GJY—SEC: W3KPJ PAMs: W3WFR, K3-ZNP, RMs: WA3AKH, W3KUN, W3LOS, W2NEM. Traffic nets: KSSN, 2330 GMT; WPA, 0000 GMT 3585 kc. Nominating petitions will be accepted this month to select the most outstanding amateur in the section to be awarded the Harold C. Link, W3NIR, Annual Memorial Award. Petitions must be submitted, in triplicate, to John F. Woitkiewicz, W3GJY, 1400 Chaplin St., Conway, Pa. 15027. The WPA Traffic Net had 31 sessions, 300 stations QNI and 199 messages handled. W3-NGI/WA3KFX are a father-and-son combination; W3WZ/W3LJF/K3PUQ, a father-mother-and-son combine. Advanced Class licensees now are W3RTR, WA3-FIS and WA3HSQ. WA3GMN chases DX on 21 Mc. K3VHL locates on Guam with the Air Force. Former K3EBX is now K4CEN in Florida. Newly-elected officers of the Two Rivers ARC are W3OFM, pres.; WA3-LNF, vice-pres.; WA3GKL, secy.; WA3AZY, treas. W3RWU tests ATV on 440 Mc. WA3RGE attends Case Western Reserve U. and operates W8EDU. K3QYR received his B.S. degree from Pitt U. W3BRB and XYL spent their Christmas Holiday in Moscow. WA3NDP joined the Steel City ARC. The new slate of officers at the Etna ARC is K3HZL, pres.; K3OTY, vice-pres.; W3OJM, secy.; K3FGQ, treas.; W3OVM, act. mgr.; K3VYO, director. WN3NLN, the daughter of W3SG, attends West Virginia U. W2ZCZ/3 is an electrical engineer with RCA at Meadow Lands. WA3LDZ has been appointed Communications Radio Officer for RACES in Clearfield County. WN3NNO is newly-licensed at Etna. WN3NGX studies at Duke U. and is the offspring of K3FEJ. A Globe 90 is used at WN3LLX. K3EAT is asst. principal at the Westmoreland Area Vocational School in Youngwood. New appointments: W2ZCZ/3 as OO; K3HZL as OPS; W3UT as ORS; WA3ECD, WA3ISG, W3KQD as OVSs. Endorsements: K3FFJ as OO; K3EDO as OBS; W3ELZ, WA3HSI, W3KQD, W3LOD as ORSs. New officers of the Steel City ARC are K3QYR, pres.; W3ZPZ, vice-pres.; W3ZDW, treas.; WA3LJE, secy.; and WN3LIA, corr. secy., who just acquired his General Class license. A Happy, Prosperous and Healthy New Year to all with one resolution—check the expiration date on your license. Traffic: K3ZNP 428, WA3IPU 208, W3LOS 167, W3KUN 114, WA3AKH 94, WA3FBN 43, K3SOH 37, W3GJY 31, K3HKK 31, K3-SMB 29, WA3BLE 28, K3SJN 19, W2KAT/3 18, K3HCT 12, WA3HSI 6, W3YA 4, W3UHN 3, W3ELZ 2, W3IDO 1.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—SEC: W9RYU, RM: WA9ZDE, PAMs: WA9CCP and WA9PDI (v.h.f.) Cook County EC: W9HPG. Net reports.

Net	*Freq.*	*Times*	*Days*	*Tfc.*
IEN	3940 kc.	1400Z	Sun.	No report
ILN	3750 kc.	0100Z	Daily	167
NCPN	3915 kc.	1300Z	Mon.-Sat.	195
NCPN	3915 kc.	1800Z	Mon.-Sat.	
Ill. PON	3915 kc.	2245Z	Mon.-Fri.	946
Ill. PON	3915 kc.	1430Z	Mon.-Fri.	
Ill. PON	145.5 Mc.	0200Z	M.W.F.	27
Ill. PON	50.25 Mc.	0200Z	M.W.F.	8

W9KFV, W9WYB, K9WMP, K9RAS, W9KFQ, W9JUV/K9OSO, W9GEG, K9CZU and W9EY participated in the recent ARRL Frequency Measuring Test. The Waukegan V.H.F. Society and Amateur Radio Club has been approved by the League's executive committee as a duly affiliated society. New officers of the Six-Meter Club of Chicago are K9ENZ, K9ZWU, K9YJQ, K9ZWV, W9-WIC, WA9NTA and WA9BWB. K9RAS received his Extra Class license. W9IDY is recuperating from an emergency operation. W9IWI is on 20 s.s.b. with a new HW-32A and working new DX. WA9LHU is mobiling with an HW-12. New Synton Amateur Radio Club (W9YH) officers are WA9TCC, WA9UIE, WA9UQO and WA9RPF. The York Radio Club sponsors a 2-meter net (146.6 Mc.) every Mon. night at 8:30 (local Elmhurst time). The club's call is W9PCS/9 and all interested are asked to check in. A sneak preview of the new Heath products was shown at the 3rd Annual Heath Night held by the Chicago Area Teleprinters Society Nov. 5. Dewitt County Radio Club again is sponsoring its popular code and theory classes. W9KRH has a new TR-4, and W9VHD is using a TR-3 and a 30L-1. New officers of the Sangamon Valley Radio Club, Inc., include, W9-IDQ, pres.; WA9LDC, vice-pres.; WA9QEL, secy.-treas.; and W9FFP, dir. WA9WMI, WA9EXZ, WA9ZWY and WB9AAE have received their Advanced Class tickets. WA9PRO has passed the Extra Class exam and is waiting for the upgraded ticket. K9PAK has been appointed Radio Officer for Winnebago County. The writer of this column expresses his sympathy to the family and friends of K9OVB, who recently passed away. Traffic: (Oct.) W9NXG 324, K9AVQ 211, WA9WNH/9 193, W9EWN 152, WA9LDC 118, W9OT 112, WA9ZUE 92, K9RAS 85, W9YH 82, W9LNQ 70, W9JXV 52, W9DOQ 51, WA9TCC 41, W9OET 32, WA9NZF 27, WA9BHQ 22, W9PRN 18, WA9IXF 18, WA9LHU 16, W9IDH 15, K9HSK 14, K9TXJ 14, WA9OBT 12, K9RAS 6, WN9CIG 4, W9IDY 2, WA9SDT 1. (Sept.) WA9BRQ 110.

INDIANA—SCM, William G. Johnson, W9BUQ—Asst. SCM: Mrs. M. Roberta Kroulik, K9IVG. SEC: W9RUQ.

Nets	*Freq.*	*Time*	*Oct. Tfc.*	*Mgr.*
IFN	3910	1330 Daily 2300Z M-F	305	K9IVG
ISN	3910	0000Z Daily 2300 S-S 2130Z M-Sat.	661	K9CRS
QIN	3656	0100Z Daily	192	WA9FDQ
Ind. PON	3910	1245Z Sun.	72	WA9YXA
IND. PON V.H.F.	50.7	0200Z Mon.-Thurs.	61	WB9AMB

W9PMT, mgr. of the Hoosier v.h.f. nets, reports Oct. traffic as 58. With deep regret I report W9OEM, of Lafayette, and K9JTO, of Indianapolis as Silent Keys.

K9WGN, W9HCQ and W9UC sent in FMT reports. New officers of the IRCC are K9HYV, chairman; W9HZI, vice-chairman; WA9QEQ, secy.; W9IMU, treas.; W9-CKB and W9BUQ, directors. The IRCC Picnic will be sponsored by the Michigan City ARC. W9HPG, Central Division Director, was down at the meeting. New licensees are WA9VBT and WA9RZA, Generals, and WA9WSX Advanced Class. New officers of the La Porte ARC, K9JSI, are K9WHF, pres.; WA9OCQ, vice-pres.; K9LHC, secy. W9RGY, EC of Tippecanoe County, reports the Red Cross held a Simulated Emergency Test Oct. 29. The Indiana Amateur Television & U.H.F. Club held its fall meeting Oct. 24 by running a live telecast from the QTH of WA9MIA to the Club, picture on 432 Mc, sound on 146.88 Mc. K8REG gave a talk on antennas and how he was able to work 16 states on 432 Mc. using c.w. K9FZU sends out Bulletins on 7100 kc. at 0030 and 1800Z. Club papers are published by the Lake County ARC, Goshen Ind. ARC, La Porte ARC, Allen County Amateur Radio Technical Society, Spark Tri-State Amateur Radio Society and Bison Ind. Radio Club Council. WB9ATL is the Cathedral High School ARC call. QIN Honor Roll: WA9KAG 23, W9QLW 19, W9QXF 20, K9HYV 17, WA9KOH 16, K9VHY 16. *Amateur radio exist because of the service it renders.* A BPL certificate went to K9FZX. Traffic: (Oct.) K9FZX 1296, K9IVG 448, W9UEM 258, W9HRY 238, W9FWH 235, WA9TJS 125, K9HYV 96, W9RUQ 87, WA9VZM 84, WA9KAG 68, WB9AMB 61, W9JBQ 58, WA9YXA 54, K9CRY 47, K9CRS 44, W9ICU 42, W9SNQ 34, W9LG 33, WA9OHX 33, W9EJW 31, WA9VBG 31, WA9GJZ 30, K9RWQ 30, W9YYX 28, W9CMT 25, K9VHY 20, WA9-SBR 19, K9FUJ 18, W9PMT 17, WA9WAT 16, K9IUK 15, WA9OAD 14, K9JQY 13, K9GBR 11, WA9UMT 9, WA9RVL 8, W9DZC 8, W9HWR 8, K9WGN 7, K9BSL 6, WA9VRV 5, W9IDOK 4, WA9JNC 4, WA9RNT 4, WA9IIX 3. (Sept.) WA9VZM 62, WA9WMT 8.

WISCONSIN—SCM, Kenneth A. Ebneter, K9GSC—SEC: W9NGT. PAMs: WA9IZK, W9NRP, WA9QNI, W9AYK and WA9QKP. RMs: K9KSA and WA9TXN.

Nets	*Freq.*	*Time*	*Days*	*QNI*	*QTC*	*Mgr.*
BWN	3985 kc.	1245Z	Mon.-Sat.	412	365	W9AYK
6BN	3985 kc.	1800Z	Daily	736	112	WA9QKP
WSBN	3985 kc.	2300Z	Daily	1375	174	WA9QNI
WIN	3662 kc.	0115Z	Daily	338	140	WA9TXN
WSSN	3780 kc.	0030Z	Tue.-Thurs.-Sat.	71	18	K9KSA
WRN	3620 kc.	0130Z	Sun.	19	4	K9GSC
SWRN	50.4 Mc.	0300Z	Mon.-Sat.	120	0	W9NRP
SW2RN	145.35 Mc.	0330Z	Daily	215	22	WA9IZK

WISCONSIN QSO PARTY

Jan. 24-25, Jan. 31-Feb. 1, 1970

Wisconsin SCM K9GSC alerts Wisconsin amateurs only to the QSO Party to be held *cw* Jan. 24-25 between 1600-2300 GMT both dates and *phone* Jan. 31-Feb. 1 between 1600-2300 GMT both dates. Categories are phone 160-10 meters, phone 6 meters and up phone mobile 160-10 meters and cw 160 meters and up. Exchange consecutive QSO numbers, starting with number one, RST) and county. You may work each station only once in each category and separate logs for separate categories are required. Cross band, cross mode and multiple transmitters are not permitted. Contacts are not permitted on nets in session. Logs must show time, station worked, reports, band, emission, input, numbers exchanged and county names. No power limit. Score one point for each contact, add the message credit if applicable and multiply by the number of counties worked. 25 points can be added to the contact points (before multiplier) if a message is sent in correct ARRL form to the SCM stating the category, county and input. This must be sent within two days after the contest ends. A copy of the message with handling data must accompany the log for credit. Certificates showing partipant's place and category will be sent to all stations submitting logs. First three places will also receive ribbons. Suggested frequencies: 3662 3985 50,400 145,350 and 146,940. Logs must be postmarked no later than Feb. 28, 1970 and sent to Roy Pederson, 510 Park St., Jureau, Wisconsin 53039. Any violation of the contest or FCC rules may result in disqualification. Decisions of the contest committee are final.

Net certificates: W9ZBD, WA9ZTY and WA9EAN for BWN; W9EMC for WIN. Renewed appointments: K9-WIE, W9IQW and WA9OMO as ORSs, W9IQW and K9-GDF as OOs, W9NRP as OBS, K9WIE as OPS, K9GDF participated in the FMT with an average error of 3.2 p.p.m. W9ZFU has moved to Marinette. K9GDF led the OOs with 171 notices sent in Oct. K9OSC was second with 24 notices sent, and has added a Drake TR-4 to his station. W9ZBD passed the Advanced Class test. WA9YCV's dad received his Novice ticket as WN9CHP. Reports from individuals and clubs are invited for this column by the SCM. Traffic: (Oct.) K9CPM 360, WA9-QKP 214, W9RSJ 147, WA9QNI 92, W9DM 78, W9SUF 68, W9KRO 56, W9AYK 48, WAØVKI/9 44, K9TBY 43, K9FII 38, W9RTP 36, W9HW 28, W9BCH 23, K9KSA 22, W9NRP 22, W9JDXV 19, WA9THF 15, WA9LRW 10, WA9PKM 10, K9GSC 4, W9IQW 4, W9ONI 4, K9OSC 3, WA9SAB 2, WA9YCY 2, K9GDF 1. (Aug.) WA9YCY 6.

DAKOTA DIVISION

MINNESOTA—SCM, Larry J. Shuma, WØPAN—SEC: WAØMZW. RMs: WAØLAW, WAØRRA. PAMs: KØGYO, WAØMMV, WAØOEJ, WAØHRM. V.H.F. PAM: WAØDWM. Please refer to last month's column for a listing of section nets. A new traffic net is the Minnesota 40-Meter C.W. Net which meets M-W-F at 2300Z on 7060 kc. Welcome to the newly-affiliated Mankato State College ARC. WAØTQT has a new two-element Triband quad. New Novices: WNØZVW, WNØZWY. The simulated tornado disaster held at Farmington in Oct. was very successfully handled by KØKPJ, Dakota County EC, WAØIAW, WAØTGM, WAØPOC, WAØWBG, WAØMZW and W9DB/Ø assisted at the scene. We need more AREC members. Contact WAØMZW for information. I would like to thank all appointees for their support in 1969. Section activities are moving in the upward direction as evidenced by the following statistics:

Section Net	*QNI*	*QTC*	*QNI*	*QTC*
	Jan.	'69	Oct.	'69
MSPN (noon)	1066	309	914	255
MSPN (evening)	835	230	973	238
MSN	220	61	131	147
MJN	160	55	312	114
Station Activity Reports	48		72	
County ECs	20		65	
AREC Membership	250		500	

WØRIQ and WØOPX have returned to their Aitin QTH. Endorsements: WAØDOT, WØISJ and WØOMC as ORSs; WØPAN as OPS. Appointments: WAØWEZ as ORS; WØAIH, St. Louis County (north), and KØKPJ, Dakota County as ECs. Traffic: (Oct.) WAØVAS 355, WØZHN 234, WAØEPX 223, WAØIAW 147, WAØTHI 145, KØZRD 124, KØMVF 119, WAØRRA 108, WAØTGM 105, WAØRPS 88, WAØMMV 71, WØAZR 70, WAØWEZ 66, WØBTC 65, WAØOEJ 62, WAØRKV 52, WAØTQT 45, WAØVIS 44, WAØGRX 42, WØPAN 41, WAØURW 41, WAØIAD 39, WØFHH 37, WAØVTZ 35, WAØTYL 33, KØZNE 29, WØATO 28, WAØHRM 28, WAØVEB 26, WØEQO 23, WNØYAH 23, KØICG 22, KØGYO 21, KØFLT 19, WAØJPR 16, WAØMZW 14, WAØVDG 14, WØIYP 13, WAØVYV 13, WØBUO 12, KØIKU 12, WAØDFT 11, WØKLG 11, WØUMX 11, WAØDWM 10, WØKNR 10, WAØZND 10, WAØOEF 9, WØKUI 8, KØIJL 7, WAØRKE 7, WØISJ 5, WAØTLN 5, WNØYWA/Ø 5, WØOPX 4 WØRIQ 4, KØZBI 4, WAØJPS 3, WAØRAG 3 WØAAT 2, WØSZI 2, WAØUWL 1. (Sept.) WAØTAD 26, KØZNE 19, KØJTA 17, WØIYP 12, WAØDFT 8. (Aug.) KØJTA 17, WAØUTQ 4. (July) WAØJPS 6.

NORTH DAKOTA—SCM, Harold L. Sheets, WØDM—SEC: WAØAYL. OBS: KØSPH. PAM: WØCAQ. RM: WAØRSR. OO: WØBF. KØPZK has moved to the State of Washington. WAØMSJ's brother, WAØYSF, is moving to Williston. WØECX took off for Florida via Moline, Ill. He is using a vertical on the trailer so watch for him on 20, 15 and 10 meters. KØRSA's XYL, WNØUDC, has had a bout in the hospital, while KØSPH's XYL is steadily recovering. WAØAYL and WØDM have a class of twenty enrolled in a course of amateur radio at the UND under the Dept. of Continuing Education. WØDM has a class of eleven at the YWCA and nine at Valley Junior High. The Bismarck Club has affiliated with the YMCA and has set up its station, WØZRT, there. The YL WX Net has started activities again seven days a week. WØNMV is helping on the week ends as NCS. WAØSDQ announces a rag-chewing net at 1200 CST on 3995 kc., called the Sugar Bowl Net. WØJW is ex-WØDAO, that old DX hound in Cando. WAØTBR was bitten by a black cat on Halloween, believe it or

not, and has been taking rabies shots. WAØRWM and the two offspring, WAØRWK and WAØRWL, have completed working all the counties in the state. WAØRWL received the Lutheran Scout Award PRO de ET PATRA while his father, WAØVGJ, was presented with the Lamb Award for adult leadership in scouting. WØCAQ is the new MARS coordinator for N. Dak. succeeding WØCGM. The Red River Radio Amateurs Club meets in the EE building at NDSU. WAØHUD had 44 QNI on TEN.

NDak C.W. Net 3840 kc.
16 sessions 15 check-ins 1 Tfc. 2100 M-F WAØHSR RM
Goose River 1990 kc. Net
4 sessions 58 check-ins 3 Tfc. WØCDO NCS
ND PON 3915 kc.
12 sessions 313 check-ins 25 Tfc. Sat. 1730 CST
WAØHUD, Mgr. Sun. 0900-1730 CST
YL WX Net 3995 kc.
19 sessions 313 check-ins 15 Tfc. WKLY 0730 WAØGRX, WAØMND and WØNMV
NDRACES 3996.5
26 sessions 645 check-ins 73 Tfc. M-Fri. KØSPH RO
1730 sessions M-F NCSs: KØATK, KØBF, WAØJPT, WAØUKD, KØTYY. Alt.: WØNMV, WAØHUD
1830 sessions M-F NCSs: WØCAQ, WØEFJ, WØGFE, KØPVG, WØHJU. Alt.: WØCDO

Traffic: (Oct.) WAØHUD 141, WØNMV 66, KØPYZ 46, KØSPH 35, WAØTBR 21, WØDM 20, WØWWL 15, WAØJPT 7, WØCDO 3. (Sept.) KØSPH 48.

SOUTH DAKOTA—SCM, Edward C. Gray, WAØCPX. SEC: WAØFUZ. PAM: WAØCWW. RM: WØIPF. Net Mgrs.: WØHOJ, WAØLLG, WAØPNB, WAØMWN. Silent Keys: KØALP. Following is a list of South Dakota Nets:

Net	*Freq.*	*Time*	*Days*	*QNI*	*QTC*
SDN CW	3645	0100Z	Mon.-Sat.	234	35
Morning	3955	1400Z	Mon.-Sat.	485	40
NJQ-Noon	3955	1815Z	Mon.-Sat.	387	38
Early Evening	3955	2330Z	Daily	451	13
Late Evening	3955	0030Z	Daily	1274	77
AREC	3955	1430Z	Sun.		

WAØCUL is the new EC for Harding County. AREC membership is up 10 since Aug. Traffic: WAØSKA 165, WAØPNB 119, KØAIE 23, WØHOJ 23, WØCAS 22, WAØUEN 16, WAØFUZ 10, WAØSHA 7, WAØMWN 6.

DELTA DIVISION

ARKANSAS—SCM, Robert D. Schaefer, WA5IIS—SEC: W5PBZ. RM: W5NND. PAM: WA5KJT. WA5TLS is doing a good job as OZK manager while W5NND is out of the state. WA5KJT replaces WA5QMQ as PAM because Roger's new job keeps him off the nets. Participation in OZK has been discouraging. All stations, regardless of speed or ability, are invited to participate. Congratulations to WA5KJT, WA5LIO and W5FPF on passing the Advanced Class exam. WA5TAF is now operating mobile in Oklahoma City. WA5CQZ has a new HW-12A. Net reports:

Net	*Time*	*Freq.*	*Tfc.*	*QNS*	*Mins.*	*Mgr.*
OZK	0100Z	3790	11	121	389	WA5TLS
RN	0030Z	3895	17	468	380	WA5KJT
APN	1200Z	3937	24	500	1441	W5VFW
PON	2130Z	3925	60	456		W5ELF
EC Net	0000Z Sun.	3995				W5PBZ
VHF PON	0200Z W-Sat.	51 Mc.	4	140		WA5SKG
DX INFO	0045Z Mon.	3860				WA5EFL

Traffic: WA5TLS 56, WA5TJB 18, W5NND 15.

FIFTH ARKANSAS QSO PARTY

January 24-26, 1970

The North Arkansas Amateur Radio Society of Harrison announces its fifth Arkansas QSO Party and invites all amateurs to participate.

Rules: 1) The time will be the 30-hour period from 2200 GMT January 24 to 0400 GMT January 26, 1970. 2) Arkansas stations score 1 point per contact and multiply by the number of states, Canadian provinces and foreign countries worked during the contest period. 3) Outside stations score 5 points for each Arkansas station worked and multiply the total by the number of counties in Arkansas worked during the period. 4) Stations may be worked once on each band and each mode. 5) A certificate will be awarded to the highest-scoring station in each state, Canadian Province and foreign country (with 100 or more points). 6) General call: "CQ ARK". Arkansas cw stations should identify themselves by signing de (call) ARK K. Phone say "Arkansas Calling." 7) suggested frequencies (plus or minus 5 kHz.) will be: cw, 3560 7060 14,060 21,060 28,060; ssb, 3960 7260 14,300 21,360 28,560; Novice 3735 7175 21,110. 8) Arkansas stations send QSO number, RS(T) and county, all others send QSO number, RS(T) and state, province or country. 9) Logs and scores must be postmarked no later than February 5 and sent to the North Arkansas Amateur Radio Society, c/o J. K. Fancher Jr., W5WEE, 407 Skyline Terrace, Harrison, Arkansas 72601.

LOUISIANA QSO PARTY

January 17-18, 1970

The Fifth Annual Louisiana QSO Party sponsored by the Lafayette Amateur Radio Club will start at 1800 GMT Saturday January 17 and end at 2200 GMT Sunday, January 18, 1970. All bands may be used, cw and phone (phone classified as both am and ssb). The same station can be worked and counted for QSO points on each band and each mode. Louisiana stations score 1 point for each contact (including contacts with other Louisiana stations). All others score 1 point for each contact with a Louisiana station. Louisiana stations multiply total QSO points by number of different states, Canadian Provinces and countries worked. All others multiply total QSO points by the total number of different Louisiana parishes worked. Louisiana stations give QSO number, RS (T) and parish. Others give QSO number, RS(T) and state, province or country. Suggested frequencies are: 3600 3910 7075 7260 14,075 14,300 21,075 21,400, 28,100 and 28,700. In Louisiana, certificates will be issued to the 1st, 2nd and 3rd place scorers. Also, the *W5PM Trophy* will be awarded the first place Louisiana winner. Other stations outside Louisiana will be issued certificates for highest scoring stations in each state, Canadian call area and each country. (Note that a minimum score of 50 points for U.S. stations and 25 points for DX stations is needed to win). Logs must show dates, times, stations worked, exchanges sent, exchanges received, bands, modes and scores claimed. Logs must be postmarked no later than February 28, 1970 and sent to the Layfayette Amateur Radio Club, c/o Danny Griffith, K5ARH, 123 Normandy Road, Lafayette, Louisiana 70501. Anyone wishing to receive a copy of the contest results should send a stamped, self-addressed envelope with his log.

LOUISIANA—SCM, J. Allen Swanson, Jr., W5PM—SEC: W5OB. RM: K5ANS. V.H.F. PAMs: W5UQR, WA5DXA. The Central Louisiana Amateur Radio Club has opened its new club house. The club is located at Camp Beauregard up Alexandria way. Incidentally, this club demonstrated fine Public Relations with a station operating at the Rapides Parish Fair. Traffic was dispatched to all parts of the country as well as to Viet Nam. There was good newspaper publicity from this activity. Yours truly adorns the cover of the *DXer Magazine* for Oct. 29, W5CEZ says Army MARS activities claim most of his operating time. W5OB recently recovered from a bout with a virus. Bob is up and DXing again. W5LDH recently addressed the gang of the Jefferson Radio Club. W5NQQ and W5NQR have moved their shack to the front of their house to avoid interference from their harmonic! W5VAQ, is the proud owner of a new Swan 500. WA5TXQ passed the Advanced Class exam. It's about time to consider someone for SCM. My term expires in June. I do not anticipate running again as I have had the position for six years and feel there are several good men around the state who should be considered. Traffic: W5M1 119, K5AN8 64, WA5WBZ 58, W5CEZ 53, W5EA 10.

MISSISSIPPI—SCM, Clifton C. Comfort, WA5KEY—SEC: WA5JWD. RM: W5JDF. We are all glad to hear W5BW back on the air after a heart attack. WA5CAC was home on emergency leave from Vietnam.

EIMAC's new family of outstanding power tetrodes offers 13 impressive features:-

(1) High linearity. 3d order products — 40 dB or better.

(2) Low input capacitance. Typically, 45 pF.

(3) Over 600 watts measured output at 865 MHz.

(4) Very high gain-bandwidth product. Over 125 MHz.

(5) Low grid interception in linear amplifier service.

(6) Low drive. Typically 40 volts for class AB-1 service. Easily driven at 150 MHz with 5 watt solid state device.

(7) Plate dissipation up to 800 watts. Both air and liquid cooling available.

(8) Coaxial base adapter available.

(9) Shock-resistant design for rugged service.

(10) 20 kW pulse output at 430 MHz.

(11) Very low cathode lead inductance.

(12) 5-pin base adapted for heat-sink cooling.

(13) High grid and screen dissipation ratings.

The unique 4CX600 family is an exciting result of EIMAC's CAD (computer-aided-design) program for ceramic/metal tetrodes. Closely controlled parameters permit intermodulation distortion limits to be included as a defining tube characteristic, establishing new criteria of performance.

EIMAC's advanced segmented cathode and electron focussing combine with an unusually high figure of merit in this family, providing you with tubes useful in widely diversified services: linear amplification, high reliability aircraft-to-ground communication, wideband distributed amplifier service in airborne ECM gear, and r-f pulse application.

Another example of EIMAC's ability to provide tomorrow's tube today! Here are the numbers to prove it:

TUBE TYPE	FIL. VOLTS	RATED TO: (MHz)	BASE	COOLING	MAX. RATINGS		TYPICAL POWER OUTPUT (150 MHz)	USEFUL FOR:
					Plate Volts	Plate Amperes		
4CX600B	6.0	890	5-PIN SPEC.	Air	3000	0.6	750W	WIDEBAND AMPLIFIER SERVICE
4CX600F	26.5							
4CW800B	6.0	890	5-PIN SPEC.	Liquid	3000	0.6	750W	WIDEBAND AMPLIFIER SERVICE
4CW800F	26.5							
4CX600J	6.0	150	OCTAL SPEC.	Air	3000	0.6	750W	CLASS AB-1 LINEAR SERVICE
8809								

More? Our Application Engineering Department's ability to design tube into circuit means less engineering time for you. For all-around capability, talk to EIMAC. For circuit and application information on these new power tetrodes, write to EIMAC for our new, free application bulletin #14, *Using the 4CX600 Family Tetrodes.* Or contact your nearest Varian/Eimac Electron Tube and Device Group Office. They are located in:

Albuquerque, N. M.
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Here's the exciting new Heath SB-220 2 kW Linear Amplifier. Running maximum legal power on amateur bands between 80 and 10 meters, this compact powerhouse features two rugged EIMAC 3-500Z zero bias triodes in proven grounded grid circuitry. Note the modern desktop styling and the heavy duty components. And note the use of the reliable 3-500Zs. Heath chose EIMAC because these dependable tubes are ideal for heavy-duty operation, around the clock, around the world. And the two tubes have a total plate dissipation rating of 1000 watts.

