

February 1970

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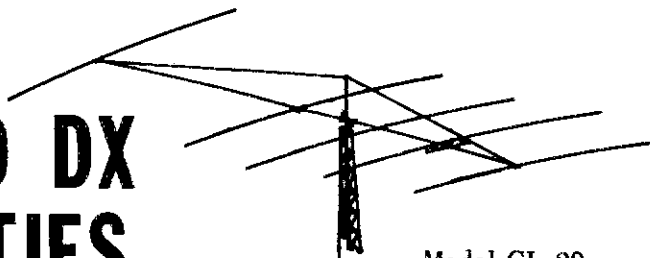


OFFICIAL JOURNAL OF THE ARRL



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The Classic 20 WITH EXPANDED DX CAPABILITIES



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ON 20 METERS

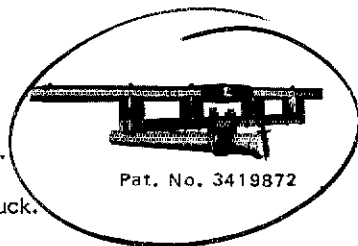
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- SWR: 1.5/1 or better.
- MATCHING SYSTEM: Balanced Capacitive.
- FEED POINT IMPEDANCE: 52 ohms.
- NUMBER OF ELEMENTS: 5. Aluminum tubing; 6063-T832.
- MAXIMUM ELEMENT LENGTH: 38 ft. 1½ in.
- BOOM LENGTH: 46 ft.
- RECOMMENDED MAST SIZE: 3 in. OD.
- TURNING RADIUS: 28 ft.
- WIND SURFACE: 18.7 sq. ft.
- WIND LOAD (EIA Std. 80 MPH): 364.45 lbs.
- ASSEMBLED WEIGHT: Approx. 139 lbs.
- SHIPPING WEIGHT: Approx. 145 lbs. via truck.



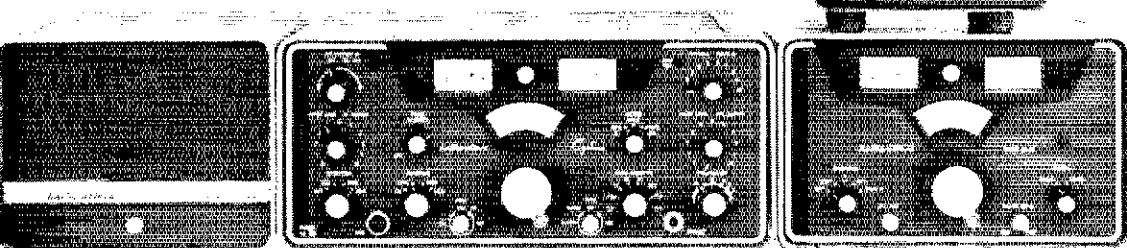
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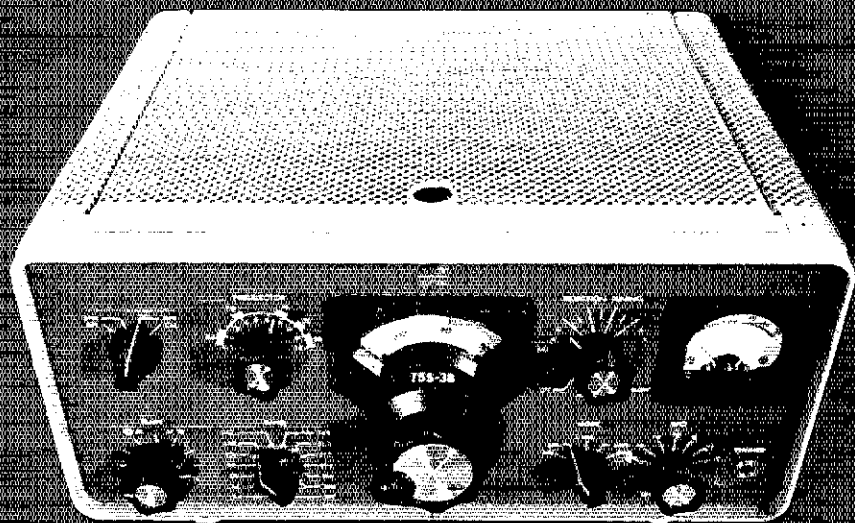
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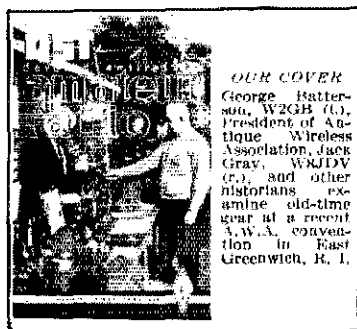
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amine an old-time
gear at a recent
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QST

FEBRUARY 1970

VOLUME LIV NUMBER 2

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1970

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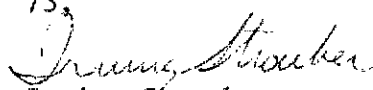
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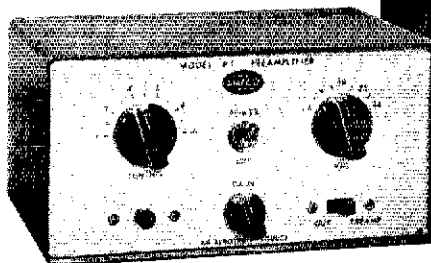
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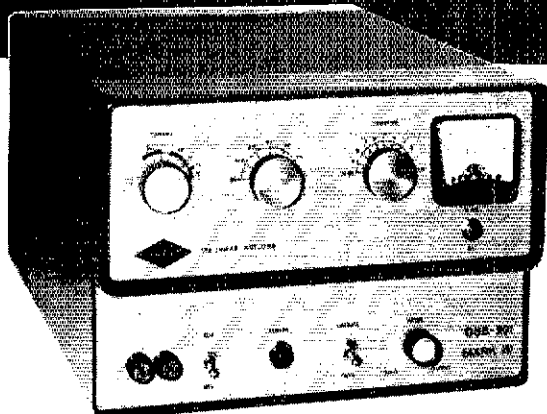
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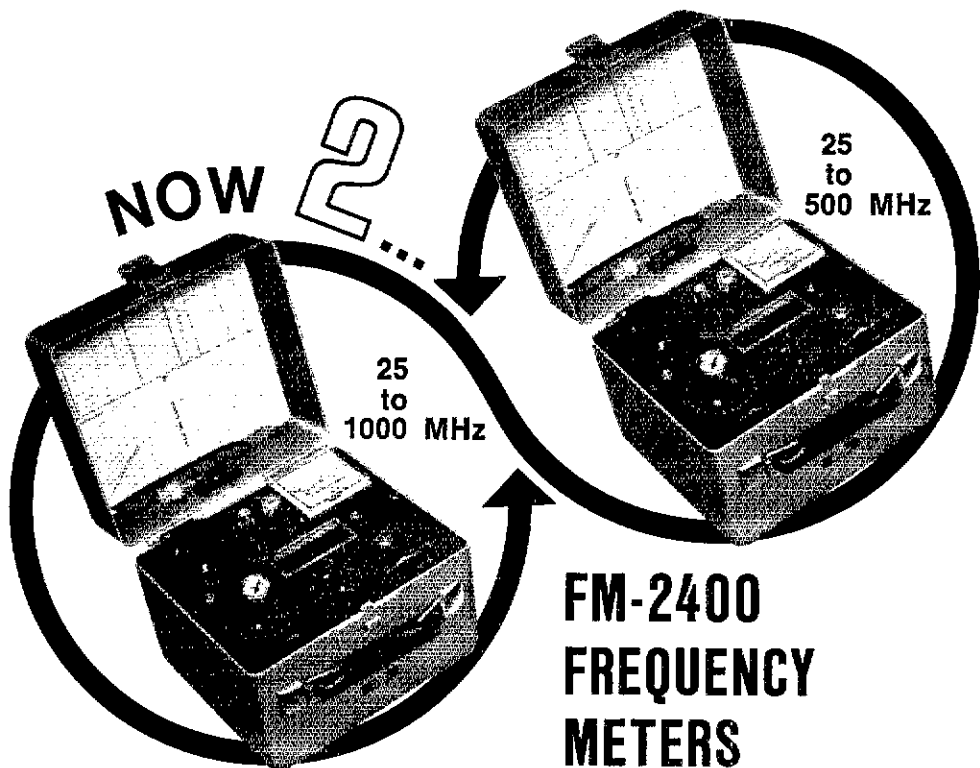
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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors.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

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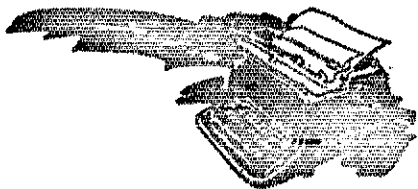
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* Member Executive Committee

"It Seems to Us..."



TOWER HAZARDS

RIGHT from our first use of the "Switch to Safety" slogan many years ago, the emphasis has been on electrical aspects. We have promoted the doctrines of physical shielding of power leads, good personal habits, suitable grounding of equipment, proper electrical design, and the use of components well within ratings — all with the aim of keeping you alive, of keeping you from being electrocuted. (We hate to lose members!) Perhaps partly as a result of this QST safety campaign, perhaps partly as a result of the greater use of manufactured gear with interlocks and other safety features in the design, the number of amateur victims of electrocution from station equipment in recent years has — thankfully — dropped to a very minimum.

But then there was another phase where a number of people, not all amateurs, were killed or severely injured because of carelessness in erecting antennas or masts near high-tension lines. A swinging guy wire, a mast falling out of control, a drooping feedline — some of these brought contact with a commercial high-voltage line, and death or injury to one or more of the antenna party. Here again QST published the grisly details, and a stern warning of the hazards.

There is now another portion of the amateur's installation which presents a serious safety hazard — the crank-up tower. Already one prominent amateur has died as a result of an accident with a crank-up — an unnecessary one, sad to relate — and elsewhere there has been a spate of broken arms, crushed fingers and toes, and many near-misses.

The crank-up is a great idea. It's ever-so-much easier, and (properly used) safer, to assemble that 4-element yagi, or 3-element quad, when you work only 15 or 20 feet off the ground. And although you can certainly suffer some lumps in a fall from that height, the consequences are far less serious than a tumble from 50 or 75 feet. Moreover, if you insist on doing your antenna work in the dead of winter, as seems to happen to us consistently (the DX contest, y'know), the wind blows much less bitterly at 20 feet than at 100.

But for this convenience we must pay a price — and that price is utmost vigilance and care. The crank-up tower is a mechanical device. Mechanical devices — no matter how good their design and construction — can go awry.

Ratchets holding the winch handle can slip. One of the Hq. crew ended up with a bloody scalp when a winch handle stuttered a couple of notches and cracked him a glancing blow. He was lucky; in a slightly different stance, the handle would have struck head on (no pun!), and perhaps split his skull.

"Dogs," supposed to keep the extended tower from dropping when the winch pressure is released, can fail to seat properly. This seems a fairly common occurrence. One prominent amateur knew that his top section hadn't latched, and grabbed the tower to shake it, hopefully to get the dogs to seat fully. The extended section broke loose, dropped — and the ham wasn't able to extricate his arms in time. The resulting injuries lead to his death a few days later.

Another ham decided he wasn't going to bother to lower his crank-down — he climbed to the top, without a safety belt. The top section let go, and the climber was dumped some 30 feet to the ground. He's lucky — he's alive, though with several crushed vertebrae.

And we've had a rash of reports of crushed fingers and toes, resulting from a tower section inadvertently "nesting" while the operator was standing on the rungs, catching fingers and toes between the cross members of the inner and outer sections. A drop of only a few inches can do it. And we're especially susceptible to this sort of thing in hurried, last-minute adjustments before or during some big event like the DX contest.

We're not suggesting disposal of your towers — they have many advantages. But we are advocating that you realize they have certain quirks which can be lethal. So find out how the extended sections lock securely to avoid inadvertent collapse. Satisfy yourself that at your QTH (weather conditions are rather different in Phoenix and St. Paul) the tower will work equally well both winter and summer. Find out who else in the area already has a crank-up, and make a personal inspection. The same general principles, we should add, apply to "tilt-over" jobs.

Above all, treat that tower with respect. If a section breaks loose and starts coming down, you simply do not have time to get out of the way. Take no chances. You're no good to anyone if you're dead, and only a little carelessness can cause it.

QST

League Lines . . .

We thought we'd seen most every possible example of ham enthusiasm -- until a 5BWAS aspirant wrote to ask if the January 1 starting date was local time or GMT! (Answer: GMT, naturally, since local would give us easterners an unfair advantage over W6s.)

That new publication for youth, the Membership & Publications Committee has decided, should be not so much a training and study manual as a promotional piece to create newcomer interest. League p.r. people are now hard at work preparing an appropriate brochure to describe the many intriguing facets of ham radio.

A question has popped up several times recently: how are Life Membership dues spent? They're not spent, but invested -- largely in mutual funds, under the direction of the Finance Committee. The aim is to have income cover the equivalent annual dues costs and, as the economy grows (or inflation sets in), that investments will grow correspondingly and finance future increased costs.

We've acquired an IBM copy-composing system, hopefully looking toward the day when most of the editorial material will be prepared and proofed right in Newington rather than at the printer. The system is hardly new, but became practical for QST only after we switched to the offset production process. Or hadn't you noticed?

Such economy steps are still not going to prevent an adjustment in advertising rates to meet rising costs; starting in April, Ham-Ads will be 15 cents a word, instead of 10, for individual, non-commercial insertions.

Several members have become concerned over a statement in "Electronics Illustrated" that amateur radio won't have any representation at the next international allocations conference, and slyly implying we've never even had a voice in the past! Forget it. This stuff is written by a ham who knows better, but who also knows that facts don't sell as many magazines as his scare fiction.

More good news for DXers. On the heels of an extension to French-U.S. reciprocity privileges comes news of a similar expansion of the U.K.-U.S. arrangement. U.K. will now grant authorization to U.S. amateurs in the Bahamas, Bermuda, British Honduras, the British Virgin Islands, and about eighteen other British possessions and territories. Further details in QST next month, and in the meantime from Hq. if you're on the verge of going somewhere in the British empire.

Hq. maintains a register of hamfest dates for up to two years in advance. Drop us a line about your hamfest dates -- if possible before you make commitments -- and we'll tell you whether anyone else has nailed down the date in your area. Last year the system kept two pairs of hamfests from cutting into each other's crowds, and only a fraction of the events have registered dates with us.

Concerning the League's new 27 1/2-minute color film on amateur radio, if you are able to convince your local television station to run it, first get in touch with the division director (see page 8). The number of prints is limited, so priority is given TV exposure; certainly this is more important than showings at the ham club. However, a commercial film library is distributing additional prints to high schools, civic clubs, etc., and serves as backup in case the director's print is booked long ahead.

Although the proper kind of equipment is essential, there's more to helping a sightless amateur than supplying just the electrical necessities.

Equipment Modification for the Blind

Tuning Accessories and Operating Procedure

BY A. E. SCHWANEKE,* WØGS, Ex-WØTPK

DURING the past few years I have received numerous requests for information on modifying equipment to be used by sightless amateur operators. The following article represents, more-or-less, conversational answers to the many questions that have been raised. Its purpose is to help the sighted amateur who is trying to help the sightless amateur. It is organized about the way I have discussed the problem with parents or other amateurs who were working with the blind. So far, the results have been very successful.

The main problem facing the sightless amateur is tuning the transmitter. In many cases he is limited by depending on someone else, usually a relative or companion who knows little about radio, to set up the transmitter periodically for operation in a limited segment of one of our amateur bands. This situation need not exist. The blind amateur, with proper help, can operate on all allowed amateur bands and frequencies without difficulty.

The problems peculiar to the sightless amateur operator can be resolved into two areas: (1) the physico-psychological and (2) the technical.

The Physico-Psychological Situation

The physico-psychological part of the problem involves placing the sightless operator in the electronic equipment environment and overcoming all the possible limitations. The equipment situation must fit the capabilities of each individual operator. Some general discussion will show what can be involved. Certain questions should be answered.

The first question is, "Has the subject been sightless from birth, for many years, or is the condition recent?" I have found that those who had sight at one time usually have a better feel for spatial relationships. How will this affect their ability to tune the rig? Take, for example, the Galaxy V. It has a symmetrical arrangement of eight knobs, practically all identical in shape. For the one who has seen before this is not too big a problem. For the one who has never had sight, it is best to remove practically all the knobs (store them for future replacement when

the rig is traded) and replace them with many differently-shaped knobs, especially bar-shaped and pointer-type knobs. Then, knob shape immediately identifies function for the operator.

Another question, "Does the sightless operator recognize the clockwise-counterclockwise knob-turning problem?" This question sounds odd, but it has meaning. Some sightless operators consider the bottom end of a bar knob the pointer end (and there are lever knobs in use, too). Turning "left" or "right" means what to the operator? "Turn up the gain control" — What is "up"? or "down"? These points should always be completely covered. How does a sightless person know what is clockwise motion or counterclockwise motion? Does the loading increase turning left or right, clockwise or counterclockwise?

Another question few will think of is, "Is the blind operator male or female?" In tuning the transmitter, sight (locating the position of a pointer on a voltmeter or milliammeter) will be replaced by sound (pitch will determine the value of the voltage or current in question). I have found that YLs prefer low pitches (60-200 Hz) while OMs can work better with slightly higher pitches (200-500 Hz). Select the pitch ranges to suit the operator's preference.

Another difficulty is the matter of plugs and jacks on various components: coaxial cables, microphones, keys, power cords, and the like. The best approach is to keep all plugs and jacks to a minimum — or best, eliminate them entirely. Use small boxes for junctions, and perform every transfer function with switches. Switch all antennas, keys, microphones, power. To see how difficult these simple operations can be, enter your shack at night with your eyes closed. Can you plug in the power, change bands, change antennas, remove the microphone, plug in the keyer without fumbling? Try it. You'll be surprised — and besides, you have had the advantage of previous visual memory of where everything is located. The blind do not have this starting point. Most rigs require the key to be unplugged to operate phone or to tune. The jack may even be on the rear side of the transmitter case. Supply a small box to plug in the

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key permanently, and a switch to restore circuit continuity so the plug does not have to be removed. With some rigs the microphone used for VOX operation must be unplugged for tuning. Instead of unplugging, put a switch on the mike base that will short the mike cable so noises will not affect tuning procedures.

The operating position must allow room for necessary functions — Braille tablet or typewriter, microphone, key, clock, and so on — yet the receiver-transmitter combination must be grouped conveniently for reaching all necessary controls. The table should be uncluttered. Small or lightweight objects must be either out of reach or tied down. This prevents the objects from being accidentally knocked off onto the floor where it will be practically impossible to locate them. Also, no dangling wires should be present to trap or trip the operator.

The above are a few of the points to observe. Spend a little time with the sightless operator, and then a little time reflecting on possible problems. Put yourself in the operating position with your eyes shut and see how things feel.

The best story I know to convey the meaning of sightlessness is that about the reader for a sightless college student. The reader is a sighted person who is employed to read the textbooks to blind students on the campus. The reader and the blind student had been walking together late in the evening and arrived back at the dormitory after dark. As they chatted together

they entered the darkened room. The sightless one walked casually into the room, put his books on the table, walked across the room, and sat down in a chair, all the while chatting with his companion. The one with sight was fumbling and stumbling around trying to locate the light switch. Only then did the sighted one realize what the world was like to the one without sight.

The Technical Situation

The second part of the problem of freeing the sightless from his dependency on others for tuning the transmitter is technical. The basic device to accomplish the tuning operation is known by the name "auditory gimmick." Early models used vacuum tubes, but the advent of the transistor has simplified the device. I'm not sure who originated the gimmick, but a lot of credit should go to Bob Gunderson, W2JIO, for his work in developing and publicizing it for the blind amateur. There are several articles on the gimmick scattered back through the years in amateur magazines.

The "gimmick" is basically a voltage-sensitive tone generator. A typical circuit is shown in Fig. 1. It consists of a relaxation audio oscillator connected to a voltage amplifier that will vary the pitch of the oscillator. This combination, with the addition of regulated voltages and proper switching, can be used to tune a transmitter more accurately than it can be done with a panel meter. The system can be adapted to any com-

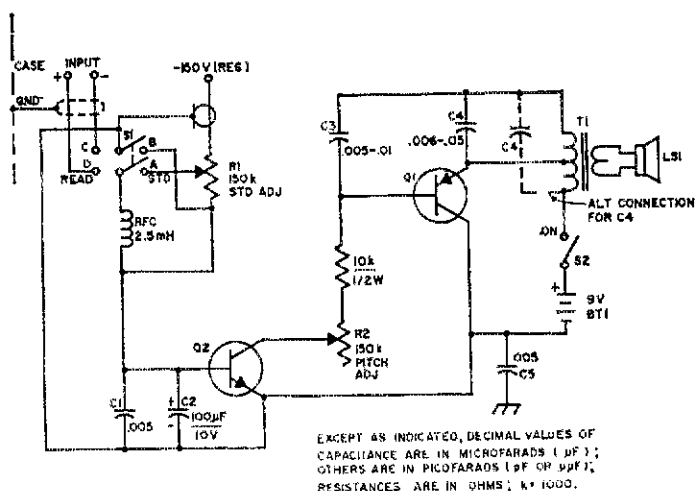
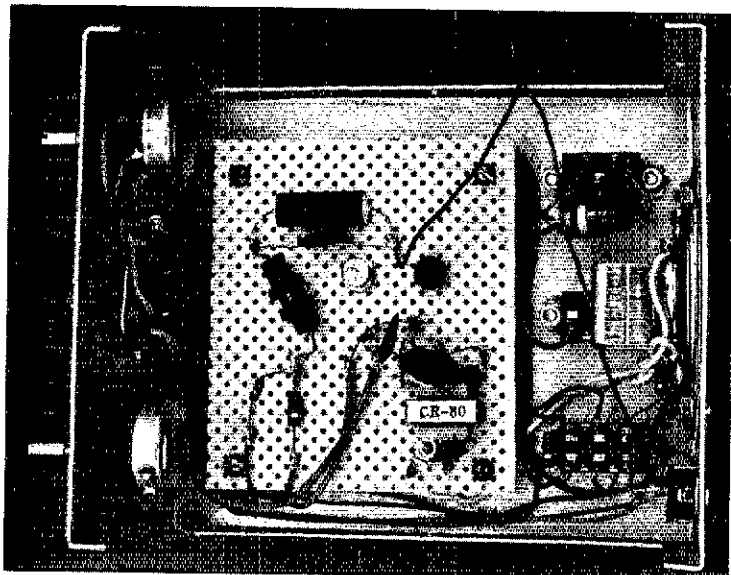


Fig. 1—Circuit diagram of the Auditory Gimmick (voltage-sensitive tone generator). As the circuit is sensitive to rf fields a metal case is required. Ground terminal connects to case and through cable shield to transmitter ground, but common chassis connections shown in the circuit cannot be connected to case except when negative input lead is at ground potential; check transmitter metering circuit.