Heath's choice is your choice. Go EIMAC. Look for the equipment featuring EIMAC power tubes.

The 3-500Z is one of EIMAC's family of zero bias power triodes: from 400 watts to 50 kW. Contact your distributor or a Varian/Eimac Field Office for further information. Offices are located in 16 major cities. Ask information for Varian Electron Tube and Device Group. Or write Amateur Services Department, Eimac Division of Varian, San Carlos, Calif. 94070.

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EIMAC 3-500Zs are Heath's Choice.

WA5PTE was on 30-day leave. WA5MPQ is considering "RTTY." WA5SUE and W5PDG report a v.h.f. club being organized on the Coast by the 2-meter net members. WA5LXC, K5VQA and WA5WJP are practicing frequency measurement on the MSBN net frequency which should help all NCSs to calibrate their rigs. Glad to have W5ODV active again. K8YUW/5, in Gulfport, is showing up you locals in traffic-handling. WA5SIM resigned as net mgr. of MSBN because of business pressure. WA5UBQ is the new net mgr. W5HZQ has a new rig. WA5TWI has a new antenna that has increased his signal strength. We are all waiting to hear K5ZFM sound off on his new Swan 500C. Net time changes with the end of Daylight Savings Time are: MSBN, 6:15 P.M. CST, on 3990 kc.; GCSBN, 6:30 P.M. CST, on 3925 kc.; CGCHN, 7:00 P.M. CST, on 3935 kc.

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-Tu.-Su.	0030Z	24	722	84	WA4YBT
TPN	3980	M-Sat. Sun.	1245 1400	31	964	56	W4PFP
ETPN	3980	M-F	1140	23	698	38	WA4EWW
TPON	3980	Mon.	0030	4	164	22	K4RTA
TTN	3980	Daily	2200	31			WB4HMA
TN	3635	Daily	0100	31	95	30	K4AMC
ETVHF	145.2	Tu.&Th.	0000	8	76		WA4TJJ
ETVHF	50.4	M-W-F	0000	12	133		WA4TJJ

I urge everyone to register his station with his EC and hope all AREC groups have established contact with the Red Cross and Government agencies. ECs should inform SEC W4WJH of their activities during the Simulated Emergency Test. RM K4AMC is doing a fine job as RM and is mailing out a Tn. Net bulletin. The Tn. Ten-Meter Net had its first meeting at 2130 EST Nov. 4 on 28.8 Mc. NCS WA4YON was located in Knoxville and stations checked in from as far away as Manchester, Cookville, Cleveland and Greenville. The QNI was very good, so join in no matter how far away you are. WB4HSS works c.w. with 2 watts, 26 stations worked WB4CFI. W4OGG, K4RCT and WA4YHO one night after the TSSB for the Memphis Sesquicentennial Award. Traffic: W4OGG 162, W4FX 135, WA4UAZ 124. WB4JFT 95, W4SQE 91, K4AT 69, W4WBK 49, WA4CGK 20, WA4GLS 16, WB4JTS 15, W4PFP 15, WB4ANX 14, W4KAT 14, WB4EHK 12, WB4HSS 12, K4LTA 11, WB4EHD 10, W4LBD 8, WB4DYJ 6, W4LHE 6, W4VJ 6. WA4EWW 4, W4SGI 2.

GREAT LAKES DIVISION

KENTUCKY—SCM, George S. Wilson, III, W4OYI—SEC: W4VYS. Appointed: WB4AIN as EC, K4FXN as OO, WB4FLA as ORS. Endorsed: W4BAZ as RM (KYN), W4OTP as PAM (FCATN) and OVS, W4CID as EC and ORS, WB4CTV as EC, W4TOY as OVS and OO, W4YYI as OPS.

KRN	402	QNI	34	QTC	KYN	375	QNI	261	QTC
MKPN	428		91		FCATN	226		65	
KTN	768		134						

The key of Henderson's W4MWX is silent. 73, Sprig! Owensboro's Novice Class, tutored by W4UX is going great guns. W4RHZ is in the Cincy area "Amateur Hall of Fame." Hazard boasts WN4s NWU, NZS and OEF, while newly-ticketed WN4KCV is the XYL of WB4IOU. IOU, incidentally, is going great guns on 6. The Kentuckiana RC put on a big booth at the Louisville Hobby show, and traffic was being pushed by W4BAZ, WA4VUE and company. W4OTP is on 6 p.m. He says a 6-meter transmitter hunt will be in the Louisville area. WB4HUS was 100% 9RN in Oct. Owensboro ARC's officers are WB4IZY, WB4IZX and WN4MQR. A portable repeater, complete with power, is in the works at Owensboro. We have 69 top-notch people holding 97 meaningful appointments; many others are dedicated to public service. Help protect our frequencies, join AREC, join a net, report. Don't just sit there. Traffic: (Oct.) K4DZM 259, WB4HUS 231, WB4KPE 212, W4BAZ 78, WA4DYL 76, K4MAN 72, WA4VZZ 67, WB4ILF 62, W4OYI 59, WB4FDK 58, K4TRT 55, WA4AGH 46, WB4EOR 38, W4NBZ 38, W4OTP 34, WB4FLA 30, WA4FAF 26, WB4BQM 25, WB4GCV 23, WA4MXD 22, K4UMN 20, WA4WSW/3 19, WB4EQY 17, W4UK 17, K4HOE 14, K4AVX 12, WB4LFZ 11, K4VDO 10, K4FPW 9, W4SZB 9, W4KJP 7, K4FXN 6, K4YCB 6, WB4LKP 5, W4BTA 4. (Sept.) WB4IOU 46, WA4MXD 39, K4FPW 19, K4HOE 10, W4SZB 10, W4NBZ 9. Total: 1810.

MICHIGAN—SCM, Joseph L. Pontek, K8HKM—Asst. SCMs: Rodger C. Phillips, WA8LWK; Howard A. Walker, W8JTQ. SEC: W8MPD. RMs: W8GAI, W8JTQ, W8RTN, K8KMQ. PMSs: K8GOU, K8JED, V.H.F. PAM: W8CVQ. Appointments: W8ACW, W8AP, K8DAC, W8FWQ, K7NHV/7, W8PBO, WA8SQC, W8WVL as ORSs; W8ACW, K8DAC, WA8WZF as OPSs; K8RCT as OO; WA8AXF as EC; WA8DHP as OVS; WA8MTX as OBS. Silent Keys: W8AUD, W8KSR, W8OGY, W8ONH.

Net	*Freq.*	*Time*	*Days*	*QNI*	*QTC*	*Sess.*	*Mgr.*
QMN	3663	2300	Daily	661	321	59	W8GAI
WSSB	3935	0000	Daily	785	186	31	K8WRJ
UPEN	3920	2230	Daily	451	35	21	WA8LHC
PON-DAY	3937	1600	Daily	675	524	30	K8LNE
GLETN	3932	0230	Daily	926	169	30	K8HIJ
BR/MEN	3930	2230	Mon.-Sat.	845	132	27	K8LJS
PON-CW	3645	0000	M-Sat.	152	13	26	VE3DPO
M6MTN	50.4	0000	M-Sat.	171	35	21	WA8LRC

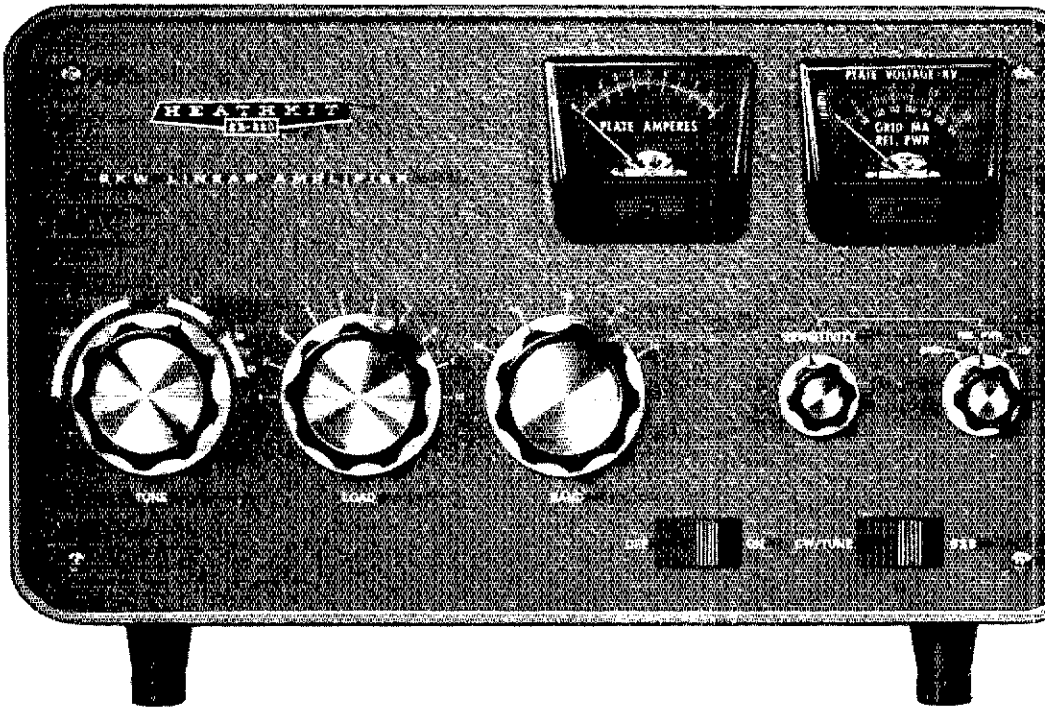
WA8NLC, WA8VGQ and WA8VBZ are attending Mich. Tech. The Stu Rockafellow ARS had a successful Spook Patrol. W8FX added a WJR 1921 era "Blue Racer" to his big collection of keys. The Tawas Hamfest was its usual success. W8DX worked a good pile of JAs during its DX Contest. W8LNU is retired and is W7FVT in Ariz. W8OCP now is W8JG, W8YLA is W8JV, W8WUD is W8JU, W8IZ made a visit to W6-Land. The W8-QRP Net meets Sat. at 0100Z on 7080 kc. New tickets: WB8-CMQ and WB8AEX, General; WA8YTL, Advanced; W8ALP, Extra; and now W8KW. New officers: Catalpa ARS—K8IIN, pres.; WA8OIU, vice-pres.; K8ALF, secy.; WA8VHA, treas. S.E. Mich. ARA—WA8NYK, pres.; W8KAZ, vice-pres.; WA8SJX, secy.; W8GV, treas. Motor City RC—WA8VSQ, pres.; WN8DIJ, vice-pres.; K8HFN, treas.; WN8APM, secy. Blossomland ARA—WA8WTS, pres.; W8IAI, vice-pres.; WA8WNZ, secy.; W8CGD, treas. The Hills ARS—K8RUB, pres.; WB8-ABN, vice-pres.; WA8ZFN, secy.; WB8AYH, treas. Does your county have an active AREC program? If not, check with your EC. Who is he, you say? Check with W8MPD. You might have a job open for you. It can be darn good fun as well as an education. Also, is your club affiliated? Let me know if not and will help you get in. Traffic: (Oct.) K8LNE 680, WA8WZF 616, K8KMQ 310, W8JTQ 308, WA8SQC 204, W8MO 121, K8GOU 104, WA8LXY 94, W8NOH 85, W8IXJ 84, K8-MXC 81, WA8TBL 81, W8IHR 76, W8IZ 72, WA8ONZ 55, K8HLI 53, W8RTN 50, K8HLR 45, W8DSE 44, K8TIV 40, K8JED 39, WB8DTT 37, W8IUC 31, W8TDA 26, WH8ANR 20, WA8ENW 20, W8MPD 18, W8SWF 16, WA8PIM 15, WA8LWK 14, W8FX 12, WB8CMQ 11, W8AGQ 4, WA8ZJM 4, W8BEZ 2, W8WVL 2, WA8MCQ 1. (Sept.) WA8WZF 725, K8LNE 681.

OHIO—SCM, Richard A. Egbert, W8ETU—Asst. SCM: Roger Barnett, K8DDG. SEC: W8OUU. RM: W8IMI. PAM: K8UBK. V.H.F. PAM: WA8ADU. Oct. net reports:

Net	*QNI*	*QTC*	*Sess.*	*Freq.*	*Time*	*Mgr.*
OSSBN	2216	1464	70	3972.5	1530 & 2345Z	K8URK
BN	589	341	60	3580 50.61	0000 & 0300Z 0000Z	W8IMI
06MtrN	470	132	51	50.16	0200Z	WA8ADU
OSN	198	71	31	3580	2325Z	WA8VNU
Apricot	240	457	31	51.0	0030Z	K8ONA

BPL certificates for Oct. traffic goes to W8UPH, WA8ETX, WA8DWL, WB8BZX and W8QCU; OSN certificates to WA8GRR, WB8ALU and K8EHU; BN certificates to W8JD, W8LZE, WB8ALU, WB8CKI, WA8ZNC, WA8BZR and WA8TYF. W8CUT provided 164 phone patches for Hospital Ships *Repose* and *Sanctuary* during Oct. With regret we report the following Silent Keys: K8ACP, WA8QNI and W8FOO. Seneca RC's new officers are WA8APY, pres.; WA8WIA, secy.-treas. Columbus ARA's officers are W8ELE, pres.; K8IIF, vice-pres.; WA8FSX, secy.; WB8AKU, treas. Canton ARC's officers are W8PZG, pres.; WA8TUY, vice-pres.; WA8RIV, secy.; WA8SOG, treas. Lancaster and Fairfield Co. ARC's officers are WA8SSJ, pres.; W8AIT, vice-pres.; WA8HJH, secy.; WA8VCV, treas. Westpark Radions is conducting a class for aspiring Advanced and Extra Class licensees. WA8AGV has moved to Pittsburgh. WA8JXM reports the formation of the Queen City Repeater Assn. W8QID is temporary director and WA8JXM is doing the secy. job. Also in Cincinnati, WA8COA tells us that a Cincinnati Area Amateur Radio Council has been started. I attended the fall meeting of the Ohio Council of Radio Clubs in Columbus. For those not familiar with the Council, it's intended to combine the opinions of the member clubs and nets and present the collective findings to the Division Director. The Great Lakes Division Director,

The New Heathkit® 2-kW Linear Is Here



(at last)

New Heathkit® SB-220 . . . $349.95*

It's not just a rumor anymore . . . the SB-220 is here, with a price and performance worth the wait.

The New Heathkit SB-220 uses a pair of conservatively rated Eimac 3-500Z's to provide up to 2000 watts PEP input on SSB, and 1000 watts on CW *and RTTY*. Requires only 100 watts PEP drive. Pretuned broad band pi input coils are used for maximum efficiency and low distortion on the 80-10 meter amateur bands.

Built-In Solid State Power Supply can be wired for operation from 120 or 240 VAC. Circuit breakers provide added protection and eliminate having to keep a supply of fuses on hand. Operating bias is Zener diode regulated to reduce idling plate current for cooler operation and longer life.

Double Shielding For Maximum TVI Protection. The new "220" is the only final on the market that's double shielded to reduce stray radiation. The heavy gauge chassis is partitioned for extra strength and isolation of components. When you put this kind of power on the air, you'd better be sure. With the SB-220, you are.

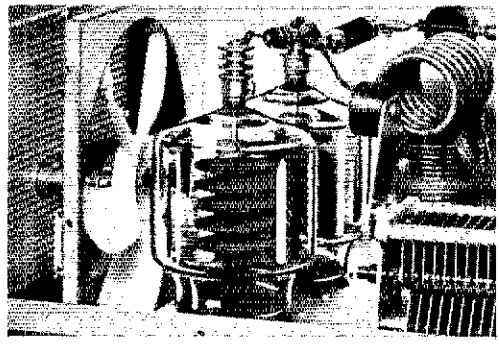
Really Cool Running. The layout of the SB-220 is designed for fast, high volume air flow, and a quiet fan in the PA compartment does the job. The "220" actually runs cooler than most exciters.

Other Features include ALC output for prevention of overdriving . . . safety interlock on the cover . . . easy 15 hour assembly and sharp Heathkit SB-Series styling.

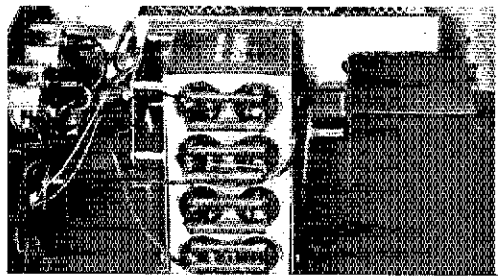
Tired Of Stumbling Barefoot Through The QRM? Put on big shoes . . . the new Heathkit SB-220. Another hot one from the Hams At Heath.

Kit SB-220, 55 lbs. **$349.95***

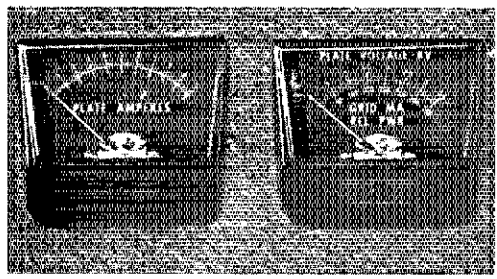
SB-220 SPECIFICATIONS — Band coverage: 80, 40, 20, 15 and 10 meter amateur bands. **Driving power required:** 100 watts. **Maximum power input:** SSB: 2000 watts P.E.P. CW: 1000 watts. RTTY: 1000 watts. **Duty cycle:** SSB: Continuous voice modulation. CW: Continuous (maximum key-down 10 minutes). RTTY: 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:** 14⅞" W x 8¼" H x 14⅛" D. **Net weight:** 48 lbs.



A pair of rugged, dependable Eimac 3-500Z's in the final mean unbeatable performance. Zener diode regulated operating bias reduces idling Ip and the large fan means cool running, long life.



The SB-220 has a reliable, well-designed power supply . . . the plate power transformer is at right, a 25 ufd capacitor bank in the center gives excellent dynamic regulation and the filament and bias circuitry and transformer is on the left.



Complete monitoring facilities for fast, easy tune up. The left meter gives continuous monitoring of Ip . . . the right one can be switched to read Relative Power, Ep and Ig.

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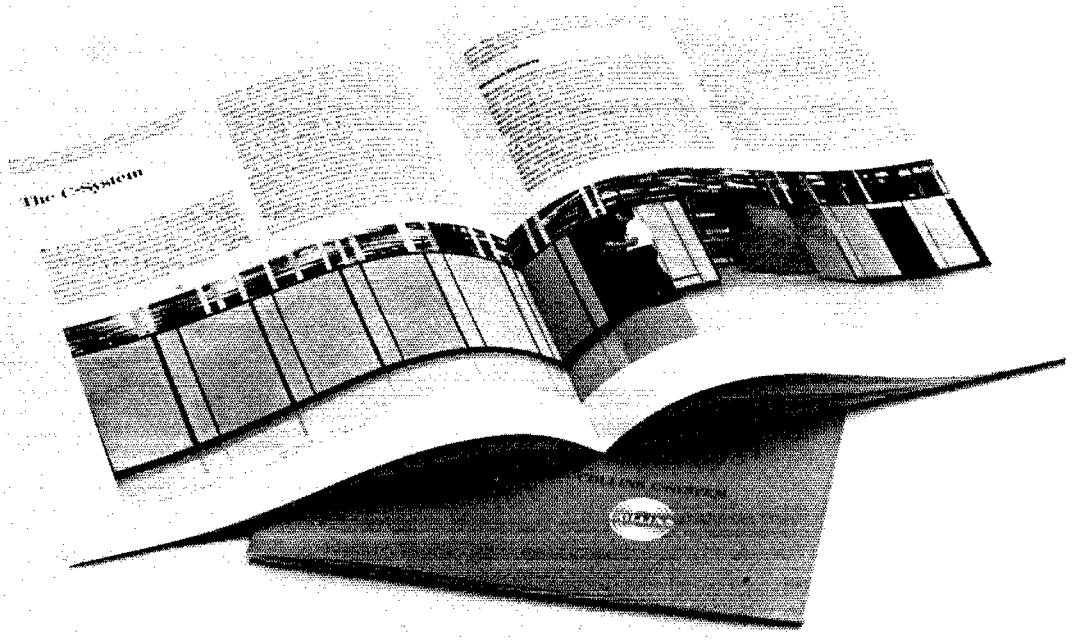
W8WG, regularly attends OCARC meetings. Following the Council meeting, a gathering of the section's ECs was called and conducted by W8OUU. Class I Observers are W8GRG and W8BU. W8DPW and WA8DUL participated in the Sept. FMT, with W8GRG averaging 0.2 parts per million for ten measurements. W8UX is sending Official Bulletins on 7197 kc. at 0530 EST under 10 w.p.m. WA8YIB has been appointed OPS. We now have a total of 163 appointees in the section. We can use more appointees, particularly 00s and OBSs. A look at the traffic reports below shows that 104 Ohio section hams took the time to report their traffic totals in Oct. In addition, about 65 reports of other activities were received. Traffic: (Oct.) W8UPH 1143, WA8ETX 577, WA8VNU 304, W8QZK 265, W8QCU 256, WA8DWL 245, WB8RZX 230, W8GNL 183, K8ONA 159, W8OE 158, WB8AKW 150, WA8NOQ 143, WA8SUS 141, WA8UPI 140, W8IMI 134, W8CUT 131, W8JD 131, WA8ETW 126, WA8DXY 123, W8JH 118, WA8WAK 112, W8CHT 109, WA8DUL 107, WA8TYF 104, WB8BLH 102, WA8SED 96, WA8YIB 89, WA8WJR 86, W8PMJ 78, K8ONV 76, K8UBK 76, W8GRT 73, WA8PKN 71, W8LRE 67, WB8ALU 64, WB8BPR 60, WB8DSV 55, WA8OCG 55, W8UX 54, WB8CKI 53, W8FGD 52, WA8ULF 51, WA8VWH 50, WA8ADU 46, WA8PPK 44, K8BYR 42, W8GVX 42, WA8QFK 41, WA8FSX 39, W8GOE 39, WA8YLW 39, W8DAE 38, W8UPD 34, WA8YHN 33, W8AJZ 31, K8HF 31, WA8TKM 28, K8ZBL 27, WA8KPN 24, WA8ZTV 24, W8LAG 23, W8MOK 23, WA8SHP 23, WA8COA 22, WA8GRR 22, K8WZI 21, WB8CHW 19, K8EHU 18, K8DDG 17, WA8ZNC 17, WA8FQW 16, W8GRG 14, W8ERD 12, WA8JEH 11, WA8TRE 11, W8IO 10, WA8LAM 10, WA8MHO 10, WA8YUB 10, W8BU 9, W8NAL 9, W8OUU 9, K8QYR 9, W8WEG 9, W8LZE 8, K8PRE 8, WA8VVN 8, WB8AKU 7, W8ETU 7, WB8CEH 6, W8RYP 6, K8LFI 5, W8AEB 4, W8AL 4, K8CKY 4, K8DHJ 4, W8ELE 4, W8JBP 4, K8EKG 3, WA8RQQ 3, W8VND 2, WA8ZUK 2, K8BPX 1, WB8EHI 1. (Sept.) WA8YTH 20, W8ILC 14, W8ELE 1

HUDSON DIVISION

EASTERN NEW YORK—SCM, Graham G. Berry, K2SJN—Asst. SCM/RM: Ruth E. Rice, WA2VYS. SEC: W2KGC. PAM: WB2VJB. V.H.F. PAM: WB2YUQ. *Section Nets:* NYS nightly on 3675 at 2300Z; ESS 3590 nightly at 2300Z; NYSPT&EN nightly on 3925 at 2300Z. *Renewals:* WA2VYT, W2ODC and WA2HGB as ORSs; WA2VYT as OPS; W2CRS and K2DNR as OVSs; K2RDS as OBS. Appointments: WB2FUV as ORS; WB2SIH as OVS. *On the club circuit:* The Westchester ARA heard W2KFB speak on Hi-Fi at its Oct. meeting. The Syracuse V.H.F. Roundup pulled many ENY v.h.f.ers. Schenectady ARA's Auction Night was held in Oct. The Communications Club of New Rochelle members heard WA2TEQ speak on digital logic circuits at its Oct. meeting. The Albany ARA also was auction-minded in Oct. *Classes:* The Schenectady Club has a class in progress at Niskayuna HS Wed.-Thurs. New Rochelle starts again Jan. 13 with a Novice course—higher grades later. Any others, please report direct to Communications Dept. at ARRL. The Hudson Council already is planning the 1970 convention with K2SJO, K2IES and other ENY stations on the committee. *Individual station activities:* The new RACES setup in New Rochelle has W2DPV as RO, assisted by WA2VEG. K2SJN is Communications Chief for the city. W2PV was in Europe in Oct. WA2DRP is now Extra Class. WB2JBT is chief op for the Red Cross Albany Cy RACES. W2TPV will be in the Cape Cod area by year-end. Look for WA2IQY from Scout Center, Rye, under the assistance of W2ZNE, K2SJO, K2IES, W2NVB and W2PBL. The station is operated by Explorer Post 51 with 7 licensed members. K2RDJ has a new 30-ft. tower with beams on 2 and 6. WA2YFR has a new HW-32A. WA2VLS is now Advanced Class and trying for WAC/QRP. WB2BXL has a new SB301-401. Attention club secretaries: Please report new officers/directors for 1970 for this column. The WB2AAL Net moved to 14.335 Nov. 15. K2JQB, K2RRZ and K2YCJ are sponsoring Explorer Radio Post in Hutchinson-Siwanoy council, BSA, lower Westchester County area. Traffic: W2FAF 210, WA2VYT 116, WA2VYS 78, WB2FUV 44, WB2VJB 40, W2ODC 38, W2TPV/2 36, K2SJN 28, W2ANV 23, W2URP 16, WA2WGS 14, WB2IYO 9, K2UYK 3.

NEW YORK CITY AND LONG ISLAND—SCM, Blaine S. Johnson, K2IDB—Asst. SCM: Fred J. Brunjes, K2DGI. SEC: K2OVN. PAM: W2EW.

NLI*	3630 kc.	1915/2200 Nightly	K2UAT	RM
NLIVHF*	145.8 Mc.	1930 MTWTF	WB2RQF	PAM
NLIPhone*	3932 kc.	1600 Daily	WA2UWA	PAM
Clear Hse	3925 kc.	1100 Daily	WA2GPT	Mgr.
Mic Farad	3925 kc	1300 Ex Sun.	K2UBG	Mgr.



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All Svc	3925 kc.	1300 Sun.	K2AAS	Mgr.
NYSPTEN	3925 kc.	1800 Daily	K2SPQ	Mgr.

**Section Nets. All times above are local.*

Listen, this is my last report as the Section Communications Manager of the New York City and Long Island Section. I withdrew from the 1969 election for a fourth term because that doggone job that provides for mama and the gang has begun to fight back. Not only that, but with a young'un in high school, another in junior high and three more in grade school, guess who cornered the market on dummies? I had an easier time with homework in college than I do with the stuff these guys are bringing home! Anyhow, NYCLI covers seven busy metropolitan counties (Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk) with a large collection of amateurs in the ARRL structure. The paper work alone is enough to trip a galloping gargoyle and demands the attention of a full-time SCM. So, by the time you read this, W2DGI, your new full-time type SCM, will have taken office. Management of a section this size is impossible without the invaluable assistance of the Leadership Appointees. I am grateful to K2OVN, the SEC during my three terms, and his staff of Emergency Coordinators who are: WB2ACH (EC-E. Hampton), W2BOT (EC-Queens 2), W2ELK (EC-Hempstead 2), W2FI (EC-Nassau Cty), WB2FXN (EC-Kings 6), WA2GAB (EC-Kings 2), W2HAE (EC-Huntington), K2HFX (EC-Suffolk Cty), W2IAG (EC-Queens 10), K2OGT (EC-Queens 6), W2OQI (EC-Brookhaven), WB2RXB (EC-Queens Cty), W2UAL (EC-No. Hempstead 2), WA2UCP (EC-Kings Cty), W2VKF (EC-Richmond Cty) and W2ZAI (EC-Nassau 10). My thanks also go to those ECs who have previously served but can not be identified because I can't locate those past records. I would also applaud the grand old traffic-handler, W2EW, who has been the V.H.F. PAM during all three terms and his cohort, WB2RQF, who has been PAM for NLIVHF since Nov. '66. The Route Managers were: NLI—W2WFL (1/64), WA2EXP (6/64), K2UFT (4/66), K2DXV (12/66), WA2UWA (5/67) and K2UAT (1/69); for NLS WA2RUE (8/64), WB2SLI (4/66) and WB2UQP (12/68). Phone Activity Managers for NLIPhone were: WA2QJU (2/64), WB2HWB (12/64), WB2DXM (11/65), WB2SLH (11/66), WB2UQP (12/67), WB2ZET (3/68) and WA2UWA (1/69). To these folks and all the many others that have been encountered at the radio clubs, meetings, hamfests, auctions, conventions, etc., it has been a distinct pleasure knowing and working with you over the past six years. It has been I that have benefited from knowing you. My thnaks also go to the Asst. SCM, K2DGI (2/65), who now becomes the SCM. Please address all future correspondence to him: Fred J. Brunjes, K2DGI, 22 Ivy Drive; Jericho, N.Y. 11753.

NORTHERN NEW JERSEY—SCM, Louise J. Amoroso, W2ZZ—SEC: K2KDQ. RM: WB2RKK. PAMs: W2PEV, K2KDQ, WA2KZF and WA2TBS.

ARPSC Section Net Schedules

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*Tfc.*	*Mgr.*
NJTTYN	3625 kc.	7:30 P.M.	MWF				WA2TAF
NJN	3695 kc.	7:00 P.M.	Dy	31	377	315	WA2BLV
NJN	3695 kc.	10:00 P.M.	Dy	31	180	110	WA2BLV
NJSN	3740 kc.	8:00 P.M.	Dy	25	120	24	WB2FEH
NJEPTN	3950 kc.	6:00 P.M.	M-Sat.	30	606	364	W2PEV
NJPON	3930 kc.	6:00 P.M.	Sun.	4	67	46	WA2TBS
NJAN	50,425 kc.	8:00 P.M.	M-F	23	219	39	WA2KZF
PVETN	145,710 kc.	7:30 P.M.	Dy	31	186	124	K2KDQ
ECTN	146,710 kc.	9:00 P.M.	Dy	31	137	110	WA2TBS

New appointments: WA2FRZ as OPS and ORS. Endorsements: W2CVW as OVS. Please note the new teletype net that was started in Nov. If you're interested and have the gear, drop in on the net. The annual NJN Net meeting was held at W2CVW's QTH. WA2BLV again was elected net mgr. with WB2FEH and WA2FRZ as asst. mgrs. WB2KPD is home on leave from Great Lakes. WA2SUR joined Navy MARS. WB2OUZ is back on with the Henry 2K. WA2CAT, WB2BYQ and WB2HEO are on 2-meter f.m. WN2JHM is a new ham in Clifton, on 15 and 40 c.w. WN2LBI and WN2LBJ is a new father-and-son team in Westwood. K2KDQ updated and mailed out a new PVETN roster. Contact him for a copy. The annual NJ Phone Net Dinner again was a big success with WA2TAF and W2PEV doing the leg work. WN2MAT is a new ham in Linden and is using the HR-10 and DX-60. WB2FEH is on 2-meters with the Gonset 4. WB2RCS is going strong with 7 new stations in his AREC group. WB2FSY reports his SSTV monitor completed and is picking up video. WA2NHH reports picking up 11LCF on his SSTV monitor during Oct. For those interested,

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• The one the Amateurs have been waiting for! A 2-Meter FM Transceiver with Galaxy's well-known fine quality and performance! This American-made, solid state, FET front end transceiver offers no compromise performance for direct or repeater communications. A full 5 watts of Power (or 10 watts with the optional AC-DC Power Booster!) Check these specs and you'll agree – it's a lot of Transceiver for only $199.95!

SPECIFICATIONS

General: Frequency Range: 143-149 MHz. • Antenna Impedance. 50 Ohms Nominal Power Req'mts: 12-14 VDC (or optional power booster) • TRANS/REC. Crystals: 146.94 MHz included.

Transmitter: Power Input: 5 watts (10 W. with pow. booster)• Freq. Control: 3 Chan. crystal controlled • Microphone: High Impedance (PTT) required • Deviation: Adj. narrow or wideband with clipper filter also adjustable for optimum clipping level.

Receiver: Sensitivity: SINAD .5uv for 12db, 1uv provides 20db quieting. • Adjustable squelch • Modulation Acceptance: FM wideband (narrow band available) • Type: Dual Conversion. FET front end for minimum cross modulation and overload • IF Frequencies: 10.7 MHz and 455 KHz • Frq. Control: 3 chan. crystal controlled • Audio Output: 3 watts (internal 3.2 speaker)

Power Booster: Provides high power operation from either 12-14VDC or 117 VAC. Makes an ideal fixed station accessory. ($39.95)

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QST-HH49

the SSTV Net meets every Sat. at 2 P.M. local time on 14.230 kc. WA2GVW has a new two-element beam. K2OOJ has a new dipole up. WA2BAN is looking for volunteers for his Essex County AREC group. WB2NYK has his new SB-610 soupe working. WB2JYM received his Extra. He reports using 250 milliwatts on the low end of 40. W2PEV published and mailed another EB net roster for his NJEPTN. We regret having to report the sudden passing of WA2DZR, who was a member of BARK. K2IEF is up to 165 worked and WA2CCF applied for DXCC 300. K2RLW is the new advisor for the Hackensack High School RC. WA2LYJ. The group is using a DX-60 and HA-350. W2ZZ has a new TH6DXX up with WB2DRJ enjoying it. All nets will be on for the SET drill. If you read this, send the SEC a message during the DRILL. Traffic: (Oct.) WA2FRZ 504, WA2BAN 491, WA2CIQ 443, K2DEL 303, K2KDQ 288, WB2FEH 266, K2OQJ 168, WA2BHJ 133, WA2TBS 98, W2EWZ 92, WB2TUL/2 77, K2TZC 74, W2PEV 60, WA2CCF 52, WA2LDX 46, WB2WID 44, WB2BUS 34, WA2DQE 32, W2CVW 29, WB2HEO 28, W2ZZ 25, *WA2GLI 20, WA2NJB 20, WB2WNZ 18, K2ZPI* 14, W2MFX 12, WA2CQC 10, WB2VXJ 8, W2IDRV 7, K2DQT 6, WA2KZF 6, K2PBP 6, W2TFM 4, K2JBJ 2. (Sept.; WA2TAF 4.

MIDWEST DIVISION

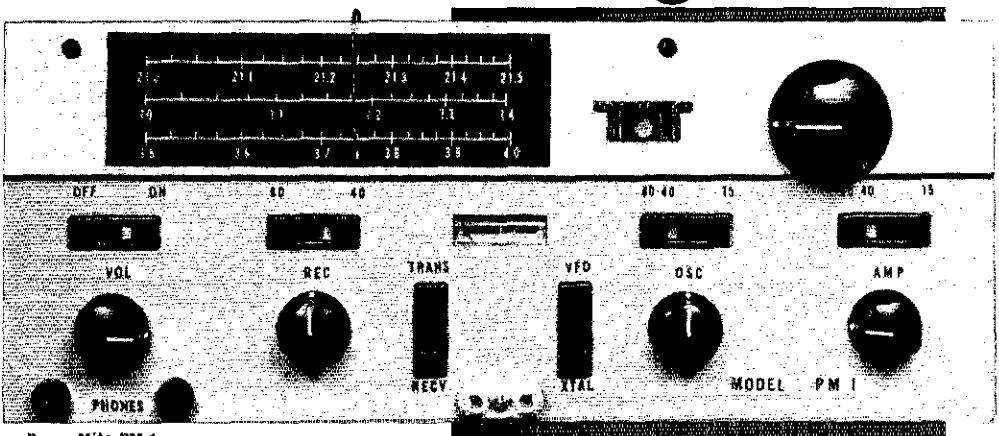
IOWA—SCM, Wayne L. Johnson, KØMHX—SEC: KØLVB, PAM: WØPZO, RM: WØLGG, ORSs: WØLCX, WØJAQ, WØLR, WAØMIT. New appointee: WØUCE as ORS. KØLVB is the first Iowa station to make the Public Service Honor Roll (PSHR). This is a list to be published monthly beginning in Feb. See page 75, Nov. '69 *QST*. WØLCX has changed his Official Bulletin transmissions to 0015Z, Mon., Tues., Wed. New Novices are *WNØAAM at Des Moines and WNØZBT at* Eldon. A new Tech. at Eddyville is WBØSZY. WAØOTQ says his traffic total is down because of school work. WØUPX announces formation of the Midwest Interstate Traffic Net on 7270 at 1800Z daily. Initial NCSs are WØTFV, WØVHU, and WØUPX. John hopes this will expedite traffic from long-haul nets to local nets. KØAZJ has renewed his 00 duties and WAØMLE, a new appointee in Iowa, has joined Dave in 00 work. WØJAQ announces formation of the 3910 Club on Sun. at 1500Z. KØLKH and 12 Boy Scouts participated with Scouts-on-the-Air during the Jamboree. New officers of the Clinton ARC are KØKPQ, pres.; WAØEFN, vice-pres.; WAØRBU, secy.-treas. Happy New Year. This is the year for our SCM election. Any candidates?

Net	*Freq.*	*Day*	*GMT*	*QNI*	*QTC*	*Mgr.*
Iowa 75	3970	M-Sat.	1830	1498	312	WØPZO
TLCN	3560	Daily	0030	212	94	KØAZJ
Iowa 160	1815	Daily	0100	615	9	KØTDO

Traffic: (Oct.) WØLCX 1184, WØUPX 281, WØLGG 117, WAØMLE 104, KØAZJ 101, WAØVJD 89, WØKB 81, KØJGI 75, WØPZO 71, WØJPJ 41, WAØVDC 41, WAØGVJ 38, WAØOTQ 38, WAØPOE 38, KØTDO 22, WAØVBG 20, WAØUVH 18, WAØVVR 16, KØKAQ 14, KØLKH 13, WAØSRM 13, WAØVZH 12, WAØQZG 11, *WØUCW 10, WAØVRJ 10, WØBW 6, KØTFT 4.* (Sept.) WAØGVJ 12, WAØEFN 2.

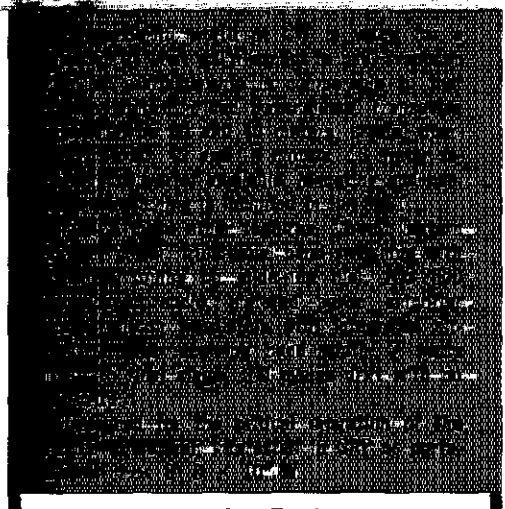
KANSAS—SCM, Robert M. Summers, KØBXF—SEC: KØEMB, PAM: KØJMF, RM: KØMRI, VHF, PAM: WAØCCW. Silent Key: WØPGU, Wichita. The Hiawatha Amateur Radio Club provided communications for the 55th Annual Halloween Parade at Hiawatha Oct. 31. 2 meters was used utilizing 7 walkie talkies and 3 base stations. WAØLLC says phone patching has let up a little. The Boy Scouts in Salina were given an introduction to ham radio *Oct. 18.* WØILR, WØCY and WAØNXD were the hosts. Zone 14 AREC Net is operational now at 7 P.M. Sun. local time on 3920 kc. The Tri-State Amateur Club has applied for the club call WØDE. A new plan for emergency operations at the Red Cross Bldg. in Wichita is in its beginning. WAØFEF and WAØPGH are spurring the plan. Congrats to KØNL on his reelection as Vice Director. In Sacramento, Calif., The CB License Plate Bill, AB-60, passed its final legislative step Aug. 7, 1969. A late Sept. report showed the Kansas *PI Net, 2 sites, reporting 112 QNI, in 12 sessions.* Oct. PI, 1 sites, reports 26 QNI, 2 QTC, in 4 sessions. Other v.h.f. activity: ARARA and Zone 1 AREC totals were 72 QNI, 4 QTC in 8 sessions. Oct. QKS, QNI 439, QTC 225, in 62 sessions. KPN, QNI 213, QTC 18. KSBN, QNI 735, QTC 84. KPON, QNI 213, QTC 717 in 31 sessions. Traffic: WØHF 301, WAØTHO 300, WØINH 215, KØMRI 196, WØLXA 143, WØCIK 105, WAØLLC 90, KØJMF 89, WØGCJ 87, WAØTZK 77, KØBXF 71, WAØUTP 60, KØPSD 39, WAØOZP 31,

where excitement begins



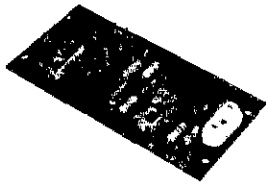
Power Mite PM-1

the $49.95 quality transceiver



MODULES

Basic PM-1 circuit modules, tuning dial, instructions for bread board mounting and interconnecting. Completely wired $29.95



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WAØOWH 24, WAØWVN 23, KØLPE 22, KØGH 20, WAØCCW 14, WØBGX 13, KØUVH 9, WØCHJ 6, WAØJOG 4, WØFDJ 2.

MISSOURI—SCM, Robert J. Pevyler, WØBV—SEC: WØBUL. New appointments: KØRPH as RM and OBS. Appointments renewed: WAØFLL as OO, OPS and *ORS. MWN certificates go to* WAØFKO, WØJKF, KØRPH, WAØTOD and WAØVRL. Net reports:

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
MEN	3885	2330Z	M-W-F	14	200	15	WØBUL
MON	3585	0100Z	Daily	23	146	58	KØAEM
MNN	7063	1900Z	M-Sat.				WØOUD
MoSSB	3963	2400Z	M-Sat.	27	1143	130	WØRTO
SMN	3585	2200Z	Sun.				WØOUD
MoPON	3933	2300Z	M-Sat.	27	428	191	WAØTAA
MWN	3585	0345Z	Daily	30	161	87	WAØRVR
MoCD/CW	3531.5	1400Z	Alt. Sun.	2	13	5	KØRPH
PHD	50.45	0130Z	Tue. (GMT)	4	106	4	WAØKUH

MoCD/CW is the Missouri State RACES Net. RACES membership is open to all classes of licensees except Novice. Applications should be sent to KØQNU. CP3BV/WØ became the 100th member of the PHDARA; Phil is a missionary in Bolivia. The PHDARA will *start code and theory classes for Novices and Generals* in Jan. Those interested, please contact. WAØQLN. WØENW has succeeded WAØIHV as pastor of Trinity Lutheran Church in Sedalia. WAØIHV has moved to Tulsa and is now WA5ZMD. WØGBJ now has antennas for 80 and 40 and WØGCL has finished a 2-meter beam. Congratulations to the Mules Amateur Radio Club at Central Missouri State, which sponsored Miss Cheryl Byers, daughter of WNØVAA, as candidate for Homecoming Queen. WAØYYR now has General Class. Traffic: KØONK 1241, KØAEM 294, WØBV 113, WAØHTN 113, WAØVRL 93, WAØRVR 70, KØRPH 53, WØBUL 44, WAØTAA 44, KØORB 42, WAØQIA 28, WAØVJN 14, WØRTO 10, WØBVL 7, WØJKF 7, K2RIU/Ø 6, WØOUD 6, WAØWQA 6, WAØKUH 5, KØJPJ 4, WAØFLL 2.

NEBRASKA—SCM, V.A. Cashon, KØOAL—SEC: KØODF. NEB I has been discontinued because of lack of activity. NEB II is facing the same unfortunate fate if activity does not increase. Your help is solicited. I believe we all owe the managers of the various nets a vote of thanks for the excellent manner in which they are fulfilling their duties for us. On behalf of the gang, thank you to WAØLOY, WAØCBJ, WAØHWR, WAØJUF, WØNIK, WØHRZ and WAØGHZ. Hearty congratulations to WØWZR on receiving his certificate of membership into the Old Timers Club. If you have anything for this column pass on the good word.

Net	*Freq.*	*GMT*	*Days*	*QNI*	*QTC*	*Mgr.*
NSN I	3982	2330/0030	Daily	1212	90	WAØLOY
NSN II	3982	0030/0130	Daily	1011	54	WAØLOY
Nebr 160	1995	0130	Daily	101	1	WAØCBJ
NEB II	3590	0400	Daily	18	2	WAØHWR
NMN	3982	1330	Daily	1092	44	WAØJUF
WNN	3950	1400	M-Sat.	550	13	WØNIK
AREC	3982	1430	Sun.	210	1	WØHRZ
CHN	3982	1830	Daily	1020	96	WAØGHZ

Traffic: WØLOD 184, WØBFV 42, WAØBOK 32, WAØCBJ 30, WAØHWR 29, KØJFN 20, WAØGHZ 19, KØDGW 18, WAØPCC 18, WAØTMG 18, WAØUPK 18, WAØJIH 17, WØGEQ 14, WAØIRR 14, WØWR 11, WØNIK 10, WAØOQX 9, WAØJXD 8, KØODF 8, WAØTET 8, WAØSGS 7, WAØTTM 7, KØECH 6, KØFRU 6, KØOAL 6, WAØVIT 6, WAØLOY 5, WØBJA 5, WØVEA 5, WØFBY 4, WØHTA 4, WAØJAY 4, WØSWG 4, KØUDW 4, WAØEEI 2, WAØFGV/Ø 2, WAØJUF 2, WØRAM 2, WØVZJ 2, WAØSOP 1.

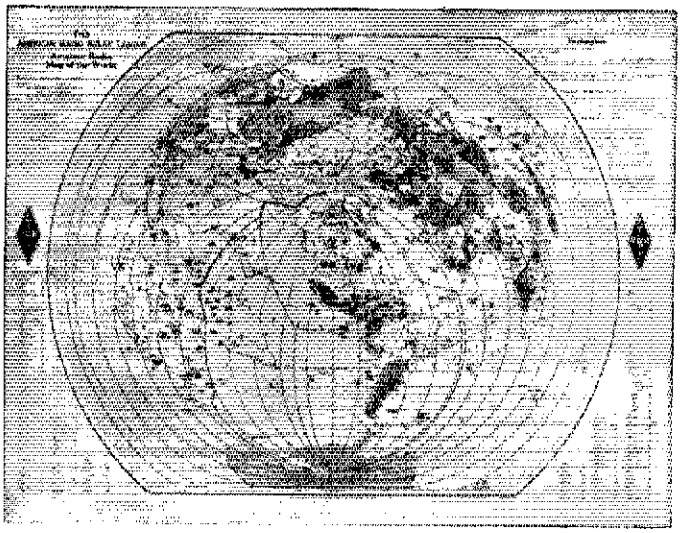
NEW ENGLAND DIVISION

CONNECTICUT—SCM, John McNassor, WIGVT—SEC: WIHHR. RM: WAIHSN. PAM: KIYGS. V.H.F. PAM: KISXF. Activity report for Oct.:

Net	*Freq.*	*Days*	*Time*	*Sess.*	*QNI*	*QTC*
CN	3640	Daily	1845	31	313	279
CPN	3965	M-S 1800 Sun.	1000	31	439	128
VHF 2	145.98	M-S	2200	21	81	10
VHF 6	50.6	M-S	2100	23	163	13

High QNI: CN—WAIHOL, W1KUO and WA1HSN. CPN—WIGVT 31; KIYGS 29; WAIHOL 27; WA1FXS 26, W1NPB, KISXF 25; WA1KMR 24; W1LUH 22; W1DQJ 21. Very happy to have W1HHR, Whitney Rd., Columbia, Conn. 06237, as SEC. He demonstrated

NEW EDITION!



We are pleased to announce a brand new edition of the **ARRL WORLD MAP!**

Just revised and updated by RAND-McNALLY, the new edition shows the latest geographical/political changes around the world. Latest changes in call sign prefixes, too.

As in previous editions, country prefixes are shown on each country as well as in the marginal index, for easy reference. Continental boundaries and time zones are clearly indicated.

A big 30 x 40 inches, heavy map paper, printed in eight colors.

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THE AMERICAN RADIO RELAY LEAGUE, INC.
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CONNECTICUT QSO PARTY

January 17-19, 1970

The Candlewood Amateur Radio Assn. invites hams throughout the world to take part in the 7th Connecticut QSO Party. *Rules:* 1) The contest period is from 2300 GMT January 17 to 0400 January 19. Each station may be worked once on each band and mode. The general call is "CQ CONN" on cw and "CQ CONN QSO PARTY" on phone. 2) Conn. stations send QSO number, RS(T) and county. All others send QSO number, RS(T) and ARRL section or country. 3) Score one point per QSO. Out-of-state stations multiply total contacts times the number of counties worked (maximum of 8). Conn stations multiply contacts times the number of ARRL sections and countries worked. 4) Certificates will be sent to the high scorer (6 or more contacts) on each ARRL section and country, also the two highest scorers in each Conn. county. Novice certificates will also be awarded. 5) Suggested frequencies are 3540 3925 7040 7275 14040 14300 21050 21300 28040 and 28880 kHz. Novices try 3740 7175 and 21125 kHz. 6) Logs must show dates, times in GMT, band, mode, QSO numbers, RS(T) and QTH. Send all logs before February 20 to the Conn. QSO Party, c/o Tom O'Hara, W1DDJ, 7 West Wooster St., Danbury, Conn. 06810. Include an s.a.s.e. for results.

willingness and ability for many years as EC and will appreciate your cooperation. Please report all EC activity to him. Goblin Patrol reports indicate EC activity that is a Public Service. See ARPS column Nov. *QST* for information on the new Public Service Honor Roll award Nov. activity will be listed in Feb. *QST*. Thanks to the Candlewood ARA, the Conn. QSO Party will be held Jan. 17 to 19. Please take part and help others get a Connecticut QSL. New officers of the Candlewood ARA are W1GSM, pres.; W1HYF, vice-pres.; WA1JGA, secy.; W1ZKQ, treas. *Notes:* WA3JSU/1 is active at Wesleyan University; WA1QJ has a new 6-meter mobile rig; WA1IIK and WA1GWS both have new Swan rigs. Murphy Marauders meets on 3860 Thurs. at 8 P.M. Congratulations to: WA1GFH, K1JHX and WA1CQW on Extra Class; WN1LOW, WN1LWD, WN1LWR and WN1MCE new Novices; East Catholic High School ARC on ARRL affiliation; and WA1JYU on making WAC! Suggested New Year's resolution: Copy W1AW every night if possible for the *correct* information on amateur radio news. A Very Happy New Year to All! Traffic: WA1HOL 204, W1EJI 202, W1EFW 171, WA1KMR 166, WA1HSN 129, W1KUO 105, WA1JVV 74, W1GVT 55, W1AW 50, K1SXF, 34, W1NBP 28, K1YGS 25, WA1QJ 23, WA1JGA 23, W1YBH 20, W1BDI 18, WA1JZC 15, WA3JSU/1 15, W1BNB 14, WA1JYE 13, W1CTI 9, W1QV 8, WA1GWS 7, W1CUH 4, WA1FXS 4.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, Jr., WIALP—SEC W1AOG received reports from WA1DXI, K1ZUP, K1DZG, W1ZQM and W1LE. Silent Keys: Ex-W1CIC, K1BPJ, W1EAB. K1AAG writes from near Tokyo but will be moving to Chitose on Hokkaido same as KA9MF and will be KA9AG on 15 and 20 c.w. The T9 Radio Club held Ladies Night at Country Squire Inn. W1AEC held a drill and an auction. WA1FNM says the Guardian Angel Net is on Sun at 1400 GMT on 7263. W1NXY got married; also W1CTR. W1BGW is on 10 c.w. Many c.d. groups were out on Halloween. WA1ELV and W1ODQ were on 2 during Hurricane Gerta to assist c.d. hq. at Segreganset. W1BRD has RTTY. Sharon ARA has started again. W1IAU is on 20 s.s.b. and 40 c.w. The South Shore Club had a meeting. W1AAU is coming along fine after an eye operation. W1PH is on 40, 80 and 160. The AROA met at the Wellesley Hills Library. WA1KNA is on 75. WA1ITZ put up a TA-33-Jr. The Catholic Memorial HSARC was in the SS with the call WA1KDL/1. New club officers are WA1KDL, pres.; WN1KZK, vice-pres.; WN1KZF, secy. For information on the 3 MARS groups write to W1QVK for Army, K1NAY for Air Force, K1TWK or WA1CTR for Navy-Marine. W1OTN had a heart attack. W1LYA/1 on 2, also WA1CGO. WA1JWM is ex-WA2PQC. W1NZ has a place in Cliff Island, Me., also the call WB4NVZ in Alexandria, Va. K1ESG has an EAN certificate. W1EJN has the new 250-watt final on the air. W1PEX is back in the BPL column. K7JBE/1 is QRT school work. W1UX is in several nets. W1ABC has Advanced

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. ½ microvolt receiver sensitivity. Voice quality, performance and rellability 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

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 Tribanders, 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

SWAN
ELECTRONICS
OCEANSIDE, CALIFORNIA

Class. W1MX completed its first 2-way moonbounce QSO with W1FZJ/KP4. Operators were WA4TTG and WB2GLQ. K1WVW is on 2 and 6 only, s.s.b., a.m., f.m. WA1FHU has a 75S-3 and an inverted "V" for 80. NEEPN had 4 sessions, 78 QNIs, 3 traffic. EM2MN had 23 sessions, 175 QNIs, 177 traffic. New officers of the Brookline HSRC: WA1JWQ, pres.; WB4AVR/1, vice-pres.; WA1LJB, secy.; WN1LAG, treas.; WN1JJI, pub. chairman. The Somerville ARC's officers are K1YUB, pres.; K1OUM, vice-pres.; WN1LSD, secy. EC K1DZG will be a trustee. W1AEL is Asst. Radio Officer. The 6-Meter Cross-Band Net had 18 sessions, 67 QNIs, 5 traffic. WN1JAZ is General; K1HRV Advanced Class. Wis AYG and BGW took part in the Sept. FMT. W1AKC is active on 2 with s.s.b. WA1MAI and WN1MAD are new YLs. W1DTY spoke at the Massasoit ARA on "Transistors." WA1BFD and XYL have a new harmonic. W1OFK has a new tilt-over tower for his beams. W1CUY is putting up a new tower. WA1s KVU and KVV have their General Class licenses. Congrats to W1DAX, who received a plaque award. Had a card from W6INI, ex-W1INI, who used to be in my father's Scout troop back in the 30s. W1GBW/W4ULR was another one. WA1FHU is a new OO. W1AOG has been endorsed as SEC/ORS/OBS. The Framingham RC now has General Class instructions. K1GIR and WA1s LFK and KQH are instructors. The Middlesex ARC had a talk on the new NCX-1000. K1QLP and WA1JSN have a theory class. WA1s KYK, KOU and LAW have the Thunderbird Net on Sat. 9 to 11 P.M. on 3935 kc. The Capeway RC met at W1ZXG's. K1IPB has an HW-12. W1RGH has a Galaxy in his car. Traffic: (Oct.) W1PEX 519, W1OJM 410, WA1EYY 336, WA1FAD 230, W1BUF 125, WA1JVL 121, W1HKJ 87, W1EMQ 75, K1ESG 74, W7JRE/1 66, WA1IFE 54, K1PRB 49, W1CTR 41, W1UX 41, WA1FHU 39, W1ABC 38, W1AOG 30, WA1IJL 30, WA1IRY 29, W1DOM 26, K1LCQ 26, W1FJN 17, WA1DPX 12, WA1DED 8, WA1JYY 7, W1MX 7, WA1DEC 6, K1CLM 5, K1OKE 5, K1WVW 5, WA1DFL 4, W1DAL 2, W1LE 1. (Sept.) W1DOM 28, WA1IJL 24.