- BT1—9-volt transistor battery.
- C1—Ceramic.
- C2—Electrolytic.
- C3, C4—Paper or ceramic (see text).
- C5—Paper or ceramic (not required if negative input lead is at ground potential).
- LS1—Miniature pm speaker, 2 to 4 inch dia.
- Q1—Any npn audio type.

- Q2—Any npn audio type.
- R1, R2—Composition control, linear taper, screwdriver adjust, with lock nut.
- S1—Dpdt slide switch.
- S2—Spst slide switch.
- T1—Universal output transformer (push-pull plates to voice coil) or transistor output transformer, 500 ohms center-tapped to voice coil.

Interior of the TR-4 adapter. All components are mounted on the flanged part of the box. The pitch and standardizing controls, R_1 and R_2 , are on the rear wall, to the left in this view, as is also the octal plug for connections to the TR-4. Circuit arrangement is not critical, but shielding the whole unit is essential.



mercial or homebuilt rig that uses a panel meter for tuning.

A range of values is given for C_3 and C_4 , depending upon the characteristics of T_1 , Q_1 , and the pitch preferences of the intended operator. If T_1 is a push-pull-plates-to-voice-coil vacuum-tube output transformer, the lower values for C_3 (.005) and C_4 (.006) will produce a beginning pitch (points C-D on S_1 shorted together) around 200 Hz. If T_1 is a transistor output transformer (500 ohms, center-tapped, to voice coil) try the higher values for C_3 (.01) and C_4 (.05). Because each combination of speaker, T_1 , Q_1 , C_3 and C_4 results in a different pitch, each hookup should allow for adjusting C_3 and C_4 for best results. The exact pitch obtained with points C-D shorted together is not critical so long as it is low enough. Fifty to 100 millivolts dc applied to the input (points C-D) will result in a pitch increase of an octave or two. R_1 allows for some final adjustment to keep the pitch in a usable range.

In designing and building a complete homebrew rig for a sightless operator it might be best to incorporate the auditory tuning system directly into the rig design. Some years ago I built a complete ssb/cw/a-m transmitter for KØONK that worked out very well. It used a Heathkit SB-10 converted to a 9-MHz ssb generator along with added power supplies and final amplifiers. The completed rig was designed to be tuned on all hf amateur bands (including some MARS frequencies) by a built-in auditory gimmick with appropriate switching and safeguards. The speaker for the gimmick was mounted directly on the front panel. For the benefit of those with sight who might tune the rig the original meter supplied with the SB-10 kit was also mounted on the panel. It was switched out of the circuit most of the time.

With all the commercial transceivers available today I would not advise the above approach.

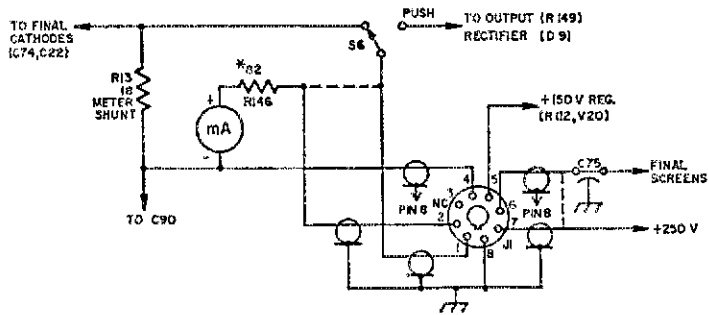
The addition of an auditory "gimmick" to any commercial rig is relatively simple, and the modifications should not affect the trade-in value of the equipment. Although the following information is given for only two commercial transceivers, the Drake TR-4, and Galaxy V, the circuits and techniques used may be applied to any on the market. Because the two examples represent different problems it is advisable to study both if the job is to be performed on a different set.

The Drake TR-4

One important requirement for any conversion is that all wiring and circuitry associated with the gimmick must be completely shielded to prevent rf voltages from upsetting the gimmick operation. The gimmick is very sensitive to any extraneous voltages. In addition, overloading the final amplifier tubes with too much current should be prevented.

The Drake TR-4 conversion is relatively simple because the set has a good cw capability already built in. The circuit is shown in Fig. 2. By using an octal plug and socket combination the gimmick may be removed for easier transportation or for connection to another set. The parts designations in the TR-4 section of Fig. 2 are those of the original TR-4 schematic except for the cable-mounting socket, J_1 . The dotted lines represent connections in the TR-4 that are unsoldered and connected to separate leads. Note that all leads are shielded except the ground connection. The shields are all grounded together at J_1 , pin 8, and are not grounded inside the transceiver. The wire used to make the connections to the transceiver should be shielded single-conductor with an outside insulating jacket. Thin coaxial cable such as RG-174/U is suitable, and is preferred over mike cable.

The easiest procedure for making the connections inside the transceiver is first to strip about



TR-4
BOX

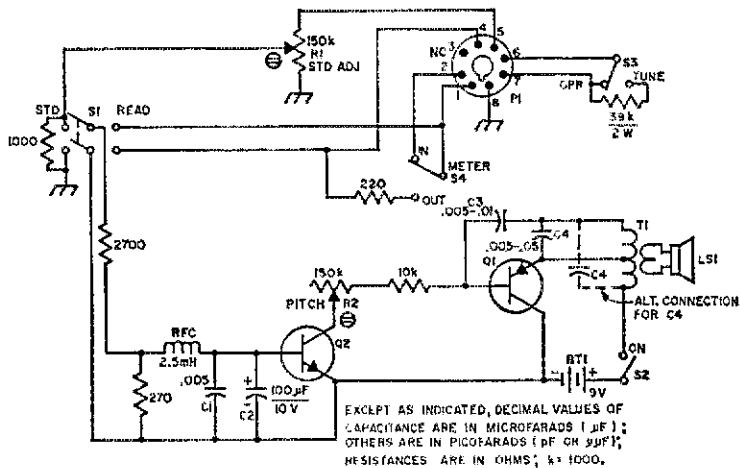


Fig. 2—Auditory Gimmick adapter for the Drake TR-4. Fixed resistors are 1/2-watt composition. Components not listed below are the same as similarly-numbered components in Fig. 1. Dashed lines in TR-4 section represent original connections removed.

S₃, S₄—Spdt slide switch.

J₁—Female receptacle, octal, cable mounting.

P₁—Male octal plug, chassis-mounting.

1/2 inch of outside jacket and shield from one end of a 3-foot piece of shielded cable; next, remove enough inner insulation to expose about 1/4 inch of the center conductor; and then, pass the stripped end through holes in the chassis near where the connections are to be made. After all the shielded leads have been connected to the proper points, gather them together and lace with string or tape to form a cable starting inside the set and leading out the rear of the cabinet. Dress all leads away from any component that may get hot, such as tubes and power resistors. Once cabled, cut all leads to the same length, remove about 1 inch of jacket, and unbraided and twist the shield to make a ground connection. After the socket is wired it may be desirable to make up a dummy plug that will restore the dotted-line connections just in case someone wishes to use the rig without the gimmick box attached. Otherwise, the transmitter section will not work properly.

The box containing the gimmick, usually a 4 x 5 x 6-inch aluminum Minibox, also has

some switches for extra functions. S₁ is the switch that transfers the gimmick input from the meter that reads final current (or r.f. output) to a standard voltage. The standard voltage, taken from the regulated 150-volt line in the transmitter, establishes the pitch corresponding to the correct meter reading for proper loading of the final power amplifier. The operator will eventually tune the final amplifier so that the pitch is the same for either position of S₁. The standardize-adjust resistor, R₁, is a screwdriver-adjustment potentiometer, and is mounted on the back of the gimmick box. A potentiometer with a locking nut is good insurance that once set, the control will not be accidentally changed.

S₁ is mounted on the top right near the front of the gimmick box where it can be conveniently reached with the index finger while the rest of the operator's hand cradles the right front corner of the box. In operation, if the "read" pitch is lower than the "standardize" pitch, the loading is increased until the two pitches match. The "read" pitch must never exceed the "standard-

ize" pitch, to prevent damage to the final tubes by excessive plate current.

S_4 is mounted on the top center near the front of the gimmick box. Its purpose is to switch the regular panel meter out of the circuit and to replace the meter with a resistor equivalent to the internal meter resistance. Early models of the TR-4 used a d'Arsonval meter, and the over-swing of the needle, if the meter was left in the circuit, would cause the pitch to waiver or vary. In later models of the TR-4 the panel meters are iron-vane types and do not react on the pitch of the gimmick. However, I usually include S_4 and the resistor for insurance, and the possibility of the box being used for a transmitter with a different meter.

One problem with the TR-4 is the possibility of damaging the final amplifier tubes by excessive plate current during tune-up. For the sightless, this can occur easily while searching for the proper knob, or by accidentally turning the wrong knob. Safe tune-up is provided by S_2 . It inserts extra resistance in the screen supply to lower the screen voltage on the final amplifiers, and prevents overload under any circumstances of mistuning. S_2 is mounted to the left of S_4 and S_1 . It saves the cost of new finals many times over.

S_2 turns the gimmick on and off and is easily mounted on the front of the gimmick box just below S_1 . The speaker for the gimmick, a 2- or 3-inch diameter unit, is mounted behind the center front of the box with appropriate holes backed up by a sheet of screen wire to let the sound out. The screen wire is needed so the sightless operator does not damage the speaker with his fingertips.

Experiments with various types of switches for these applications have shown that the small, inexpensive slide-type switches are the best. They are very rugged, and the wiping action keeps them operating much longer than ordinary toggle switches. They are also free from accidental switching that often occurs with rotary switches and their protruding knobs, or toggle switches. All switches are attached with screws, nuts, and shake-proof washers so they will not work loose. All parts that may be touched by the operator should be tightly attached. It is surprising how switches and control knobs can work loose in time and upset the operations for a blind operator.

The entire gimmick circuitry, up to the connections to S_1 , is mounted on a small sheet of perforated plastic board which is secured inside the top of the gimmick box on short threaded bushings. The 9-volt battery is mounted on the bottom cover of the box with leads long enough to allow the cover to be removed for servicing

without disconnecting the battery. Lacking a battery-mounting clip the small transistor battery may be secured in place with plastic electrical tape. The current drain is of the order of 2 to 10 mA, depending on pitch, and the battery should last a year at least.

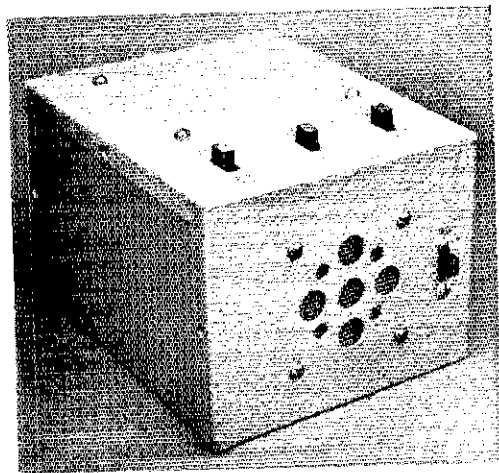
After the gimmick is installed on the transceiver, tune the rig into a dummy load (Heathkit Cautenna, or equivalent) and adjust for proper loading with S_3 in the "operate" position (the 39,000-ohm resistor switched out of the circuit). Once loaded properly on the meter, switch S_4 to remove the meter and then alternately switch S_1 back and forth while adjusting the standard-voltage potentiometer, R_1 . When the pitch is the same for both positions of S_1 the gimmick is ready for use.

Tuning Procedure

A training session for the sightless operator should be arranged so that all procedures can be reviewed several times. It might be advisable to have the operator Braille small notations to be cut out of the Braille paper and pasted next to each switch position. These notations will eventually wear out, but by that time the sightless operator will be very familiar with the switch locations. Be sure the table and chair arrangement will be near to what the operator will be using in his own shack. Also, stress the importance of the overload protection supplied by S_2 — that all adjustments should first be made with S_2 in the tune position before switching to the operate position. A logical step-by-step procedure should be outlined to the operator and, for safety, a Brailled check-sheet of the tuning procedure should be prepared.

A typical step-by-step tuning procedure for the TR-4 would read as follows:

- 1) Adjust receiver to operate normally on the band and frequency of interest. (Be sure proper antenna or dummy load is in use.)
- 2) Reduce receiver gain to minimum. (The cw sidetone will interfere with hearing the gimmick.)
- 3) Turn XATR GAIN (rf drive) control fully counterclockwise (minimum).



The adapter for the TR-4 is in a 4 X 5 X 6-inch box. The on-off switch, S_2 , is beside the miniature speaker on the front. The three switches on the top, left to right, are S_3 (tune-operate), S_4 (meter in-out) and S_1 (standardize-read).

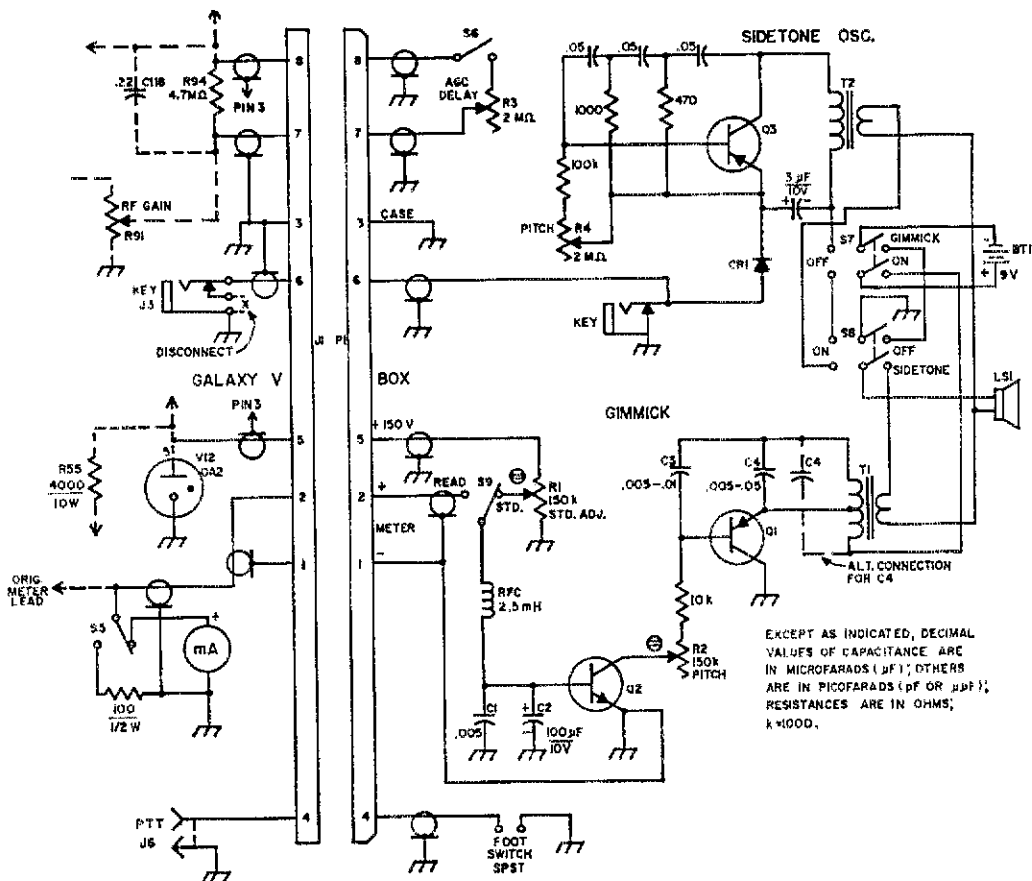


Fig. 3—Adapter for Galaxy V Transceiver. This circuit includes a sidetone generator for monitoring cw transmissions. Fixed resistors are 1/2-watt composition; fixed capacitors not otherwise specified are ceramic, except where polarity is indicated (electrolytic). Components not listed below are the same as similarly-numbered components in Fig. 1.

- CR₁—Silicon, 400 PIV, low current rating satisfactory.
- Q_x—Any pnp audio type.
- R_x—Composition control, linear taper, screwdriver adjust.
- R₄—Composition control, linear taper.

- S₃—Spdt slide switch.
- S₆—Spst slide switch.
- S₇, S₈—Dpdt slide switch.
- T₂—Same as T₁, Fig. 1.

- 4) Turn LOAD control fully counterclockwise (minimum load).
- 5) Turn sideband switch clockwise to "X" (position for tuning according to instruction book).
- 6) Put S₃ in "tune" position (safety position to prevent final overload).
- 7) Put S₄ in "meter-out" position (panel meter out of circuit).
- 8) Turn on gimmick (S₂).
- 9) Put S₁ in "read" position (this will be indicated by a relatively low pitch. The "standardize" position will produce a much higher pitch).
- 10) Turn function switch to "X-CW." Relays will click, indicating transmitter is turned on.
- 11) While turning the XMTR GAIN clockwise slowly with left hand, tune RF TUNE control for maximum increase in pitch from gimmick. (Do not turn XMTR GAIN so high that the pitch of the

- gimmick goes beyond standard pitch. This should not occur if S₂ (step 6) is in correct position.)
- 12) Tune PLATE control (upper left, next to panel meter) to lowest pitch possible. Note that pitch rises each way from one position of the knob. (Tuning for "dip" of the final.)
- 13) Turn XMTR GAIN to full counterclockwise. Gimmick pitch will drop back to original low pitch.
- 14) Put S₃ in "operate" position. Now be sure to get correct knobs in following steps because safety for final is off.
- 15) Check for "standardize" pitch with S₁ and return to "read." (Remember how it sounds.)
- 16) Start turning XMTR GAIN clockwise. Pitch will begin to rise.
- 17) At some point the pitch will no longer rise for further clockwise turning of XMTR GAIN.

18) With S_1 check "standardize" pitch to see if "read" pitch is still low.

19) If "read" pitch is below "standardize" pitch turn LOAD control clockwise to bring "read" pitch up to match "standardize" pitch. If pitch goes too high reverse direction of turning LOAD knob.

20) When "standardize" and "read" are about alike check carefully the position of PLATE tuning and turn slightly both ways to try to get a lower pitch. (Retuning plate to "dip.")

21) With PLATE tuned for lowest pitch possible, LOAD knob adjusted so that "standardize" and "read" pitches are identical, and increasing XMTX GAIN (further clockwise) gives no further rise in pitch, the rig is tuned.

22) Turn function switch to ssb or open key switch for cw. Rig is ready to operate.

The Galaxy V

The original Galaxy V transceiver did not have a complete cw capability, so this should be added along with the tuning gimmick, if needed. Originally, operation on cw required that the mode switch be turned through two detent positions to go from transmit to listen. Also, no side tone for cw was supplied in the transmitter. The arrangement described here uses a foot switch for rapid transfer from receive to transmit. A side-tone generator is supplied in the same box with the gimmick.

To obtain foot-switch transfer for efficient cw operation it is necessary to make a small change in the wiring of one connection on the function switch. This switch is designated S3-A on the Galaxy V schematic diagram. It is the front wafer (closest to the panel) of the function switch. The schematic shows that the switch points used for the TUNE and cw positions are tied together. The connection consists of a short piece of solid wire looped from one switch lug to the other. Locate the contact and lug for the cw position and remove that end of the solid wire from the connecting lug. This work can be performed without removing the panel if the power switch-af-rf-gain assembly is detached from the front panel and moved out of the way. This small wiring change makes it possible to use a foot switch connected to the PTT accessory jack on the rear of the transceiver to give convenient cw transmit-receive capabilities.

Incidentally, the foot switch was built as a wooden box about 18 inches long and 6 wide. A lid for the box was hinged on the long side, and has a small spring and microswitch appropriately mounted underneath. An extra strip of wood across the front of the box provides a footrest so that the operator can activate the switch by pivoting his foot. This switch is easy to find under the operating table, and is heavy enough not to tip or move about.

In one modification the front panel was removed because the tuning dial was to be replaced. Since the rig was to be used by a blind operator the upper/lower sideband indicator lights

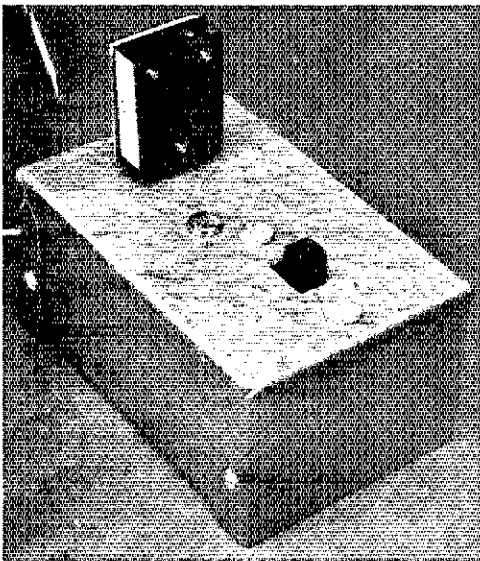
were also disconnected and removed. It is necessary to take out these lights to remove the panel so they were left out when the panel was replaced. The dial light was removed, the meter light disconnected, and the filament line rebalanced with a resistor to divide the 12 volts into two equal 6-volt sections. The plastic dial and dial window were removed. A new metal dial having small Braille-type humps (three at band edges, two for each 100 KHz, and one for each 50 KHz) was made from the side of an empty antifreeze can. The front face of the metal dial was enameled to provide a smooth satin surface. A small wedge-shaped piece of sheet metal with rounded corners and enameled surface was installed in place of the plastic dial window. The wedge projected out over the dial to furnish a reference point to align the Braille-type markings of the dial for tuning. Later, Brailled numbers were glued to the face of the metal-disk dial to number the various 100-KHz points.

The side-tone generator was included in the same box with the tuning gimmick. The side-tone generator is a standard phase-shift circuit, and with the component values shown in Fig. 3 will produce a signal of about 850 Hz. This frequency happens to be very close to the off-set of the carrier crystal that the Galaxy V uses for cw operation. This means that, using cw with the sideband switch in the sb2 position according to the instruction book, if a station is tuned in to produce the same pitch as the sidetone generator, the transmitted cw signal will be almost zero-beat with the other station. This is the reason why the phase-shift oscillator instead of the gimmick oscillator was used for the side tone. The gimmick oscillator generates, at best, a distorted saw-tooth wave while the phase-shift oscillator output approaches a sine wave—the type of wave produced in the receiver by a good cw signal.

The wiring inside the Galaxy V is similar to that inside the TR-4 except that the small slide switch to replace the meter movement with a resistor (S_4 in Fig. 2, S_5 in Fig. 3) was mounted on a small aluminum angle-bracket attached to the shield panel inside the rig next to the panel meter. An extra hole was punched in the back panel of the set to pass the bundled cable out the rear. The numbers on the schematic diagram represent the octal cable-socket connections.