MAINE—SCM, Peter E. Sterling, K1TEV—The Bangor c.d. radio group provided communications for the lineup and orderly progress of Bangor's Bi-Centennial Parade. This group also assisted Bangor police in their patrols on Halloween night. Each mobile unit will carry an auxiliary police officer. Amateurs involved are K1ONY, K1HXB, K1RQG, K1LLN, K1GUP, K1IVJ, K1IKI, WA1FLG. Code and theory classes are being held Wed. evenings at Bangor C.D. Hq. The present class has 4 YLs. WA1AIM, a former resident, is now stationed at Goose Bay, Labrador. New hams in Maine are WN1MCA, WN1LZL, WN1LZR. W1VA will be back on the air as soon as they get a decent antenna up. WA1KVY is a new General in the Portland area. WN1JVZ is active on 15 meters with a new TA-33 and 40-ft. tower. K1PCJ is now active on 2-meter RTTY. I am still looking for news for this column. W1FV is now a Silent Key. He will be missed by many. W1JKR is the new mgr. of the Barnyard Net and W1BHA is asst. mgr. Traffic: W1NND 46, WA1FCM 19.

NEW HAMPSHIRE—SCM, Donald Morgan K1QES—SEC: K1RSC. RM: K1BCS. PAM: K1APQ. Welcome, WA1LZY. The holders of endorsed certificates are W1ET and W1AIJ as OPSs; K1IIK as OO; W1EVN, K1IIK, W1AIJ, W1MHX, K1PQV as ORSs. We regretfully note that W1JNC has joined the legion of Silent Keys. Chappy will be remembered by his many friends as a devoted ham. Station reports are increasing. Keep them coming. News is needed for this column. K1BCS has been named co-chairman of the Disaster Committee for Kearsarge Chapter American Red Cross, which covers several towns, and he also sent 50-plus messages to State Presidents during National Business Woman's Week. Congratulations, Press. K1APQ reports 952 check-ins and 102 traffic on the GSPN. The Me-NH-Vt C.W. Net reports 30 sessions, 161 QNI, 127 traffic, average 4.2. W1RCC reports much activity in emergency work. WA1JTM reports that rotating the work schedule curtails c.w. activity. K1PQV has completed winter preparations and again is deep in traffic. Happy New Year to all. Traffic: K1BCS 520, W1MHX 97, K1QES 18, K1PQV 7, WA1JTM 5, W1EVN 4.

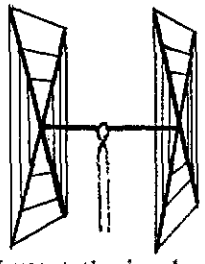
RHODE ISLAND—SCM, John E. Johnson, K1AAV—SEC: K1LII. RM: W1BTV. PAM: W1TXL. V.H.F. PAM: K1TPK. Appointment: WA1IQH as ORS. Endorsement: K1QFD as ORS. The radio clubs in Rhode Island have started their fall programs with the fol-

AHA! YOU THOUGHT GOTHAM

was a giant, automated, mechanized, computerized factory. No, no, no. Just two brothers, making thousands of the best antennas possible at low, low, low prices that reflect the tiny overhead. In QST since '53 without missing an issue!

QUADS

Worked 42 countries in two weeks with my Gotham Quad and only 75 watts . . . W3—



CUBICAL QUAD ANTENNAS—these two element beams have a full wavelength driven element and a reflector(the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount; uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a foolproof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you!

10/15/20 CUBICAL QUAD SPECIFICATIONS

Elements: A full wavelength driven element and reflector for each band.

Frequencies: 14-14.4 Mc.; 21-21.45 Mc., 28-29.7 Mc.

Dimensions: About 16' square

Power Rating: 5 KW.

Operation Mode: All.

SWR: 1.05:1 at resonance.

Boom: 10' × 1¼" OD, 18 gauge steel, double plated, gold color.

Beam Mount: Square aluminum alloy plate, with four steel U-bolt assemblies. Will support 100 lbs.; universal polarization.

Radiating elements: Aluminum wire, tempered and plated, .064" diameter.

X Frameworks: Two 12' × 1" OD aluminum 'hi-strength' alloy tubing, with telescoping ⅞" OD tubing and dowel insulator. Plated hose clamps on telescoping sections.

Radiator Terminals: Cinch-Jones two-terminal fittings.

Feedline: (not furnished) Single 52 ohm coaxial cable.

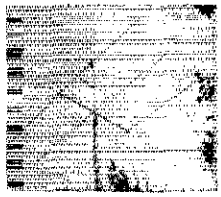
Now check these startling prices—note that they are much lower than even the bamboo-type:

10-15-20 CUBICAL QUAD	$35.00
10-15 CUBICAL QUAD	30.00
15-20 CUBICAL QUAD	32.00
TWENTY METER CUBICAL QUAD.	25.00
FIFTEEN METER CUBICAL QUAD.	24.00
TEN METER CUBICAL QUAD	23.00

(all use single coax feedline)

BEAMS

"Just a note to let you know that as a Novice, your 3-E1. 15 Beam got me RI 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"



Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history! Each beam is brand new! full size (36' of tubing for each 20 meter element for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; ⅞" and 1" aluminum alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

2 E1 20	$19	4 E1 10	$18
3 E1 20	25*	7 E1 10	32*
4 E1 20	32*	4 E1 6	18
2 E1 15	15	8 E1 6	28*
3 E1 15	19	12 E1 2	25*
4 E1 15	25*		
5 E1 15	28*		

*20' boom

ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, TI2FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2-FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1-MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2-KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1-LC, PY5ASN,FG7XT, XE2I, KP4-AQL, SM5BGK, G2AOB, YV5CLK, OZ4H, and over a thousand other stations!

V40 vertical for 40, 20, 15, 10, 6 meters $14.95

V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters $16.95

V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters . . . $18.95

How to order: Send check or money order. We ship immediately upon receipt of order by railway express, shipping charges collect. *DEALERS WRITE!*

GOTHAM, 1805 Purdy Ave, Miami Beach, Fla. 33139

lowing activities. The W1OP Club of Providence has a program on the high frequencies and the possibility of getting a 2-meter repeater station on the air. The Fidelity RC of Cranston, K1NQG, has started a course in electronics for license advancement. The Newport County RC, W1SYE, has completed a successful auction and has several new hams for its emergency net. The W1AQ Club of Rumford has plans for a 10-meter net with a base station at the club. A new antenna system has been installed in the operating room enabling the operator to switch to several antennas. Club secretaries: Please send news of activities your club is planning to the SCM. K1VYC and his XYL, K1EQE, have recently returned from a trip to the Midwest and are back at work on the Rhode Island State Phone Net. R1SPN report: 31 sessions, 500 QNI, 93 traffic. Traffic: WB2-HPW/1 128, W1TXL 111, W1YKQ 91, K1VYC 58, W1-BTV 45, K1QFD 33, K1TPK 17, WA1CXF 12.

VERMONT—SCM, E. Reginald Murray, K1MPN—

Net	*Freq.*	*Days*	*Time*	*QNI*	*QTC*	*Mgr.*
Gr. Mt.	3932	M-S	2230Z			
Vt. Fone	3955	Sun.	1400Z			WA1EDI
MNV	3885	M-F	2330Z	161	127	W1BJG
VTCD	3990½	Sun.	1500Z	19	4	W1AD
Carrier	3945	M-F	1400Z	345	4	W1KKD
VPO	3909	Sun.	2300			K1BQB
VTSB	3909	M-S	2230	570	70	WA2HSG
		Sun.	1330			

W1MRW has a new jr. operator and has been doing well in many QSO Parties. W1FIS has new 50-ft. tower up. Don't forget the Vt. QSO Party, Feb. 28-Mar. 1, 1970. Welcome to WA1GWD (Burlington); Novices WN1LPA, WN1LRT, WN1LTN (all from St. Albans), WN1LTQ (Lyndonville), WN1LUP (Richford), WN1-MCB (Winooski) and Gen. WA1LUF (Randolph). Welcome to WA2VKO/1 (Barre). More calls are being heard on the W1KOO 2-meter f.m. repeater. Season's Greetings. Traffic: (Oct.) K1BQB 141, WA1GKS 52, K1MPN 20, W1MRW 4, K1KKD 4, WA1IZD/1 28, (Sept.) WA1-IZD/1 17.

WESTERN MASSACHUSETTS—SCM, Percy C. Noble, W1BVR—C.W. RM: W1DVW. SEC:—. PAM:—. The latter two positions need filling. Who has enough League spirit to apply for either one? U. of Mass. station W1PUO is now equipped with brand-new Collins Slim Line gear and is active on s.s.b. and 80 c.w. Officers of the club there are WB2HWH, pres.; WB2-QVY, vice-pres.; K1ZBN, secy.; WA1ECO, treas. W1KK (ex-W1MNG) is working DX with a Drake 1mear and is running skeds with HI6JHL and HI6-OGH, parents of HI6JRH, a student at a Conn. college. W1ZPB now has an Eastern Area Net certificate. Also, Dartmouth College is publishing one of his projects on computers. W1FGJ, now of Pittsfield, is moving to Agawam where he will be a welcome addition to the c.w. net for the Springfield area. Now that W1BVR is on s.s.b. he is meeting many old-time friends who switched from c.w. to phone years ago. CW RM W1-DVW reports the following for the West. Mass. C.W. Traffic Net (WMN 7:00 P.M. daily): QNIs 173, number of stations 18, traffic 173, minutes per message 4.1 average. Top four stations in attendance: W1BVR 26 sessions, W1DVW 25, W1ZPB 21, K1IJV 20. WMN frequency? 3560 kc. All are welcome. The HCRA reports that Dick Stevens filled in for Les Cushman as guest speaker at the Oct. Meeting. The Conn. Valley 2-Meter Net (Mon. 9:00 P.M. on approx. 145.2) needs more checking. How about giving it a whirl? W1IC has just completed his fifth year as Net Control Station of the 10-Meter Net (Wed. 9:00 P.M. on 28.985). K1JGD, of the National Company, was guest speaker at the Oct. meeting of the CMARA in Spencer. The club address is 152 Main St. and information on meetings may be obtained from K1WNN. New members of the club are WA1KRJ, WN1IEA and WA1HKO. Traffic: (Oct.) W1-ZPB 153, W1IHI 108, W1BVR 85, W1DVW 73, K1IJV 52, W1KK 40, K1WZY 35, W1FGJ 34, W1IC 17, WA1BTU 14, WA1IZS 14, W1PUO 14. (Sept.) WA1JCT 23.

NORTHWESTERN DIVISION

ALASKA—SCM, Albert F. Weber, KL7AEQ—Via *Modulation Times*, the Anchorage Amateur Radio Club journal, KL7AZH has been named "Ham what Am" for Nov. A bill introduced to the Alaskan legislature by KL7FC has been passed, granting the issuance of vehicle license plates to hams who have five-band h.f. capability mobile, for the sum of one buck. This may be the impetus needed to get lots of mobile activity again up here. The crew around Fairbanks is starting to get hot on 160, but it seems it will be a local deal most of the time, as propagation conditions aren't so hot under the Aurora Borealis. Both the Anchorage and Fairbanks Clubs are running Novice and upgrading classes. KL7FLS, in the *NARC News*, suggested that it might be possible to run up code tapes for swapping around. Reports from Adak say that KL7FGG soon will be on with a new phased array. My only question is, who holds it up? Traffic: KL7CAH 104, KL7EKZ 4.

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. The Boise Club is sponsoring a code and theory class. The Lewiston-Clarkston Club organized a Halloween Patrol that received praise from the Nez Perce County Sheriff for its help last Halloween. WA7MXN is a new amateur in Boise. WN7BNE is a new amateur in Clarkia. WN7NCG is a new call in Gooding and WN7NBI is a new amateur in Orofino. FARM Net report: 18 sessions, 436 check-ins, 75 traffic handled. Traffic: W7GHT 270, WA7BDD 53, W7IY 20, K7CSL 14, W7ZNN 8, W7FIS 2.

MONTANA—SCM, Joseph A. D'Arcy, W7TYN—SEC: W7RZY. PAM: W7ROE. Nets:

Montana Traffic Net	3910	0100	M-F
Montana Post Office	3950	0245	Daily
Butte 2-Meter F.M. Net	146,760	0300	Sun.

I received the following information from W7LR at Bozeman. W7YB, the club station at MSU, has a new T4XB and R4B on. They are using antennas on a 100-ft. tower with log periodic antennas on 315 and 7 Mc. The LPs are on 150-ft. towers. Bob is active with Explorer Post 660. He is doing antenna and ionospheric research to prepare for another *QST* article. See your Dec. 1968 *QST* for one of Bob's fine articles. The Helena Club has changed meeting nights to the 1st and 3rd Mon. They have a code and theory class on Mon. evenings. The new officers of the Capitol City Club are W7BIS, pres.; K7YLR, vice-pres.; K7SRA, secy.; W7-MKB, editor of *SPARKS*. WA7JWF has been active in Navy MARS. W7CPS has been in the hospital in Anaconda and Missoula. W7DB has built up a nuvistor preamplifier for his f.m. rig on 2 meters. The Butte Club participated in the SS Contest with a breakfast for all after operations. WA7IZR visited with the SCM to talk over the traffic in the state. Send your traffic count each month to me to help us get the total up for the Montana section. Traffic: WA7IZR 170, W7LBK 41, K7EGJ 36.

OREGON—SCM, Dale T. Justice, K7WWR/WA7KTV—SEC: W7HLE. RM: W7ZFH. PAM: K7RQZ. Oct. net reports: K7IFG and WA7HKV report for the BSN, sessions 61, traffic 171, contacts 207, check-ins 1260. K7-YQM reports for the AREC Net, sessions 31, traffic 53, contacts 81, maximum number of counties 20. K7GGQ reports for the OSN, sessions 18, traffic 25, check-ins 113. Net times:

Net	*Days*	*Time*	*Freq.*	*Mgr.*
BSN	Daily	0130Z	3908 kc.	K7IFG
BSN	Daily	2000Z	3908 kc.	WA7HKV
AREC	Daily	0300Z	3908 kc.	K7YQM
OSN	Tue.-Sa	0300Z	3585 kc.	K7GGQ
OEN	Daily	0200-0300Z	3980 kc.	W7VIF

BSN = Beaver State Net. OSN = Oregon State Net. OEN = Oregon Emergency Net. WA7FTN reports running 532 patches to S.E. Asia in Sept. and 917 in Oct. WA7ELO ran 99 patches in Sept. So, Oregon Club members helped K7ACR dismantle his tower for the move to Eugene. Your SCM attended a meeting of the Rogue River Club with W7HLF, K7YQM and W7DEM present. Twenty-eight persons attended. WA7JRT is on 80-meter RTTY. WA7KDU is on 75 regularly. K7YQM has a TH8DX beam up and enjoys 10 meters. Traffic: K7-ROZ 705, WA7HKV 157, WA7FFS 157, K7NTS 148, K7-IFG 68, WA7KDU 67, WA7KIU 66, K7OUF 59, WA7-RYP 51, K7WWR 43, K7YQM 37, WA7ICX 20, W7BNS 16, W7MLJ 15, W7DEM 12, W7HLF 11, WA7JAU 10, WA7JAW 7.

WASHINGTON—SCM, Harry W. Lewis, W7JWJ—With the USS *New Jersey* tied up at the Bremerton docks the traffic through W7AXT has increased. Director Thurston, W7PGY, attended the ARRL Board Meeting at Newington, Conn. WA7JFX is now Mon. NCS on NSN. W7USO has been elected director of NSN with WA7DXI the outgoing director. Last month this column referred to NSN as "Novice" instead Northwest Slow-speed Net; also did not get traffic listing from W7ZIW, (past mgr. of WSN) listed correctly. We accept three lashes from the Wouff Hong. Oct. found W7AIB vacationing in Nevada. K7ELK has been looking for any hams who are interested in flying. Thanks to OBSs such as W7BUN for consistent transmissions of Bulle-

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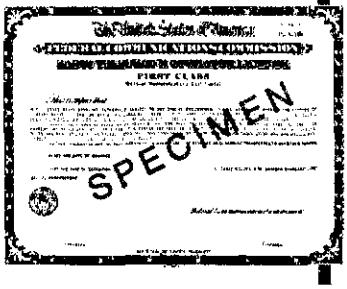

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tins. A difficult job is that of OOs and K7LET is to be commended for his monthly observations. The new mgr. of WSN is W7AXT. WA7JBM reports that daily messages still are being handled for servicemen passing through the servicemen's lounge at the Seattle-Tacoma Airport. W7RJW reports that the BEARS Emergency Committee has received a certificate and letter of appreciation from the Northwest Chapter of the Retarded. WA7LMO reports that the Issaquah High School has just formed a new radio club. W7GRS is now RN7-QNB for Tue. WA7KOB, WA7UT and W7GRS have now qualified for WSN section net certificates. The AREC Net meets on 3930 kc. Sun. at 10 A.M. PST and is developing plans for the next SET operation. Traffic: W7BA 1781, W7AXT 436, WA7DZL 379, W7KZ 365, WA7HKR 259, WA7KOB 259, W7PT 197, K7CTP 144, W7BQ 143, WA7DXI 97, W7APS 73, W7MCW 68, WA7-JFX 65, W7GYF 48, WA7LOQ 46, WA7LOL 38, W7FVT 37, W7USO 34, WA7EDQ 33, WA7ACQ 30, W7JWJ 30, K7KPA 27, WA7LMO 19, WA7BDB 13, K7OXL 13, WA7JPC 12, W7BUN 11, K7YFJ 10, K7GZI 9, WA7-HGB 9, K8SUX 8, W7AIB 7, K7OKC 7, W7IEU 5, W7-ZHZ 4, W7WPR 3, WA7HSJ 2, K7LRD 2.

PACIFIC DIVISION

EAST BAY—SCM, Paul J. Parker, WB6DHH—W6ZF reports that there will be a change in his transmissions of the Pacific Division Bulletins to the 1st and 3rd Mon. at 0400Z on 3540 kc. instead of the 2nd and 4th Mon. Ron also will have the Bulletins on 7070 and 14,070 kc. simultaneously very soon, so if you can't hear him on one frequency you can try another. W6IPW reports that his total points for traffic are the lowest he has had in four years. I received a first, station activity report from Seoul, South Korea. W6CBF has been real good about keeping me in reports and this is no exception. W6RGG is transmitting the ARRL Bulletins on 146.54 Mc. for the locals. Keep an ear open for all the latest DX news from Bob. K6PJ reports that 15 meters has been good for DX lately. John also reports that his activities in the CD Party seemed rather futile because of the low power he was running. WA6DIL reports that everything is running EB on NCN/2. Dave has been appointed manager of the slow-speed traffic net and has requested me to make a request of all those readers who would like to get into the traffic thing to step up and try to pass a few on the Training Net. NCN/2 meets daily on 3630 kc. at 0330Z, and is a very good way for budding traffic people to get their feet wet. If there is an incentive to increase your code speed for that big test there is no better way than to get on and pass a little traffic. Hope to see some new faces on the net. Traffic: WA6DIL 293, W6IPW 117, W6UZX 12, K6PJ 2.

HAWAII—SCM, Lee R. Wical, KH6BZF—SEC: KH6GQW. RM: KH6GHZ. PAM: KH6AD. QSL Mgr.: KH6DQ. ECs: KH6GPQ, KH6GLU, KH6GKV, KH6-GKD, W7UZH|KG6, KH6BAS. Races nets can be coordinated with KH6AIN.

Net	*Freqs(Mc.)*	*Times(GMT)*	*Days*
Friendly Net	7.290	2030Z	M-F
Boy Scout Ham Radio Net	21.360	1800Z	Sat.
Pacific Interisland	14.330	0830Z	M-W-F
S.E. Asia Net	14.320	1200Z	All
Marianas Islands Net	3.860	0830Z	2,3,4th Tue.
Gecko Net (Marianas is.)	14.315	1000Z	Thurs.
Pacific DX Net	14.265	0600Z	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 EC Kauai, KH6BAS. Those interested in OO, OPS, ORS, OVS and EC work should contact your SCM. The 1970 ARRL Simulated Emergency Test (SET) will be held Jan. 24 and 25, '70. Monitor your local emergency net frequencies. Make contact with your local EC or Island Radio Officer. Take immediate steps to follow any prearranged plans. Stay off the air unless or until you are *sure* you can be of assistance. In widespread emergencies, monitor WIAW for latest Bulletins and news. SEC KH6GQW is in charge of promoting emergency communications throughout the Hawaii Section. His phone contact in Honolulu is 485-693. KH6GRG was heard recently in the CQ WW Contest, his first contest. We welcome back to the area Jack Chalk, formerly KW6EJ, now at Ponape in E. Carolines. Seen at the airport recently were KH6-GQW and W3RU. At Kaiser's hospital recently was KH6BZF for minor surgery and W1QV dropped in while here on business. KR6NR has gone back to Chicago where he'll return to W9JZK chores. Marianas EC W7-

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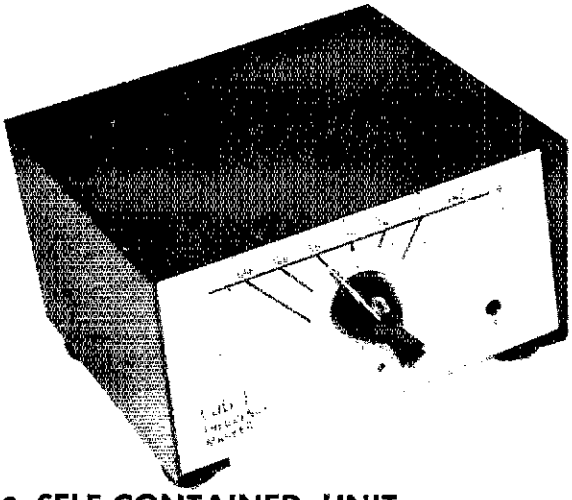
UZH/KG6 is on with a new Drake C-4, MN-4 and NewTronics 4BTV antenna. KH6FRO now signs W6LCT after a year in XV5-Land. KH6GLU, EC Molokai, has new 160-meter gear going. KH6GJN still is Net Control of the Confusion Net. W6ZRJ, our Pacific Division Director, transmits code on Tue., Wed. and Thurs. at 0530 HST on 3590 and 7128 kc. GMT time would be 0330Z but add a day to each the above. Remember the joint Pacific/Southwestern Division Convention, Hacienda Motel, Fresno, Calif. May 14-16, 1970. Best of Holiday Wishes from the Hawaii Section Staff. Traffic: (Oct.) KH6GRG 68, KH6GQW 24, KH6BZF 12, W7UZH/KG6 5, (Sept.) KIHNO/KH6 40, KH6GLU 2.

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: WA7BEU, Carson City and Reno amateurs provided communications for the Nevada Admission Day Parade and received good publicity in the local papers, with Governor Paul Laxalt extending his good wishes. Southern Nevada ARC of Boulder City reports its convention SAROC will be held Feb. 4-8, 1970, at the Stardust Hotel Convention Center, Las Vegas, Nev. WA7BEU, W7PBV and W7PRM have been busy checking TV sets with their new scintillators. W7HOP, K7QOP, K7YNV and K7ZAU continue to do a good job putting out the *WCARS-7255 Sentinel*. The Sierra Amateur Radio Society hosted an f.m. meeting in Sparks with great success. K7QGO is district chairman for the Nevada YLRL. K7RKH is now W6LET. W7TVF still is scheduling any DX or statewide amateur needing Nevada. Don't forget to send your Nevada QSO Party log in. Look for a one-time-only special event call being used by WCARS at SAROC, during Amateur Radio Week in Nev. Feb. 1-8, 1970, as proclaimed by Governor Laxalt.

SACRAMENTO VALLEY—SCM, John F. Minke, III, W6KYA/WA6JDT—The Mt. Vaca Radio Club, a new club recently formed in the section, has become affiliated with the ARRL. My sources show that most Sacramento Valley clubs are affiliated with the League. If your's isn't, why not? Speaking of clubs, when was the last time your club made an effort to acquire new members? And you non-club members, when was the last time *you* made a visit to a local group or club? Never? You know, radio amateurs are really a wonderful bunch of people. Why don't you go and meet with them personally? W6TEE is the 1970 chairman of the California Amateur Relay Council. W6ZRJ, our Pacific Division Director, attended the Nov. RAMS meeting and showed the latest PR movie made by the League. The RAMS now meet in the club house at Hagginwood Park in North Sacramento. Our section's standing was 54th for 1968 in traffic-handling, up two from 1967. 2852 pieces of traffic were reported handled from 90 reports. You traffic men: Please send me your reports—every little bit helps. W6KYA finally made the BPL listing. Let me tell you, earning a BPL is a lot of hard work. Traffic: (Oct.) W8VDA/6 247, W6KYA 112, K6YBV 104, W6LNZ 47, WA6RBD 12, WB6WJO 10, WB8ZJV 9, W6VUZ 5, WA6OWH 4. (Sept.) WA6UIT 29, WB6ZJT 11, WA6RBD 7, WA6OWH 1.

SAN FRANCISCO—SCM, Hugh Cassidy, WA6AUD—SEC: W6WLV. Heard during Sweepstakes phone week end were W6RJP, K6TVL, WA6OQZ, W6KWE and WA6AUD. W6WLV has the Extra Class type license now. WA6BYZ made the BPL in Oct. for the 10th consecutive month in 1969 and by now should have a full 12-month BPL. WA6JDT presented some BPL certificates to Joe at the NCN gathering at Livermore in Oct. WB6PQE is the new pres. of the K6GWE repeater group and also is the new pres. of the Marin County Radio Club. K6JGX received the Ham of the Year Award from the Marin Radio Club at its Annual Christmas Dinner at the Deer Park Villa in Fairfax. W6CXU spent some time in the hospital after using his Volkswagen for a weight-lifting exhibition. WA6JUV missed the Oct. CD Contest because the *CD Bulletin* arrived two days after it was over. W6KVQ has a doublet up at his new Navarro QTH but misses the beam. W6EQA got his Extra Class license to make five in one San Francisco city block. He joins W6AU, W6RQ, K6BI and W6M8M elbowing for band room. The Tamalpais Radio Club in Novato is looking for blood—new preferably. K6CWS has removed to Sebastopol after a siege in the hospital. W6BUY again is looking for DX after a long lay-off and is putting up antennas on his new QTH on the Tiburon peninsula. New appointees are W6KWE and K6KQN as OVSs. Traffic: WA6BYZ 293, W6WLV 74, W6KVQ 42, W6BWV 16, WA6AUD 10, W6CYO 1.

SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6JPI—It is my sad duty to report the passing of W6NKZ. Clark was liked by all, loved amateur radio, loved to tinker and build, and nothing could stop him



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in his endeavors. He was a past pres. of the Fresno Amateur Radio Club. He died of a massive heart attack on Oct. 22. The Kerman Harvest Festival was supplied with mobile communications on 450 Mc. through a repeater with good results. Those assisting were WA6VFU, WB6JQC, WB6IPZ, WB6KPD, WB6SVY and WB6TFU. W6GUZ is back on the air after many moons with a GT-550. W6UHN and W6PIX attended the Southwestern Division Convention in San Diego. W6WQV is on 75 s.s.b. W6IIK is heard on 75 s.s.b. WA6IOT, WB6RLX and WB6GVQ are on 2-meter f.m. There is a new 2-meter net that meets on Mon., Wed. and Fri. at 2100 on 144.35 Mc. Everyone with a 2-meter rig is asked to join. WA6GQP is working on an 80-meter beam. WA6HCJ is checking into the WCRS Net. I would like to wish everyone of you a very Happy New Year. Traffic: K6KOI 194, WA6SCE 103, WB6GJG 22.

SANTA CLARA VALLEY—SCM, Albert F. Gaetano, W6VZT—SEC: W6VZE. RM: WA6LFA. SEC W6VZE was asked by the San Mateo Police Dept. to provide some communications for Halloween to assist in handling three little conflicts that occurred. W6NVO, WA6OXE and K6VWG provided the mobile help while W6HQD monitored and W6LPS acted as the control station. The chief of police was pleased with the assistance. W6BVB was active in the QSO Party and made 102 contacts. He also was active in the CD Party in which he made 289 contacts in 58 sections. W6BPT has been busy redecorating his shack. W6AUC has been experimenting with an indoor antenna and has found it works pretty well. WA6DIL, the new NCN/2 net mgr., has been a General for about a year and already is a good c.w. traffic man. WA6OXE has made RPL two months in a row. Would like to thank W6ZRJ for his willingness to continue as Pacific Division Director. He sure has been doing a good job which has required a great deal of his personal time. More interest has been shown lately in the auctions by the various clubs in the area. This appears to be a good way for clubs to raise money, guys to get rid of equipment they no longer want and other fellows to pick up stuff they need at a good price. It looks like everybody comes out ahead. Traffic: WA6OXE 1047, W6RSV 739, W6YBV 209, WA6LFA 157, W6DEF 90, W6VZT 70, W6AUC 55, W6BPT 16, W6OII 9, W6BVB 7.