The agc delay on the Galaxy is fine for ssb phone, but is often a little slow for cw break-in. S_6 allows a faster agc recovery to be switched in or out. The connections for the agc delay inside the Galaxy are near the outer edge of the small printed-circuit transistor board next to the final-amplifier sockets.

Since the key jack inside the gimmick box is a closed circuit type (and the keyer used will usually have a shorting switch) the circuit-closing contact of the regular key jack is disconnected. The 9-volt power for the gimmick or the side-tone generator is switched by both S_7 and S_8 , Fig. 3. S_7 energizes the gimmick, and S_8 selects either the gimmick or the side-tone generator.



The "Mouse" frequency spotter is in a $3\frac{1}{4} \times 2\frac{1}{4} \times 1\frac{1}{2}$ inch Minibox. The "tail" or antenna can be seen behind the case.

The Galaxy V (as does the Collins 32-S) has a reduced screen-voltage tuning position already built in, so this is not supplied here. Operating procedures for the Galaxy V gimmick are about like those for the TR-4.

The "Mouse"

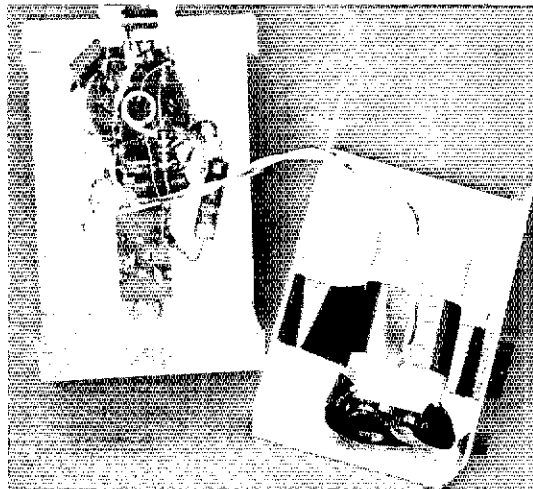
Exact dial calibration for the sightless is a little hard to accomplish. Aligning marks by touch requires micrometer precision in dial mechanisms. A gadget that has proved very useful for locating specific frequencies has been dubbed appropriately by other operators as the "mouse" because it has a "tail." It consists of an untuned one-transistor crystal oscillator built in a small metal box. The circuit is shown in Fig. 4. The antenna for the oscillator is a 12-to-18-inch length of insulated hook-up wire, and represents the so-called "tail." The entire oscillator is built on an octal socket and two alternate holes are used as the crystal socket for FT-243 crystal units. The unused socket lugs are used as tie-points while the transistor is located in the center hole. By mounting the octal socket below two matching $\frac{3}{32}$ -inch diameter holes in the top of the box the pins of the standard FT-243 crystal holder are "funnelled" into the socket. It is advisable to use a molded socket having wrap-around contacts, as opposed to the wafer type, or the molded types having forked contacts. The mouse will be used extensively with many different crystals, and the wafer sockets will break, while the forked contacts lose their shape easily and cease to make contact to the crystal pins. The conductor at the free end of the "tail" antenna is cut off so that it is recessed about $\frac{1}{4}$ to $\frac{3}{8}$ inch inside the insulation. This way the end of the tail may be inserted into the interior of the transceiver case through

a hole in the perforated cover without danger of shock. This procedure is used when the bands are crowded with strong signals, and a stronger than usual marker signal is needed.

The circuit shown will oscillate with FT-243 crystals from about 3 MHz to 30 MHz. For lower-frequency crystals the 330- and 15-pF capacitors should be increased in size by a factor of 2 or so. This may prevent 25- to 30-MHz crystals from oscillating, however. So far, I have found the circuit shown to be adequate. The battery will last for several years because the drain is around 1 mA. A high-frequency npn transistor may be substituted by reversing the battery polarity. Crystals for any specific frequency of interest can be purchased at very reasonable prices from the Ham-Ads section of *QST*. Each crystal should have its frequency Brailled on a piece of Braille paper and glued to the top or side of the crystal. A drawer or box to hold the spare crystals should be arranged for orderly filing of the crystals for the operator. The mouse is not a frequency meter, but is very useful for locating a specific frequency to within a few hertz.

Final Comments

Ignoring the danger of being redundant, a few points should be emphasized. First, put yourself into the sightless amateur's chair, with your eyes closed, and feel the results. Second, make sure all circuits are covered, all cases grounded, all small items secured in place. No plugs or jacks should require insertion or removal regularly. All antennas should be coax-fed and switched. The SWR of each antenna should be checked



Most of the parts used in the "Mouse" are mounted on unused contacts on the octal socket into which the crystal is plugged. A molded socket with wrap-around pin contacts should be used in order to stand up under frequent crystal changes. The "tail" goes through a rubber grommet at the rear (top, in this view).



25 years ago

February 1945

... It's going to be well over a year before we get back on the air, but again, the Editor cannot refrain from speculating on things to come. All the wonderful post-war possibilities such as fm, pulse transmission, etc. He sees the five- and two-and-a-half-meter bands being heavily populated with cw. Not a word on single sideband, although the mode has been in commercial use since the early twenties. (I used to listen to ssb from the ATT station down in New Jersey in 1925, using an autodyne detector. This was before inverted speech techniques came into use. This latter was tough to tune in.)

... As call letters are becoming scarce, particularly in the ninth district, Warner proposes that another district, (6) be set up to relieve the congestion. After that he sees no reason why FCC can't issue calls like WA9AAA, up through WZ9ZZZ. All in accord with the Cairo convention, of course. ... Quite an article about pulse-type transmissions by W. W. Hansen. This is quite an intriguing thought, but of course it never jelled, at least with the amateurs.

... The need for WERS apparently is dying out in certain areas, but the group in Philadelphia is going strong and has teamed up with the Red Cross, which will always have a need for disaster communication facilities, to produce a mobile disaster headquarters, WERS equipped and manned. Power via a 2kw gas engine generator. — W1ANA

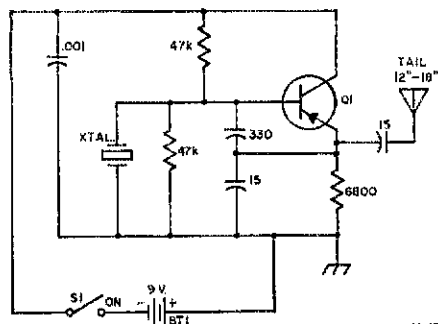


February 1920

... Let's look at the Editorials first. For a period of a couple of weeks in December last no signals from hams were to be heard over about 100 miles. Ship stations, etc. came in as usual. 200 meters or so was out. It looked like the end of the world for ham radio. When this situation cleared, many started speculating as to the cause of the "black-out." We didn't know much about the ionosphere then! The Editor makes out a good case for the low note from rotary gaps, rather than the high note, and discusses the matter. I noted the same thing at sea in 1913-1914. Patent matters forced the Marconi Company to pull half the studs from their synch. gap sets, particularly on cargo ships. The lower note was decidedly better.

... Now here is one of the most important articles ever published in QST. Major F. H. Armstrong describes in the leading piece his war-born superheterodyne receiver. It was a privilege to handle the controls of the very first superbet, in Armstrong's Paris laboratory. This paper, first presented to the Radio Club of America, is a classic and worth reading today.

... "Round's Round Ground" is described by H. E. Rawson. Round was Chief Engineer for the British Marconi Co. One version of it that I remember here in Hartford had twelve iron water boilers buried in the back yard on about a fifty-foot radius, right under the antenna. — W1ANA



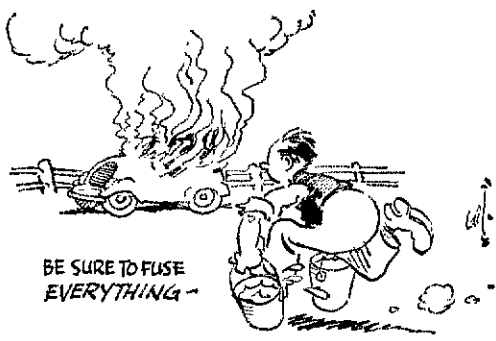
EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μF); OTHERS ARE IN PICOFARADS (pF OR μμF); RESISTANCES ARE IN OHMS, K = 1000.

Fig. 4—Circuit of the "Mouse" frequency spotter. Capacitors may be either ceramic or mica. Fixed resistors are 1/2-watt composition.

- Q1—2N1177 or equivalent high-frequency type. Reverse battery polarity for npn types.
- S1—Spst slide switch.

for the entire band. Multiple dipoles work very well to cover 3.5- to 4.0-MHz cw and phone. Each of the higher-frequency bands can be covered with a single antenna. A tri-band beam is suggested for the 10-, 15-, and 20-meter bands. It is also advisable to supply a dummy antenna (Cantenna, or equivalent) on one switch position so that the tuning of the rig can be checked off the air. High-power linears attached to the usual transceiver can be more of a problem than an aid. If the sightless operator is very dexterous and knowledgeable about amateur radio this subject might be approached.

The circuits shown can be easily adapted to fit any other transmitter or transceiver system. There is no reason for a sightless amateur being limited to one band, or one segment of a band, because he cannot tune the transmitter himself. Working with the sightless can be very rewarding, personally, but it also requires a lot of patience and attention to detail. Be prepared to track down weird effects due to stray rf leakage, dirty switch contacts, or accidental knob bumping. QST



BE SURE TO FUSE EVERYTHING

Strays

1970 ARRL DX COMPETITION

Just a reminder that time is running short for those of you who plan to enter the 36th Annual DX Test. Dates are as follows:

Phone: Feb. 7-8, Mar. 7-8, 1970.
 CW: Feb. 21-22, Mar. 21-22, 1970.
 (see Dec. QST p. 62 for details)



A Simple Crystal Tester-Calibrator

BY MICHAEL S. ROBBINS,* K6QAH

HAVE you been intrigued by those overflowing tables of bargain crystals in the surplus stores? Here is an inexpensive gadget for testing the crystals in the store before you buy them, and for using the crystals in the shop or ham shack.

As shown in Fig. 1, the circuit of the tester-calibrator consists of an FET oscillator, an incandescent lamp indicator, and a battery power supply. The indicator lamp is connected so that all of the transistor current flows through the lamp. With no crystal, or with a bad crystal, the circuit does not oscillate, and about 15 mA of current is drawn through the lamp, causing the lamp to light. When a good crystal is plugged in, the circuit oscillates, and bias is developed between the gate of the FET and ground. This causes the current to drop to less than 10 mA, and the lamp dims or extinguishes.

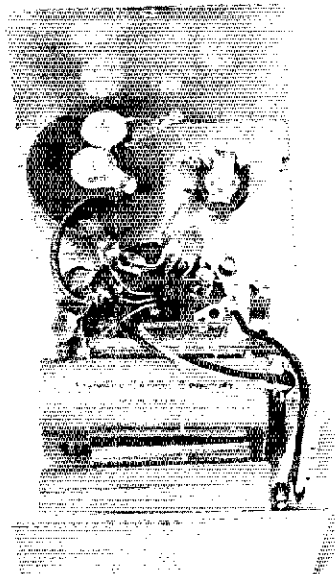
Two nine-volt transistor radio batteries are connected in series to provide 18 volts for the oscillator and the indicator lamp. The condition of the batteries can be checked by pressing the button when no crystal is plugged in.

So that the device can be used as a crystal calibrator, an antenna jack is provided to couple the output of the unit to a receiver or other device. Strong harmonics are provided to over 100 MHz.

The tester-calibrator works with 100-kHz to 10-MHz crystals,¹ including the FT-241-A and

* Kits Industries, Inc., 729 Ceres Ave., Los Angeles, California 90021.

¹ The frequency range of this device is actually much greater. In the ARRL lab several crystals in the 100-kHz to 45-MHz range were tried in the unit. Every good crystal caused the indicator lamp to dim or go out. Note that in this circuit overtone crystals oscillate on their fundamental frequency. — Editor.

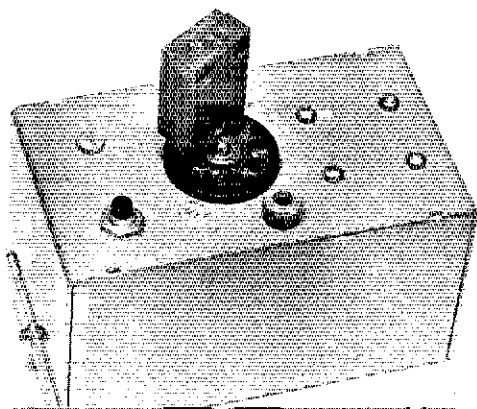


Inside view of the tester-calibrator. RFC₁ and S₁ are at the top, the octal socket and Q₁ are in the center, and BT₁ and BT₂ are at the bottom. Battery holders keep BT₁ and BT₂ in place.

FT-243 types. A Channel 360 FT-241-A surplus crystal will oscillate at 500 kHz and give markers every 500 kHz (1 MHz, 1.5 MHz, 2 MHz, etc.) for calibration.

Construction

The tester-calibrator is built in a 4 × 2¼ × 2¼-inch interlocking chassis (LMB 107). An



Top view of the tester-calibrator. The small lamp in the rubber grommet in the center of the octal socket is used to indicate the condition of the crystal. The pushbutton at the left is used to complete the circuit of the oscillator, and the banana jack is used to make external connection to the oscillator output.

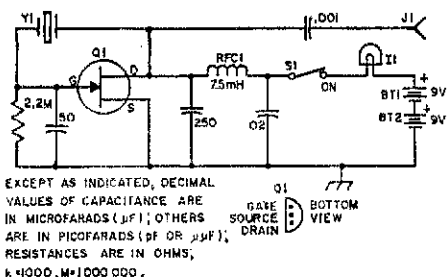


Fig. 1—Schematic diagram of the tester-calibrator. The capacitors are disk ceramic, and the resistor is 1/2-watt composition.

BT1, BT2—9-volt battery (Eveready 216).

I1—10-volt, 14-mA miniature lamp with wire terminals (GE 1869).

J1—Insulated banana jack.

Q1—N-channel junction FET (MPF-102, 2N5484, 2N5485 or 2N5486).

RFC1—7.5 mH rf choke (J. W. Miller 660 or equivalent).

S1—Normally open spst pushbutton switch (Switchcraft 961).

Y1—100-kHz to 10-MHz crystal (see footnote).

octal socket is used as a socket for the crystal, and it provides tie points for connecting the components. All leads should be kept short and care should be taken not to damage the transistor with excessive heat from soldering. The indicator lamp should be handled carefully, as its leads are fragile. The lamp is mounted in a small vinyl grommet in the center of the octal socket. Pins 1 and 3 of the octal socket are used for the crystal. To prevent confusion, the remaining pin holes can be filled with epoxy or RTV silicone sealant.

Operation

To test a crystal of unknown quality, first press the switch button while the crystal is out of the socket. If the batteries are good, the lamp will light. Next, hold down the button and plug in the crystal. If the crystal is okay, the lamp will dim or extinguish. If it is defective, the lamp will remain bright.

To calibrate a receiver or other device, connect a test lead (as an antenna) to J1. Plug a crystal into the socket and press the button. Tune the receiver until the signal is heard. QST

• New Apparatus

Waters "Band Adder"

A RECENT addition to the Waters Manufacturing line of mobile antennas is their "Band Adder." With the unit shown in the photograph, it is possible to add 20, 15 and 10 meters to an existing 80- or 40-meter Waters mobile installation. All that is required is to install the Band Adder *below* the 80- or 40-meter coil and to readjust the whip above the coil for a match on 80 or 40. With either coil the antenna system is automatically matched for 50 ohms on 20, 15 and 10 meters.

The Band Adder consists of a 22-inch arm for 20 meters, 13-inch arms for 15 and 10 meters, and a metal mounting block. On each arm is wound a loading coil for the band in question. The arms, which are threaded into the block, can be used

singly or in a group without affecting the operation or match of the mobile antenna used with the Band Adder. On one end the block has a 3/8-24 screw thread for screwing the block into a coil base, and on the other end the block has a 3/8-24 socket thread for screwing a bottom mast section into the block.

Although the Band Adder was designed to be used with Waters mobile antennas, it can be used with center-loaded 80- and 40-meter mobile antennas of other manufacturers, provided these antennas use 3/8-24 threads. Of course, thread adapters can be used if the existing threads don't mate with those of the Band Adder. In any case, the Band Adder must be installed below the 80- or 40-meter coil, and the top whip above the coil must be adjusted for a match on 80 or 40.

The Band Adder is manufactured by Waters Manufacturing, Inc., Wayland, Mass. 01778, and it is in the \$20 price class. — *WIICP*

Strays

Australis-Oscar 5 reception reporting forms are available without charge from the Radio Amateur Satellite Corporation. Send an addressed stamped envelope to Amsat, Box 27, Washington, D. C. 20044. Listen to WIAW bulletins (see page 88) further information about the satellite.

— . . . —

Stolen Equipment

Stolen from my car in late November in the L.A. area: TR3, serial No. 12151A, Shure 404C, and a speaker. Ed Kane, W3CJU/WB6MBJ, Box 361, Lakewood, Cal. 90714.

— . . . —

The Post Office Department promises faster mail service with the Zip codes. Use yours when you write Headquarters. Use ours, too. It's 06111.

A Sturdy 80-Foot Mast

BY LARRY WALROD,* VEZBRK

Steps made of $\frac{5}{8}$ -inch iron rod, shaped as shown in the detail photograph, are welded to the sections at intervals of about 24 inches. Near the top of the last section, double steps (one on each side of the mast at the same level) are provided to make it easier to stand while working on the antenna. After all welding had been completed, the mast sections were given a coat of red primer, topped off with a coat of aluminum paint.

Guying

Four sets of guys are used, spaced at 90-degree intervals about the mast. There are four guy wires in each set, one fastened to the mast at each junction, and one a few feet from the top of the mast. Galvanized iron wire not less than No. 8 in size should be used. In this particular case, the guys were broken up into sections, as shown in Fig. 1, using $1\frac{1}{2} \times 2\frac{1}{2}$ -inch porcelain strain insulators. These insulators should be fastened as shown in Fig. 4. Only new wire should be employed, and care should be taken to make sure that no kinks or sharp bends develop as the wire is unrolled and stretched out. Details of the guy anchors used are shown in Fig. 2.

Base Mounting

A base mounting that was found adequate is shown in Fig. 5. A hole a little larger than $1\frac{1}{2}$ by 2 feet was dug to a depth of about $2\frac{1}{2}$ feet. The pieces of 2×2 lumber were laid parallel to the bottom of the hole, spaced out to cover about 2 feet. The pipe assembly was then held in a vertical position while the hole was refilled. (The local soil is gummy clay. In some other types of soil, a more extensive footing might be desirable.) About 6 inches of the vertical pipes should protrude from the ground. The base of the mast, which is drilled with holes to match, fits in between the two projecting stubs. The bolt serves as a pivot to aid in raising the two bottom sections of the mast.



THE 80-foot mast shown in the photographs was built by Byrd ("Herman") Brunmeir, W6FHM/DUI, for use in the Philippines. It has proved to be a strong and inexpensive support for his triband quad antenna. It consists of four 20-foot lengths of 2-inch (inside diameter) galvanized iron pipe. A 2-foot length of $1\frac{1}{2}$ -inch (1.9-inch outside diameter) pipe is inserted half way into the top end of each section, where it is welded in place. At each junction, the bottom end of the upper mast section slides over the 1-foot stub protruding from the top of the section below it. The stub in the topmost section serves as a mounting for the rotator. To keep the sections from twisting at the junctions under the torque stress of the rotator, it was necessary to use a securing bolt only at the junction of the third and fourth mast sections. The weight of the upper sections and the guy-wire compression prevent turning at the lower joints.

* Nasuli Malaybalay Bukidnon, Philippine Islands

The mast described here has withstood winds of typhoon velocity without damage. Included in the article is a discussion of a method of accurate antenna matching.

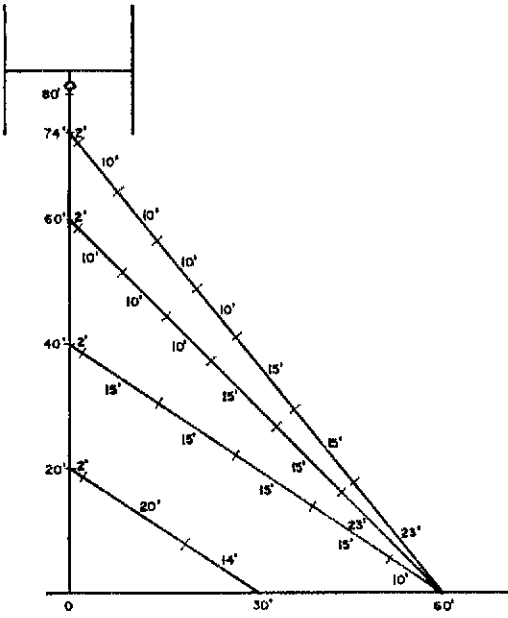
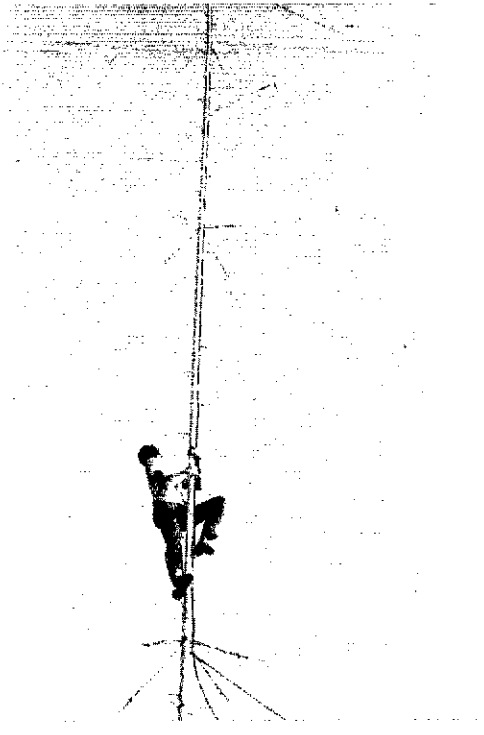


Fig. 1—Guy plan for the 80-foot pipe mast. Four similar sets of guys are used, spaced at 90 degrees around the mast. All three upper guys are brought to a common anchor 60 feet from the mast base. A separate anchor, at 30 feet from the base, is used for the bottom guy in each set.



Some climbing experience is required.

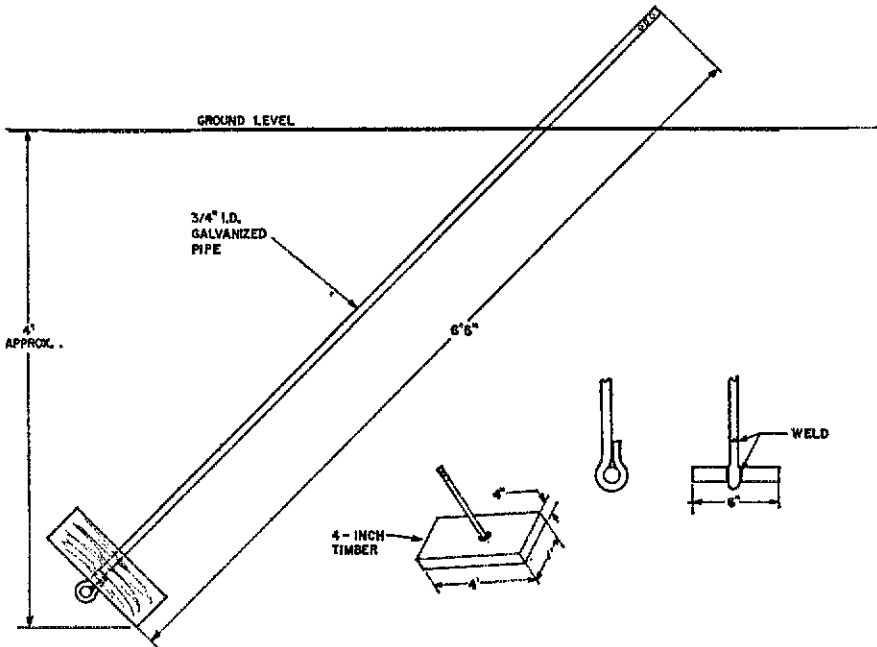


Fig. 2—Details of the guy anchors. A 6½-foot length of ¾-inch galvanized pipe is flattened at one end. The flattened end is wrapped around a 6-inch piece of the same-size pipe, and welded fast. The pipe passes through a hole at the center of a piece of 4-inch timber 4 feet long, and 1 foot wide. Holes for attaching the guys are drilled in the free end of the pipe. The timber is buried about 4 feet in the soil, with the pipe at an angle of about 45 degrees.

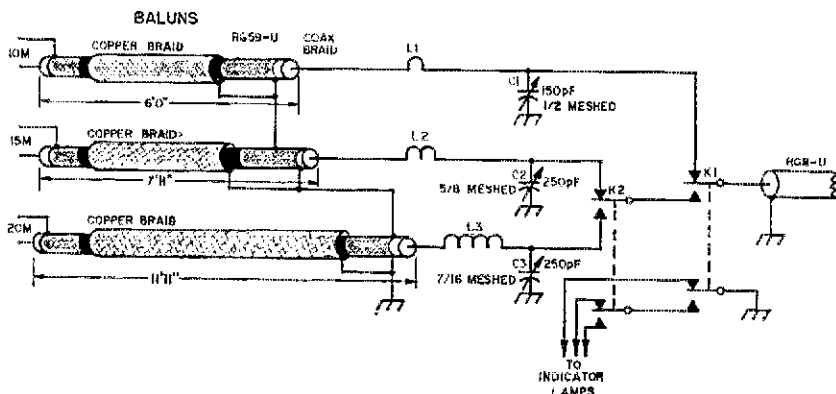


Fig. 3—Diagram of the feedline switching and matching arrangement. Relay sequence is as follows: 10 meters—neither relay energized; 15 meters— K_1 energized, K_2 nonenergized; 20 meters—both relays energized.

K_1, K_2 —d.p.d.t. relay
 L_1 —1 turn No. 14, 1-inch diameter.
 L_2 —2 turns similar to L_1 .

L_3 —4 turns similar to L_1 .
 C_1, C_2, C_3 —Air variable capacitor, 0.025-inch plate spacing (Hammarlund MC series).



Fig. 4—Guy strain-insulator fastening. The free end of the No. 8 guy wire should be wrapped tightly at least 10 times around the standing part.

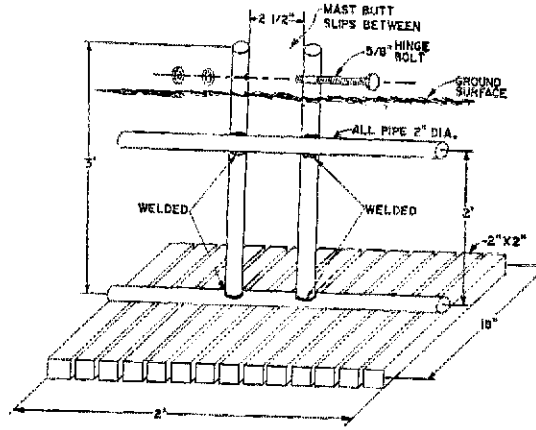
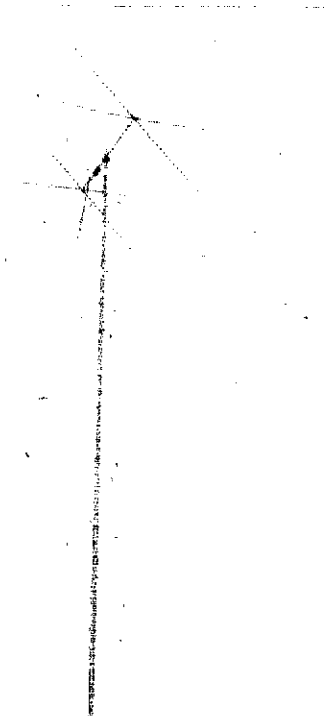
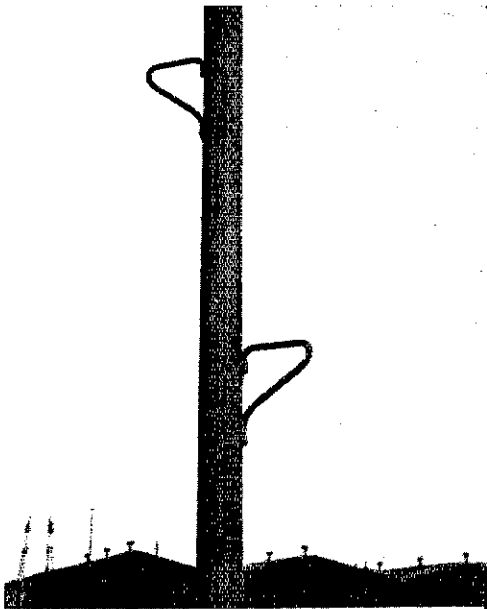


Fig. 5—Base anchor for the mast. Two-foot horizontal lengths of 2-inch pipe are welded across a vertical pair of the same diameter, and 3 feet long. This assembly rests on several of 18-inch pieces of 2 X 2-inch lumber buried about 2 1/2 feet in the ground. The 2 X 2's are spaced out to occupy 2 feet of space. Holes are drilled about 2 inches down from the tops of the vertical pipes to take a 5/8-inch hinge bolt. The bottom of the mast is similarly drilled.

With the quad boom at 84 feet, North America can be worked almost at will from 1700 to 2400 Manila time on 1.4 MHz., and such places as JA, VU, 4S7 and 9V1 are in your back yard.



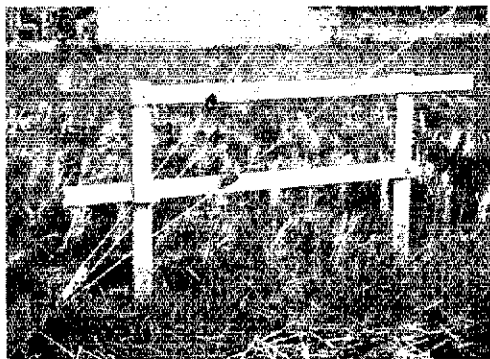
Putting Up the Mast

Erecting the mast requires some climbing experience. If you haven't had any, it would be advisable to enlist the services of someone who is familiar with the safety precautions, and who has no qualms about hanging from a safety belt 80 feet from terra firma. The first two sections can be assembled and hinged up, using the guy wires as an aid. After these two sections have been trued up vertical with a bubble level and guyed securely, the remaining sections are added, one at a time, using a gin pole.

The gin pole is a 20-foot length of 1½-inch pipe. The top end of the pipe is fitted with a rugged pulley and ¼-inch rope halyard. Two hooks are welded to the gin pole, one about 3 feet from each end. The climber then hauls the pole up behind him, using the top hook to hang the pole over a step while he takes the next step up the mast. When the climber has reached the top, the bottom hook is used to rest the gin pole on a step, as he gradually works the pole upward until the top of the gin pole is about 15 feet above the top of the mast thus far completed. Then the gin is lashed securely to the mast. As an alternative, a pulley could be temporarily fastened to the top of the last completed mast section, and the gin pole hauled up by this means.

The guys should be fastened to each mast section before it leaves the ground. The gin pole halyard should be seized around the mast section at a point somewhat above the center of gravity, so that the section will remain essentially vertical as it is hauled up. If the halyard is sufficiently long, the section can be hauled up from the ground, while the climber guides it into place when the proper level has been reached. After the guys of this section have been anchored

Climbing steps are welded to the mast at intervals of two feet.



Typical guy anchorage. The fence is to ward off wandering water buffalo that like to use the guys as a back scratcher.

securely, the last section can be added in a similar manner.

The quad antenna was hauled up piece by piece, and assembled at the top of the mast. The 8-foot aluminum boom was mounted in such a manner that it could be slid back and forth to bring the ends close in to the mast where the spreaders could be mounted and wired conveniently.

Feeding the Quad

The triband quad is fed with a single coax line, but the line is switched from one driven element to another by a system of remotely-controlled relays, as shown in Fig. 3. Some owners of quad antennas seem to have difficulty in matching the antenna to the line. W6FHM believes that the simplest method is through the use of the L network. A separate network is used for each band, and the driven elements are each fed through a coaxial balun. The baluns are made by stretching copper braid over the lengths of RG-59/U indicated in Fig. 3. Since the input impedance of the baluns is something less than 50 ohms, the L networks were configured to provide a step down from the 50-ohm line impedance. The networks are very easily adjusted. You simply rock the capacitor, and adjust the inductance, until you see which way you have to move with your values to obtain a null on your s.w.r. meter. Ordinarily, it takes only a few minutes to bring the s.w.r. down essentially to unity. The components of the networks are contained in a small weatherproof box fastened to the boom.

The mast has stood up well in typhoon winds up to 100 miles per hour, which stripped the fiber-glass spreader arms bare of wire! The total cost at local prices was about 75 dollars. **QST**

How to Wind Your Own Power Transformer

BY LEWIS G. McCOY,* WIICP

As anyone who likes to build gear and experiment knows, the cost of radio parts has gone higher and higher with inflation. And, one of the highest-priced items is a power transformer. There is one way to beat the high cost of power transformers and all it takes is a little work and some know-how. How? By salvaging old TV transformers and by rewinding them to suit your own application. Probably some readers would throw up their hands at the idea of rewinding a power transformer, but actually the process is quite simple.

Old TV sets can be had practically for the asking from TV dealers and TV servicemen. The average TV power transformer, for a 17-inch set or larger, is capable of from 350 to 450 watts output, continuous duty. Amateur service is not continuous duty, so the ratings can easily be upped by a factor of 40 to 50 percent without danger of overloading the transformer.

The Power Transformer

Before getting into rewinding details, let's take a look at a typical power transformer and how it is made. The transformer consists of an iron core made up of strips called laminations. The laminations are approximately 0.020 inch thick and are in the shape of the letter E or I, as shown in Fig. 1. The laminations are stacked in alternating layers to make up the total core. They are insulated from each other (shellac is often used) to reduce losses and to prevent vibration and hum.

The windings are layers of enamel-insulated wire, each layer being insulated from the next by a layer of paper. The amount of current that each winding will carry is primarily determined by the size of the wire. The total voltage depends on the number of turns in each winding. Fig. 2 is a circuit diagram of a typical TV power transformer. TV transformers usually have several filament windings plus a high-voltage and a primary winding.

How Much Power Will it Handle?

Of course, if you are going to go to the trouble of rewinding a transformer you will want to be sure it has adequate power capabilities for your needs. Fortunately, it is quite easy to get a close approximation of how much power a transformer will handle without having a spec sheet on it. All you need to know about an unknown trans-

former is the cross-sectional area of the core. Not the entire core but just that section of core that is *inside* the windings. Fig. 3 is an illustration of this area.

You don't have to take the transformer apart to determine this area. Nearly all TV transformers have the same width and length, the only difference being in the stack height. The standard lamination size is $3\frac{3}{4}$ inches wide by $4\frac{1}{2}$ inches long. For a core of this size the tongue of the E lamination is usually $1\frac{1}{2}$ inches wide. Knowing the width of the inner core, all we need do then is measure the height of the stack, multiply the two figures together to get the cross-sectional area, and then apply that figure to the graph in Fig. 4. For example, suppose the stack was 2 inches high. This multiplied by $1\frac{1}{2}$ would equal a cross-sectional area of 3 inches. Looking at the graph, we see that a transformer with a cross-sectional area of 3 inches would have a power capability of 300 watts. As mentioned earlier, these figures are for continuous duty, so we could easily up our figure by 50 percent for amateur service, to 450 watts.

When you scrounge old TV sets there are a couple of things to watch for as far as the power transformer is concerned. Some transformer manufacturers coat the transformer windings with tar, and while the tar can be broken off, it is much easier to rewind a unit that doesn't have the tar coating. Second, always look for transformers with the highest stack of laminations. These will be the ones that will handle the most power.

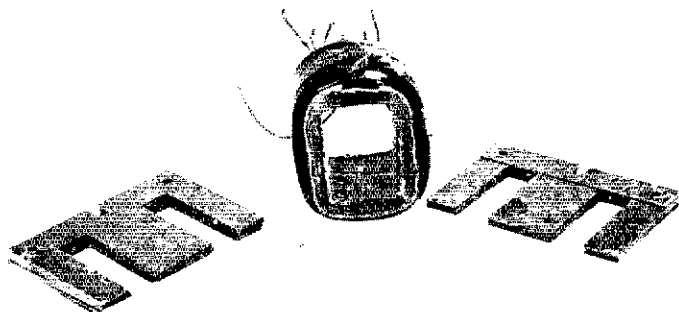
How to Take the Transformer Apart

If the transformer is still wired into the TV chassis don't clip the leads before first labeling them. The primary or input winding leads will usually be black and will be connected to the ac input terminal on the chassis, usually through a combination control and switch. As will be

In these days of rising costs everyone likes to save a buck whenever possible. One of the most expensive items for the home constructor is the power transformer. Here are details on "rolling your own" and effecting a very considerable saving.

* Novice Editor

This shows the rewound core, ready for the installation of the laminations. Note that the leads for the various windings are brought out of the top of the core.



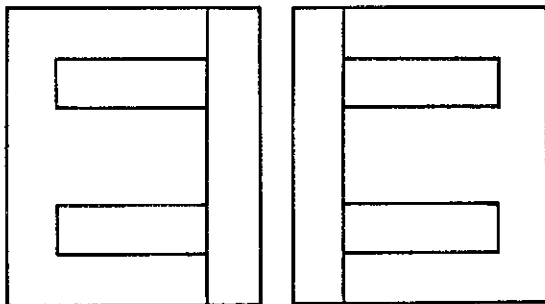
noted from Fig. 2, there are usually three filament windings on TV transformers, one for 5 volts and two for 6.3 volts. The 5-volt winding will be connected to pins 2 and 8 of the rectifier socket (the tube is usually a 5U4). One of the 6.3-volt windings will be connected to run the majority of the tubes in the set and this winding will be made of the heaviest wire. The other 6.3-volt winding will be for a single tube that is usually mounted inside the TV high-voltage compartment on top the set. The remaining one is the high voltage winding. If the transformer has already been removed, you should get the windings checked out with an a.c. voltmeter, because it is necessary to know for sure which is the 5-volt winding and which are the 6.3-volt ones. In checking with a voltmeter, and without a load on the transformer, the filament windings are likely to read slightly higher than 5 and 6.3 volts. The lower one is of course the 5-volt one. The reason that it is important to know which is which is because it is necessary to count the number of turns on a known winding to determine the number of turns per volt that will be needed for the new winding.

Once the leads are identified and tagged, remove the bell housing, if there is one, and the four nuts and bolts. Don't worry about the transformer falling apart when the bolts are removed; it won't. Next, examine the windings and layers to determine which is which. Usually, the primary winding will be next to the core followed by the high-voltage winding and then the filament windings. The outside winding is nearly always the heaviest 6.3-volt winding.

The next step is to remove the laminations. The laminations usually alternate in layers of 2 or 3. In other words, looking at one side of the transformer, you may have three E laminations and then 3 I laminations. Take an old knife blade and set it against the edge of the first lamination and with a small hammer and light

taps, use the knife edge to break away the shellac between the first and second lamination. You'll have to take this first lamination slowly, working the shellac loose all around the edges and the E tongue. Next, take a small piece or block of wood and, putting the edge of the wood against the edge of the lamination, drive the lamination out of the core. The first couple of laminations take a little time but once you have three or four removed the whole job moves along pretty quickly. Incidentally, the laminations can be removed in groups of 2 or 3, depending on how the core is put together; they don't have to be taken out one at a time. Try not to bend the laminations when removing them from the core. Also, if you nick any of them with the knife blade, file the nicks smooth.

The next step is to remove the windings. Starting on the outside, carefully cut away the paper covering the first winding. Once the winding is exposed, *carefully* count the number of turns on that particular winding to find out



FIRST LAYER

SECOND LAYER

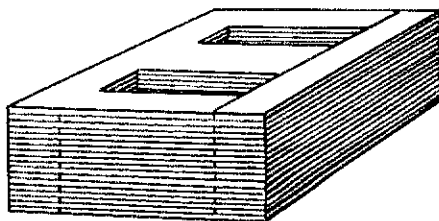


Fig. 1—This shows how the core is assembled. The E laminations are alternated, facing oppositely. As mentioned in the text, two more laminations facing in the same direction may be grouped together. In taking the laminations apart, the grouped ones can be left grouped if desired.

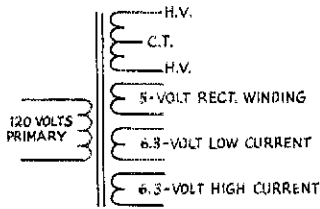


Fig. 2—Circuit of a typical TV transformer.

how many turns per volt are required. You'll probably find that it is 2 turns per volt, or maybe slightly more.

Remove the other filament windings, counting the turns for a double check on the turns per volt. The next winding will be the high voltage; and this is usually wound of fine wire, probably No. 26 to No. 28. Once the first layer is exposed you should be able to locate the end and then start unwinding the wire onto a spool or board, assuming that you might want to save the wire for future projects; otherwise, you can cut off the high-voltage windings with a knife. Once you have removed the high-voltage winding don't remove the paper covering the last, or primary winding because it will be on top of this paper that you'll start adding the new winding or windings. Incidentally, the primary winding on most TV transformers is wound with No. 18 enamel.

The New Windings

The next step is to figure out how many volts and how much current you are going to need for your supply. In the unit shown here, we wanted a low-voltage, high-current regulated supply for powering transistor gear. These requirements called for a transformer with one winding that would put out 24 volts maximum at 10 to 12 amperes, plus a second winding of 24 volts at about 300 mA. for the regulator section. (Incidentally, we couldn't find a transformer in any of the dealers catalogs that would give these voltages. The closest thing to it cost about \$30!)

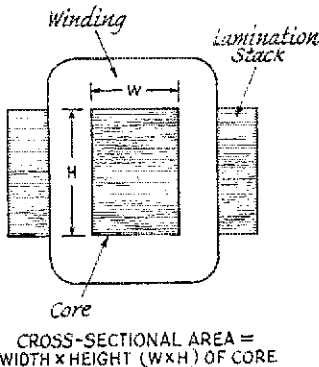


Fig. 3—Here is a cross-sectional drawing of a typical power transformer. Multiplying the height times the width of the central core area gives you the value to apply to Fig. 4.

Table 1

Wire Size	Turns per inch Enamel	Current-Carrying Capacity in Amperes	Feet per pound
12	12	11.8	50
14	15	5.87	80
16	18.9	3.69	128
18	23.6	2.32	203
20	29.4	1.46	323
22	37.0	.98	514
24	46.3	.577	817
26	58.0	.363	1300
28	72.7	.228	2067
30	90.5	.144	3287

Note: The turns-per-inch figures may vary slightly, depending on the enamel thickness. However, the figure gives a reasonably-close approximation of the winding space required.

The current-carrying capacity figures can be increased as much as 40 percent without danger of overheating the wire.

Table 1 shows the turns per inch and current-carrying capacity of the commonly used enameled-wire sizes. Using the requirements for the transformer mentioned above as an example, let's see what is needed in the way of wire sizes. First, we need to know the amount of room we have between the primary and the edge of the core. Knowing this, we can determine how many layers of a given wire plus insulation we can put on over the primary. In this TV transformer (probably it will also be true in yours) the space was just slightly over $\frac{1}{2}$ inch. Second, we need to know how much winding space we have for each layer. The width in this case is 2 inches across the primary. With this information we can then go to the wire table.

Because we need 10 amps or so, the minimum size wire would be No. 12. This size winds 12 turns to the inch (close-spaced) and will carry at least 11.8 amps. As you can see in the note in the table, you can actually draw as much as 40 percent more current than the stated figures without overheating the wire, so No. 12 would be adequate. At two turns per volt, 48 turns would be required to give us the desired 24 volts. With 12 turns per inch and a 2-inch winding space this would figure out to two layers of 24 turns each. However, it is difficult to wind wire as heavy as No. 12 and bring it right out to the edge of the winding area because the outside turns tend to "pop" off the end of the winding form. For this reason, we can use three layers of 16 turns to provide the required 48 turns. This, plus the insulation, comes out to slightly more than $\frac{1}{4}$ -inch thickness. The other winding can be made of No. 26, and a single-layer winding would do the job.

In cases where you have to squeeze a lot of layers on, and wind the turns out to the edge of the winding space, a good method of securing the outside edges of the windings is shown in Fig. 5. A piece of Scotch tape is secured under the edges of the wire, sticky side up, and then drawn back over the outside turn to hold the outside edges secure.

You'll need to know how many feet of wire will be required to complete the windings. This information can be obtained by measuring the distance around the winding form and then multiplying that figure by the number of turns required, allowing about 10 percent more for "slop" and errors in winding. Table I gives the feet per pound for each wire size so you can use this as a guide in buying the required amount of wire.