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: W4HJZ. WA4FFW was the highest scorer in the nation in the 1968 Pa. QSO Party. Mac won top honors for the highest score in the nation again last month in the N.J. QSO Party. His score in the N.J. contest now stands as the highest ever submitted for an out-of-state station in the history of the Englewood Radio Association, which has sponsored the N.J. contest for the past 4 years. Governor Robert Scott of N.C., will proclaim the week of Nov. 17-23 as Amateur Radio Week. The Buncombe County Radio Club held a fine meeting in Asheville. WB4HGT is liaison to 4th RN. WB4BGL operated SS from W4ATC. K4SKI added 2 more elements to his 21-Mc. beam and it has 14 elements on a 120-ft. boom. Wow!

Net	*Freq.*	*Time*	*Days*	*QTC*	*Mgr.*
Then	3923 kc.	0030Z	Daily	113	WA4VNV
N.C. SSB (Sept.)	3938 kc.	0030Z	Daily	13	WA4KWC
NCN (E)	3873 kc.	2330Z	Daily	45	W4IRE
NCN (E) (Sept.)	3573 kc.	2300Z	Daily	71	W4IRE
N.C.S.S.B.	3873 kc.	0030Z	Daily	27	WA4KWC
NCN (L)	3573 kc.	0300Z	Daily	75	WB4GHK

Traffic: W4EVN 221, W4IRE 122, WB4HGT 52, WA4VNV 51, K5TGA/4 46, K4EO 34, WA4GMC 31, W4ATC 30, WOAVS/4 29, WA9JSX/4 25, WA4UQC 10, K4ZKQ 9, WA4KWC 8, WB4ILO 5, WA4RVI 4, K4TTN 2.

SOUTH CAROLINA—SCM, Charles N. Wright, W4PED—SEC: WA4ECL. PAM: W4VFO. RM: K4BSS/4.

SCPN	3930 kc.	0830 and 1530 EST Sun.,	12 Noon Daily	
SCN	3795 kc.	2345Z	Daily	Oct. Tfc.: 5
SCSSBN	3915 kc.	0000Z	Daily	Oct. Tfc.: 11

New ORS appointee: WA4OWY, who has returned to Charleston. K4JIF and K4FR, both doing fine jobs on SCN. K4CSZ, in Clemson, has been appointed OBS. The Anderson Radio Club reports that it participated in an exercise demonstration Oct. 18. W4VHH and K4GIL report on extensive tropo openings on both 2 meters and 432 Mc. during Oct. W4VHH worked four new states on 432 during the period, bringing his total

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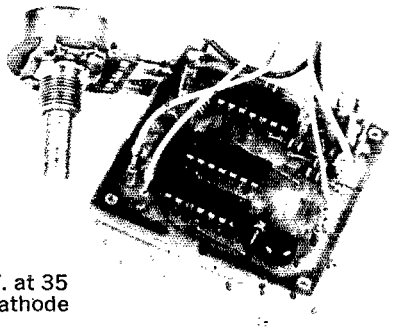

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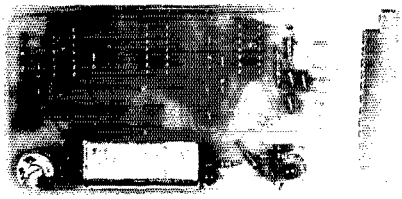

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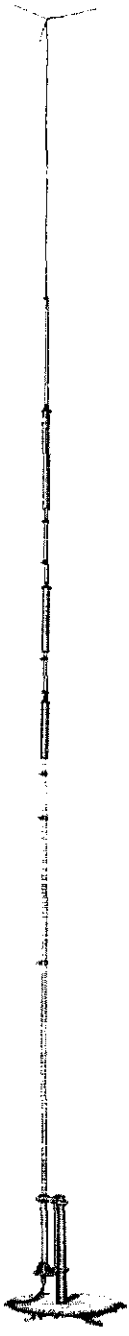
up to 12. K4GL also raised his 432 Mc. states total to 7 during the opening. Be ready for another Simulated Emergency Test in Jan. Look for further details in *QST* and bulletins. I will not be a candidate for the SCM position in the coming election. Check the Operating News section for details on nominating petitions. Traffic: K4BSB/4 187, W4NTO 57, K4OCU 25, W4JA 12, W4PED 11.

VIRGINIA—SCM, R. J. Slagle, K4GR—SEC: WA4PBG, PAM: W4OKN, RMs: WA4EUL, K4MLC, W4SHJ. Since this is the first monthly report of your new SCM, it is hoped that some leeway will be tolerated from the excellence that we have become accustomed to from W4SHJ for the past years. Monthly activity reports should be speeded up to insure inclusion; deadline for mailing in the report is the 7th of each month. Keep those cards and messages coming right after the close of the month reported on. I am sorry to announce that K4LMB tendered her resignation as SEC to each of the SCM contender during the election period and after election I was unable to get her to withdraw it. Her fine performance and records will enable WA4PBG, appointed as her successor, to more quickly pick up the reins. OBS (v,b,f,) appointment went to WA4YXK; OBS (late session VSBN) to WA4JJF to augment our Bulletin coverage. W4KFC attended the Board meeting at Hq. and was visited by WØDX. WB4FJK has K4KDJ as Va. Tech back on the air. WB4IRA and K4RHC earned V8BN certificates. Good activity was reported in the CD Party. WB4FDT gets back from college on week ends to protect his interests. WB4DRB reports a receiver at college so we have to watch our remarks on VFN and V8BN. W4NLC is working on Extra Class. K4JM is working on antennas. QSO parties and contests. W4ZM reports meeting over 10 hams, attending RSGB in London and IARC in Geneva during a trip to Europe. The city of Alexandria presented certificates of appreciation to 14 amateurs for their work during the July flood emergency. Patrick Henry ARC and S.E. Va. Wireless Assn. made ARRL affiliation. W4HU made an average error of 14.9 p.p.m. in the Frequency Measuring Test. Traffic: (Oct.) K4KNP 270, W4UQ 171, W4NLC 128, WA4JJF 107, W4QDY 107, WA4EUL 65, K4GR 56, K4TSJ 49, K4MLC 38, W4OKN 38, WB4GTS 22, W4ZM 14, W4GEQ 13, WA4WQG 12, K4KDJ 11, WB4FDT 10, WA4NJG 9, W4THV 9, WB4IRA 8, W4MK 7, WA4MJF 6, W4OP 6, K4BTQ 5, K4JM 5, W4RFC 4, W4KX 1. (Sept.) W4SQO 415, WA4JJF 31, WA4EUL 27, K4TSJ 2, WB4GTS 9, WA4WQG 7, K4BTQ 6.

WEST VIRGINIA—SCM, Donald B. Morris, W8JM—SEC: W8EV. PAMs: K8CHW, W8IYD, W8DUW. Net mgrs.: WB8AQE, WB8BBG. Our League President WØDX, was a surprise visitor to the Roanoke Division Convention in Huntington. It is with deep regret I report the passing of K8MYV, of Grafton. The Tri-State ARC 2-Meter Net meets at 8 P.M. the 2nd and 4th Thurs. on 146.760 with K8SXO as NCS. New officers for the West Va. State ARRL Convention, Jackson's Mill, July 4th and 5th, are K8BCF, pres., K8MYU, vice-pres.; K8LSN, secy.; K8NVF, treas. The W. Va. Phone Net with 31 sessions, 419 stations handled 25 messages. C.W. Nets held 36 sessions, 1[illegible] stations and 68 messages. K8CHW, Net Control for the Mountain State Emergency Net, reports 30 sessions. WA8YWK, a new OBS, has 30-w.p.m. CPC. WB8BBG, W8CKX and W8HZA are quite active in 8RN. 8RN held its 3rd Annual Regional Meeting in Huntington with TARA as the host club. *West Va. Hillbilly*, a weekly newspaper published in Richwood, devotes a column to state amateur activity. New ECs are K8BCF, WA8PFB and W8HVB. WBJWX a new ORS is active from Huntington. The Weirton ARC 2-Meter Net meets on 146.880. Traffic: W8HZA 129, WB8BBG 6, W8CKC 54, WA8NDY 38, WA8ZZI 17, W8JM 1, WA8YHH 11, WA8LFW 8, WA8WIX 7, WA8WCK 1, W8DUV 5, K8QEW 4, WA8AGC 1, K8CFT 1, W8LYV 1, K8QYG 1, WA8YWK 1.

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, Charles M. Cotterell, WØSIN—Asst. SCM: Neal Morris, KØTIV. SEC: WAØHUA. RM: WØLRN. PAM: WØCXW. V.H.F. PAM: WAØLIK. Wish all you ARRL members on the Western Slope would get in touch with KØTIV, as he is the Colorado section's representative for that part of the state. OOs WØGIL and WØLRW did quite well in the past FMT and are sending out some cooperative reports. WØWYX now has a mobile on 444.45 on his snowplow. Colorado Slow Speed Net, CSN, has had a few sessions with KØJSD, WØLRW and WØLRN as NCSs. Get your c.w. feet wet Sun. evenings on CSN. KØTIV is about on RTTY. The wind blew down KØ



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It's the 14AVQ, the most popular vertical under the sun.

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And the 14AVQ is the only trap vertical at DC ground. So you get practically no static or lightning problems.

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ECR's new vertical, W4UDS and WAØKOQ report CD Party activity. The SCM, RM, PAM and V.H.F. PAM made the Boulder Amateur Radio Club meeting in Oct. Why not send in *your* traffic report each month? Thanks to all who do and all who are helping out. The SEC reports 330 AREC members in Colorado. He still needs some ECs as was shown last month. Net reports from the Hi-Noon Net: KØIGE, mgr. total QNI 1014, QTC 138, time for 31 sessions 1235 minutes. For CCN: WØUAT, mgr., QNI 121, QTC 87, time 532 minutes for 30 sessions. Columbine Net: WØGDC, mgr., QNI 985, QTC 111, time 1580 minutes. Traffic: (Oct.) KØZSQ 648, WØWYX 210, KØJSD 109, WAØMNL 71, WØSIN 42, KØSPR 34, KØECR 27, KØTIV 26, KØMNQ 22, WAØPGM 17, WØUAT 17, WØLRW 7, WØOWP 4, WAØHLQ 2. (Sept.) KØZSQ 641, WAØLVM 38.

NEW MEXICO—SCM, James R. Prine, W5NUI—The New Mexico Net (NMN), 3570 kc. at 0230Z, is providing good training and experience in c.w. traffic. Check in and bring your fist up to steam. Net certificates have been issued to regular participants of the NMN. A series of difficulties has hampered the 2-meter repeater system. Modifications and improvements are producing a versatile and reliable network. I would like to see more of the v.h.f. traffic handled as formal messages and reported in the monthly station activity. W5DO has received a QSL subsequent to contact with JA1RST on 160 meters for a claimed first 5th district-JA QSO on this band. K5MAT has a new Drake R4B receiver which helps account for that excellent traffic count. WA5UNA has assembled a new SB-301 receiver. Prosperous New Year to all. Traffic: K5MAT 132, W2-ZVW/5 67, W5DMG 27, WA5UJY 20, W5NUI 18, WA5-UNA 14, WA5OHI 9, WA5MIY 5, WA5BLI 4, K5IBJ 4, WA5JNC 4.

UTAH—SCM, Thomas H. Miller, W7QWH—SEC: W7WKF. RM: W7OCX. Nets:

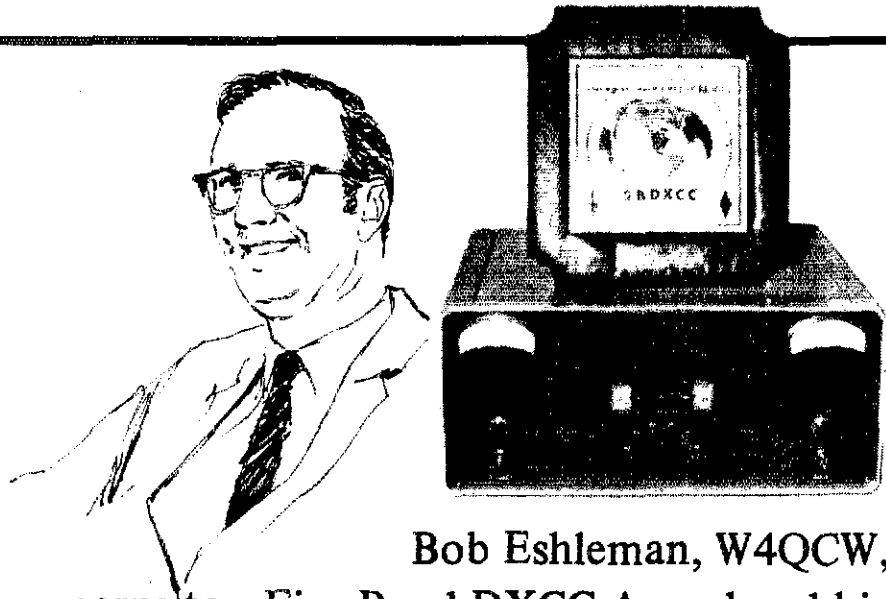
Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*
RUN	7272 kc.	1930Z	Daily	31	736	88
UARN	3987.5 kc.	1530Z	Sat.-Sun.	—	—	—

K7CLO has received the RUN certificate. This is certificate No. 70 and represents a fair amount of time spent in traffic and public service. Field Day scores recently published in *QST* for 1969 indicate a need for a change in scoring procedures. The Utah DX Assn. and the Utah Amateur Radio Club were No. 1 and No. 2 in the nation in the number of contacts made on Field Day but finished third and seventh, respectively, in the standings. It seems that stations in the mountain states do not have the advantage of the low-power multipliers on v.h.f as do groups in the large metropolitan areas. K7ZJS is doing his usual stellar job in sending out OO reports to amateurs with wayward signals and practices. Stan sent 72 notices during Oct. W7LQC is handling a large volume of Vietnam phone-patch traffic via Army MARS. Traffic: W7EM 115, W7OCX 72, WA7LES 3, W7QWH 2.

WYOMING—SCM, Wayne M. Moore, W7CQI—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 7260; Wx Net, Mon. through Sat. at 0630 on 3920; PO Net, 1900 Mon. through Fri. on 3950. It is my sad duty to report the loss of two Wyoming hams in Oct.: K7AUI, of Cheyenne, the state MARS director and W7AEC of Pinedale, one of our oldest and best liked hams. A couple of new voices from Wheatland: W7HAP and WA7-NLV. W7NKR has been accorded the honor of being elected to attend an electronics course at the Atomic Energy Commissions Oakridge, Tenn., facilities. W7VTR has been giving a series of lectures and demonstrations for the Casper Club to help in the upgrading of licenses. It was close, but Cheyenne won the SCM's Field Day trophy. Traffic: K7NQX 332, WA7CLF 134, W7GMT 58, W7TZK 52, W7YWW 43, K7VWA 24, W7HLA 20, W7-SDA 14, K7WNF 14, K7QJW 12, W7VJI 1.

SOUTHWESTERN DIVISION

ALABAMA—SCM, Donald W. Bonner, W4WLG—SEC: K4KJD. PAM: WA4EEC. RM: W4HFU. Congratulations to the Birmingham Radio Club (W4CUE) on its fine efforts in FD this past year. It was the number one club in the state. What happened to HARC this year? If they can conquer Murphy's Law WA4HGN and W4HHK may make the *first* two-way contact between Tennessee and Alabama—on 2300 Mc.! They are both very active on the V.H.F. and U.H.F. bands and build much of their own equipment. Good luck, boys. WB4-NCT has his General Class ticket and a new TR-4.



Bob Eshleman, W4QCW, earns top Five Band DXCC Award and his "trusty" 2-K amplifier was with him all the way!

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WN4LZK, WN4MUR and WN4OEI are new members checking in regularly to AENO on 3725 (2330Z daily). Good to hear K4PBN on the air with his new SB-101. Understand that the Mobile Radio Club is generating good interest in 2-meter activity. K4WHW operated the Boy Scout Jamboree as portable Decatur Jr. High. Every year, during the cold, lonely months of winter, there is an exciting event that takes place, usually at Clanton (the geographic center of the state). This is the winter-time "eyeball hamfest," or whatever you wish to call it, a good time to meet each other and have a good time chewing the rag. Let's every one go next year. Traffic: W4FYY 154, W4HFU 135, WB4EKJ 63, K4AOZ 60, WB4JMH 36, W4UBM 32, WB4BLX 24, WB4LNM 19, WB4KDI 18, WB4KSL 18, WB4LAO 16, WA4JBM 10, WB4CJC 9, WB4LAL 8, K4WHW 8, W4DGH 5, K4-KJD 5.

EASTERN FLORIDA—SCM, Ronald J. Locke, W4-YPX—SEC: W4IYT, Asst. SEC: W4SMK. RMs: K4-EHY, (c.w.), W4RWM, (RTTY), PAM 75; W4OGX. PAM 40; W4SDR. PAM V.H.F.: WA4BMC. Again WA4SCK comes out way ahead of the field in traffic—and he was on vacation! K4BV was next up with fine operation from the Daytona Beach Home Show and Volutia County Fair. W4LEP, WA4SCK and W4DFZ teamed up for the Boy Scout Jamboree on the air and demonstrated amateur radio to over 80 Scouts and Cubs. They originated 30 messages to various scout units in almost as many states. Gator Net Asst. Mgr. W4EHW reports W4NVU/4 is on the air at tht Miami Museum of Science. QFN Mgr. WB4HJW requests that all NCSs make reports daily. W4YNM says the Columbia ARS station now is WB4MLD. WA4IK1 is back in Tampa after 4 years in Vietnam and Japan, much to the joy of XYL WB4MXF. GN frequency standard K4FQP is 6-metering with a 40-ft. stick. W4IZ/4, NOFARS club station was tops in Field Day in Florida, the highest W4 in the three-transmitter class and sixth in the nation. Any challenges? K4FMA qualified for OO-I (again) and hopes for 5 p.p.m. in the next FMT. K4IEX also qualified neatly. Lake ARA has published a new directory-write K4LPS for one. SEC W4IYT reports that K4IWT at Red Cross Hq. has a new 500-C and is airborne. OBSs: Please file your annual report to Hq. Kennedy Space Center station WB4ICJ now is affiliated with ARRL. I can't push hard enough in reminding League members that since the new restrictions are now in effect it is quite important for the DXer and trafficker to upgrade and take advantage of the less crowded spaces on the bands. Old dogs can learn the new tricks. Make the effort and give it a try. Bet it's not as difficult as you thought! Remember, W1AW has morning sessions daily 20 kc. inside the c.w. bands. Traffic: WA4SCK 1225, K4BV 645, WA4RQR 561, W4IJK 464, K4QYV 320, WB4HJW 310, WB4AIW 305, W4SDR 220, WA4FGH 157, WB4HYM 149, WA4IJH 126, WB4GHD 112, WA4HED 107, K4SJH 101, W8BZY/4 98, W4EHW 95, W4DVO 88, W4YPX 87, WB4EJY 71, WA4HDH 71, K4DAX 63, K4-IEX 63, W4ILE 50, WB4EPD 48, W4NGR 48, W4SMK 46, W4OGX 37, WB4ADL 35, W4ZAK 29, WA4NBE 28, WB4IER 25, W4TJM 23, WB4HJV 22, K4LPS 20, W4-LEP 16, W4BNE 15, WA4EYU 15, W4SOM 15, W4VPQ 15, K4HS 12, W4SCY 12, K4YLE 12, K4OER 10, W4-GDK 9, W4IAD 8, W4LK 8, K4EBE 6, WB4NHL 6, WB4FLW 5, WA4BMG 4, K4JZI 4.

GEORGIA—SCM, Howard L. Schonher, W4RZL—SEC: WA4WQU. RM: W4FDN. PAMs: K4HQI, W4-YDN, W4LRR. WB4JXO and WB4MNF helped Shamrock High School in Clarkston with a Ham Radio Week handling over 100 messages. WN4OJW and WN4ORL are new Novices in Cornelia as a result of the club training program. W4TYE has a new five-element beam. WB8UTC/4 is operating mostly from the Georgia Tech. station. W4DDY reports the old night shift is playing havoc with his hamming. W4BGK has the new Drake line. WA4NJP has a new harmonic and a TX62. WA4-GHD also has a new addition to the family. WA4LLI shows more MARS activity than ham. GSN reports 41 stations accounting for 359 check-ins and 234 messages handled. The Georgia Single Sideband Net had 749 check-ins, 171 formals and 46 patches. W4HYW is candidate for CHC Chapter 43. W4DQD worked 77 countries on 10 in the CQ WW DX Contest and placed first for Georgia in the N.Y. QSO Party. W4LRR reports a new f.m. repeater on Stone Mountain. It transmits on 146.340 and receives on 146.760. K4HQI notes f.m. activity increasing and is looking for more with a new repeater in the Atlanta area. W4ISS notes a 2-meter opening Oct. 5/6/7 working N.J., R.I., Conn., Mass., Md. and Penna. Traffic: K4BAI 129, WA4GXZ 112, W4FDN 89, W4PIM 69, W4CZN 66, W4NSO 66, WA4WQU 58, WA4RAV 50, W4TYE 43, W4UVP 28, WB6UTC 26, W4RZL 18, W4REI 16, WB4NQA 12, WA4UQQ 11, W4DDY 8, K4HQI 4, WA4LLI 4.

The "Champion" is an inexpensive transmitter for radio use having exceptional sending qualities. The clarity, speed and sending ease will appeal alike to amateur and professional radio operators. Single lever with 2 pairs of contact points. Mounted on large standard size base. Weight 3½ lbs. Without circuit closer, cord and wedge. Chromium finished top parts with gray crystal base. **$21.95**

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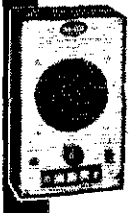

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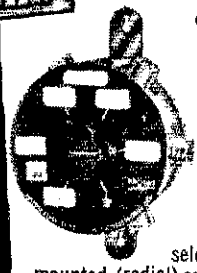
OCMK (kit) ... **$ 9.95**

OCMW (wired) **$13.50**



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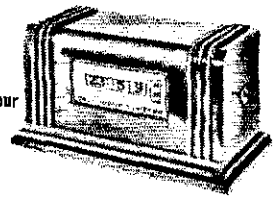
Functions as a regular selector switch with 5 side mounted (radial) connectors. Has the additional feature of automatically grounding the entire antenna system when the rig is not in use. Complete with knob, mounting hardware and escutcheon plate. Power handling 1000 w VSWR less than 1.2:1 up to 150 MHz. **$12.50**

PENNWOOD NUMERCHRON CLOCK with 10 minute warning buzzer



- 10 minute repeating timer buzzes warning to sign in your call letters
- Special independent switch turns timer on when beginning QSO
- Clock runs continuously
- Glolite dome shaped, full vision window glows in the dark
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Weight 3 lbs., 110 V. 60 cy. Complete price $22.50
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SUPEREX HAM HEADPHONES

Full comfort even after many enjoyable hours of continuous use. Superb comfort even for eyeglass wearers. Crisp, distortionless reproduction and high sensitivity allows you to single out that weak signal and hard to reach station. 600 ohms impedance, completely adjustable head harness.

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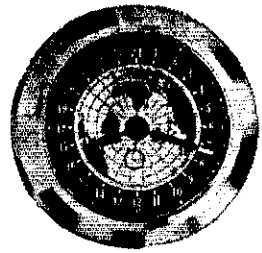

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Model 191 **$8.95**

Also 12" dial, white, red sweep, Model 2405C **$21.95**

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WEST INDIES—José Medina-Hernández, KP4CO—KP4DDB and WP4DGW are studying electrical engineering at the U. of P.R., Mayaguez. KP4DDB operates KP4CO to QSO KP4DBQ, his brother. KP4AST has completed a roundup of parts for a 2-kw. p.e.p. home-built linear. KP4CQB soon will put up a 60-ft. tower. KP4WT, KP4ANH, KP4AWI and HI8RRP/KP4 visited HI-Land. KP4ANG has been very active on 6 meters and is now an expert on predictions of openings for 6-meter DX. KP4DBK is keeping everybody abreast of 6-meter happenings. Look him up on 6. KP4RD has a daughter taking a Ph.D. course while being a faculty member at Catholic U., Washington, D.C. KP4CS has a daughter at the U. of P.R., Mayaguez, with KP4CO as a professor. The Antilles WX Net meets on 3885 at 1100 GMT daily. Traffic: (Oct.) KP4WT 172. (Sept.) KP4WT 181. (Aug.) KP4WT 152.

WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4IKB. PAM: W4MQQ. RM: K4UBR. RM-RTTY: W4WEB. Nets:

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*
WFPN	3957 kc.	2300Z	Daily	31	381	97
QFN	3651 kc.	0001/0300Z	"	62	—	—
NW FLA FM	146.94 Mc.	0130Z	Thurs.	—	—	—

Two more clubs have become affiliated with ARRL—Five Flags ARA of Pensacola and Playground ARC of Fort Walton, Pensacola: New hams include WN4OLW, WN4OOW, WN4OQF, WN4ORM and WN4OUT. The FFARA newsletter was named the *Ugly Chicken*. WA4-WAR was the contest winner. Both FFARA and USNCTC had ham exhibits at the Interstate Fair, Fort Walton: The City of FWB has purchased a TR-4 transceiver, as well as a CB rig, for permanent use at the C.D. Center. It is already equipped with 2-meter f.m. and 10-meter a.m. W4RET has an HW-17 with f.m. adapter. WB2ULQ/4, ex-WA4WJV, returned to the area to retire, and also has an HW-17. WN4OQL is a new ham. W4JOZ moved to Valparaiso. W4BVE, with assistance from WB4EQU, is now on 2-meter f.m. Panama City: WB4IXK was appointed Bay County EC. WA4VIY was active in the CD Party. Blountstown: WA4IBV has a Swan 500 on 75 and 40 from Kinard. WB4OPW is a new ham in Bascom. Tallahassee: WB4-FGW is a new club member. WB4ORH is a new ham. WB4LOQ put up a 4th-meter inverted "V". Perry: WA4-GHE was appointed Taylor County EC. He is on 75-meter s.s.s.b. and 2-meter f.m. Traffic: (Oct.) WB4LOQ 83, WB4DVM 51, WA1EBN/4 25, WB4EQU 12, W4RKH 12, W4FDJ 8, W4IKB 6. (Sept.) WB4LOQ 39.

SOUTHWESTERN DIVISION

ARIZONA—SCM, Gary M. Hamman, W7CAF—SEC: K7GPZ. RM: K7NHL. PAM: W7UXZ. The Convention at San Diego was attended by approximately thirty amateurs from Arizona. W7IV was presented a Signal One at the banquet. The Annual SARCC Convention will be held Feb. 6-8, 1970, at the Stardust in Las Vegas. The Amateur Radio Council of Arizona (ARCA) is sponsoring the Second Annual Winter Hamfest, which will be a pot-luck picnic in the Phoenix area on Feb. 1. For more information write your SCM or ARCA, Box 6602, Phoenix 85005. Arrangements have been made to have the Ft. Tuthill Hamfest in Flagstaff July 24 to 25. The Scottsdale ARC hosted a meeting at which ARRL General Manager John Huntoon spoke and answered questions. The Arizona ARC had a week-end outing at Roosevelt Lake Nov. 1 and 2 in addition to having a transmitter hunt on Oct. 26 that was won by W7UXZ. A statewide emergency exercise is planned for the SET week end. Contact K7GPZ or W7CAF or monitor the state RACES Net on 3.9905 Mc. at 0800 MST Sun. for more information. Your participation in the exercise is needed. License upgradings include W7FOJ to Extra; K7ZRC, WN7NBM, W7AKU to Advanced; WN7KQE to General. The Copperstate Net handled 185 QTCs in Oct. Traffic: (Oct.) K7NHL 228, W7GEP 152, WA7AAJ 126, WA7ISP 36, W7OUE 34, W7UXZ 20, W7CAF 19, W7DLF 17, K7KFI 17, W7LLO 17, W7JMQ 12, K7RLT 12, K7ZMA 11, W7OIF 8, K7EXF 5. (Sept.) K7EXF 16.

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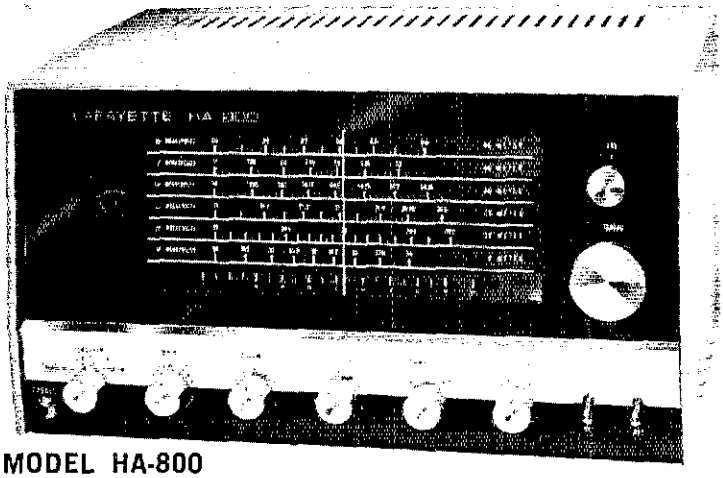

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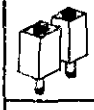

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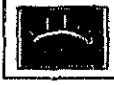

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LOS ANGELES—SCM, Harvey Hetland, WA6KZI—Asst. SCM: Donald R. Etheredge, K6UMV, SEC: WA6QZY. Antelope Valley ARC officers are WB6ZES, pres.; K6IDY, vice-pres./secy.; WB6IMB, treas. For the West Valley ARC: WB6UHF, pres.; WB6VZI, vice-pres.; WB6YNI, secy.; WA6PNN, treas. WA6QZY is our new SEC. Section amateurs are requested to give him their full support. Pasadena City College QSO Club's officers are WA6OKP, pres.; WB6LTR, vice-pres.; WB6VIA, secy. Recently-elected officers of the So. Cal. QCWA Chapter are W6IL, chairman; W6EL, vice-chairman; K6EV, secy.-treas. The East San Gabriel Valley AREC provided communications in the form of 15 f.m. mobiles for Halloween spook patrols for the City of Baldwin Park. The following amateurs provided communications for the Rosemead Parade under RACES L.A. County: W6VDS, K6TOW, W6VHU, WA6VAI, WA6WPX, WA6IDV, W6FXN, K6OXX and WB6UPC. The So. Calif. V.H.F. Club and other groups also were involved in spook patrols. WB6UYO is now Extra Class. W6MN moved to Red Bluff, and the new SCN manager is W6LCP. WN6QAM passed the General and Advanced Class exams the same day. WB6TIK is busy with college studies, and WB6OLD is now j6 at Univ. of Calif., Riverside. WB6GGL is making time for phone-patching activities. WB6KXI joined Navy MARS. Rumor has it that W6RW and crew are repairing antennas. The Feb. meeting of the Monterey Park ARC will be the Annual Valentine's Party featuring WB6-BBO. WN6LSB has a one-tube transmitter cooking on 80 and 40 meters a la ARRL *Handbook*, and WA6ARP acquired a 32V2 transmitter. K6AWO, W6EQ and W6-NYC now mobile in round table on the way to work using 3940 kc. W6BHG is back after a hospital stay. K6CDW is getting going from the new QTH. K6CL now represents the Palisades ARC at the L.A. Council of Radio Clubs. W6DGH vacationed in K2-Land, and W6DQX is working on a 80-ft. mast for a new antenna. WA6EJJ reports fine activity on the Metro Net, 50.4 Mc. at 8 P.M. W6FJT was the first section amateur to earn the new ARRL Public Service Honor Roll award. WA6GSV has a Swan going in his Toyota jeep. W6IVC is looking toward the end of the swing shift so he can return to SCN, 3600 kc at 7 P.M. W6JET reports repairs to the SB-610 monitor scope. WB6PKA reports the 40 and 80 "V" is back in the air. K6NA managed 715 QSOs in 93 countries on 28 Mc. during the Phone CQWW DX Test. WB6OUD has a new TO keyer. WB6QFE received Quarter Century Award No. 29 for 25 countries on RTTY. W6RCV is working on a new 80-meter antenna. The JPL ARC is active in L.A. County RACES. WB6VZI operated from WB6WIT during the CQWW DX Phone Test week end. Our thanks to WB6ZLP for Oct. statistics on the Metro-Net:

Net	*Freq.*	*Time*	*QNI*	*QTC*	*Mgr.*
Metro Net	50.4 Mc.	8 P.M.	419	305	WB6ZLP

I will mail any section amateurs sending in a monthly report a copy of the section's monthly bulletin, *Dididumdum-didi*. Traffic: (Oct.) W6MLF 407, WB6BBO 176, W6INH 153, W6QAE 81, K6CDW 54, WA6FJT 45, W6FD 31, WB6ABP 28, K6CL 27, W6SYP 21, WB6KGK 20, W6FJT 16, WA6TWS 13, W6BHG 12, W6DQX 10, W6-HUJ 8, W6JPH 7, W6USY 5, W6IVC 4, W6TN 4, W6AM 3, W6DGH 3, WB6KXI 2. WB6SSZ 1. (Sept.) W6MLZ 308, K6USA 250, WA6ABP 23, K6CL 23, W6IVC 8, WB6KXI 8, W6TN 5, W6AM 4, WB6KGK 4, W6TXJ 2.

ORANGE—SCM, Roy R. Maxson, W6DEY—ORS W6LCP is the new call of ex-W8ELW. Seth has been appointed mgr. of the Southern California Net. ORS WA6FOQ is 14 and apparently the youngest ORS appointee in the section. ORS K6OT still is battling noise. OO W6BAM manages some monitoring between painting sessions. RM W6BNX skeds with the Coast Guard ships at sea and on Apollo shots. OO WA6JZZ made 3.4 p.p.m. in the recent FMT and asks why there is not more local activity in the CD Parties. WA6ROF, RN6

Changes of Address

Please advise us *direct* of any change of address. As our address labels are prepared in advance, please allow six weeks notice. When notifying, please give old as well as new address and Zip codes. Your promptness will help you, the postal service and us. Thanks.

mgr., is back to work after a hernia operation. OPS W6BUK sheds many friends in Arizona, QCWA and MTN. SEC WB6CQR and many other hams from the Orange section made the Southwestern Division Convention in San Diego and lots of eyeball QSO parties were held. After Feb. '70 W6PJU and W6DEY will be found at 221 Knoll Road, Vista, Ca., 92083. WN6EPZ probably is the first Novice member of the Old Timer's Club, but Woody qualified from having W8QBD in 1939. Casey Conway is now WN6JFO. Traffic: (Oct.) W6LCP 156, W6BNX 121, WA6ROF 115, W6WRJ 31, K6OT 6. (Sept.) K6OT 6.

SAN DIEGO—SCM, Richard E. Leffler, WA6COE—Asst. SCM: Art Smith, W6INI. SEC: WA6KHN. We trust Santa was good to the shack and that your No. 1 resolution was to report to your SCM on your ham activities each month. Dec. was "Join the AREC" month in this section and many became both active and limited status members. There is an active group with plans to operate should a disaster occur. Why not join with the AREC as a part of your New Year's ham activities? Contact the SEC *Clubs*: Be sure to notify the SCM of your change in officers. V.h.f. held its Christmas Party Dinner. The S.D. DX Club Oct. meeting was at the home of K6VZA, Nov. meeting at the home of W6CAE. The W6 QSL Bureau has moved. New address is in *QST*. Our thanks to the S.D. DX Club for acting as the W6 Bureau for the past 10 years. The El Cajon ARC held a successful auction in Nov. Palomar ARC sells county call books and is meeting in Vista. *Section*: WA6KHN and K6EC build monitor scopes. WB6HZI was robbed at the QTH. WA6QYM has an inverted "V" on 40-80. WB4CYP/6 has been leading the section in emergency power check-ins to the AREC Net. W6-INI worked all states in 2 weeks by calling the Delaware SCM on the landline for the last contact sked. K6BTO attended the L.A.-S.D. ATV meeting in Oct. F.m. groups have a relay working for interconnections up the coast. WA6FXM and K6HAY are new to RTTY. WB6IMN sponsors the Greenfield Jr. High ARC. W6-AOU is a Silent Key. A very Happy New Year to all. Traffic: (Oct.) K6BPI 10,034, W6VNQ 660, W6RGF 450, W6EOT 386, W6LRU 179, K6SD/6 17, W6YKF 13, WA6COE 2, K9ZMS/6 1. (Sept.) W6YKF 33.

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: W5QGZ. Asst. SEC (Eastex): WA5KHE. Brownfield Swapfest No. 15 attendance was 450-plus and our congrats to W5NFO, WA5DQY, W5NW, W5JSM and surrounding clubs including Amarillo, Plainview, Midland, Lubbock, etc. Our OOs continue reporting in fine style. OO W5MSG made the Huntoon-Dallas meeting. Three TV stations of the Dallas-Fort Worth trade area have agreed to preview the ARRL film and possibly schedule same at a later date. K5BDC was issued an OPS appointment. North-Tex traffic nets include Eastex Traffic Panhandle, Eastex Emergency 7290, Tex 3961, and Westex Traffic Nets. Plainview RC issues a nice N/L. W5RV is considering a leadership appointment. W5FCX and WA5PPF reported late last month. W5PXW is building an 80-ft. tower and an HW-100. K5IBI says the ARRL 39th Convention records show 210 registered and 245 attending the banquet. W5FRC owns an SR-2000. Denton ARC reports 68 members. W5BVR is pres. and the club meets the 2nd Mon. in Denton County City Hall. The Annual OBS Survey is now underway. Please return your card showing your schedule. The PARC, WA5SWM net mgr., filed a complete net report. The KC Club of Fort Worth, WA5QOJ, pres., meets at 7:30 P.M. the 3rd Thurs. Club decals are available from WA5HWW. The QSL Bureau in El Paso now is in full swing. See K5QVH, Box 2915. Navy MARS has a new skipper named Chief CV Poston. West and East Texas coordinators, Messrs. Mossman and Miller, are the people to see. WA5K1V's article covering College Message Centers is really something. WA5VJB, Crowley, has been issued an OVS certificate. RM W5QGZ has RTTY capability, as does WA5QQK and WA5DQP. W5UJN has moved to Oklahoma. Al Beusdinck's XYL is W5MJU. W5IGY reports good activity in the Sherman-Denison area, including W5JQT and W5ATG. Traffic: (Oct.) WA5PPF 2570, K5HNH 1475, WA5KIV 44, W5JSM 28, W5LR 26, WA5CTJ/5 25, W5PBN 18, K5BDC 16, WA5DQP 7, WA5QWA 7, W5-FRJ 6, W5QGZ 3. (Sept.) WA5PPF 3528, W5FCX 4, WA5FRS 4. (Aug.) WA5QWA 51. (July) W5FCX 10.

OKLAHOMA—SCM, Cecil C. Cash, W5PML—Asst. SCM: W. L. (Smoky) Stover, K5OOV. SEC: WA5FSN. RM: W5QMJ. PAMs: W5MFX, K5TEY, WA5JGU, K5-ZCJ. Muskogee held a practice evacuation test in coordination with the Red Cross, assisted by K5BPY/M, K5PRW and K5WPP/M, Muskogee Co. EC. The new

officers of the Muskogee ARC are K5WVX, pres.; W5ZWZ, vice-pres.; K5BPY, secy.; W5WAX, act. mgr. WA5YRO, Stevens County EC, reports the club is holding code classes for the BSA for merit badges. WA5ZVI, of Enid, reports completion and testing of the 1964 *Handbook* 432 Mc. rig; he also passed the code qualifying run and is working hard on the Extra Class. K5OCX just returned from portable operation and a deep-sea fishing trip to the Texas coast. Congratulations to new Extra Class K5CBA. Advanced K5FKB and WA5OUV and General WA5WET. Net reports

Net	*Time*	*Freq.*	*Sess.*	*QNI*	*QT*
OLZ	0100Z	3682.5 kc.	18	72	4
SSZ	0345Z	3683.5 kc.	14	39	3
OPEN	1400Z Su.	3915 kc.	4	164	
OPON	2300Z	*3915-2 kc.	23	358	6
STN	2330Z	*3915-2 kc.	27	733	7
OWXN	0000Z	*3915-2 kc.	27	433	

*These nets meet minus 2 kc. from the Net Director listing because of interference with the Illinois PON Traffic: K5TEY 1122, WA5IMO 79, W5MFX 60, WA5YRO 52, WA5ZOO 51, W5QMJ 35, WA5LWD 33, W5FKI 13, W5PML 10, WA5FSN 9, K5WPP 7, WA5NZM 2, K5OCX 2.

SOUTHERN TEXAS—SCM, G. D. Jerry Sears W5AIR—SEC: K5QQG. PAM: W5KLV. RM: W5EZY. Welcome to the Southern Texas officials. New ECs W5RYO, Pecos County; W5URW, Colorado County; W5UEQ, Tyler County; W5QMH, Bexar County. K5HZR, who has served the amateurs of Bexar County and many others in Southern Texas, has resigned as EC for Bexar County. We wish to compliment Lee on an excellent job during the past five years and know his work has been appreciated by many. W5AJD reports that approximately 15 active area amateurs held a "get acquainted" get-together Oct. 19 at Camp Champions on Lake LBJ. W5MTB was host with Bar-B-Cue goat furnished by W5DHK. WA5KMY has moved from Laredo to San Antonio. WA5INZ, a former TEX/RN5 traffic-handler, visited in San Antonio en route to a new assignment in Germany. K2EIU/Ø, former active in So. Texas, will be stationed in the San Francisco area on a new airline job. The Houston Telephone Pioneers Amateur Radio Club, WA5DOS, had a nice open-house Nov. 9, worked most bands with kw and 2 meters with 550 watts. W5ICL, EC Orange County, advises the hurricane in Nov. gave them a good scare but provided an exercise in getting ready. Don't feel lonesome—all the rest of the northern and central Gulf Coast were in the same boat. That was the hurricane that came in strong and then turned back without coming inland. Many of us had our emergency power plants all gassed up and everything ready. OPS K5WYN, NCS for the West Gulf Emergency Net, has been on a motor trip through Illinois, Missouri, Maryland, Virginia and a whole bunch in between. Traffic: (Oct.) W5EZY 175, W5QJA 167, K5HZR 102, K5ROZ 92, W5QO 81, W5ABQ 65, W5TFW 38, W5BGE 28, W5AIR 1, W7WAH/5 10, W5KLV 3. (Sept.) W5QJA 156, W5EZY 80, K5ROZ 72.

CANADIAN DIVISION

ALBERTA—SCM, Don Sutherland, VE6FK—SEC VE6AFR. PAM: VE6ADS. In the recent World-wide DX Contest VE6ADX ran up a score of 1¼M in the single transmitter multi-op class. CARA will be host for the 1970 Alberta Hamfest. Further details will be given as the committee makes them available. The AREC has been pretty active. Hanna did communications for the March, for Millions. Lethbridge also did its March plus a Goblin Patrol. Calgary handled communications for the civic election. VE6BR is puttin' out quite a signal with his new rig and beam. The NARC is continuing its drive to bring the possibilities and thrills of amateur radio to the uninitiated. The well-planned program should bring a few more amateurs into the fold. VE6BB reports that the Yellowknife Centennial Radio Club has been formed with 8 active members. The club station, VE8NWT, will be on regularly to celebrate the Centennial. The Yellowknife Club is sponsoring a well-attended beginners class. VE6AP, historian for the C4RA, can use any information, both new and old. Traffic: VE6FK 9, VE6SS 5, VE6VF 3, VE6AFQ 2, VE6FV 2, VE6NG 2.

BRITISH COLUMBIA—SCM, H. E. Savage, VE7F—VE7AXH is now Prince George EC. VE7QQ has re-applied for ORS appointment. VE7ASY is getting married. VE7BDI and VE7BAV are proud fathers, both have boys. VE7KY, over six months in the extensive care unit, is now on the mend. VE7DB is out of the hospital after being rear-ended. VE7ACC also is out of the hospital after tangling with a parked truck. VE

BGV/W7 really did his holidays mobile. VE7BXD reports the Scouts sure had a good time because his new quad really is working. VE7LL is RTTY and looking for B.C. WB6MAY/VE7 is chairman of the new Green Keys, B.C. E.M. Communications Assn. VE7AC reports that he likely will be in the hospital for awhile. Vancouver ARC's new officers are VE7BRD, pres; VE7YG, vice-pres.; VE7AP1, secy. VE7BWH is sound man for a film crew in Costa Rica, Bogota and other parts of South America. The new editor of *Zero Beat*, V.S.W.'s monthly paper is VE7AEK, also its License Plate Committee needs a pat for its good work. Letters should be sent to *Box 134, Victoria. Goblin Patrol was supported by* forty mobile and base stations and again the increase in communications for police support stop any forming of gangs that could do damage if let loose. Traffic: (Oct.) VE7QQ 13, VE7SE 13, VE7GG 11. (Sept.) VE7-GG 11, VE7QQ 5.

MANITOBA—SCM, Keith Witney, VE4EI—VE4RW reports that the BARC has lost its club room and has elected a new slate of officers, VE4s OM, SR, RO and BS are to be congratulated on their phone tickets. Two-meter activity is strong with repeater talk in the air in Brandon and Winnipeg, 146.46 in and 146.94 out. VE4UM is back with an Oscar project in the football stadium. VE4RS is happy with his new Swan while VE4s EI, H1, 1H and XJ were the West Kildonan Goblin Patrol on 2 meters. Congrats to VE4PA on his election as pres. of *ARLM* at the Brandon meeting. *VE4SC is working* on RTTY again and a.r.s.k. activity in Winnipeg is increasing on 146.7. Phone net: 31 sessions, QNI 819, QTC 11; MTN, 30 sessions, QNI 121, QTC 66. Traffic: VE4-FQ 56, VE4RO 52, VE4EI 33, VE4RL 12, VE4RW 9, VE4OC 8, VE4QJ 7, VE4JA 6, VE4NE 6, VE4YC 6, VE4JJ 3, VE4XN 3, VE4CR 2, VE4FO 2, VE4BV 1.

MARITIME—SCM, William J. Gillis, VE1NR—SEC; F. R. Fraser, VE1HJ. The CSS *Hudson*, on a circumnavigation of North and South America, left Halifax on Nov. 19 and will return Oct. *1970*. *VE1ASM* is on board and the vessel will operate as VEØMX s.s.b. on 15 and 20. VE1YO and VE1ACO are on the sick list. VE1AJ1 recently was elected Atlantic Director of the CARF. EMO Kings ARC, VE1ABT pres.; was granted League affiliation, V.h.f. repeater activity continue at Moncton, Halifax, St. John's, Truro and new installation is planned for Saint John, Sydney and northern

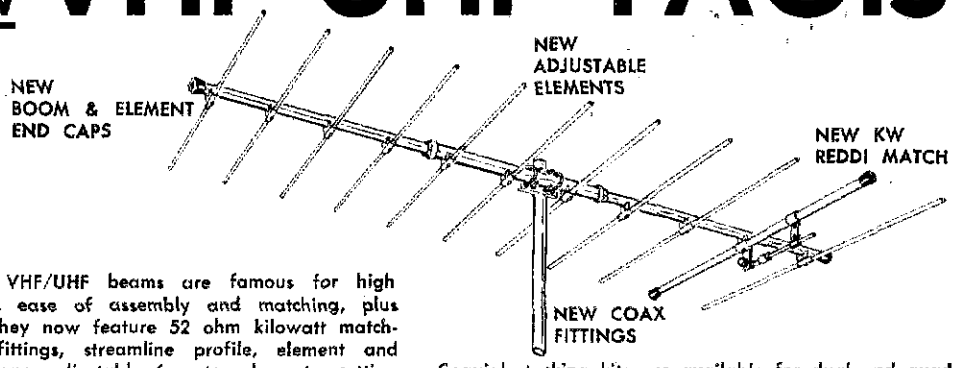
SIXTEENTH ANNUAL VE1 CONTEST

Jan. 18 and 25, 1970

All VE1 amateurs are invited to participate in a contest sponsored by the New Brunswick Amateur Radio Association. The contest is divided into two sections, phone and cw. The highest scoring contestant in each section will be awarded permanent possesion of an engraved cup, the NBARA Trophy. A special certificate of recognition will be issued to any participant submitting logs showing 25 or more valid contacts.

RULES: 1) The cw contest will begin at 1200 GMT and end at 2400 GMT January 18. 2) The phone contest will begin at 1200 GMT and end at 2400 GMT January 25. 3) Any and all amateur bands may be used but only c.w. to c.w., or phone to phone contacts will count. Any contestant may participate and be eligible for awards in both sections. 4) *The same station may be counted* but once for credit (in each section) regardless of band used. Mobile, portable, and home stations covered by the same station license constitute the same station. 5) The general call is "CQ VE1." 6) Exchange signal reports, county, province, and operator's name. Local QTH is not required. 7) Logs should show band, type emission, signal reports, country, province, time, and date. Logs not showing this information IN FULL will be disqualified. 8) Score one point for information received and one for information sent and confirmed. Multiply total points by the number of individual counties worked in the three provinces to determine final score. For contest purposes Sable Island will be classed as part of *Halifax County*. 9) *Decisions of the contest committee* will be final. Logs must be postmarked not later than Feb. 3 and should be in committee hands not later than Feb. 11. Forward all entries to: Contest Committee: c/o Roger Erskine VE1PL, Box 1800, Bathurst, N. B. Canada.

NEW VHF-UHF YAGIS



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A50-3,	6 meter 3 element	$18.50
A50-5,	6 meter 5 element	29.50
A50-6,	6 meter 6 element	39.50
A50-10,	6 meter 10 element	59.50

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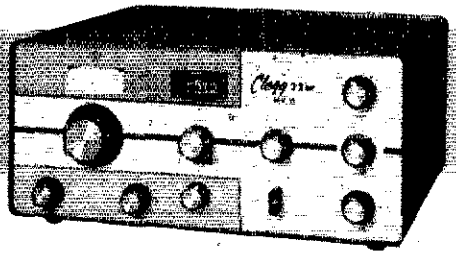

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N.B. VE1HJ reports using a Pickering keyer. VE1ES now is modulating voice. The ARC OWL is resuming activity with VO1JB/VO2 continuing as editor of its fine bulletin. VO2s AO, KW, GB and AP now have Advanced tickets. Maritime Sparketts, under Pres. VE1AHV is sponsoring an award for traffic-handling. Net *traffic: APN*, 52 sessions, *QNI* 554, *QTC* 78. See page 158. Dec. 1969 *QST*. Best wishes for 1970. Traffic: VE1AMR 98, VE1RO 77, VE1ARB 6.

ONTARIO—*SCM, Roy A. White, VE3BUX—SEC: VE3EWD.* Hats off to the Peel ARC which did such a splendid job handling communications during the natural-gas fire at Malton Oct. 25. Congrats to VE3FQZ, who is *now the EC for Peel County. He is also the* EMO Coordinator and this makes the third such dual appointment in Ontario. Welcome to VE3DOB, VE3OXB and VE3CFI, who are now Ontario Phone Net Controllers. Sincere condolences *to VE3ARQ on the loss* of his son. Fonthill will be known as Pelham after the first of the year and the twin cities of Port Arthur and Fort William will be Thunder Bay. Windsor ARC welcomes 27 students to its club and Nortown ARC has 25 potential hams signed up for classes. VE3EWD has a new rig and is looking a lot happier these days because of the increased interest in AREC. Ed is our SEC. VE3CNB has moved from Windsor to Hanover and VE3EBU, also of Windsor, has moved to Pontiac, Mich., while VE3BGW is now in Scarboro after living in Warren, Mich. VE3EFX now has certificates from WB4ICQ covering "Apollo" launchings 9, 10 and 11. VE3ECC, in Offawa, is stirring up interest in an amateur TV repeater. Congrats to VE3AYZ on his appointment as EC for Thunder Bay. He also is the EMO Coordinator. VE3CBG worked 100 countries in three weeks and 200 within six months. VE3WT has just received his "300" sticker. 10 meters was hot for the Oct. World-Wide DX Contest. Traffic: (Oct.) VE3EMQ 309, VE3EBH 129, VE3GI 129, VE3FRE 105, VE3ERU 84, VE3DPO 75, VE3AWE 48, VE3DU 36, VE3CYR 28, VE3ATI 20, VE3EHL 15, VE3VD 14, VE3DH 13, VE3EWD 12, VE3DBG 8, VE3APL 7, VE3WW 5, VE3EFX 4, VE3GHO 4. (Sept.) VE3AWE 14, VE3EWD 10.

QUEBEC—*SCM, A. W. Ibey, VE2OJ—Local net RTQ* on 3600 is active after a slow spell. RPQ, the section-wide phone net, remains very active on 3780. For Ontario-Quebec traffic, don't forget OQN on 3535 and for out-of-area watch for ECN on 3540. Former VE2CJ is active now as VE3ANJ. Among those who made local participation in the International Boy Scout Jamboree a success were VE2BBL, VE2OV and VE2ABP. VE2OK held his Annual Spaghetti Dinner at his Lac Simon Lodge Nov. 9. VE2FN has many feet of 8 mm. film of amateur radio. The La Salle High School (Three Rivers) Amateur Radio Club, VE2MO, executives are VE2AUH, pres.; VE2BVV, past-pres.; VE2VE, vice-pres.; VE2AGP, secy.; VE2AJD, treas.; VE2OY, dir.; VE2ACO, *dir. VO2EC* remains as permanent executive committee secy. Pour la première fois, le congrès 1970 de RAQU se tiendra a Québec au début de juillet. Le Radio Club de Québec (VE2CQ) vient de former plusieurs comités dont *les responsabilité* sera de préparer un des plus grands congrès de l'Association Provinciale. VE2DLQ, VE2DJT, VE2DBB, VE2BBL et VE2DKC sont maintenant en téléphonie sur le 75 et 40 mètres. Bon succès a VE2*WM, responsable du concours VE2* de RAQI qui aura lieu en avril ou mai prochain. VE2BAI abat un travail de géant dans la région du Saguenay; c'est grâce à ses nombreux efforts si la radio-amateur est si populaire *dans cette région du Québec. Traffic: VE2DR 67*, VE2CP 16, VE2EC 13, VE2BVV 9, VE2OJ 2, VE2PJ 1.

SASKATCHEWAN—SCM, Gordon C. Pearce, VE5HP—SEC: VE5CU, PAM: VE5PZ, RM: VE5GL, ECs: VE5IL, VE5DO, VE5RJ, VE5NX, VE5BO, ORS: VE5HQ, OVSs: VE5CU, VE5US, OPS: VE5US, ORS: VE5GL, OO: VE5KE. The Regina 2-meter repeater is in full operation under higher power. A Saskatoon 2-*meter* repeater is being planned. Walkathons are being assisted by local ham clubs. The Boy Scout Jamboree on the Air in Oct. still is capturing the imagination of many Boy Scouts and their leaders. The SARL director's meeting was held in Saskatoon Nov. 9. VE5CU appointed as assistant to Director Noel Eaton, will make a report in *QSO* magazine. The 40-meter net is on each evening on 7.188 and 7.203 at 0200 and 0300 GMT, respectively; the Saskatchewan Phone Net each evening on 3785 kc. at 0100 GMT; the Saskatchewan C.W. Net at 0230 GMT on 3880 kc. Code practice is sponsored by Saskatchewan hams on 3730 kc. at 0200 GMT Tue. and Thurs. The Saskatchewan 1970 hamfest will be held in Regina July 3, 4 and 5, 1970. Hamfest manager is VE5HA. Traffic: VE5GL 44, VE5SC 34, VE5KZ 14, VE5BO 11, VE5EO 8, VE5SN 6, VE5HZ 4, VE5JK 4, VE5OJ 4, VE5XL 4, VE5RE 3, VE5CP 1, VE5MX 1, VE5YR 1. QST

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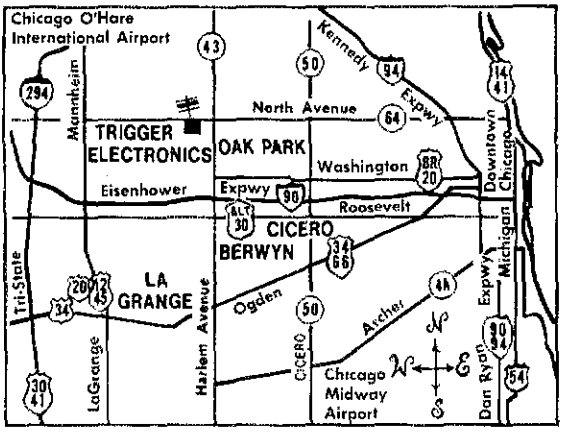

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Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

HAM Auction, February 1, 15th Annual by Toledo Mobile Radio Assn. at the Lucas County Recreation Center,2901 Key St., Maumee,OH. $1.00 registration, open table sales, map and further information. Write Ron, W8STA, 4654 Monac Dr., Toledo OH 43623.