In the actual winding process, we secured one end of the wire in a vise, and then started winding at the free end, making sure there were no kinks in the wire. Starting at one edge, wind on the turns slowly, keeping the wire taut and the turns as close together as possible — and most important, keeping track of the number of turns you put on. It is always a good idea when winding a coil to make sure no one is around to interrupt you and make you lose track of your count. (In fact, disconnect your telephone during the process!) After the first layer is put on, secure the ends with Scotch tape. Each layer should be insulated from the next, and you can use ordinary household waxed paper for the purpose, a single layer of paper being adequate. We cut some sheets to size beforehand and as each layer was put on, the waxed paper was secured over each layer with tape. Be sure to bring all leads out the same side of the core so the covers will go back in place when the unit is completed. When the last layer and winding is put on, use a couple of sheets of waxed paper and then cover that with Scotch electrical tape, keeping the tape as taut as possible. This will add mechanical strength to the assembly.

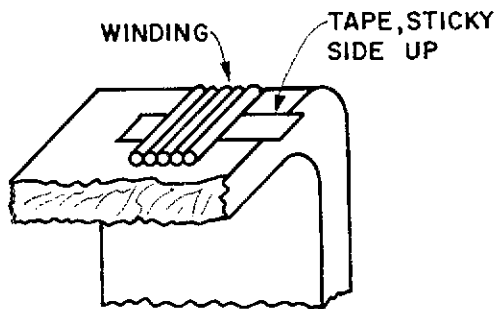


Fig. 5—This shows the method for securing the outside edges of a winding to keep the outside turns from coming loose. After the last turn is wound on, the tape is brought back across the winding to secure the wire.

Putting the Transformer Together

The laminations and housing go back together in just the opposite sequence to that followed in taking them apart. Use a light coating of shellac between each lamination. After we had about a third of the laminations in place we clamped them in a vise to take up the slack, then removed the unit from the vise and added about another third, then clamped them together again, and so on. You may find that you cannot get the last few laminations in. If so, don't worry about them because it is better not to force the unit together. If there should be any space between the outside of the new windings and the core, the space can be blocked up with wooden wedges. This will help eliminate vibration. Put the bell housing back on, and after tightening the nuts down your transformer is ready to go.

Although we have rewound several transformers, we haven't found one yet with the primary winding on the *outside* rather than around the inner core. However, you can rewind such a transformer by fitting the windings inside the primary, although you'll probably save time by taking off the primary and rewinding it as the first winding around the inner core.

Some Additional Dope

In designing your new transformer keep in mind that you can make several different voltages available from a given winding by merely bringing out a tap at the appropriate turn for a given voltage. Also, while we didn't mention it above, always wind your turns in the same direction. In other words, don't put on one layer and then reverse the direction of the winding.

What can be taken in power from a given transformer has already been mentioned. Additionally, a good check is to feel the core after the transformer has been running for a while. If it is too hot to keep your hand on it, the transformer is at, or over its power limits. However, if it is running fairly cool to the touch, you can no doubt draw a lot more power from it. **QST**

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

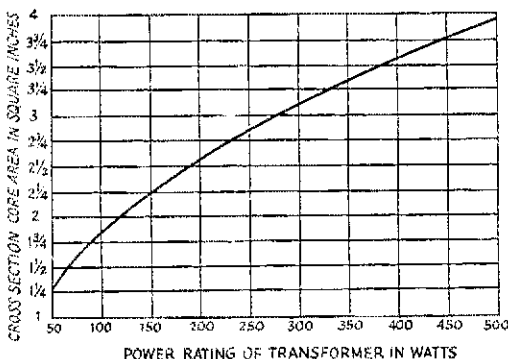


Fig. 4—To determine the approximate power-carrying capabilities of an unknown transformer find the cross-sectional area on the vertical axis and then go across the graph to the curve. Drop from this intersection point straight down to the bottom of the graph to find the power in watts.

There Is No Such Thing As

A Long-Delayed Echo All

BY O. G. VILLARD, JR.,* W6QYT, C. R. GRAF,** W5LFM,
AND J. M. LOMASNEY,*** WA6NIL

ON September 22, 1969 (GMT), WB6VKV was in QSO with WA3KQA on 20-meter cw. At 0100 plus or minus one minute, he stood by. The frequency was QRM-less, and WA3KQA was unaccountably slow in coming back. When the receiver came alive, a signal could be heard in the background noise on WB6VKV's frequency, about 82 but clearly copiable. Although band conditions were normal for six o'clock on a California afternoon, and not much by way of DX could be heard, the signal sounded as if it had come a long way. It sent: "WA3KQA de WB6VKV K", and was an exact repeat of WB6VKV's transmission.

Sounds spooky? You bet. This was WB6VKV's initiation into a very exclusive club: those who have heard long-delayed echoes, or LDEs. The authors know of only about 50 other members in all, and they would very much like to add to the list, because LDEs are just possibly one of the world's "longest-delayed" radio mysteries, having first been discovered in 1927. It seems to be time that *somebody* tried to figure out what nature is trying to tell us in this way. (Of course, as in all similar situations nature's message may turn out to be trivially simple, but then it *might* be important. No one can tell until the particular Rosetta Stone gets deciphered.)

The "delays" are really impressive. For example, WB6VKV timed himself with a watch, as he simulated sending the above letters, and got a delay of 11 seconds. It takes only one-seventh of a second for a signal to travel all the way around the earth. Where had that signal been all that time, and why was only *one* echo heard? If the effect is not an illusion or a hoax, how in the world can nature "store" signals that long? Consider how difficult it is to build any purely electrical signal storage device capable of delays much in excess of milliseconds.

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Another curious feature of LDEs is that they are so phenomenally evanescent: WB6VKV estimates that his next standby would have come two or three minutes later; by that time all trace of the effect had disappeared.

The WB6VKV incident was chosen for mention because it happened fairly recently, because it has been investigated with some care, and because it is typical of a number of reports which have been received. LDEs are not just an anachronism from the 1930s; they still happen, and they still need to be explained.

The LDE Hunt — Where We Stand

In their article in the May, 1969 issue¹ the authors told the story of LDEs and solicited reports from initiates into the "club". The response was impressive; there are now over 40 "good" reports (i.e., reports in which time, date,



Fig. 1—WB6VKV, who heard the LDE on September 21, 1969 (California date). Charley's dedication to science may be surmised from the fact that he allowed his station to be thoroughly checked over by the senior author, and in addition submitted to a polygraph test at Stanford University. The test showed conclusively that his report was not a fabrication.

A report on long-delayed echoes (LDE's), by way of a sequel to the authors' article in the May, 1969 issue. The 40-plus reports received thus far have permitted encouraging progress in the search for an explanation, but the mystery is far from solved; additional observations are clearly needed.

Long-Delayed Echo \overline{AR} . . .

or, The LDE Mystery Deepens . . .

frequency, etc., were logged), and it has been possible to begin some statistical studies. Following are the authors' present views:

- (a) It appears that LDEs tend to be reported at times when magnetic activity is low.
- (b) According to psychologists, there is a chance that one- or two-second "echoes" may be a trick of the imagination. But the longer ones don't seem to be readily explainable as "internally" generated.
- (c) There appear to be two classes of unusual echoes. One is observable at 3.5 MHz over short distances, and involves one- or two-second delays. The other (usually) is characterized by longer delays and seems to be associated with long-distance propagation. It is observable at the higher frequencies, especially at times of band opening and closing.
- (d) On balance, the evidence suggests that both effects are real and associated with the ionosphere.

The Spectrum of Effects Reported

In scientific work, one tries to operate "blind" as much as possible, because of a well-known tendency of the human mind to find whatever it is told to look for. For example, if observers are asked to walk through a grassy field and report the number of rabbits they flush, there is a high probability that some rabbits will be reported. However, the field may not have contained any rabbits at all: those brown furry fellows diving into their holes were actually woodchucks.

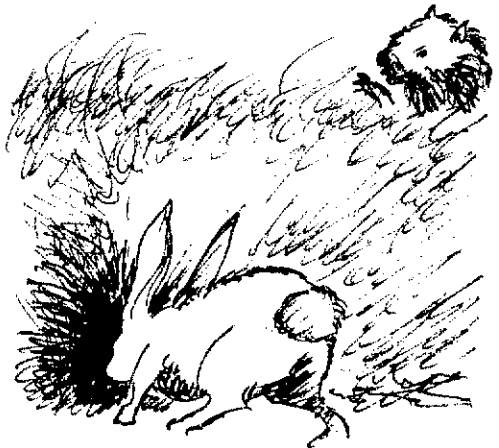
For this reason one hates to publish accounts of long-delayed echoes, because it may attract reports too closely matching the descriptions. But, on the other hand, if an observer doesn't know what to look for, he can scarcely be blamed for not finding anything, either. At the moment, in respect to LDEs, we can't even specify that the thing we are looking for has four legs and fur; this "field" we are investigating — to push the analogy further — might contain anything from a katydid to a kangaroo.

The diversity of reported effects is impressive. In longitude, the locations at which LDEs have been heard range from Africa to the Marshall Islands; in latitude, from Peru to Canada. The reported delays range from fractions of a second to over five minutes. The radio frequencies at

which unusual echoes appear extend all the way from 810 kHz up through 144 MHz. A purpose of this article is to list what has been reported, in the hope that it may stir latent memories and/or stimulate future observations.

Are the Echoes Real or Imagined?

The first step in trying to understand LDEs is to ask whether they could be a trick of the imagination. The hearing of "voices" is a well-known feature of some psychological derangements — we all have our disoriented moments; why don't we hear occasionally our own voices or "fists" repeating themselves? The authors have consulted four psychologists on this question, including two specialists in "cognition", or the science of how the spoken or written word is perceived.² They indicate that the possibility of psychological origin for the shorter delays — one or two seconds — should not be ruled out. But at the moment a physical — rather than a psychological — explanation for the longer delays seems to them more plausible. (On the other hand, physicists seem to feel that short delays will be much easier to explain than the longer ones!)



**"WATCH OUT FOR WOODCHUCKS;
REPORT WHAT YOU HEAR, NOT
WHAT YOU THINK YOU WERE
SUPPOSED TO HAVE HEARD."**

Table I

Name	Call	Date	GMT	Band MHz	Emis- sion	Delay, Sec	Dura- tion, Sec	Ows/ Other	Location	Interval Aurible	What Was Heard
Barton, A. J.	K40HK	5/21/60	≈2000	21	cw	4-5	4-5	both	Tripoli, Libya	4 min	Complete contest call and signal exchange at 30 wpm.
Bates, H. S.	W44FIU	March, 1934	morning (local)	28	a-m	1-2	1-2	own	Rome, New York	few min	Repeat of call letters "W8GWZ".
Beek, K. H.	W3VDX	1950	late night (local)	7	cw	10-15	10-15	own	Newtown, Pa.	at least once	Call letters of called station plus "de W3VDX".
Birks, D. W.	K9IUI	2/3/68	1753	7	ssb	30	20	own	Minneapolis, Minn.	once only	After 30-second delay, heard "W9IOG, W9IOG, Peoria, Illinois, this is K9IUI portable @ Minneapolis, Minn."
Beek, A.	W1DNT	5/20/68	1230	14	ssb	2	2	own	Southwick, Mass.	once	"Thank you very very much."
Burr, A. F.	W6QNG	10/8/68	2000	23	ssb	5	5	other	Las Cruces, N. M.	once	Delayed replicas of a W2 transmission.
Butler, J. A.	K6CAZ	2/17/69	1445	14	ssb	1-2	1-2	own	Pacific, Cal.	5 min approx	Heard own words repeated.
Carroll, R. E.	W8DZD	7/20/66	0218	21	ssb	1/2	1/2	other	Ann Arbor, Mich.	at least 3 min	Words of W4SLUI repeated.
Clark, C.	W7FFV	fall 1938	dark, (local)	.850	a-m	1/2-2	1/2-2	other	Logan, Utah	20-30 sec	Heard distinct words, not just syllables. Koah Denver. Believed not to be a recording artifact.
Clark, V.	W9NZK	7/20/69	0447	3.5	cw	1	1	own	Callowhee, N. C.	once	Heard repeat of "K" after standing by.
Clement, A. J. F.	W6KPC	12/18/68	2000	28	ssb	1	1	other	Northridge, Cal.	2 min	Short whole words, like "power", "name", etc. Station was a W8.
Ernst, A.	W2EXX	winter, 1968-9	?	21	ssb	5	5	own	Buffalo, N. Y.	—	Heard repeat of signoff (one sequence of call letters); was weak but clear.
Feld, H. L.	OA4C	June or July, 1952 (local)	evening (local)	21	cw	5(?)	3	own	Lima, Peru	30 min	After standby, repeat of last three letters of own call, wavy.
Graf, C.	W6LFM	1/27/68	1400-1430	10.002 MHz	Time Ticks	1/2	1/2	other	San Antonio, Texas	30 min	Delay of seconds ticks on U.S.S.R. Station RID, relative to WAVV.
Grandgent, C. M.	W41FNJ	8/8/69	0913	3.5	cw	1/2	1/2	other	Granby, Conn.	once	Heard distinct echo of RT's on W1EO transmission.
Hall, W. R.	W5UVI	5/2/69	2345	14	ssb	15-18	12-15	own	Millford, Del.	1 min (?)	Entire directional CQ plus signature. Repeated call and heard echo a second time.
Harbeck, D. B.	K5AZJ	11/20/61	0620	3.5	cw	1/2-1	1/2-1	own	Marion, Iowa	1 min	Echo of own signal.
Hill, E. R.	W3FEG	3/1/41	1012	14	a-m	22	22	other	Rehoboth, Del.	once	Weak repeat of a transmission of W6EBB in New Orleans, La.
Hollings, M. T.	OA4ED	March, 1954	late night (local)	21	cw	—	—	own	Lima, Peru	19 min	Heard one or two letters of own call repeated.
Horton, C.	W4SJET	1920's	?	7	cw	—	—	other	New England	—	Heard part of transmission of W1BFQ repeated.
Jenkins, D. S.	WA9OGH	June, 1905	0230	3.5	a-m	1.2-1.6	1.2-1.6	own	Tarzana, Cal.	once only	Heard words "off and clear, goodnight".
Jones, D. L.	W6WKU	3/7/50	0415	14	a-m	10	10	own	Deerfield, Ill.	few min	Heard "his and my calls" after two different standbys.
Kattan, G.	HK5BQW	12/30/68	0400	14	ssb	300	210	other	Calif, Colombia	once only	Repetition of several transmissions from YU3CT after contact had been completed.

Name	Call	Date	GMT	Band MHz	Emis- sion	Delay, Sec	Dura- tion, Sec	Own/ Other	Location	Interval Azimuth	What Was Heard
King, J. D.	W6LUU	winter, 1950-51	0300	7	cw	5	5	own	Baton Rouge, La.	few min	Heard own call letters repeated twice, after standby.
Lietmann, J. G.	W6BRH	1967	0220	144	a-m	2-2.5	2-2.5	own	Oklahoma City, Oklahoma	20 min	Repetition of own signals — believes delay 2-2.5 secs.
Lovae, A. W.	W6BRQ	winter, 1952-53	0200- 0400	7	cw	---	---	own	Indiana	---	Heard tail end of own CQ — believed that someone was calling him.
Lundstrom, E. A.	W6FUR	March, 1952	0400	14	cw	2-3	2-3	own	Storing, Ill.	5 min	Heard own signals after 2-3 sec delay; believed another station was calling him. Repeated test several times.
MacKinnon, J. C.	KX0CG	5/31/57	1800- 1800	14	cw	3-4	3-4	own	Eniwetok, M. I.	one half hour	Heard repetition of own signals; two other persons also heard the echoes.
Matties, M. F.	W6ZLOR	9/21/60	0045	14	a-m	6	6	own	East Williston, N. Y.	once only	Heard about nineteen words, part of the last transmission at a QSO.
Means, G. H.	W6ADP	10/10/52	≈1800	28	cw	18	18	own	Hollywood, Cal.	once only	Heard "ON44U de W6ADP".
Miller, C. N.	W6BVKY	9/22/69	0100	14	cw	11	11	own	Alpine, Cal.	once only	Heard "W4SKQA de W6BVKY K".
Mix, D.	W7TTS	6/24/69	0430	3.5	cw	---	---	other (W70EG)	Falmouth, Mass.	several min	Echoes on New Britain, Connecticut station so severe that had to QRS to 5 wpm.
Montague, J. E.	KH6DVG	April, 1941	0400	14	cw	12-15	12-15	own	Honolulu, Hawaii	10 min	Heard "—Q CQ de KH6DVG K". Effect repeatable.
Myers, W. H.	W60L	1/21/69	1526- 1538	14	cw	6-10	6-10	other	San Jose, Cal.	once only	Heard echo on U.S.S.R. station (UT6).
Neal, J.	W6SZNO	7/9/69	1933	7	cw	3-4	3-4	own	Clinton, Ohio	once only	Heard "VV de W6SZNO".
Neld, D. E.	W9HFX	7/14/69	0413	14	ssb	20	15	own	Fort Wayne, Ind.	once only	Heard "CQ calling CQ this is W9HFX . . . etc." Carefully tried to duplicate, without success.
Noyes, G., Jr.	W4LDYU	early sum- mer, 1966	≈0000	50	a-m	3-10	3-10	own & other	West Bridgewater, Mass.	5 min	Heard echoes on K1TZO and self.
Patterson, J. C.	W5VY	12/2/67	1328	28	ssb	4-5	4-5	own	San Antonio, Texas	only once	Heard "W5VY, W5VY, W5VY, W5VY"
Pewitt, S. J.	W9TUT	2/8/60	2215- 2218	.850	a-m	¼-½	¼-½	other	Hayden, Colo.	once only	Heard echo on KOA, Denver, local (i.e., non-network) broadcast.
Pulitzer, S. M.	W5JYK	4/26/69	afternoon to 21	14	may- be 21	7	5	other	New Orleans, La.	once only	Echo sent "GB OM SK," may have had some Doppler shift. Station probably in U. S.
Rampson, A. A.	VE4AS	2/25/69	0118	14	ssb	1	1	other	St. Boniface, Manitoba	10 min	YNGILB had echo repeating words; by DF-ing source found to be to the north of both stations.
St. John, Ed	K6EV	November, 1965	0600- 0700	14	ssb	3-4	3-4	own	Los Angeles, Cal.	observed echo twice	Heard "standing by for any DX call".
Thompson, J. H.	W1B1H	9/7/58	0345	14	cw	300	20(?)	own	Torrington, Conn.	once only	Heard complete repeat of his call to DX station, five minutes after standby.
von Dieingon, D.	W40KMD	winter, 1966	≈1000	21	a-m	4-5	4-5	other	Winfield, Kansas	5 min	Heard echoes on SW broadcast from East Coast station — N.Y.C.?
Vellman, E. J.	W8B1	7/13/69	1341	14	ssb	1	1	other	Wyoming, Ohio	once only	Heard repeat of standby transmission of W4ZYKU.
Viggins, B. A.	W60NY	12/1/61	0800	3.5	ssb	½-¾	¼-½	own & other	Los Angeles, Cal.	½ hour	Echo heard by various stations in LA area, but not outside. Tape recording made.

Observations on Long-Delay Radio Echoes

An Opportunity for Amateur Cooperation

By J. H. Dellinger*

SPECIAL signals are being transmitted from two European stations for the study of long-delay echoes. The signals and the whole undertaking are adapted to the participation of persons all over the world who have high-frequency receiving sets, no technical training being required.

Long-delay echoes are a most surprising and baffling phenomenon. Mr. J. H. Dellinger was listening in Norway, one day in 1927, to telegraphic signals from station PCJJ in Holland at a frequency of about 9600 kc. Some of the signals were followed, after about 3 seconds, by a faint echo or reproduction. Echo signals occurring one-seventh of a second after an emitted signal had been well known, being due to the reception of waves that had travelled all the way around the earth. But the discovery of echoes after a materially greater interval than a seventh of a second immediately raised the puzzling question of where such an echo could come from.

The phenomenon has been verified in a few scattered observations by Dutch, British, and French engineers. Echoes have been heard from 1 to 30 seconds after the emitted signal. Not enough is known, however, to determine what causes the echo signals, nor how they are propa-

listen with a high-frequency receiving set. Listeners in all parts of the world have been enrolled in the endeavor, over 10,000 of them in Great Britain. It seems likely that information of unique value to science will result, and an orderly explanation of the curious phenomenon developed, when definite data are secured on the frequencies and the times of day and season at which these echoes occur, their intensities, the area over which a given echo is heard, their relation to magnetic storms, sunspots, etc.

FOR SPECIAL TRANSMISSIONS

The stations transmitting the special signals are GSB, Daventry, England, and HBL, Geneva, Switzerland (the League of Nations station). The GSB signals are transmitted on 9610 kc., with a tone of modulation of 1000 cycles per second, each Sunday, Tuesday, and Thursday, from 3:25 to 3:55 a.m., Eastern Standard Time. The HBL signals are transmitted on 9675 kc., modulated continuous waves, each Sunday, Wednesday and Friday, from 6:30 to 6:50 a.m., EST. Each transmission consists of a five-minute adjusting period (GSB using phonograph music, and HBL using its call letters in code repeated) followed by the letters of the alphabet in code, spaced a minute

Fig. 2—The first U.S. amateur search for LDE's! The article by the late J. H. Dellinger appeared in QST for August, 1934, and was drawn to the author's attention by Ray Rinaldo, W6ZO. It is not known whether any reports were received in response to this request. The special transmissions alluded to were in all likelihood far too infrequent.

Are the Echoes Hoaxes?

Unfortunately, the authors know of no way by which this can be ruled out in any given case. Extremely clever practical jokes have been pulled off in the past, and doubtless there will be more in the future. The number of hoaxes will probably grow with the number of people looking for LDEs, and with the amount of publicity the whole matter receives. Oddly enough, this fact is an important reason why many reports are

needed: hoaxes often become obvious when a large number of observations are examined for internal consistency.

Correlation with Magnetic Conditions

Dr. A. C. Fraser-Smith of Stanford University has correlated the level of magnetic activity on days when LDEs are reported with the average level for that month. He finds that "78 per cent of the LDEs occur on days which are quiet relative to the rest of the month". This finding needs further checking, but if it stands, it will be an important result because it tends to reduce the credibility of both the psychological origin theory and the "hoax" theory. There is little reason to believe that the tendency to hallucinate would be greater on days of low magnetic activity than on any other. Likewise, it seems unlikely that practical jokers would consult magnetograms before turning on their equipment.

Two Kinds of Echoes

A striking feature of several reports at 3.5 MHz is the fact that the echoes are heard on the signals of a particular station (usually one nearby) but not at the same time on other stations near to the same radio frequency but somewhat farther away. (This kind of observation is helped by the multiple-station netting usually practiced at the lower frequencies.) If the presence or absence of an echo is a sharp function of distance at the lower frequencies, a possible explanation is that the delay may be a consequence of slowed velocity of propagation accompanying deep penetration of the layers directly overhead.

At higher frequencies, such deep penetration of the layers is highly unlikely, and other explanations must be sought.