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.

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 PM.

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. Gironda, W2JE, Box 394, Mamaroneck, N.Y. 10543.

MICHIGAN Hams! Amateur supplies, standard brands. Store hours 0830 to 1730 Monday through Saturday. Roy J. Purchase, W8RP, Purchase Radio Supply, 327 E. Hoover St., Ann Arbor, Michigan 48104, Tel. NOrmandy 8-8262.

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.

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WANTED: Military and commercial laboratory test equipment. Electronicraft, Box 13, Binghamton, N.Y. 13902.

SOUTHERN California Amateur Network, Scan 14.325 MHz Monday through Friday 0400 GMT. Join us, K6YCM.

SAROC new QTH Stardust Hotel new QTR 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.

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GREENE– Center of dipole insulator with or without balun. Free flyer, O. Watson Greene, Box 423, Wakefield, R.I. 02880. See December QST, p. 150.

WANTED: QST copies in good condition 1920, 1921, 1922 and August of 1958 to complere personal 50-year collection. Rex Bassett, W4QS, Box 4163, Fort Lauderdale, Florida.

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FOR Sale: Drake R4-A, T-4X, MS-4, AC-4, excint condx, $730. Will consider first best offer or sell separate. WA1KZZ, D. J. Burke, Meadowcrest Dr., RFD 5, Bedford NH 03102.

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WANTED: Military, commercial, surplus, airborne, ground, transmitters, receivers, test-sets, especially Collins Airborne. We p y cash, and freight. Ritco Electronics. Box 156-Q567, Annac ale, Va. Phone: 703-560-5480 collect.

WANTED: 2 to 12 304TL 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, W1CUT, 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.

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TOROIDS, 88 mh uncased, 5/$2.50. Postpaid. Humphrey, WA6FKN, Box 34, Dixon, Calif.

WANTED. Tubes and all aircraft an d ground radios. Units like 17L, 51X, 618T or S, R388, R390, GRC. Any 51 series Collins unit. Test equipment, everything URM, ARM, GRM, etc. Best offer paid, 22 years of fair dealing. Ted Dames Co., 308 Hickory St., Arlington, New Jersey 07032.

INTERESTING Sample copy free. Write: "The Ham Trader," Sycamore, Illinois 60178.

RTTY gear for sale. List issued monthly, 88 or 44 Mhy toroids five for $2.50 postpaid. Eliot Buchanan & Assoc, Inc. Buck, W6VPC, 1067 Mandana Blvd., Oakland, Calif. 94601.

WORLD QSL Bureau. See ad page 145.

1000 PIV @ 1.5 amp. epoxy diodes includes disc bypass, caps and bridging resistors, 10 for $3.95. Postpaid USA. With diode 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.

COUNTER, 100kc, Berkley, eput, model 7150BDK, excellent condition, $200, John Link, 1081 Aron St., Cocoa, Fla. 32922.

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.

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 GW14A, $89.00. All in excellent condition. W2ERV, 14 Bernice Dr., Freehold, New Jersey 07728.

GOVERNMENT Surplus Electronics Barkain Catalog, 96 pictured pages. Send 25¢, Meshna, Nahant, Mass. 01908.

NEW Galaxy GT-50. Will consider your gear in trade. W4UHP, 1300 Milton Street, Clearwater, Florida 33516.

WANTED: Hammarlund HC-10 converter. State condx and price. S. E. Hyatt, Box 530, Canton, GA. 30114. WA4YVY

NATIONAL HR060 A,B,C,D, coils, spkr, xtal calibr. Am original owner, $225. NCX-A, NCX-D xtal cal. All like new. $135. K2EDU, 97 Miller Ave. Brooklyn, NY 11207.

WANTED: The following antique radios: Colin B. Kennedy Model 110, 220 and 2-stage amplifier; Pilot AC Super Wasp Shortwave receiver with plug-in coils; Atwater Kent Bread board and Horn Speaker. Wallace I. Glavich, 1208 Gross Street, Eureka, California 95501.

HT-37, $165.00, Autronic keyer, $35.00; Heath SWR Bridge, $10. All in xcint condx. Charles Lachterman, 3 Archer Lane, Scarsdale, N.Y. 10583.

HIGHEST Trades on Galaxy, Hallicratters, 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. Claus Amateur Radio Shop, 104 Wetzel Road, Pittsburgh, Penna. 15209.

SELL: KWM-2 with Waters Q Multiplier Notch, 136B-2 noise-blankerm 351- D-2 mobile Mount, 516F-2 a.c. supply, MP-1 mobile supply, MM-1 mobile microphone. $850.00. W4-DGA, 3154 Singleton, Fairfax, Va. 22030. Tel: (a.c.) 703-273-8278.

WANTED For cash: P&H VFO-Matic Model 80-10, Transtenna 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, W3VFQ, 104 Wetzel Road, Pittsburgh, Penna. 15209.

DRAKE TR-6 extra crystals to 52, AM filter 9 NB, 1 hour on air, $525, Cost $745. Ship 200 miles. George W. MacCool, 4151 A. Ridge Ave., Philadelphia PA 19129.

EXPERIMENTING in Facsimile? Leading manufacturer of 18" facsimile weather chart recorders is in process of converting existing network for automated weather charg transmission. Conversion will make available a number of used 18" weather map recorders ideally suited for use by anyone experimenting with facsimile. All recorders in operating condition. They include recording head, all electronics including automatic start, phase and stop circuits. Recorders can be used to monitor radio weather chart broadcasts, accept press wire photo transmissions or transmissions from orbiting weather satellites R. Boire, Surplus Equip. Sales, Alden Elec. & Impulse Recording Equip Co., Inc., Washington St., Westboro, MA 01581. Tel: a.c. (617)-366-8851.

DRAKE R4-A, in xcint condx, $275. Richard Harker, WA7-DOK, 2711 Kincaid, Eugene OR 97405.

COLLEGE: For sale—SR-400, used 10 hours, Swan 350, Heath phone patch, etc. WB4APZ. Tel: a.c. (813)-995-5314.

NOVICE Crystals: 40-15M $1.33, 80M $1.83, Free list. Nat Stinnette, Umatila, Fla. 32784.

SELL swap and buy ancient radio set and parts magazines. Laverty, 118 N. Wycomb, Lansdowne, Penna. 19050.

DUMMY Loads, 1 KW, all-band, $7.95; wired, $12.95, Ham Kits, P.O. Box 175, Cranford, N.J. 07016.

XMTRS—S22, Collins TCS12/VFO, AM, CW 160, 75, 40; HT-18, AM/CW/FM; CE-10B/VFO/coils 160 thru 10, TX-62, ARC-5 set 1.3 thru 9.1 Mcs, Rcvrs—S40A, GR-211/ANL/S meter; HQ-110A/clock, BC-453A/pwr; home brew hi-pwr 432 and 1296 rigs. Want commercial 160, 6.2 M SSB rigs. R. Beck K2UUR, 13 Georgetown Rd., Parlin, NJ 08859.

DISCOUNTS! New displayed items: full warranty. Drake TR-4 $510; T4XB, $380; R4B, $365; 14B, $640; Ham-M, $99; TR-44, $59 (control cable available). Terms: cash f.o.b. 90505. Midwest: Evansville Amateur Radio, 1311 N. Fulton L.A. Radio Sales, 24214 Crenshaw Blvd., Torrence, CA Ave., Evansville, IN 47710.

FOR Sale: Drake 2A receiver $210; Q-multiplier/speaker, $20. Write R. Lunan, 56 Parkdale Ave., Pointe Claire, Que. P., Canada.

HEATH HW-100 and HP-23 ac supply $275. Mosley Tig array, $35. All equipment in excint condx. E. Eggert, W1EGM, 42 Ridgewood Dr., Rockville, CT 06066.

LIQUIDATION: Excint condx, one owner with manuals SX101 MK III with spkr, $135; Johnson Courier 500 w., $105; DX-60, $20. W9KON/1, Box 32, Reeds Ferry NH 03078.

COLLINS S/Line 75S-1 recv. with 500 cycle filter; 32S-1 xmtr, 516F2 power supply, in excint condx. First best reasonable offer. M. Mahr, W2STG, 24 Campbell Drive, Dix Hills, NY 11746. Tel: a.c.(516)-543-6373.

ANTIQUE Philco Model 20, first best offer; dual HV supply 1450 volts 1125 volts, both 350 Ma., $150; Heath educational kits EE-2 EE-3—both $20; Lambda regulated power supply 150-200 volts, at 150 Ma., $150. C.R.E.I. math course, $30. W2RUK, 7 Charles, Auburn, NY 13021.

SELL: 75S3, 3.1; 2.1; 0.2 filters, $400; R4A-SWL xtals, $290; Swan 500C-AC, DC, HD-10 Keyer; CW-Filter Speaker, 2 mikes. Package: $485, Davco DR-30; DR-30S, $295. All above with manuals, lab aligned—specs. HR-45 working, $45. Will ship. Wanted: Self-supprtg. tower, FTDX-150, NCX-5-IT. Henry Niklas, 7 Delmont, Boston, MA 02122. Tel: a.c. (617)-288-5846 nite.

FOR Sale: Compressor, Raytrack auto level, full instructions, special plugs, all new, $60. Al Bowers, K3GXX, 1306 Garden Lane, Reading, PA 19602.

HEATHKITS assembled, completely guaranteed, 12%. Stanfill, WAØYIR, Box 96, Hills, MN 56138.

WANTED: 14 AVO antenna. L.A. area. Peter Mayer, 1714 Westridge, Los Angeles CA 90049.

DRAKE R4-B Serial #8537R, in mint condx. $350; Clegg THOR6 plus 418 12 DC positive ground power supply, in excint condx, $270; Heath IM-25 solid-state VOM, in mint condx, $80; Telrex 2-meter 38 element, 43 ft. yagi, used 6 months, excint condx, $115.00; Heathkit 5-channel digital proportional radio control system, Model GD-47, never used, $220. Heath SB-110A 6-meter SSB transceiver, in mint condx, $320.00. Don Roehrs, Ewing Ave., Franklin Lakes, NJ 07417. Tel: a.c. (201)-891-0790, days only.

COLLINS 32S-3 with 516F-2 a.c. supply; 75S-3 and 30L-1. All in mint condx. Package. Price: $1100.00. Roger Beamon, 8 Valley Road, Telford, PA 18969. Tel: a.c. (215)-723-5356.

TR-3, $360 with new AC-4, excint condx. Vergne, K2KGU, New York, NY (tel: a.c. (212)-MO6-8513.

KNIGHT R-100A receiver, 100 kc. cal. Q-multiplier, S/Meter, speaker manual. Professionally aligned, excint condx, $65.00. WA7NKW, 1305 Hammond Lane, Toppenish, WA 98948.

PAWNEE 2-meter transceiver, $149.00; Eico 730 modulator 30-watts, $45.00; Eico 720 transmitter 90-watts, $55.00. Relay *box above $7.00. Want: 2-meter Lunch Box. Call or write* WB2LXI-PAS-4970. 4379 Furman Ave., NY 10466.

GALAXY V, AC-35, calibrator, speaker console, like new condx: $275; Valiant II, t-w, with 3B28, in excint condx; $175.00. Both shipped REA prepaid in 48. D. P. Crowell, WA5DZP, 314 E. Main St., Ada, OK 74820.

SWAN 350C with 110/220 volt 60 cycle power supply and 12 volt d.c. power supply. Used 1 week. $400.00 W7ZFY, W. N. Rohrer, Quarters 12-N-6, Governors Island, NY, NY 10004. Tel: a.c.(212)-825-1690.

NEED Money for college: Swan 250, excint condx, Lakeshore Industries P-400 GG linear amplifier, 575 watts P.E.P. input, 200 watts input AM/CW, still in original carton, never used. No first reasonable offer refused for either or both. WA2VEQ, Jerry Weinstock, 54 East Williston Ave., East Williston, NY 11596.

HRO-50-T1 coils wanted. Mark Connally, 2715 Sixth Ave., Fort Worth, TX 76110.

ATTENTION DX! We are Collins distributors with warranty repair, complete export facilities. Write for best trades, quotes on Collins, other equipment, new and used. All items guaranteed. CECC, Bankamericard. Prices f.o.b. Houston. Madison Electronics, 1508 McKinney, Houston TX 77002. Tel: a.c. (713)-224-2668.

ARC-27 UHF transceiver, RBL-3 VLF receiver BC 603 w/ Essa satellite converter ARB receiver. Dynamotors, miscellaneous. S.a.s.e. for list. J. O. Wood, 201 Montebello, Charlottesville, VA 22903.

ESTATE Sale: Three complete Collins set-ups, owned by late Dr. Sam Sosnov includes 75A4, KWS-1, 30L-1, KWM-2, etc. with all accessories, plus new tower and beam. Equipment now stored at W6AG and priced right for fast sale. S.a.s.e. for complete list with prices asked. Tel: (a.c.)-213-764-4401.

WANTED: Hi-band Motorola FM station monitor F4MU24B (Alle, mechanical filter Collins #F500B-60, W7IYG, R #5, Nampa, ID 83651.

MONEY Is hard to save, but try our prices. You'll be surprised. Galaxy, Drake, Swan, National, Hy-Gain, etc. E. C. Electronics, RFD #2, Box 97, Raymond NH 03077.

ANTENNA Bearings calculated by computer for your own QTH. Over 300 locations in both United States and foreign countries for only $1. Euclid Radio Club, WA8ZGE, Charles *Reno, 711 East 222nd St., Euclid, OH 44123.*

SELL: Brand new Galaxy GT-550 transceiver with matching a.c. supply, speaker and 25 KHz calibrator. Factory-sealed carton. $475.00. WA9HRN, Craig L. Pitcher, 580 Crooked Lane, Barrington IL 60010.

WORLD Radio used gear has trial-guarantee-terms! KWM-2, $695; 75S, $159.95; SR-150, $299.95; HW-32, $89.95; Swan 250, $22.95; *DuoBander 84*, $119.95; *Eico 753*, $129.95; TR-3, $369.95; NCX-3, $169.95; NC-200, $249.95; SB-33, $199.95; SB 34, $299.95. Free "Blue-Book" List for much more. Write World Radio, P.O. Box 919, Council Bluffs, IA 51501.

FOR Sale: 75A-4, vernier knob, noise-blanker .8 and 3.1 KHz filters, in excint condx; $325.00. Freight and packaging not included. K0EXD, Thorsell, 1195 E. 77th St., Kansas City, MO. 64131.

DRAKE: 2-NT, brand new, used only a few hours. Complete with manual, original carton. 15, 40, and 80 meter Novice xtals. In mint condx, $120.00. Wanted: "Vibro-Keyer" and Tri-band antenna. Inquire Frank Ahern, 162 Moore Ave., Oceanside, NY 11572. Tel: a.c. (516)-R04-2070.

COLLINS: 32S-1, 75 S3B, 516F2, 312B4 filters, 4-1000A linear; Hygain 203BA, etc. $1350. Roger Young, 33-15 Roswell Road, NE, Apt. A-16, Atlanta GA 30305. Tel: a.c. (404)-261-3908.

COLLINS 75A-4, new PTO, low-noise mixers, spinner knob, $400. Heath SB-200 linear, new 572B tubes, $190.00. Local pick-up. W2HC, tel: a.c. (516)-333-1079.

QST; 1946 thru 1960. Dec. 1954, 1956, Jan. 1950 and June 1934 missing. Make offer. *W2AAU, 85 Collidge Ave.*, Spencerport, NY 14559.

SR-150 a.c. and d.c. power supplies, mobile mount and three mobile antennas, $450.00. R. P. Gautreaux, P. O. Box 1786, San Benito, TX 78586.

FICO 720 c.w. transmitter, vy gud condx, 90 reducible to 75 watts, $55. WA1LAT, 14 Percy Road, Lexington, MA *02173.*

HEATH HW-32, SB-600 spkr, HP-23, 100 kc. calibr., manuals, cables, mint condx. $125. WA2VWG, 6029 56 Drive, Maspeth 11, NY 11378.

SELL: NCX5 MK II spkr/ac.ps, xtal calibr., mint condx, little used, $400 firm; HQ-180, noise blanker, all new tubes, $200; Viking I AM-DSB-CW, 160-10M, VFO, Dow-Key relay, 2 unused 4D32 finals, D-104-G stand, $100; 6N2, all new tubes w/ps, Dow-Key relay, $100; Filter King, 6M conv. w/ps, $15.00; two 8122 unused finals $50. Will ship. Tel: a.c. (513)-561-5330. Curt Gamble, 7283 Thomas Drive, Cincinnati OH 45243.

SPECIAL: Gyrator-Filter Kit Q's up to 1500. Make your own low-pass, band-pass, or band-reject filter up to 50 KHz. Instructions included, $32.00. Special offer good until December 31st, 1969. Reaction Instruments, Inc. 215 Mill St., N.E., Vienna, Va. 22180. Tel: a.c. (703)-281-4040.

SELL/Trade: New Swan 350C, $515.00; Ranger, $60.00; Navigator, $70.00; prop-pitch motor, $25.00. Stamp for list. Want: Hy-Tower vertical. J. Shank, 21 Terrace Lane, Elizabethtown, PA 17022.

DRAKE 2C, 2CQ and xtal calibrator, in excint condx: $200. HA-5 vy gud condx, $25. Ken Bauer, 6358 Lyric Lane, Falls Church, VA 22044.

NEED 500 Hz filter for 75A-4 at reasonable price. Sell PolyCom 62-B, 6 and 2M transceiver; clean, $225.00. Dick Shonkut, W2QFR, 28 Cameron Place, New Rochelle, NY 10804.

SP-600-JX, as is: make offer. You ship. Robin Huckaby WB4GKI, Rte. 4, Box 165-B, Griffin, GA 30223.

SELL: Digital counters: 540; HP-AC-4 indicating plus-in *decades, $5; HP-560A digital printers, $100; Heckman counter* parts and manuals, Jennings UCS 300 vacuum variables w. turn head, $25.00. Stamp brings list. Trammell, 1507 White Oak Ct., Martinsville, VA 24112.

WANTED: Electronics Instructor. General, Theory and work shops. Science Camp, Lake Placid, New York. Write: Eddie Stein, Apt. 4B, 440 West End Ave., NYC 10024.

WRONG Coat taken at OWCA meeting, Engineers Club, NY N.Y. October 24. Mine: Dark gray, winter, short, label "Burleigh". Yours: Blue gray, spring size 41, short. Label Witty Bros., 18th Ave., N.Y. Handkerchief with initials "A.G." W2GVT, 157-28 18th Ave., Flushing, LI, NY 11357. Tel: a.c. (212)-FL3-0914.

FOR SALE: 600L Central Electronics linear amp. Price: $1.75. Good condx. Tel: 65-9464. Bob Pierson, W3WO, 902 N. Broom St., Wilmington, *DE 19806. Tel: a.c. (302)-655-9564.*

DRAKE R4 and all 10 M and 160M xtals; t4X, MS4, AC-3 and Shure 520SL mic. Like new condx, $500. Sonar hand held FR103/S police-fire (150-175 MHz and BCB) rcvr, $30. Joe Heffler, WB2QFR, 2200 Morris, Bronx, NY 10453, Tel a.c. (212)-295-1694.

SX-11 in excint condx, $115; HX-20 SSB-CW xmtr, with HP-20AC power supply, $115. Package deal: $215. Will ship. Rick Rosen, WA2JTR/Ø, 6252 Northwood, St. Louis, MO 6310

FOR Sale: Complete 1 KW SSB KW Collins S-Line station to settle estate. Hardly used. For list write W8KHI, 68 Ridge Road, Hinckley, OH 44233.

DRAKE R4B *in immaculate condx.* Five extra xtals. Manual. Will not ship, sry. $325.00 W2HIN, 17 Kensington Ave., Clifton, N.J. 07014 Tel: (a.c.)-201-473-6685

DRAKE 2NT (2 yrs old) and HA-5 VFO, very stable c.w. rig, plus 7 Novice xtals, $130.00. You pay shipping. WA3GFP, A. F. Gudzumeh, 218 Dumont Rd., Wilmington DE 19804.

GALAXY V transceiver, AC-35 power supply (AC), excint condx: $250.00. Robert Mauro, WB2UHY, 150-3 18 Ave., Whitestone, LI, NY 11357.

SELL: AKAI 1710W tape-recorder with tapes. $300. Barry H. Brantley, 104 So. Denton St., Dothan, AL 36301.

FOR Sale: National NC-109 receiver with matching speaker like new, used vy little, 4 bands, .54 mc-1 .6 mc, 1.6 to 4.5 Mc, 4.6 to 15 Mc and 14 Mc to 40 Mc. 11 tubes, a beauty $50. Roman Segiel, 1603 N. Richmond St. Chicago IL 60647 Tel: 489-1226.

NC-300, less speaker, perfect: $100. W3MFL, 101 Forsythia Dr., Newark, DE 19711. Tel: a.c. (302)-737-2373.

COLLEGE Forces Sale: Drake R-4A, $275. Richard Harker 2711 Kincaid, Eugene, OR 97405.

SR-46A with matching VFO in mint condx, $125 or best offer for the pair. Must sell. WA8SPZ, Ray Vander Bok, 165 Philadelphia S.E., Grand Rapids, MI 49507.

SELL: HW-16, Sixer halo and m/p/s., DX-100, open mind on sell or trade for ham or hi-fi gear. New York City area or pick-it-up deal only. Ronnie Lulov, 2665 Grand Concourse Box, NYC 10468.

RTTY Filter, ITT Kellogg, hermetic, octal base, new 212 *hz/6 db, 100 hz/ 30 db, 180 hz/ insertion loss 3 db; 600* ohms inp. outp.; also 2295, 1955 comparable specs. $11.5 each ppd. Fred Firestone, WN6ZRB, 1098 Syracuse Drive Claremont, CA 91711.

WRITE, Phone or visit us for the best deal on new & reconditioned Collins, Drake, Swan, Galaxy, Hallicrafter, Hammarlund, Hy-Gain, Mosley, Waters, Henry Linear, BI Linear, towers, rotators, other equipment. We meet an advertised cash price on most equipment. We try to give you the best service, best price, best terms, best trade-in. Write for price lists. Your inquiries invited. Henry Radio, Butler MO 64730.

PRICED To sell! Heathkit HW-17A two-meter receiver with d.c. power supply, $75.00. Heathkit HW-18-3 160M SSB transceiver, $40. Heathkit HP-23 a.c. power supply, $2 All like new and operating. K8BLL, 2154 Bonnie Drive Stevensville, MI 49127.

SELL: SX-100 receiver, $100; Triplett meter 631, $40, or make offer. Local deal preferred. Jim, WB6MOE, 517 Emerson Ave., Monterey Park, CA 91754.

2-Way unit, used, wanted for 2-meter use. W5KVE, 130 So. 21st St., Temple, TX 76501.

RCVR For sale: HQ-140X, vy gud condx, excint for Novice $90.00. WQCVR, Box 472, Schenectady, NY 12301, tel: a. (518)-393-8754.

WANTED: House and/or land in Florida or West Indies suitable for ham operation (low noise antenna space). If small part or full time business opportunity also, even better. Available inspect *February 1970. VE1FW, Box 309, Liverpool* N.S. Canada.

HALL HA-5 VFO, vy gud condx: $35.00. A. E. Wilson Box 392, East Brewster, MA 02640.

HEATHKIT Station, SB-300 with SSB, CW, AM filters and speaker; SB-400, all crystals. Excellent condition. Use transceive or separate. $450.00. K1VII, 17 West Main St. Niantic, CT 06357. Tel: a.c. (203)-739-5362.

VIETNAM Duty in January. Want IC-key with letter spacing or equivalent keyer to take with me. State price and condx. SP/4 Kenneth C. Hopper, K9DNY, 6240 Azure Lane, Indianapolis, IN 46220.

FOR Sale: 1 tube-tester Sencore Mighty-Mite II A-1, $25.00 or will swap for grid dipper. R. Penko, 9183 Rte 306, Kirtland OH 44094.

HQ-145C with speaker/manual, like new condx: $155.00, or first best offer. K1NLW, 165 Stanford Dr., Westwoood, MA 02090.

HALLICRAFTERS HA-6 6 M Transveeter with p/s. Asking $119.00; HT-30 AM/CW/SSB. All-band transmitter. Needs work. Asking $70.00. Dan Hubecky, Losee Rd., Wappingers Falls, NY 12590.

STATION Closeout: HRO-60 $300; SB-200, $200; Viking Ranger, $1250 HW-32 (power supply, mike, speaker) $110; TH-2 beam and Ham-M rotator, $100; RME DB-20, $15.00; D-104 p.t.t. mike, $15. Also: Q-multiplier, tube-tester, coax switches, etc., etc., $50. If you act fast, $750 takes all. Will not ship. You must pick up. W3YJM, 692 Deaver Drive, Blue Bell, PA 19422. Tel: a.c. (215)-646-5399.

SPIDERS For boomless quads. Heliarc welded aluminum. Al's Antenna Accessories. 1339 South Washington St., Kennewick, WA 99336.

SELLING Out: Viking II with VFO: $100; SX-100, $75.00, plus most elaborate xmter ever, 500 w. 4-65 as PA, 811A's modulator, 'scope G-E commercial cabinet, loaded with extras. Meters, relays, variable power devices. Built to meticulous professional standards, $200. W2GCQ. Ted Skoglund, West Lake Road, Cazenovia, NY 13035. Tel: a.c. (315)-

SELLING: Heath Apache with SB-10, manuals, $125.00; HQ-170AC with I.F. noise silencer, manuals, $200. J. Morgenstern, WB2VBK, 104 Canterbury Dr., Camillus, NY 13031. Tel: a.c. (315)-488-9932.

SALE: KWM-2 a.c. power supply, $675.00; 30L-1, $275.00; Classic 33, rotor, Spaulding self-supporting 40 ft. tower $125.00. All are in top condx. Dr. Jack Kaplan, 56 Carver Terrace, Yonkers, N.Y. 10710 Tel: a.c. (914)-SP9-6636.

WANTED: Pair of new 7094 tubes. Please quote price. Bernard Grossman, WB2NDL, 1505 Grand Concourse, NY 10452.

DX Awards Log. 150-page book lists contacts for over 100 major word-wide awards. Individual logs for each award for record of contacts and confirmations. Required over two years to prepare. $3.95 ($4.95 foreign). McMahon Co., 1055 So. Oak Knoll, Pasadena, CA 1106.

SELL: Johnson Courier 500-watt linear. 15 watts will drive. $90.00 F.o.b. Longmont, Colorado. John Vick, 26 Princeton Circle, Longmont, CO 80501.

HALLICRAFTERS SX-101 rcvr in "like new" condx with Hallicrafters R-42 bass-reflex speaker, $160.00. Bob Eckert, 133 East 7th St., Clifton, NJ 07011.

VFO For sale: Heathkit HG-10. Excellent condition. With manual, for $25.00. Jonathan Zins, WB2WSI, Exeter Academy, Exeter, NH 03833.

DELUXE 6-band integrated Heathkit kilowatt station, 80 through 10 and 2 meters. SB-101 transceiver (with SSB and CW filters) plus SB-640 external VFO for split frequency operation. HP-23 power supply. Also SB-500 transverter for 2-meter SSB/CW; no cable changing to switch bands. Also SB-200 linear amplifier. Manuals and cables included. Expertly wired and aligned, guaranteed perfect shape. Package only, $850 (10% below list costs). Pick up or will deliver 100 miles from NYC. W2NZ, tel: a.c. (516)-541-9355 evenings, weekends.

SWAN 260 Cygnet, like new, $300 Swantenna 55 remote control mobile antenna used little, $50. W4IH, 6619 Skyline Ct., Alexandria, VA 22307. Tel: a.c. (703)-768-0098.