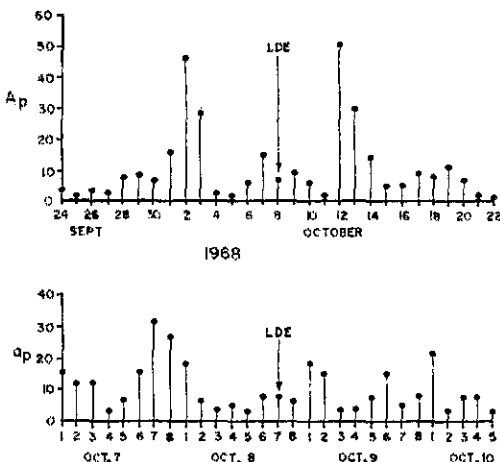
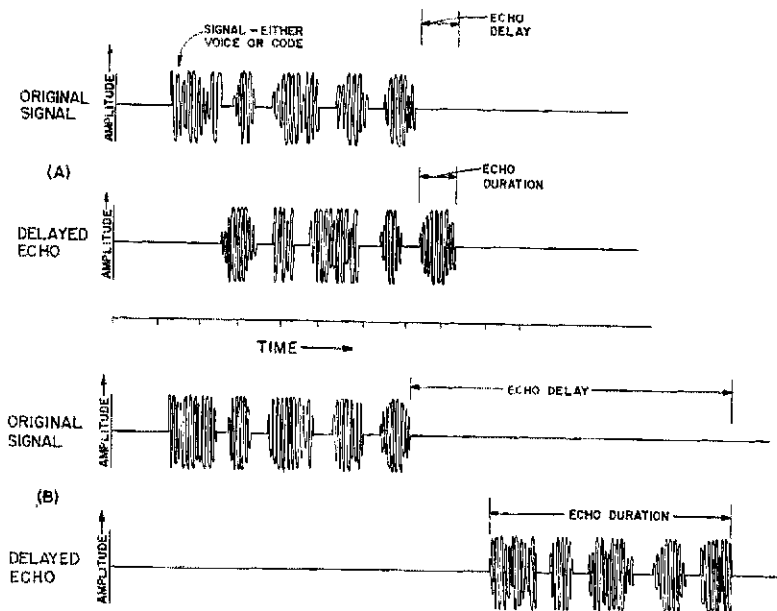


Fig. 3—Representative example (chosen at random) of the way in which LDEs seem to occur during dips in relative magnetic disturbance. The lower plot (ap) is an average of this quantity over three hours, plotted for each three-hour interval of the three-plus days centered on the LDE. The upper plot (Ap) is an average of the eight daily Ap figures, plotted for each of the 30 days centered on the LDE.

Fig. 4—Definition of "echo delay" and "echo duration." A—In this case echo delay equals echo duration. B—Here echo delay differs from echo duration.



One might imagine that if LDEs are in fact more likely to occur at times of magnetic calm, then more than one instance ought to be reported on the same day. But there are no such coincident reports thus far. One concludes from this that the chance of any given echo being heard must be very low. It is probable that a fairly large number of requirements must have to be satisfied in order for an echo to be observed. Some of these are not hard to visualize. For example:

- 1) The radio frequency may well have to be just right.
- 2) The frequency must be free of interference. The called station, or the other half of a QSO, or general QRM, must not drown out the echo.
- 3) The operator must be alert and aware that an echo of this sort is unusual and worth reporting.
- 4) Because the echoes are normally weak, the receiver must be sensitive and must be operating with sufficient gain so that antenna noise is audible, and
- 5) Any beam antenna should be pointing in roughly the right direction.

Of course, there may well be other requirements that cannot even be guessed at as yet!

On the Origin of the Longer LDE's

The longer LDEs are frequently reported when transmission in the higher-frequency bands is just opening up or shutting down. These are times of day when QRM is low, when long-distance propagation may be good, and when tilt-initiated ionosphere-to-ionosphere reflections often take place. Such reflections are now known to be an important feature of round-the-world (RTW) propagation,³ but they have not as yet been studied in detail. With the aid of such propagation, the ionosphere can function as a giant echo box or "whispering gallery." Could LDEs be temporarily-lost whispers in the

whispering-gallery? It's a possibility. For example, RTW propagation is also best at times of low magnetic activity.⁴ In addition, only two of the reports thus far have mentioned any Doppler shift, although in many instances frequency changes as small as plus or minus 20 Hz ought to have been recognizable. This suggests that the "reflecting" regions—whatever they are—are relatively fixed in position, like the earth's ionosphere itself. On balance, it seems desirable—at least initially—to seek a relationship between LDEs and the quality of long-distance transmission.

A difficult thing to explain, however, is the fact that without exception—so far—only *one* echo is reported! Yet in the early days more than one repeat of a given test transmission was quite frequently noted. Is this entirely a threshold effect resulting from the lower powers of today?

It doesn't strain the imagination much to visualize that there might be times when the ionospheric echo box could achieve phenomenally high "Q", either due to fortuitous focussing or exceptionally low losses or both. In that event, however, one would expect to hear a jumble of decaying energy, rather like shouting at a piano with the damping of the strings removed. But no one has reported this type of behavior at all.

The authors will be grateful for further reports of echoes greater than one or two seconds in length. Shorter echoes can in general be explained by round-the-world propagation, and are of lesser interest. Address: W6QYT, Radioscience Laboratory, Stanford University, Stanford California 94305. All reports will be acknowledged and credit given.

Comments on the Reports

Table I is a summary of the principal features of the reports received thus far. Some reports which are inexact as to time, place, and other details, have been omitted. In cases where authors have submitted more than one report, the most complete one has been chosen for inclusion.

It can be seen that—strictly speaking—the list is not exclusively echoes of “long” delay, according to the classical definition of “long” which is 3–30 seconds. It is really a list of echoes which the observers felt to be unusual enough to report. The authors thought it wisest to be guided by the reporters’ judgment in this respect. It is well known that the ability to estimate the passage of time depends strongly on the observer’s mood. Hence, the estimates of echo duration in seconds must be treated with great caution except for those cases where there is memory of the exact words heard, and the rate of speaking or sending.

Of particular interest are the two reports of echoes heard in the broadcast band, the VHF reports, and the two reports of delays in the order of minutes.

Note that where an undesignated time appears, it is GMT and the date is GMT; where the time is designated as “local”, the date is local. Also, please note the definition of “echo delay” and “echo duration,” which is given in Fig. 4. “Audible interval” refers to the length of time during which the echoes could be heard.

Home station call letters are listed opposite reporters’ names. The “location” column lists the locations (often different from home) at which the LDE’s were actually heard.

References

- 1 O. G. Villard, Jr., C. R. Graf and J. M. Lomasney, “Long-Delayed Echoes . . . Radio’s ‘Flying Saucer’ Effect”, *QST*, Vol. LIII, No. 5, May, 1969, pp. 38–43.
- 2 Professors E. R. Hilgard and R. N. Shepard of Stanford University; Professor Colin Cherry of the Imperial College of Science of Technology, London, England and Dr. D. R. Broadbent of the Applied Psychology Research Unit, Medical Research Council, Cambridge, England.
- 3 R. B. Fenwick and O. G. Villard, Jr., “A Test of the Reality and Importance of Ionosphere-Ionosphere Reflections in Long Distance and Around-the-World High Frequency Propagation”, *Journal of Geophysical Research*, Vol. 68, No. 20, October 15, 1963, pp. 5659–5666.
- 4 R. B. Fenwick and O. G. Villard, Jr., “The Effect of Magnetic Storms on Around-the-World High-Frequency Propagation”, *Journal of Geophysical Research*, Vol. 68, No. 16, August 15, 1963, pp. 4683–4688.

Acknowledgements

In addition to the reporters included in the list, the authors wish to thank the many others who have taken the trouble to write, and regret that space does not permit all the names to be included.

The report by W3FEG was referred to us by O. P. Ferrell.

This work was supported in part by the Office of Naval Research under Contract Nonr-225(64), and by the Advanced Research Projects Agency.



A.R.R.L. QSL Bureau

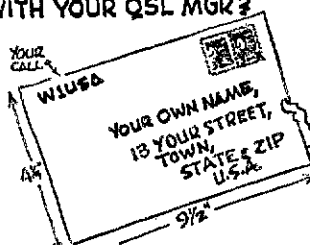
The function of the ARRL QSL Bureau System is to facilitate delivery to amateurs in the United States, its possessions and Canada of those QSL cards which arrive from amateur stations in other parts of the world. All you have to do is send your QSL manager (see list below) a stamped self-addressed envelope, about 4½ by 9½ inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner.

Cards for stations in the United States and Canada should be sent to the proper call area bureau listed below. W1, K1, WA1, WN1—Hampden County Radio Association, Box 216 Forest Park Station, Springfield, Massachusetts 01108.

- W2, K2, WA2, WB2, WN2—North Jersey DX Assn., P.O. Box 505 Ridgewood, New Jersey 07451.
 W3, K3, WA3, WN3—Jesse Bieberman, W3KT, RD 1, Halley Hill Rd., Malvern, Pennsylvania 19355
 W4, K4—H. L. Parrish, K4HXF, RFD 5, Box 804, Hickory, North Carolina 28601.
 WA4, WB4, WN4—J. R. Baker, W4LR, 1402 Orange St., Melbourne Beach, Florida 32961.
 W5, K5, WA5, WN5—Hurley O. Saxon, K5QVH, P.O. Box 31367, El Paso, Texas 79931.
 W6, K6, WA6, WB6, WN6—No. California DX Club, Box 11, Los Altos, California 94022.
 W7, K7, WA7, WN7—Willamette Valley DX Club, Inc., P.O. Box 555, Portland, Oregon 97207.
 W8, K8, WA8, WN8—Paul R. Hubbard, WA8CXY, 921 Market St., Zanesville, Ohio 43701.
 W9, K9, WA9, WN9—Ray P. Birren, W9MSG, Box 519, Elmhurst, Illinois 60126.
 W0, K0, WA0, WN0—Des Moines Radio Amateur Association, P.O. Box 88, Des Moines, Iowa 50301.
 KP4—Alicia Rodriguez, KP4CL, P.O. Box 1061, San Juan, P.R. 00902.
 KZ5—Gloria M. Spears, KZ5GS, Box 407, Balboa, Canal Zone.
 KH6, WH6—John H. Oka, KH6DQ, P.O. Box 101, Aiea, Oahu, Hawaii 96701.
 KL7, WL7—Alaska QSL Bureau, Star Route C, Wasilla, Alaska 99687.
 VE1—L. J. Fader, VE1FQ, P.O. Box 663, Halifax, N.S.
 VE2—John Ravenscroft, VE2NV, 353 Thorncrest Ave., Montreal 780, Quebec.
 VE3—R. H. Buckley, VE3UW, 20 Almont Road, Downsview, Ontario.
 VE4—D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg 9, Manitoba.
 VE5—A. Lloyd Jones, VE5JL, 2328 Grant Rd., Regina, Saskatchewan.
 VE6—Karel Tettelaar, VE6AAV, Sub. P.O. 55, N. Edmonton, Alberta.
 VE7—H. R. Hough, VE7HR, 1291 Simon Road, Victoria, British Columbia.
 VE8—George T. Kondo, VE8 ARRL QSL Bureau of Department of Transport, Norman Wells, N.W.T.
 VO1—Ernest Ash, VO1AA, P.O. Box 6, St. John’s Newf.
 VO2—Goose Bay Amateur Radio Club, P.O. Box 232, Goose Bay, Labrador.
 SWL—Leroy Waite, 39 Hannum St., Ballston Spa, New York 12020.

These bureaus prefer 5 × 8 inch or #50 manila envelopes.

IS YOURS ON FILE
WITH YOUR QSL MGR?



Another Look At Your Receiver And Its S-Meter

BY JAMES N. THURSTON,* W4PPB

It has become a matter of pride among many amateurs to see how many "db. over S9" can be registered on the receiver of some colleague with whom they may be in contact. When I report on the air that I have an S-meter but don't put any faith in it, I can almost sense the surprise and wonder that crosses the mind of the person to whom I am talking. There is good reason however, to be suspicious of all S-meter readings.

Time and again I have watched amateurs with years of experience incorrectly operating modern ham receivers. The first thing they do, almost invariably, is to turn up the r.f. gain control to a maximum. This is necessary, they explain, to insure an accurate S-meter reading. After all, they add, the audio gain control can always be used to make the required adjustments in audio level.

This habit of using maximum r.f. gain is in many cases very poor practice, particularly on the 80-, 40-, and 20-meter bands where the receiver is likely to have its maximum sensitivity. This is not to say that all ham receivers cannot be operated with the r.f. gain control opened up, but many receivers do experience difficulties when the r.f. gain control is opened up. Many receivers suffer from serious overloading in the r.f. and i.f. stages which distorts the incoming signal. Spurious signals are often generated within the receiver which cause apparent birdies, key clicks and thumps, and other undesired effects such as a poor signal-to-noise ratio and inter-modulation distortion.

To illustrate what I mean, one evening while completing a regular c.w. schedule I was astounded to hear key thumps and a generally unsatisfactory sounding signal coming from a friend who always is meticulous about the quality of his transmitted signal. I found, very quickly, that the trouble was in *my* receiver, as I had inadvertently left the r.f. gain control nearly at maximum. As soon as I turned the r.f. gain back, my friend's signal was once more as clean as usual.

In another instance, a local ham told me that he could hardly copy my s.s.b. transmission, and that I had spurious signals at several places in the band. I was much concerned about this and checked with other hams to see just what was going on. I soon discovered that the local ham had his r.f. gain turned up so high that my signal was completely overloading his receiver. The spurious signals he heard had all been produced by his own receiver.

Because of the danger attached to the improper use of the r.f. gain control in a receiver equipped with an S-meter, most amateurs might be better off if their receivers had no S-meters at all. Usually there is an optimum setting of r.f. and a.f. gain controls which will minimize distortion and yet provide ample sensitivity. Turning the a.f. gain control up and adjusting receiver gain with the r.f. gain control will usually give a cleaner signal.

Of course S-meters can be useful as *relative* indicators of signal strength. In many cases the actual calibrations seem to be so far off as to be ridiculous. If for example an input power of one milliwatt to the receiver registered as an S9 signal, it would require 10 million watts going into the receiver (wow!) to produce a signal that was 100 db. over S9. It only takes a little common sense to realize that S-meters do not always tell the truth.

Another area of S-meter misuse occurs when hams try to compare their "barefoot" signal strength to that strength observed when the linear amplifier is fired up. Such fantastic increases in output as 30 db. are often reported on the air. Now a 30-db. increase means that the power has been increased by a factor of 1000. A more realistic figure would be 10 db. or so.

Generally speaking, it is wise to regard all S-meter readings with a jaundiced eye. The next time you hear what seems to be a distorted signal, try reducing your receiver's r.f. gain control before concluding that the trouble is in the other guy's transmitter. You may be amazed at the results.

QST

Strays

QST congratulates . . .

Bob Lewis, VO1BL, who was reelected to the City Council of St. John's, Newfoundland, placing second on a slate of eight candidates.

Columbia Amateur Radio Society, on receiving a blue ribbon for the second straight year for their exhibit at the Columbia County (Fla.) Fair.

Herman Lukoff, W3HTE, on becoming a Fellow in the Institute of Electrical and Electronics Engineers for pioneering in the development of digital computers and digital input and output devices.

Jack Kelleher, W4RAE, on being appointed Senior Staff Advisor at National Scientific Laboratories.

G. E. Smith, W4AEO, elected a Fellow member of the Radio Club of America.

*212 Seneca Road, Clemson, South Carolina 29631.



Let's Talk Transistors

Part 4—The Transistor

by ROBERT E. STOFFELS*

We have, during the past few months, spent considerable time discussing fundamentals of transistor operation—those subjects which do not specifically involve transistors, but which are so important for a comprehensive understanding of the subject. This month we shall take these various subjects—structure of matter; crystals, holes, acceptors, donors; and finally the semiconductor diode—and apply them all to the subject of the transistor itself.

As you will recall, in Part 3 we discussed the semiconductor diode, and the pn junction (that line of demarcation between p-type material and n-type material) which is essential to its operation. In this diode it was possible for excess electrons on one side of the junction to combine with holes on the other side of the junction for *only a brief period*, because the resultant ions (atoms which have gained or lost an electron) opposed the motion of additional electrons and holes toward this junction, and, hence, caused a *depletion region* to be formed.

We found that this depletion region was present even if no external battery was applied to the pn crystal, and that it could be made larger by connecting an external battery of the proper polarity to it. A diode so connected is said to be *reverse biased*, and current flow in the circuit is prevented.

By the same token, the battery could be connected to the crystal so as to reduce the size of this depletion region; a diode so connected is said to be *forward biased*. If the forward bias, or the voltage of the external battery, is great enough to reduce the size of this depletion region to almost nothing, then current flows in the circuit. Thus, we have the well-known rectifying action of the semiconductor diode.

Note that so far we have been dealing with a device consisting of two parts and, consequently, one junction. Let us now expand this philosophy

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Conduction in a two-junction device — npn or pnp — and how it is biased; how a transistor operates in a circuit.

to a piece of material consisting of three parts as shown in Fig. 4-1. The first and third section of this device shall be composed of p-type germanium (that is, with holes, and resultant negative ions), and the second, or center section of this device, shall be composed of n-type material (with its excess electrons, and its positively charged ions.)

Let us combine these three sections, in exactly the same manner as we did with the semiconductor diode. For the sake of clarity, all three sections are shown the same size; in actual practice the center section is extremely small. As these three pieces are joined (and once again, a mere physical connection is not sufficient; the device must be grown) we form two junctions, and because of the nature of the material we also form two depletion regions.

As explained last month, the physical size of these depletion regions is appreciable, even with no external battery connected to the unit. After an initial period of combining, all holes (in the two outside sections) and excess electrons (in the center section) stay completely out of the depletion regions, since they are repelled by the ions on the other side of the junctions.

As you will recall, it is possible to *cut down* the size of the depletion region by applying a forward voltage bias to the material on either side of the junction, and it is likewise possible to *enlarge* the size of the depletion region by applying a reverse voltage bias to the material on either side of the junction.

Fig. 4-3 shows a forward bias being applied to the junction to the left (notice that the positive plate of the external battery BT_1 is connected to the p-type material, thus repelling the holes in the material, and causing the size of the depletion region to be decreased) and a reverse bias being applied to the junction to the right (notice that the negative plate of external battery BT_2 is connected to the p-type material, thus attracting the holes in the material and causing the size of the depletion region to be increased).

Recall also that when a pn junction is forward biased (as at the left) the holes from the p-type material combine with the excess electrons of the n-type material. In order to not leave the ions in the two sections uncompensated, electrons in the p-type material broke away from their atoms, and headed for positive plate of the battery, thus leaving new holes in their wake. Likewise,

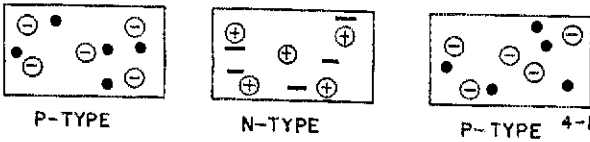
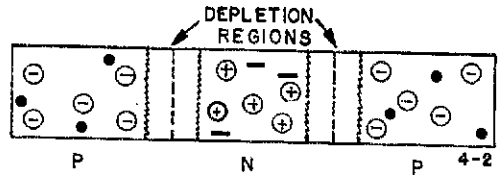


Fig. 4-1—Three parts of pnp transistor.

Fig. 4-2—Pnp sections joined to form a transistor



in the n-type material (to the right of the junction) new electrons were injected into the material from the wire connected to the negative plate of the external battery.

Diffusion

This action takes place in this three-section device just as it did in the two-section device we call a diode — with, however, one notable exception. In the diode there were only two sections, rather than three, and consequently there was no means by which other, outside influences could be exerted on the junction. Furthermore, it was mentioned earlier that, although the figures show each of the three sections to be the same size, the center section is in reality made extremely thin (on the order of .001 inch, or somewhat thinner than a human hair). Thus, the holes which migrate to this n-type center section under the influence of the forward voltage bias have great difficulty finding an excess electron which to combine, and in reality often diffuse right through this center section into the depletion region to the right (see topmost hole, Fig. 4-3).

If this diffusion of holes does occur, they are more often than not further attracted to the right by the negative ions in the right-hand p-type section. Consequently, the current, or passage of electrons, in the wire connected to the center section is appreciably smaller than would be the case with a similar two-section device. It is this diffusion of holes through the center section, into the depletion region to the right, and hence into the right hand section, which characterizes the action of a transistor.

Note that the current so formed (and certainly the motion of these holes is truly current) was

started by the forward bias being applied to the center section, but the result of this bias caused current to flow in the right-hand section instead. We might indeed consider the wire attached to this center section to be little more than a trigger, in that it causes current flow in an entirely different area.

The Transistor

As you may have guessed, this three-section device is the unit we have been sneaking up on these past months, the junction transistor. As you can see, it has three wires coming out of it, and is composed of three different sections.

This particular transistor is called a pnp transistor, since the materials making up the three layers are p-type, n-type, and p-type, respectively. It would also have been possible for us to demonstrate an npn transistor; in this case the polarities of our external batteries would have been reversed, and the transistor itself would have been composed of n-type, p-type, and n-type material, respectively.

The left-hand section is called the emitter of the transistor; the center section is called the base of the transistor, and the right-hand section is called the collector of the transistor. Note that in normal operation the emitter-base junction of the transistor is forward biased, and the base-collector junction of the transistor is reverse biased.

It was suggested above that the action of the transistor depends upon the thinness of the base region. This is indeed the case, and it is possible to make this region extremely thin, thus improving the action of the transistor. In fact, by careful manufacture, it is possible to cause more than 98 per cent of the holes leaving the emitter region to diffuse into the collector region, and only

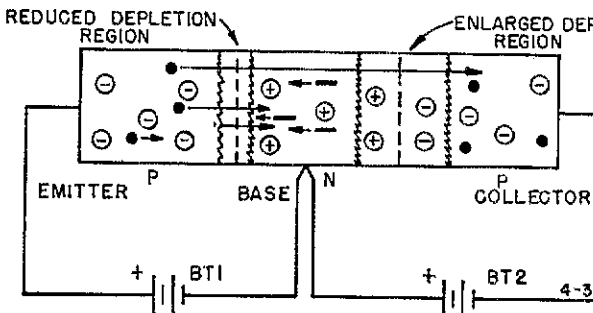


Fig. 4-3—Forward bias applied to a pnp transistor.

about two per cent of the holes to be captured by electrons in the base region.

Consider the implication of this fact! If 98 per cent of the holes passing through the emitter actually reach the collector, and only two per cent reach the wire connected to the base, then if the wire to the base is physically opened we are actually interrupting only a small current (two per cent of the total emitter current) but are causing to be interrupted the entire emitter-collector current. For certainly if the wire to the base is opened, then the emitter-base junction is no longer forward biased, and no current at all flows. Thus the great achievement of a transistor, stated simply, is as follows:

If a transistor is used in a circuit, and if the current in the one wire (to the base) is interrupted or changed, then the action of the transistor causes a much greater current in a different wire to be similarly interrupted or changed. And isn't this, after all, the exact definition of a relay or vacuum tube?