SELL: Several 4-400A—4-250, $10 each, $18 a pair; plate caps-suckers, $1.00; vacuum variable w/counter dial 10/300 pf, $25.00; B&W Kw #850A inductor, $75.00; B&W plate choke, $3.00; FC-30 filament choke, $5.00. K8WQE, 2731 Cottonwood Dr., Springfield, OH 45504.

MANUALS: R-390, R-390A, OS-8C/U, $6.50 each. Many others. List for 20¢. S. Corvalen, 4905 Roanne Drive, Washington, D.C. 20021.

HEATHKIT HW-100, HDP-21, HD-15, HM-15. Assembled, tested, but builder unable to obtain license. Contact Tom Barnett, 152 N. Carolina St., (2316), El Paso, TX 79915. Tel: a.c. (915)-772-1121.

LOOKING for HA-1 keyer and key to $50.00. Must work. Ralph, WB6PCZ, 7335 Santa Monica Blvd., L.A. CA 90046. Tel: HO49523.

FOR Sale: KWM-2 No. 13459, PM-2, 35TD2, M:1 $900; 312-B-5, $275. Trade: Nikon "F" (f/1.4 50 mm), flash, case, for TR4, RV4, AC4. Jim Craig, 29 Sherburne Ave., Portsmouth NH 03801.

SELL: Excellent Galaxy III, and AC supply. Serial No. 4104M345, $175. K4RON, 2100 Bentley Drive, Sylacauga, Al. 35150.

FOR Sale: Lafayette HR-500, 160-6, Crystal and speaker. Never used, $85.00. W2LZW, Charles Judd, 66 Hornblower Dr., Waretown, NJ 08758.

SX-101A, in excint condx. No scratches, $160.00 F.o.b. Jamie Crandall, WA2GVI, 6136 Broadway, Lancaster, NY 14086. Tel: a.c. (716)-683-5363.

HW-12, HP-10, $80.00. Extra heavy duty rotator for base mounting. Will turn most anything. Less control; swap for HP-13. Mel Warren, WA1JNB, 107 Dean Mather, AFB CA 95655.

COLLINS 75S 3B, used less than 5 hours. Serial No. 85231, $595. WØCPM, 1729 South 86th Ave., Omaha NB 68124.

SELL: Hammarlund SP-600 rcvr, 0.54-54. MHz and Hammarlund HC-10 SSB converter USB LSB T-notch, etc. Both units are in gud condx, with manuals. Make reasonable offer. Hallicrafters HT-32 transmitter 80-10 SSB, AM, CW gud condx, with manual, $150.00. Hammarlund HQ-145C, $85.00. Pick up deal only on all units. Joe, WA2CKM, 1816 Parkview Ave. Bronx, NY 10461. Tel: 597-6366.

SELL: KWM-2, PM-2 (a.c. pwr. supply), and CC2 (Samsonite carrying case). In excint condx. All for $700. Purchased from an authorized Collins dealer. Gud package for portable applications. Contact WA1KAY, 15 Moraine St., Belmont MA 02179.

NEW Galaxy GT-550. Will consider your gear in trade. W4UHO, 1300 Milton St., Clearwater FLA 33516.

SX-111 mint condx. Not a scratch! $120.00. R. McGregor, 2924 Santa Rosa, Ft. Wayne, IN 46805.

PITTSBURGH area: Heath SB-200 linear, oversize fan, gud spare tube, $185.00. No shipping, sry. W3AEV. Tel: a.c. (412)-835-9548.

HEATH, SB-400, excint, $200. New York area only. Jay Sclar, WA2CAS, 2691 Reservoir Ave., Bronx, NY 10468. Tel: a.c. (212)-KI3-9630.

SELL: Gonset GSB-201 linear, converted for transceiver, in excint condx, with manual: $175.00. You pick up or pay shipping. Joe, WA2CKM, 1816 Park View Ave., Bronx, NY 10461.

SELL: Knight T-60 80-6 meter, xmtr, with homebrew antenna change-over. In excint condx: $25.00. You pay shipping. WA2GMD, 8 Hollis Place, Huntington Station, LI, NY 11746. Tel: a.c. (516)-HA1-9286.

SWAN 350, selectable SB, xtal calibrator, with 117XC a.c. and 14X, d.c. power supplies. Like new condx, $325.00. Capt. John L. Sielke, 310 Sn. MacArthur Ave., Panama City, FLA 32401.

TRANSFORMER: primary 220V, single phase, 60 cycle, secondary 2050 and 2900 volts CT, 1.4 amps, $50 plus freight. Capacitor, variable: 50-1050 mmfd., 0.090" airgap, 3000V RMS breakdown, $10 plus PP. W7KHI, 2101 Allumbaugh, Boise, ID 83704.

SELL: HT-41 linear, $170.00; HX-50 exciter, $175.00; Johnson KW Matchbox, 250-30-3, $100.00; $3-400Z Eimac tube, new, $20.00; 117V, new filament transformer 5V secondary @ 30A, $20.00. All in gud condx. F.o.b. Roanoke, Va. You pay shipping charges. W4PRJ, 801 Carroll Ave., N.W., Roanoke, VA 24016.

NATIONAL NCX-500, $350.00; A.c. supply, $85.00, never used, brand new, factory sealed cartons, warranteed. "Chick" Whitley, W4TKX, 2806 Cornwallis Drive, Greensboro, NC 27408 Call a.c. (919)-292-1350.

SELL: Gonset GSB-100 guaranteed mint condx, $100. Dr. G. Harris, 4725 Lyman Lane, Madison, WI 53711.

LIMITED Quantity: RCP #780 color/black & white "do-all" sweep generators, 6 ranges: 3.2, 800 mcs. New, original cartons. Original price, $189.50 net. While they last: $49.95, plus shipping (15 lbs.). Ramco Electronics Corp., 3830 Cypress Ave., Brooklyn, NY 11224. Tel: a.c. (212)-449-1893.

WANT: RCA 852-204A, etc. Also, any Taylor transmitting tubes. Defective or open filament OK. Sell: 2 KW P.E.P. solid-state power supply; 2700-3000 v. output, 115 V or 230 V primary 7" x 12" chassis, similar to Handbook or Bandit 2000C supply: $40. F.o.b. Winona, MN. Martin Peterson, 1311-W. 5th., Winona, MN 55987.

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LIKE New Drake TR-3, VFO, original boxes and manual. New SWR bridge, cables, 14 AVQ antenna Turner mike and textbooks. You make offer. Larry Smalley. Tel: a.c. (203)-744-2925. 4 Golden Heights, Danbury CT 06810.

SELL: Hammarlund HQ-129X, Lettine 2 meter xmtr, Gonset converter. All are in A-1 condx. W1THA, W. Lange, 27 Bonair Ave., Stamford, CT 06907.

SEASON's Greetings to all from Steve, WN4JKZ, "D.B.," W4UDQ, and Paul Wilson, W4HHK/A4HHK, and Carol and George King. See you on 80 and 40 meters and 2300 MHz.

SWAN 240, xcint condx, $165; Swan 412 d.c. power supp. recently factory rebuilt, $50. W. H. Wood, W8CIS, 705 Niles Ave., Berrien Springs MI 49103. Tel: a.c. (616)-471-3766.

ONE SX-130 Hallicrafters receiver with matching speaker, built-in 100 kc. cal., $150.00; one Heathkit DX-60A xmttr, used 4 months, $50.00; one VFO Heathkit, HG-10B, $30.00 Gil Walker, 5218 Dodge Ave., Ft. Wayne, IN 46805.

FOR Sale: Utica 650 with VFO, in mint condx. $95.00. M. Heiman, Box 744, Show Low, AZ 85901.

LAFAYETTE HA-700 receiver with speaker, $40. Good condx. Buyer must pay shipping charges. Henry Gac, 1715 Holden, Detroit, MI 48208.

SACRIFICE: Complete station HT-46, SX-100, preamp, T-R switch, 800/300 6.3 volt power supply, ant. relay, $400. F.o.b. St. Louis. Steve, WAØWOA, 9241 Old Bonhomme Rd., St. Louis, MO 63132. Tel: a.c. (314)-993-5578.

I would like to get in touch with any Ham that can beat my record of fifty years of active service in a fire department. George J. Trostle, WØFYC.

NOVICE: DX-20, Knight VFO, c.w. Monitor, Cantenna, 2 FM mobile all A-1 condx. QSL info dime and s.a.s.e. L. Kaminsky, 2501 Lippincott Blvd., Flint, MI 48507.

EICO 720, fair condition, and Dow-Key relay, $45.00. Stan, WB2QQX, 15 Myrtledale Rd., Scarsdale, NY 10583. Tel: a.c. (914)-SC3-6050.

HALLICRAFTERS SX-110 recvr, $90; Ameco 2 meter converter with preamp, $25.00; Twoer with mike and rocks, $35, Larry Rachman, WA2BUX, 2 Maggio Lane, Old Bethpage, Plainview, NY 11804.

CW Opers, Ivy clean Collins 32V-2, gud final and manual $90, Eico 717 keyer, perfect, $65.00. Bill Wallace, K8HYY, Rte 6, Box 110, Xenia, OH 45385.

HALLICRAFTERS SX-117 receiver, $189.00; F-500AC power supply, $74; new unbuilt Heath HD-15 phone patch, $21; Heath 2er, $29; all are in xclnt condx. Offers OK. WA6BWB, 13241 Eton Place, Santa Ana, CA 92705.

SELL CE20A transmitter with QT-1 and 458VFO, 195.00. Hammarlund HQ-129 recvr with xtal calibrator and matching speaker, $65.00. Both in excellent condition. You pay shipping. Jim Biber, WA0SGE, 2106 Sequoia, Grand Junction, Colorado 81501.

IMPEDANCE bridge $50; AC vtvm $15; G.D.O. $20, also have transistor ignition, meters, dial drives, cabinets, parts, books, magazines, etc., and much more. Cleaning out everything. You pay shipping, postcard for list. John Yurcik, 163 Main Street, Milburn, N.J. 07041.

HW-30 Twoer, crystals, mike, ant., $40; Heath 0-8, 5 inch oscilloscope, in wkg condx, $25. Wanted: 275 watt Matchbox, with SWR, also triband beam. K1WHY, Scully Road, Somers, CT, 06071.

KWM-2, S16F-1 D. C. power supply, 351D-2 mobile mount, MM-1 mobile antennas, 80-40-20 with mast. $650.00. Will ship. Elzie Hacker, Jr. Rt. 5, Box 482, London, Kentucky 40741.

SELL: Johnson Ranger II. Excellent condition. Push to talk built-in. With D-104 mike and G-stand, and low pass filter, $160. Will trade for mobile SSB. WB2FOH, 1694 Stewart Avenue, New Hyde Park, N.Y. 11040, (516) HU8-3695.

HOT Carrier Diodes; New HP 2800, 90¢, 12/$10 pp. Integrated circuits: New Fairchild Micrologic, epoxy TO-5 package, 900 buffer, 914 gate, 60¢ each, 923 J-K flip-flop, 90¢ each. Guaranteed. Add 15¢ postage. HAL Devices, Box 365A, Urbana, Illinois 61801.

JT breaks my heart, but I need the cash. Must sell my new HW-100 S.S.B. transceiver, mint condition, serviced and aligned by Heath. Quote "Unit now meets or exceeds all published specifications." Sacrifice, first $300 takes it. Power supply optional. Joe Bellucci, WA2GJG, 5800 Arlington Avenue, Riverdale, N.Y. 10471. Phone 212-549-2525 after 5:00.

GOING mobile—sell—HQ 170C—$170; Heath TX-1 & SB 10—$165; Dow-Key T-R relay—$14; or all together for $335 pre-paid. Plus Novice station—Eico 720 & 4 xtal & Ntl. NC 121 for $85 packed FOB Durango. Clean excellent gear in daily operation with all manuals. Bill Watts, WAØSOL, Box 274, Durango, Colorado 81301.

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SAFETY Belts for climbing, new nylon body belt $15, Link, 1081 Aron, Cocoa, Fla. 32922.

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HALLICRAFTERS recvr SX-146, just made purchase. Exclnt, $190. Warranty good. Ser. *#545020. Sell* SX-146 recvr. *#542020*, recently bought, no room. Rodia, 748-2293, Brklyn, NY 11220.

CE-200 Perfect condition with manual $475, CE-100 Same $375. WØCPM, 1729 South 86th Avenue, Omaha, Nebr. 68124.

WANTED: 2.1 KC filter for 75A4, monitor scope, KW watt meter, George Cherney, 4986 Leavitt Road, Lorain, Ohio, 44053.

SQUIRES Sanders SSIR receiver and SSIV band scanner. Being used at the present time. $600.00. K2SHU, 139 Southwood Circle, Syosset, N.Y. 11791, 516-921-0616.

BC-221-T, vy clean, built-in regulated AC P/S and calibration book. $40.00 DX-60, CW only, built-in monitor, TR switch, and VFO, good bk-in CW, $40.00. K5KPD, 5305 N. *Drexel, Oklahoma City, Oklahoma 73112.*

FOR Sale: Collins 32S-3, $400; 516F-2, $75; 312B04, $90; Henry 2KD 30 hours use, $400. Beautiful condx. WA4WAO, 1815 Forney Dr., NW, Huntsville, AL 35805. Tel: a.c. (205)-534-5512.

GONE Tranceiving. Lafayette HA-350 amateur bands receiver, 2.1 KHz selectivity, mint condition, $90. Knight T-150, VFO, 150 watts lowpass filter $65. Tom Wood 24 Roxbury Rd., Port Washington N.Y. 11050, 516-767-4461.

SALE: Heath 1014 scope, HW16 xcvr, GC1A recvr, Eico grid dipper, GR RF generator. Best offer. Weisenburger, RD. 1, Ottsville, PA. 18942.

KWM2, perfect w/waters $600; 516F2 $100. Drake TR4 trade for R4/T4 setup or sell RV4 $75. Galaxy V-Mk-11 spotless w/ac/console $375 or trade for linear. WØBNF, Box 105, Kearney, Nebr. 68847.

FOR Sale, Heath GR-64 mint, $30. Michael Simmons, Cisne, Illinois 62823.

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R-390 Digital receiver $950, Central Electronics 200V $39 Eldico SSb-100 Mil. transmitter $295, CV-57/URR teletyp convertor $145, Polycomm six meter transceiver $145, Tec nical Material GPR-90 receiver $375, all equipment, excellen condition. R-220 receiver 20-220 MHz FM/AM needs alig ment $175, Ashcraft, W8QWO, RD. 1, Box 417, Aberdee Maryland 21001, Phone 301-272-0548.

HEATHKIT model HR-10B amateur receiver with cryst calibrator, mint condition $75 or best offer, Contact Pet Wexler, WA2COM, 192 Haypath Road, Plainview, N.Y 11803 CH9-4892.

HOSS Trader. Ed Moory says if you don't buy your Ha gear from him, you might pay too much! Shop around fo your best price and then call the Hoss before you buy! Ne display equipment: Factory warranty: TTdx-400, $489.0 BTI LK-2000, $649.00; SB-34, $359.00; New Swan 260 Cy net with free mike, mobile mount and antenna, $435.00; Ne Rohn 50 ft. toldover tower prepaid, $188.00; New Mosle Classic 33 and Demo Ham-M rotor, $209.00; Used Equi ment: Swan 500C, $339.00; TR-4 $419.00; T4-XB, $329.0 R4-B $319.00; Ham-M rotor, $85.00; GT-550, $339.00; Swa Cygnet, $299.00; Ed Moory Wholesale Radio Co., Box 50 Dewitt, Arkansas 72042 Phone (501) 946-2820.

SB101 with AC power supply, speaker cabinet, and 400 tilter. All in absolutely perfect condition. Best offer ov $400. K2ODT, Dairy Farm Road, Stony Brook, New Yo 11790, 516-751-8898.

SELL Swan 350, calibrator, 117V power supply top cond tion, little used. To close estate. First cashiers check $31 Gets it. Ship collect as instructed. W4PE, Box 654, Hol Sound, Florida 33455.

GUY Ropes: Never used ¼" diameter dacron (test streng exceeds 1,000 pounds). Won't stretch, rot or affect antenn radiation pattern. Complete with eyelet-thimbles, springloc fasteners and snubbers. Cheaper than equivalent guy wir 40'—$2.50; 54'—$2.75; 72'—$3.50 plus postage. Wante Heathkit MP-14 inverter. Bill Shepherd, 12,000 Twin Ced Lane, Bowie, Maryland 20715.

FOR Sale; 2½ K.W. mod. xfrmr. Kenyon S-10765. Any re sonable offer. J. Horvath, 522-3rd St., San Rafael, CA 9490

SELL: SX-101A, perfect $190, TX-62, never used, $13 GE20A with VOX, good condition $90. BC-342, $40. Amec 2 meter converter with p.s. $40. Tom Bager, 63 Fernda Drive, Hastings-On-Hudson, N.Y. 10706 Tele: (194) 478-121

LINEAR 3-1000Z table-top cabinet, $250; Chippewa KS power supply for above linear, $100; Collins 75S3, $39 32S1, $395; S16F2, $100; Drake SW-4, $185; Swan 1 transceiver with HR ac, $295; Drake 2A-2AQ, $150; Heat kit, 6-meter Seneca transmitter, $145. F. E. Coble, 2 Collier Ave., Nashville, TN 37211.

BEST Cash offer: (package deal!) BTI LK-2000 linear a plifier, Johnson K.W. Matchbox, Hallicrafters HA-1 keye Drake W-4 Wattmeter, Heath (10-18) 5 in. oscilloscop Heath phone patch. Write: C. J. Mozzochi, 18 Tuxis Roa Madison, CT 06443.

HT-40 xmtr. $50; HA-5 VFO, $35.00. A. E. Wilson, Box 39 East Brewster, MA 02640.

CQ—Radio—OST from 1928, 389 copies: $65 f.o.b. Nappane W9TFB, Kenneth Pippen, 852 E. Marion St., Nappanee, I 46550.

SELL: Extremely clean Swan 140, $110; HP-13 D.C. supp $45. WA6MWA, Michael Gibson, 121 Pine St., Apt. 20 Concord CA 94520.

SALE: HT-32 Drake 2B keyer, bug, accessories. Chea WA6JVD, Alhambra at 21461.

VALIANT I, F/W, original owner: $110. WØBM, 4220 Street, Omaha NE 68105.

WHO can help me with a diagram of the National Receiv NC-33? H. J. I. Schuurmars, PZ1DK, c/o Kennedystraat Paramaribo, Surname.

HEATH Marauder HX-10, $160; Drake R-4, $260; both $400. Both mint condx, with manuals. Lt. G. C. Hirst, BO Box 1108, Hanscom Field, MA 01730.

GALAXY GT-550, SC550, AC400, VOX 35. New, in wa ranty, used less than 10 hours. Package: $575.00. Bob Seyo son, 1500 17th Ave., N.W., New Brighton, MN 55112. T a.c. (612)-633-9662.

GALAXY RX-2 VFO, exc condx. $55 ppd. Jim VanNostran WA7IFX, Box JJ, Jackson, WY 83001.

WANTED: Schematic or manual for United Cinephc Model TS-100/AP oscilloscope. WN8DNF, 64603 Norwi Circle, Romeo, MI 48065.

HQ-100C, 190; DX-40 with antenna relay, $40. Will sh Write WA8YZC, 10426 Meisner, Richmond, MI 48062.

SELL: Teletype Model 19, table, TD, reperf, manuals, spa parts, $75 plus shipping. Air freight available only. Bacon, KL7EQG, P.O. Box 28, Annette, AL 99920.

HAMMARLUND HQ-180 receiver 540 KHz, 30 MHz in bands, selectivity 500 hz-6 KHz, tunable slot filter, lin products detector, matching speaker, manual, $195. Will sh Lewis Colins. Tel: a.c. (713)-225-5501 or a.c. (713)-781-0 nights.

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COLLINS Transceiver 2-9 MHz, AM, CW, PTO. Autotune, full break-in antenna tuner. ARC-2 $55 w/manual. Jerry Malone, W1FNZ, 27 Maple, Cambridge, MA 02139.

COLLINS KWM-2 (all rev.) #1144, 516F-2 power supply, 30L-1 #2386, 312B-5, #326, all mint condition. No trades. $1200 complete only. P. M. Freeland (789-7534) Rt. #3, Box 330-B, Oklahoma City, OK 73127.

SELL Collins 75S3-B and 312B-3 speaker, s/n 85237. Purchased new in February and used less than ten hours. Exquisite condition, with instruction book, cartons. Guenther, W4UIT, 3 Foxcroft Road, $619 f.o.b. Williamsburg, VA 23185.

MINT Gonset 50 MHz 500 linear, $165; 225W 144 MHz, $95; Hallicrafters S-17 144 MHz AM-FM receiver, $50; nice Hammarlund SP-600 JX-17 34-54 MHz receiver, original cabinet w/matching speaker $325.00; GR variable co-ax line section $35.00. Couple Bird #43 elements, trade VHF-UHF list s.a.s.e. W4API, Box 4095, Arlington, VA 22204.

SWAN 350 (late) 117c power supply, $350; Harvey-Wells transmitter 80-2, $25; CMV2E1 FM 53.290 30 watt base sta., $75; CMV3E1 FM 53.528 Mc. mobile 60 watt, $75. HP-13, $50. code tape keyer $10 (Gardner). Want: Heath KL1 linear (or similar). Don, K7LMN, Tel: LE76085, 2802 E. 120 St., Tacoma WA 98445.

JOHNSON Invader 2000 w/cables, manual, like new condx $495; Drake R4A w/MS4 spk, manual, mint, orig. carton, $315; Collins 312-3B spk, $18; Ham-Scan panoramic PCA 2500 $35; National HRO 50/60 NB-FM adp., $15; Fisher MPX 10 multiplex adap, mint $35.00; Sony 101 tape recorder 7" reel, like new, $49.50. Roger Batista, WB2ZBM, 1219 Taylor Ave., Bronx, NYC NY 10472.

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WANTED: Heath DX-60B, HG-10B, HR-10B or similar. Advice condx age, modifications if any, and price. Eugene Sussli, 3501 Branson Dr., San Mateo, CA 94403.

COLLINS 75A4 3.1 and .5 filters vernier dial SN2606, $299. National NC-109 all-band rcvr, $75. Lila Howard, WA2IIO, Tel: a.c. (516)-IL4-2046.

HX-20 all-band xtal filter SSB transmitter with Heath heterodyne xtal modification; keyed VOX break-in c.w., power supply, like-new, $135; 3-400Z one kw all-band c.w./s.s.b. linear, $100. W2AZI Cascode 417A 2-meter converter, with spare tubes, $25. WAØZMA, Griffiths, Quarters 4213A, USAF Academy, COL 80840.

WANTED: Viking Ranger II. John M. Vasicak, W9ZEN, 124 North Glen Ave., Oglesby, IL 61348.

51J-3 or SP-600 wanted for cash. Must be in gud condx. Donald Cameron, W8YAE, 3132 Villa Dr., Toledo OH 43614.

FOR The finest in amateur gear, write for a free catalog. Amateur Radio Headquarters, 514 Yellowstone, Billings, MT 59102.

SELLING Out: All excellent, SX-100, $100; HT-30, and HT-33, 500 watts SSB, $200; B&W 5100B, W/ssb, $175; HQ-180, $175. We ship u pay postage. WØLOV, 1364 Madison, Denver, COL 80206.

HAM Package 60 ft. cz 454 free-standing or guyed crank-up tower, TH6-DXX ant., mast, Ham-M rotator, indicator, all cables and coax: $400. Phone Bill at a.c. 213-93-93197 in Los Angeles A 90005. WN6PGG.

HEATH SB-301 with SSB and c.w. filters, Heath 6-meter converter, in exc. condx: $270. Tom Ashley, 591 Cricklewood Dr., Lexington KY 40505.

COLLINS KW-1, mint condx, factory SB modif., $895; R390A, $695; 75A3, $175. Johnson Viking K.W., $435.00. Dr. Tom Nash, W5NWA, 1100 Canterbury, Dallas, TX 75208.

SELL: Lafayette HA-750 xcvr, HF-50 xcvr, Shure 444T mike, Johnson Challenger xmttr w/homebrew relay, Allied Compreamp, HA-350 rcvr. All this equipment is in excint condx. WB2PHY, 325 Wilson Ave., Westwood, NJ 07675.

ESSCO RTTY converter with selector magnet driver and Heath SB-610 'scope; both for $75, with manuals. WA1LJM, Gaston, 673 Dart Hill Road, Rockville, CT 06066.

HALLICRAFTERS HT-37, SX-111 in excint condx. Now on the air. $295.00. WA6TXP, 715 Larch #12 Inglewood, CA 90301 Tel: a.c. (213)-677-8071.

COLLINS 32S-3 transmitter, $565; 516F-2 supply, with spkr, $105.00; 75S-3A receiver (22 crystal positions) with 2.1 KHz and 200 HZ filters and 4-10 meter crystals, $465. All late serial, factory maintained and guaranteed perfect. K1YYC.

SELL: SB-101 C.W. filter, HO-170AC w/noise blanker, 1500 v. p/s, following equipment brand new: TR-44A and Mosley TA40KR. Ron Hornek, 63 Park Drive, Warwick, NY 10990.

TELETYPE Wanted: M28 typing units, any condx, keyboard perforators—reperforators, cast aluminum TD bases, all unused parts. Sell, too. Typetronics, Box 8873, Ft. Lauderdale, FLA 33310.

KWM-2, No. 10006 with 516F2 power supply with speaker and Jones Micro-Match mounted in power supply unit: $750 cash. W3CJP, H. A. Stoudt, Tuckerton Rd., Reading, PA 19605.

32V3 wanted. State price and condition. R. McCloud, Esopus, NY 12429.

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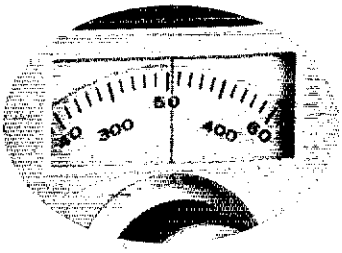

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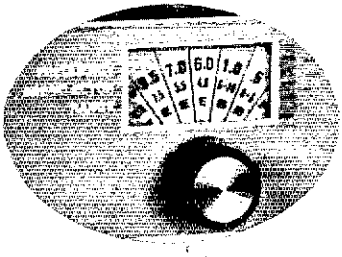

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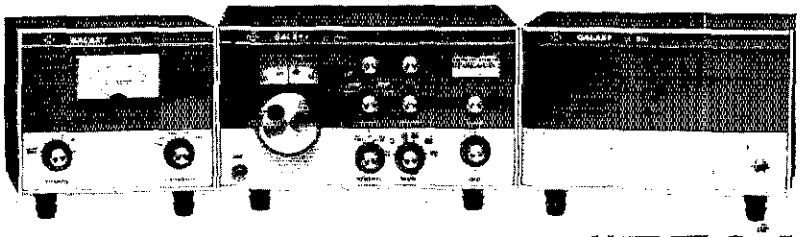

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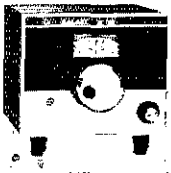

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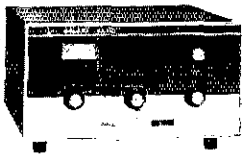

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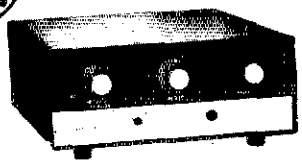

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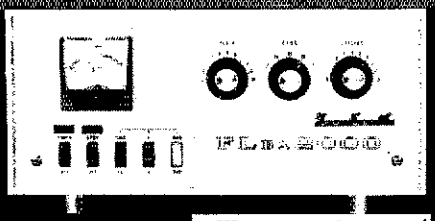

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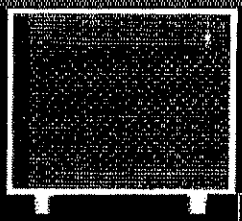

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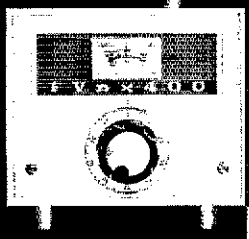

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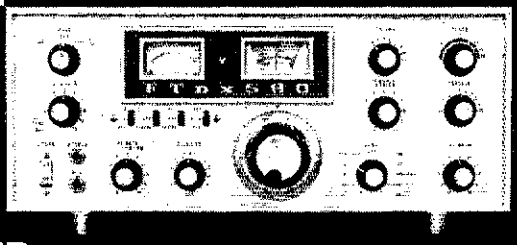

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