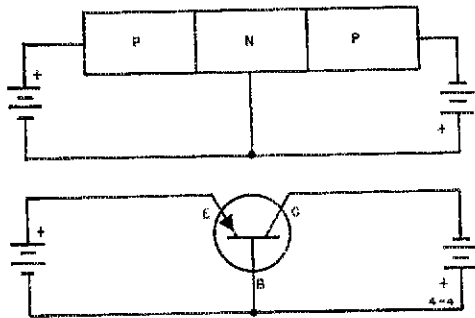


Fig. 4-4—Conventional way of showing the pnp transistor.

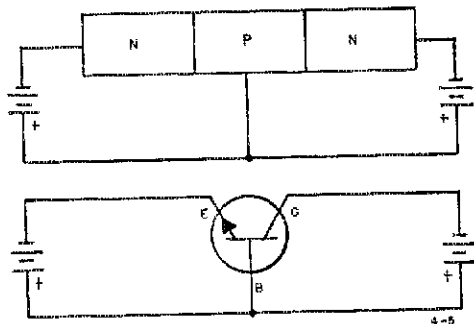


Fig. 4-5—Conventional way of showing the npn transistor.

Figs. 4-4 and 4-5 show the conventional mean of showing a pnp and an npn transistor. Note that the base lead is shown leaving the body of the transistor at right angles to it, and that the emitter and collector leads leave at an angle. Furthermore, the emitter lead bears an arrowhead, the direction of which differs between the two types. This arrowhead points in the direction of conventional current—that is, opposite from the direction of the electrons themselves. Normally

a transistor is not even labeled as being a pnp or npn transistor; the direction of the arrowhead conveys this information.

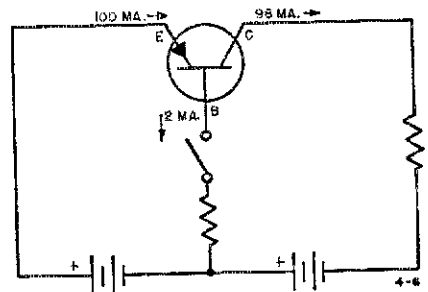


Fig. 4-6—Switch and resistor added to base lead.

An Easy Example

In Part 5 we shall discuss at some length various examples of the transistor in operation; however, in order to nail down the physical characteristics and operation of the transistor, let us discuss one simple example at this time.

If we were to take the circuit of Fig. 4-4, and add a toggle switch and resistor to the base lead, and a resistor to the collector lead (see Fig. 4-6) we would have an actual operating circuit. The resistor in the base lead is simply a protecting resistor (remember, the emitter-base junction of a transistor is a simple forward-biased diode, and unless some sort of a resistor is inserted in the circuit the junction will rapidly destroy itself). The resistor in the collector lead is the load resistor, and it is in this wire, or circuit, that we are attempting to control current.

If we were simply to say that two per cent of all current entering the emitter emerged from the base, then it is obvious that the other 98 per cent of the current emerges from the collector. (These figures, as mentioned earlier, are not at all unreasonable.) So, for the purpose of this example, let us assume that 100 mA. flows into the emitter, 2 mA flows out of the base, and 98 mA flows out of the collector. Now, if the toggle switch in the base lead is of very delicate construction, such that it is able to safely interrupt only 2 mA, we were still perfectly safe in operating our circuit as shown. For even though the current in the collector load resistor (perhaps a light bulb) is 98 mA, opening the toggle switch, and thus the direct interrupting of 2 mA, will cause to be interrupted the 98 mA collector current.

Next month we shall rearrange this circuit somewhat, and apply values to the various components. The similarity between a transistor circuit and a relay circuit will also be examined.

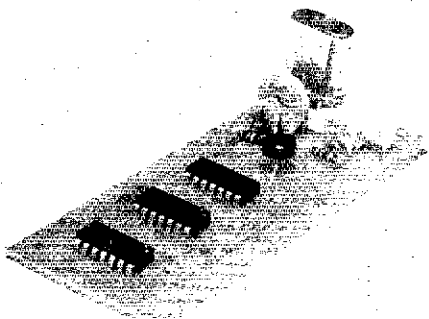
Questions:

1. What is the difference between a pnp transistor and an npn transistor?
2. What type of bias is applied to a pnp transistor in operation?
3. What type of bias is applied to an npn transistor in operation?

(Continued on page 89)

• New Apparatus

Radio Shop Lab I Frequency Marker



BECAUSE we now have restricted segments in the ham bands, something other than the usual 100-kHz crystal calibrator is needed to accurately determine receiver frequency. One solution is a Radio Shop Lab I frequency marker, which is available in three models. Depending on the output connection selected by a 2-pole 6-position switch (only included in the most expensive model), the frequency marker will generate signals every 5, 10, 25, 50 or 100 kHz up to at least 50 MHz.

One Fairchild μ 1914 dual two-input gate and three Motorola MC790P dual JK flip-flops are used in the frequency marker. The Fairchild IC is wired as a crystal-controlled multivibrator, while the Motorola units are employed as frequency dividers. Output of the oscillator is a 100-kHz square wave. On-the-nose operation is made possible by an adjustable capacitor in series with the crystal. The first flip-flop divides the 100-kHz signal by two to produce a 50-kHz output. The 50-kHz signal toggles a second flip-flop to produce a 25-kHz signal and, at the same time, it drives a group of three flip-flops in a divide-by-five circuit to produce a 10-kHz signal. Toggling of the remaining flip-flop by the 10-kHz signal produces a 5-kHz output.

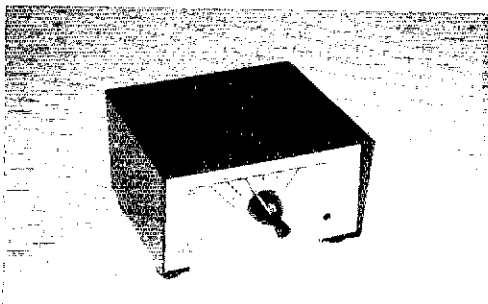
The frequency markers require 3 to 4 volts dc at about 75 mA. Two C or D cells can be used to furnish the necessary power or three C or D cells in series with a silicon diode (forward biased) can be employed (only the top model of the line includes a diode).

The least expensive model of the frequency marker is the kit version, which sells for \$16.50 postpaid from the manufacturer. A $1\frac{1}{4} \times 3\frac{3}{4}$ -inch glass-epoxy printed-circuit board is used to mount the parts. Although few components are employed in the circuit, it's necessary to solder at least sixty connections. Because of the closeness of these connections, all soldering should be done carefully with small-diameter solder and a low-wattage iron having a small tip. If one follows the instructions included with the kit, he shouldn't have any difficulty. The completed kit is shown in the upper photograph. Only the components pictured there (less the crystal) are furnished with the kit; the user must supply his own crystal, switch, coupling capacitor, enclosure, and power supply.

A second model of the frequency marker is a wired and tested version of the kit. It sells for \$19.95 postpaid.

The top model of the Radio Shop Lab I line is shown in the lower photograph. Designated the TBL1, this wired and tested model contains all the required parts, except three C cells and a 100-kHz crystal. Three battery holders mounted inside the TBL1 cabinet make the unit completely self-contained. A phono jack on the back of the TBL1 is used as an output connector. Three 24-pf capacitors connected in parallel are used to couple the marker output to the phono jack. Should the output level be too high for the user's application, one or two of these capacitors can be disconnected. A hole on the front of the unit provides screwdriver access to the variable capacitor in series with the crystal, thus permitting the oscillator frequency to be set at exactly 100 kHz. A six-position function switch is used to select 5-, 10-, 25-, 50- or 100-kHz markers, and to turn the unit off. The TBL1, which measures $2\frac{1}{2} \times 4\frac{5}{8} \times 5$ inches, sells for \$24.95 plus \$1 for postage and handling.

Several Radio Shop Lab I frequency markers were tested in the ARRL lab and all performed satisfactorily. However, because of the switching arrangement used or recommended care must be taken to select the proper marker signals when calibrating a receiver. Since all the flip-flops operate when the unit is turned on, and since the function switch merely connects the output coupling capacitor to the desired frequency divider, there is signal leakage in the circuit, and many markers are heard in addition to the desired ones. Fortunately the unwanted markers are weaker than the wanted signals.



The products described above are manufactured by the Radio Shop Lab I, 48 Elm Street, New Canaan, Conn. 06840. — W7YDS

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.

Graphic Solution of L

THE nomographs of Figs. 1 and 2 provide a graphic means of determining the resonant frequency of a combination of L and C or, conversely, of determining the values of L and C that resonate at some desired frequency. No intermediate conversion to reactance is necessary.

The chart of Fig. 2 covers a frequency range from low audio frequencies to the highest r.f. frequencies at which lumped-component circuits are practical. The range of capacitance values covered is from 1 pF to 10 μ F, while the inductance range runs from 0.01 μ H to 100 Henries. This chart is readable to approximate values only, and is used primarily to determine the

* 8352 Westlawn Avenue, Los Angeles, Calif. 90045.

scales to be applied to the chart of Fig. 1, which yields a high degree of accuracy.

It will be noticed that Fig. 2 is divided into sections. Fig. 1 can be considered as a magnification of any selected section of Fig. 2, when the frequency, capacitance and inductance scales of Fig. 1 are made to correspond to those of the section selected from Fig. 2.

Example: Given: $f = 100$ kHz, $L = 80$ mH.

Find: C necessary for resonance at f .

Referring to Fig. 2, it is found that the intersection of the 100-kHz diagonal line and the vertical 80-mH line fall in the section marked (A). In this section, the L scale runs from 10 mH to 1000 mH, while the C scale runs from 1 pF

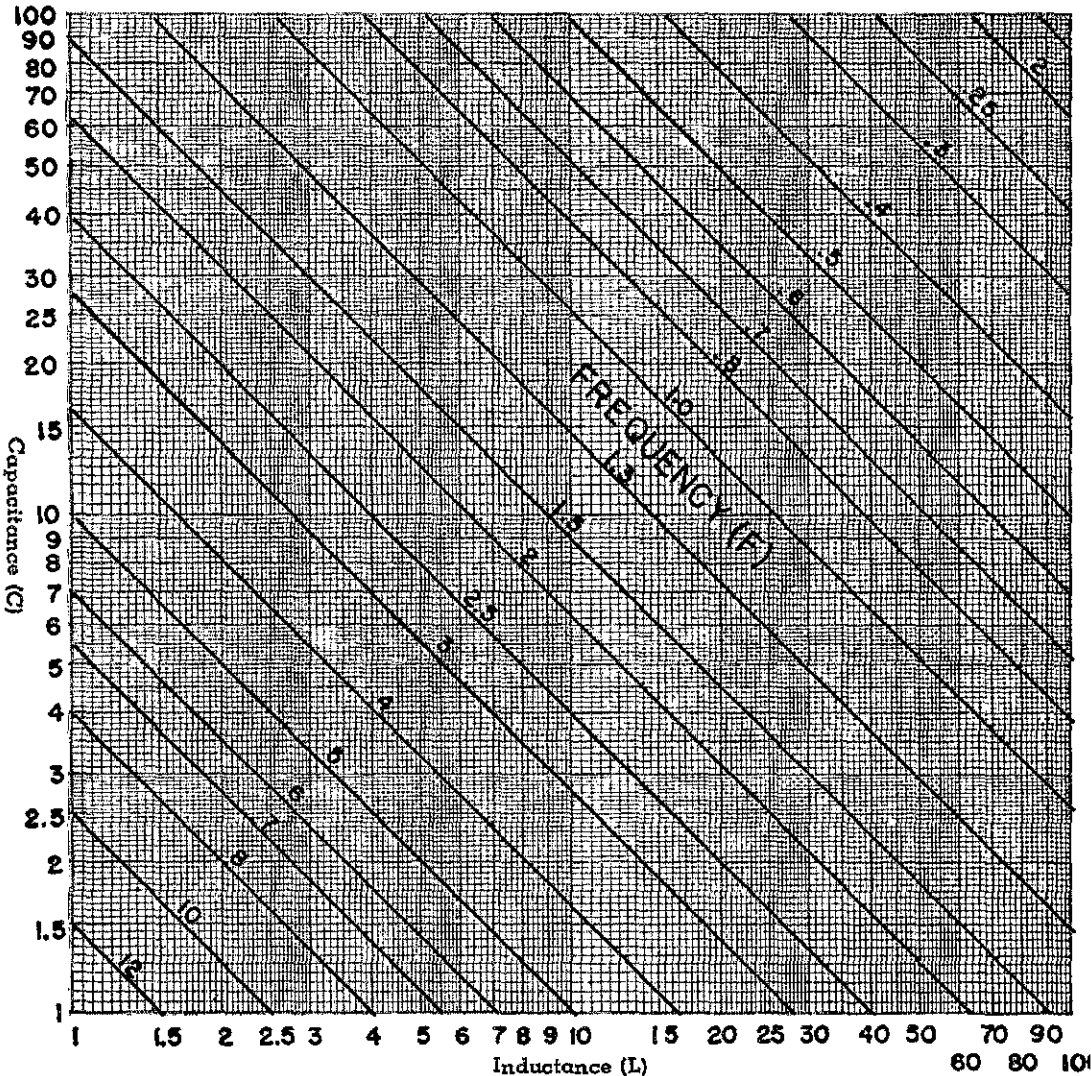


Fig. 1—High-resolution chart. This chart may be substituted for any section of Fig. 2 by making the L , C and f scales correspond.

Resonance

BY DONALD K. GOSHAY,* W6MMU

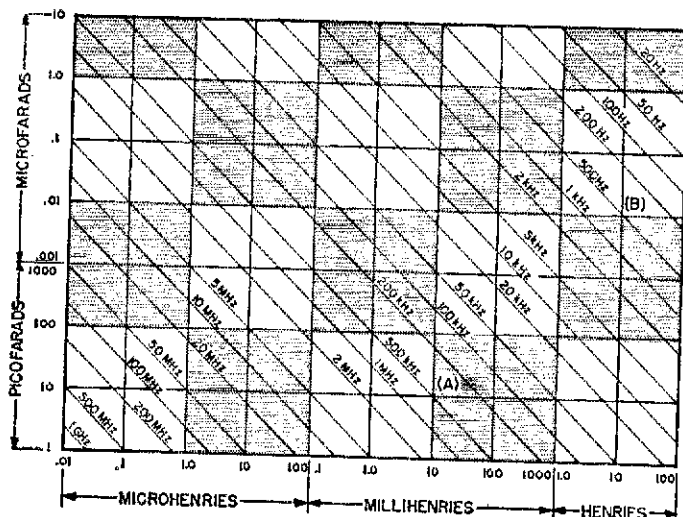


Fig. 2—Wide-range resonance chart.

to 100 pF, so the C and L scales of Fig. 1 are made to correspond, i.e., with pF at 1 on the vertical scale, 100 pF at 100 on the vertical scale, 10 mH at 1 on the horizontal scale, and 1000 mH at 100 on the horizontal scale.

In section (A) of Fig. 2, the frequency range runs from about 1 MHz (1000 kHz) to approximately 20 kHz. Therefore, diagonal line 1.0 in Fig. 2 is labeled 100 kHz, line 4.0 is labeled 400 kHz, line 0.3 is labeled 30 kHz, and so on.

With the scales set, the unknown capacitance is found by running vertically from 8 (80 mH) to intersect diagonal line 1 (100 kHz), and thence to left to the vertical scale, where a reading of 32 (32 pF) is obtained.

As a second example:

Given: $C = 0.1 \mu\text{F}$, $L = 10 \text{ H}$.

Find: resonant frequency f .

The intersection of the 10-H vertical line, and the 0.1- μF horizontal line in Fig. 2 falls in

the section marked (B). In this section, the L scale runs from 1.0 to 100 H, so 1 in the L scale of Fig. 1 represents 1 H, while 100 represents 100 H. Also, in section (B) of Fig. 2, the C scale runs from 0.01 to 1 μF , so 1 on the vertical scale of Fig. 1 is read as 0.01 μF , while 100 on the scale is read as 1 μF . The frequency in section (B) of Fig. 2 runs from approximately 1000 Hz. to 20 Hz, so diagonal line 1 in Fig. 1 represents 100 Hz, line 4 represents 400 Hz, line 0.3 represents 30 Hz, and so on.

The unknown frequency is found from Fig. 1 by running horizontally from 10 (0.1 μF) on the vertical scale to intersect the vertical line from 10 (10 H) on the horizontal scale. At the intersection of these lines, read approximately 1.45 (145 Hz) on the diagonal scale.

A few trials will show that the charts are much easier to use than they are to explain.

QST

Strays

1970 QCWA QSO PARTY

Starts: 2400 GMT Friday, February 13, 1970.
Ends: 2400 GMT Sunday, February 15, 1970.
This year's party is being sponsored by the Arizona Chapter of QCWA. Only members are eligible for the QCWA certificate and plaque donated by the National Headquarters, and only contacts with other members will count toward this award.

Overseas members can be contacted, as they too, enjoy the fraternalism. This year, as last year to add interest, a simple point scoring system will be incorporated. Count one point for

each QCWA member worked. (Repeats on other bands of modes do not count, nor do non-members.) Multiply the points by the sum of the states, Canadian provinces and countries other than the U. S. and Canada in which a member was worked, for the final score.

Your log should show in this order: Contact Nos., Date/Time in GMT, Station worked, reports, band, QTH, name, and QCWA number.

Activity will be found near the following frequencies: *cw*: 3580, 7080, 14080, 21080, 28080 kHz. *Phone*: 3980, 7280, 14280, 28580 kHz. *RTTY*: 3595-3600, 7095-7100, 21070-21075, 28070-28075 kHz. Mail your log by Mar. 15, 1970 to Harry Manning W7GDT, 1895 Grandview Road, Prescott, Arizona 86301.

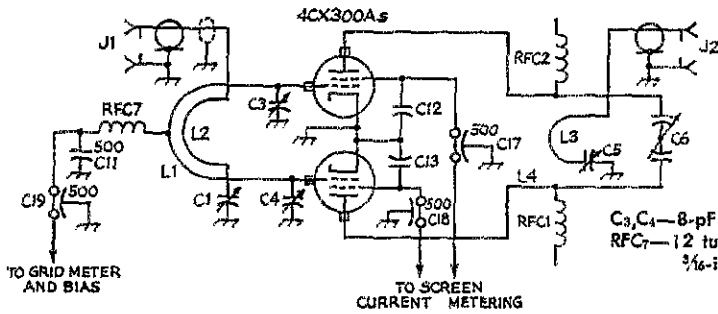
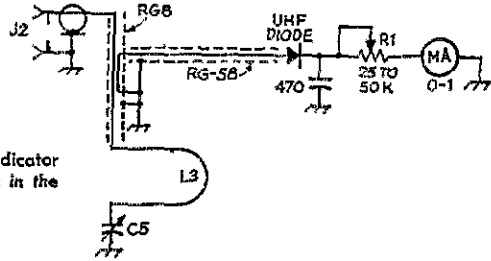


Fig. 1—Details of the 432-MHz amplifier at W2JKI, showing modifications of the W1QWJ design. Parts of the circuit not shown, and components marked but not described below, are the same as in the original version.

C₃, C₄—8-pf glass trimmer.
RFC₇—12 turns No. 24 enamel, 3/8 inch long, 3/16-inch diameter (Ohmite Z-460).

Fig. 2—Details of a simple relative-output indicator for the 432-MHz amplifier. L₃, C₅ and J₂ are as in the original amplifier design.



Some Hints on Push-Pull 432-MHz Power Amplifiers

THE external-anode type of vacuum tube is almost standard equipment for 432-MHz transmitters of more than a few watts output, and for good reasons. This large family of tubes offers about our only hope of obtaining reasonable efficiency on amateur bands from 144 MHz up. In the 2-meter band they work well in either single-ended or push-pull layouts, and may even be used in parallel, if great care is used in the circuit design. But when we get up to the 420-MHz band there is often a large difference in performance between one- and two-tube designs.

In single-ended amplifiers the external-anode tube is a natural, its physical characteristics having been worked out with coaxial tank circuit applications in mind. It is even relatively easy to build a multiband amplifier for 144, 220 and 432, using coaxial tank circuits. A 4CX250B amplifier shown in both editions of our *V.H.F. Manual* is an adaptation of an earlier design that provided for all three bands.¹ On any of these frequencies its efficiency closely approximates that of a good 500-watt amplifier for, say, the 14-MHz band. But if you want to run

the maximum legal power it is necessary to use more than one of these tubes, and here the 432-MHz picture changes for the worse.

One basic design has been used by most workers on 432 who want kilowatt capability: a push-pull layout by W6FZA², or an improved version by W1QWJ³, the latter being the more widely copied. At its best, the W1QWJ amplifier is capable of 55 to 60 percent efficiency, but some builders have not done this well. Much of the trouble seems to lie in making circuits work the way they are supposed to, at this frequency. A push-pull circuit may, for instance, tend to look like a parallel one at some other frequency, and if the parallel resonances happen to show up at certain critical frequencies the amplifier may refuse to work at all. Split-stator capacitors that are not properly balanced to ground are notorious for causing this, at 220 and 420 MHz.

Balanced drive may also be difficult to attain. This was a problem in a 432-MHz amplifier built by Bill Noah, W2JKI. He used 4CX300As, but otherwise his layout was similar to that of W1QWJ³. Bill found that he could develop

¹ Margot, "A Practical Kilowatt Amplifier for 432 Mc.," *QST*, August, 1964.

² "The W1QWJ 432-Mc. Kilowatt Amplifier," *QST*, February, 1966. Also, Chapter 17, "The Radio Amateur's Handbook," 1968 Edition, p. 453.

³ Brayley, "A Coaxial-Tank Amplifier for 220 and 420 Mc.," *QST*, May, 1951. Same principles apply for 144-MHz tank circuit.

grid current, but the driving voltage at the two grids was largely in phase, rather than 180 degrees out of phase, as it should be in a push-pull stage. The solution turned out to be as shown schematically in Fig. 1.

The input circuit of the W2JK1 amplifier looks very much like its predecessor, except that there is no butterfly tuning capacitor, shown as C_2 in the W1QWJ version. The tank inductance, L_1 , a $\frac{3}{4}$ -wave U-shaped loop as before, is tuned at each grid by 8-pF glass coaxial capacitors. Balancing of the circuit is done by means of these two trimmers only. Also important is the installation of RFC₇ in the bias lead to L_1 , and removal of C_{11} to the cold end of this rf choke. With the center tap of L_1 thus ungrounded for rf, the two trimmers, C_3 and C_4 , can be used to balance the drive to the tube grids, if the adjustment procedure given below is followed. The position of the link, L_2 , with respect to L_1 , may be critical also, and it may be found that the $\frac{1}{8}$ -inch spacing between them, recommended in the original article, will not be optimum.

Tune-up Procedure

Leave the shield off the grid compartment for adjustment of the tuning and coupling in the input circuit. With the link capacitor C_1 half meshed, apply drive and peak the tuning capacitors C_3 and C_4 for maximum grid current. Swing C_1 through its range to see if it actually tunes the link. If not, move L_2 nearer to or farther from L_1 and try again. W2JK1 reports that he had to use less than the recommended $\frac{1}{8}$ -inch spacing. He used No. 14 wire with Teflon insulation for L_2 . Moving the link affects the grid tuning, so repeat C_3 and C_4 with each change.

Reaching a maximum grid current value does not necessarily indicate that the drive to the two tubes is the proper 180 degrees out of phase, so now a check should be run using amplifier output and screen current balance as the indicators. Run the amplifier at 800 to 1000 volts on the plates, and with a proper 50-ohm load, check the output. It is nice to have a reliable uhf wattmeter available at this stage, but if you don't have one, the relative-output indicator arrangement shown in Fig. 2 may be of interest. This was suggested to W2JK1 by W2DEG.

Note the output, relative or actual. Now move C_3 one turn lower in capacitance, and C_4 one turn higher, and take another efficiency or relative-output reading. This adjustment will affect the phase of the drive to the grids, and will probably affect both the grid current and the output. If the efficiency is degraded, the test shows that C_3 needs more capacitance and C_4 less. You will probably note a greater difference in screen current readings between the two tubes if this is the case. Remembering how far you moved, go in the opposite direction and repeat the efficiency check. Maximum rf output and very nearly perfect balance of screen current should coincide, when the drive to the two tubes is exactly 180 degrees out of phase, if reasonably

well-matched tubes are used. With the amplifier properly balanced an output efficiency of at least 55 percent should be readily obtained.

Good dummy loads capable of dissipating in excess of 500 watts at 432 MHz are hard to come by. The Heath Antenna will show about 10 percent reflected power at this frequency, but it is usable for initial adjustments at moderate power. It will start to smoke in about 2 minutes at 550 watts output from the transmitter, however. The best load is usually a well-matched antenna — but don't do extensive testing this way at full power, on 432.001, when the band is open. There's plenty of testing room without QRM-ing the "high-rent district," and a couple hundred kHz either way will make no practical difference in results of the adjustment procedure.

Relative Output Indicator

A simple relative output indicator that can be built into the plate compartment of the amplifier is shown in Fig. 2. Coupling to the coaxial line between the output loop, L_3 , and the power output jack, J_2 , is effected by running the inner conductor of a short section of RG-58/U under the shield of the output line, for a distance of one-half inch. The outer conductors of the two coaxial lines can be connected together and grounded. The diode should be outside the strong rf field of the plate tank circuit, and can be on the outside of the amplifier box, if this is convenient.

The amount of coupling and the setting of the control R_1 will depend on the power level. Start with maximum resistance in R_1 , and adjust it as required to maintain a usable reading on the meter. As W2JK1 puts it, "This will give you an output measurement in gobs, but at least it is something to let you know which way you're going." — W1HDQ

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● Technical Topics

Transistor Rigs and Cold Weather

IF you live in one of the colder areas of the country, and you have a mobile or portable rig using transistors, it will be no news to you that transistors may not be at their best after spending a typical New England winter night in a car that stands outside. It certainly is not news to the writer of these lines. My first encounter with the sensitivity of transistors to cold weather came with a vibrator substitute in a 6-meter mobile rig, quite some years ago. The phenomenon has shown up in a different transistor vhf rig every winter since.

Two 50-MHz transistor transceivers, described in November, 1964, and February-March, 1967, *QST* turned up dead on the first really cold morning after being in a car all night, but revived quickly when they were left on the lab workbench for a half hour or so. It was not too surprising to have this happen with something I built myself, but the experience has been repeated with several vhf rigs of otherwise impeccable commercial design.

The latest was a 50-MHz transistor transceiver of Japanese manufacture that would have received unqualified praise, had I rushed into print with it before seeing how it survived the rigors of a New England winter. This little job performed superbly when first checked, last October. Its built-in vfo was reasonably stable and the modulation was adequate and of excellent quality when the rig was used on am. Performance on fm was also very good. The receiver was as good as I have ever seen in a 50-MHz mobile setup, with transistors or vacuum tubes.

But after "the frost was on the pumpkin" we noted that the receiver took a while to get warmed up to the job, and this got worse as the weather got colder. When we had a snappy 12-degree morning in December I decided to bench-test the rig immediately after bringing it in out of the cold. The results are probably typical, and they are not pleasing.

Using the built-in "D" cells, the receiver made only a weak click when turned on. The noise resulting from connecting an antenna (normally a loud roar in this fairly noisy location) was nil. A wattmeter in the antenna line showed 0.1 watt output when the push-to-talk switch was closed. This was with vfo control. On crystal control the output was 0.3 watt. After 15 minutes at 75-degree room temperature the receiver hiss became barely audible, and the transmitter output was up to ½ watt, crystal or vfo. After 30 minutes the receiver noise was up nearly to normal and the transmitter power was 1.4 watts. By an hour's time everything was running normally again: 1.5 watts output, and the usual excellent receiver sensitivity.

This warmup cycle is very similar to that of the two homebuilt transceivers already mentioned. All use bipolar transistors throughout, except for the FETs in the rf stage and vfo of the Japanese transceiver. All were operated from inexpensive D cells of the carbon-zinc type. It can be assumed that the relatively poor cold-weather performance of this type of cell is a factor in this, but not a major one. (The Japanese rig worked just as poorly when connected to the car battery, except that the transmitter output was a shade higher when checked in the extreme-cold position.)

The real culprits are the transistors, apparently, especially those used as oscillators. Our transistor vibrator substitute has an oscillator in the audio range. It quits when the temperature plunges into the sub-zero region, but works uniformly otherwise. The tunable oscillator in the earlier of our two 50-MHz transceivers conked out regularly in cold weather. The transmitter and converter crystal oscillators in the second transceiver seem to stand temperatures down to about 10 degrees above zero, though output is below par at near-freezing temperatures, or lower. The little Japanese transceiver has been less than its best almost continuously since the last of the warm fall days, unless the car has been running long enough so that the heater blast warms the rig up thoroughly.

Something has to make the electrons jump around, and heat is one thing that does it. This is automatic in vacuum tubes, but almost totally lacking in transistor equipment. In circuits where feedback may normally be low, as in vhf oscillators, there may not be enough electronic activity, when temperatures fall to characteristic New England winter conditions, to maintain oscillation at a usable level.

If you use your vhf gear merely for fun, this may pose no great problem. On a frosty morning you're likely to be more concerned with whether or not the car will go, and talking to your vhf pals on the way to work is not very vital. But suppose you are a radio officer in your local CD organization. Last summer you sold your civil authorities on an investment of several hundreds of dollars for self-contained transistor vhf rigs. There's nothing better for handling many local communications jobs — if you don't let an emergency communications assignment sneak up on you in sub-zero weather.

Better keep those transistor rigs in where it's warm, or provide them with 12-volt heaters that can be plugged into a cigarette lighter for a few minutes — just in case. Battery efficiency can be maintained under low-temperature conditions by the use of alkaline or nickel-cadmium batteries. And don't throw away "obsolete" transceivers that use those funny old vacuum tubes. — *W1HDQ*

Strays

The British Amateur Radio Teletype Group is sponsoring a spring RTTY contest what will run from 0200 GMT March 21, to 0200 GMT March 23, 1970. Contest rules appeared in *IARU News of QST* for March 1969, page 72.

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Feedback

The Thyrector diode assembly, Z₁, used in the primary circuit of "A Power Supply for that Big Linear Amplifier," (*QST*, December 1969, page 43) should have been designated as GE part number 6RS20SP4B4. The first three digits were mistakenly omitted in the *QST* writeup.



Hints and Kinks

For the Experimenter



THE "MINILOOP" LOW-FREQUENCY ANTENNA SYSTEM

ON the low-frequency bands it is sometimes necessary for the ham to use very limited space for his antenna system. It may even be necessary to operate for an appreciable period with the antenna confined to an apartment or hotel room which houses the station!

Recent literature^{1,2} has emphasized the improvement in efficiency that can be realized by using a highly-conductive loop rather than, for example, the more-conventional center-loaded whip. Extensive experience using the "Mobiloop" antenna² has prompted the author to apply this same basic principle in the development of a compact 80- and 40-meter antenna system, which is suitable for rotatable operation indoors.

The "Miniloop" antenna shown in Fig. 1 is a miniaturized version of the Mobiloop. Actually, this self-supporting loop antenna was formed from the center section removed from the Mobiloop. (This section was fabricated by overlapping the tips of two 102-inch Citizens' Band whips by approximately three inches, wrapping this overlap with copperweld wire, soldering the joint, and then encasing the entire 16¾-foot length in ½-inch wide copper shielding braid.)

¹ Patterson, "Down To Earth Army Antenna," *Electronics*, August 21, 1967.

² Taylor, "The 'Mobiloop' — An Improved Mobile Antenna System," *QST*, November, 1968.

The section was curved to form a circle approximately 5½ feet in diameter, and two standard swivel-ball mobile mounts were attached to a 3 X 5 X 7-inch aluminum box and used to support the loop.

The antenna is fed at one end by 52-ohm coaxial cable, and the opposite end is returned to ground through a series-resonating air-variable capacitor, C_3 . Impedance matching at the feed point is achieved by means of one or two Mylar capacitors across the coax. Band-changing is accomplished by switching this matching capacitance, and by readjusting the variable capacitor to put the system in resonance. A flashlight bulb, shunted across approximately three inches of the antenna near the feed point, is used to indicate the correct adjustment.

Results using this portable antenna have been quite satisfactory, considering the size of the system. The assembly was placed in the middle of a first-floor room, which houses the ham station. Signal strengths experienced on 75 and 40 meters during the daytime were sufficient to permit uninterrupted contacts over distance of a few hundred miles.

Comparisons were made on 75 meters with a center-loaded mobile whip located on a nearby automobile. The signal strengths were greater for the Miniloop by an average of at least one S unit. This advantage is most likely the result of using a system that does not have the resistive losses present in the loading coil of the conventional 75-meter mobile antenna.

Major sources of loss in an indoor antenna installation are the electrical wiring and other conductors present in the near field of the antenna.³ Inasmuch as the Miniloop can be rotated, it is possible to minimize these losses in certain cases by rotating the antenna assembly until the received signal strength is greatest. This provides another advantage over more conventional portable installations. — James E. Taylor, W2OZH

REMEDY FOR SLIDING KEYS

THE nonskid nature of the "Grip-Eze" jar opener, a 3¼ X 6-inch piece of thin high-friction rubber, provides an ideal means for preventing a bug or semiautomatic key from sliding across a table. The Grip-Eze jar opener, which is made by the Mosedale Manufacturing Company of St. Charles, Illinois, is distributed as an advertising novelty by many concerns. — William Stan Hornbaker, WA4TJJ

³ On the other hand, the loop may be coupling to the ac line and picking up signals from it. — Editor.

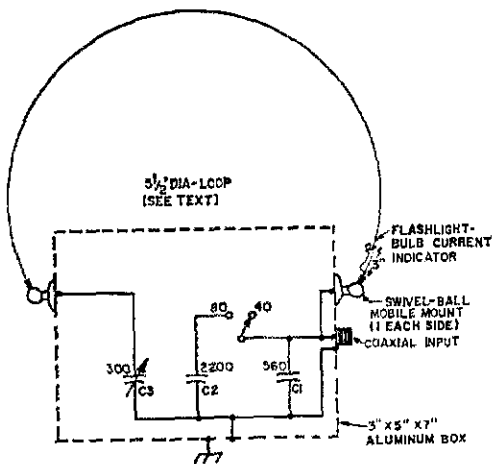


Fig. 1—Schematic of the "Miniloop." Capacitance values are in pF. C_1 and C_2 are 500-volt Mylar capacitors. C_3 is an air variable.

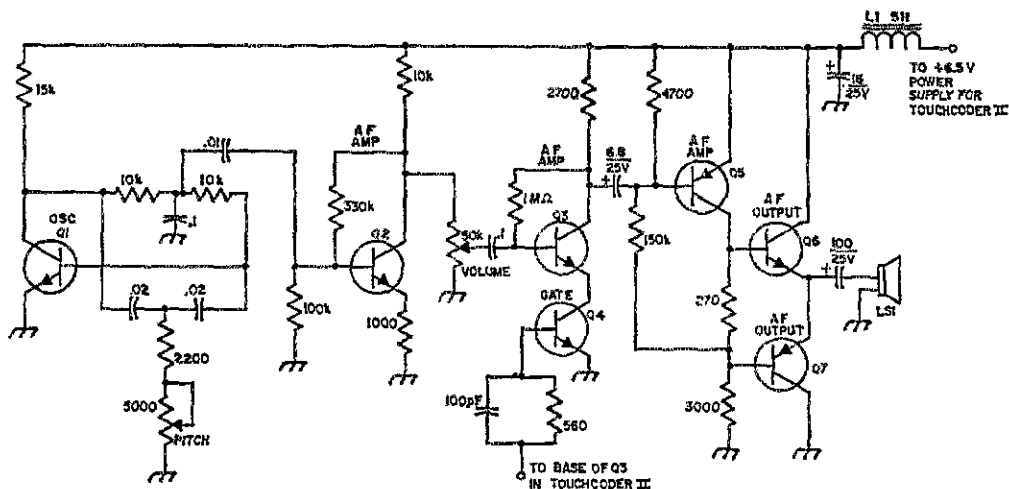


Fig. 2—Schematic diagram of a cw monitor for the Touchcoder II. Except as noted, capacitance values are in μF . Capacitors marked with a polarity are electrolytic. Resistances are in ohms; k=1000. Resistors are composition, $\frac{1}{4}$ watt or larger.

L₁—5-H, 100-mA filter choke.
 LS₁—Small 8-ohm speaker.
 Q₁, Q₂, Q₃, Q₄—2N2369A.

Q₅, Q₇—2N404.
 Q₆—2N338.

CW MONITOR FOR THE TOUCHCODER II

THE Touchcoder II⁴ is a fine piece of equipment, but it lacks a monitor. Fig. 2 shows the schematic of a monitor attachment I recently designed for use with this code typer. The monitor consists of a 700-Hz twin-T audio oscillator, gating circuitry, three audio preamplifiers, a complementary-symmetry audio output stage, and an 8-ohm speaker. Power for the unit is taken from the 6.5-volt output of the Touchcoder-II power supply via a 5-henry choke, L₁. There is sufficient room in the Touchcoder-II case so that one board can be used to mount the components of the power supply and the parts of the monitor. — William W. Crilland, WA1HMW

CIRCUIT-BOARD FABRICATION

HERE are two suggestions that can make the fabrication of circuit boards easier:

1) To clean and polish copper-clad boards that are not heavily tarnished, wipe them with a paste composed of ordinary table salt and vinegar. The proportions are not critical.

2) Prior to placing a board in the etching bath, attach about a foot-long piece of string to the board. Let the free end of the string hang outside of the bath. The string provides a convenient handle for agitating the board and for removing it from the bath without the danger of staining one's fingers. Attach the string either by taping it to the back of the board or by threading it through a small hole drilled in an unused area of the board and tying a loop. — Melvin Leibowitz, W3KET

⁴ Bryant, "Touchcoder II," QST, July, 1969.

TOROID MOUNTS

TELEPHONE loading coils (88-mH toroids) have become popular with hams for building tone generators and band-pass filters. The problem of mounting these open-frame toroids on a Vectorbord can be solved by cementing each coil to a 2-watt resistor, as is shown in Fig. 3. Each resistor can be secured by soldering one of its leads to a flea-clip terminal inserted in the board. The resistors do not affect the inductive properties of the toroids. — Howard Phillips, W6FOO

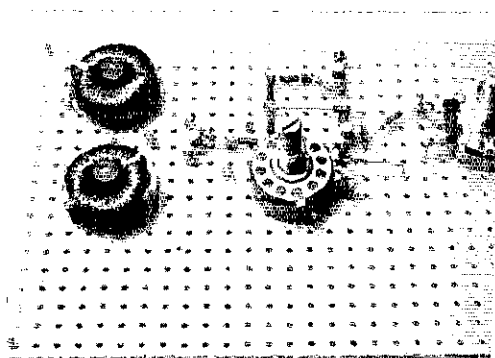


Fig. 3—Two-watt resistors serve as circuit-board mounts for telephone loading coils.

CLEANING CRACKLE FINISHES

WHEN crackle finishes need cleaning, try using an art-gum eraser. The eraser doesn't appear to harm the paint and the refinished surface looks like new. — Ray Tripp, VE3FOH

SIMPLIFIED CONSTRUCTION OF A 50-MHZ MOBILE ANTENNA

I HAVE been getting very good results operating I portable with a modification of a mobile antenna described by Tilton.⁵ The antenna is constructed exactly as described in the article, except that $\frac{3}{4}$ -inch conduit is used for the mast, and a conduit coupling is used for the center fitting. This arrangement has the advantage of being much easier to construct; in particular, the junction between the antenna and the mast involves no machining beyond the drilling of two holes in the conduit coupling, as is shown in Fig. 4. Additional advantages are that RG-58/U can be used instead of the smaller coaxial cable used by Tilton, the mast can be made in a number of segments and easily coupled using standard hardware, and conduit is less expensive (approximately \$1 for a ten-foot section) than aluminum tubing. — Robert O. Woods, K2VEP

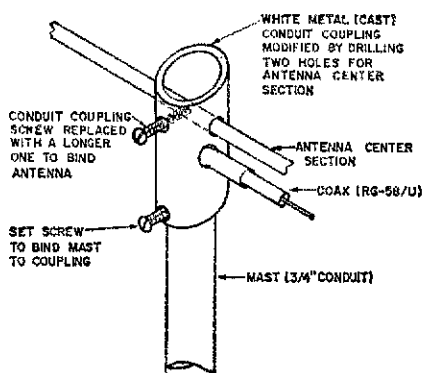


Fig. 4—Modified portion of mobile antenna.

DRAKE DC-4 POWER SUPPLY

AFTER about 30 hours of mobile operation, my Drake DC-4 mobile power supply began to burn out 2N2156 transistors. Two replacement jobs by two different Drake-authorized service facilities resulted in only a few hours of operation before the next failure.

Since the Motorola 2N2156s used in the DC-4 have a junction-temperature rating of 110 degrees centigrade, and since their heat sink never reached finger-burning temperature, it seemed reasonable to assume that the problem was not heat. Not being able to come up with a solution, I took advantage of a business trip to Scottsdale to get Motorola's opinion of the problem. Tests by Motorola's Failure Analysis Lab indicated that there were two problems: overheating and a collector-to-base-to-emitter fused-metal short (different transistors). A careful examination of the DC-4 assembly revealed that the manufacturer had used a heavy serrated solder lug in direct contact with the inside mica washer on

⁵Tilton, "A Neat 50-Mc. Mobile Antenna," *QST*, May, 1966. Also, *Mobile Manual*, IV edition, page 130, and *V.H.F. Manual*, Chapter 9.

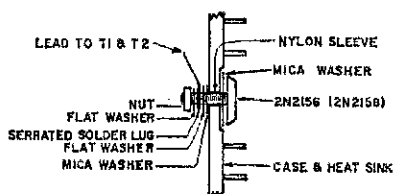


Fig. 5—The installation of a flat washer between the serrated solder lug and the mica washer on each 2N2156 in the Drake DC-4 prevents the mica from being damaged during periods of physical shock.

each 2N2156. Under mobile vibration conditions the serrations had fractured one of the mica washers, shorting to ground the transistor collector, and the primary of T_2 and T_1 . In addition there was no evidence of silicone grease between the transistor case and the mica washer or between the mica washer and the heat sink.

The solution consisted of three steps:

- 1) Replacement of the mica washers that were next to the serrated solder lugs.
- 2) Installation of a flat washer between each serrated solder lug and its adjacent mica washer, as shown in Fig. 5.

3) Application of a film of silicone grease between the transistors and the mica washers and between the mica washers and the heat sink.

I went one step further and replaced each 2N2156 with a 2N2158, which is the top transistor in the series of power transistors to which these units belong. Whereas the BV_{CBO} , BV_{CES} , BV_{CEO} and BV_{EBO} ratings of the 2N2156 are, respectively, 45, 45, 30 and 25 volts, the BV_{CBO} , BV_{CES} , BV_{CEO} and BV_{EBO} ratings of the 2N2158 are, respectively, 75, 75, 60 and 40 volts. With the 2N2158s installed in the power supply, the DC-4 runs cool and there have been no further failures.

I am indebted to Ralph Ponce de Leon, Manager IC Facility, Motorola-Scottsdale, for the assistance of the Failure Analysis Lab in establishing the failure mode of the power supply. — A. A. Zimmerman, K4HPP/6

ANOTHER METHOD OF STARTING MACHINE NUTS

I RAN across an item the other day which should prove of interest to those who build or service their own gear. It is merely another method of starting machine nuts in inaccessible places, but it seems to work as good or better than any other well-known way.

To apply the idea, a piece of solder is laid across the nut and given a slight tap with a hammer. This drives the solder into the hole and against the threads, holding the nut securely. The screw is then started in from the opposite side of the nut. After the screw has started, the solder may be released by giving it a slight pull.

This method has been used with various sizes of nuts up to and including the 1-inch type. It worked equally well in all cases. — Robert B. Walker, W3MIH

Technical Correspondence

DETERMINING ANTENNA GAIN BY FORMULA

Technical Editor, *QST*:

W6KPC's excellent article, "Collinear Yagi Quartet,"¹ contained considerable text and footnote material which highlighted the difficulty of accurately determining the gain of an antenna over a reference half-wave dipole.

The method used involved a receiver and transmitter, S-meter readings, a precision decade attenuator, and directional adjustment of the antenna to obtain a table of attenuation in dB. This table was converted to a table of volts vs. angle, and eventually this was plotted to give a field-strength diagram.

The editor, using W6KPC's final figure of 28 degrees beam width, arrived at a gain over a dipole of 13.66 dB, according to Jasik's Antenna Engineering Handbook, and a gain over a dipole of 14.96 dB according to Lindsay in "Quads and Yagis," *QST*, May, 1968.

Not only is the method cumbersome, but its accuracy is limited by the human element, the dependability of the transmitter and receiver, the correctness of the S meter (and particularly its linearity), the precision of the decade attenuator, the accuracy of the various tables used, and topographical and weather factors.

Here at a leading antenna manufacturer we use a mathematical formula to determine the maximum forward gain of a Yagi antenna. Only two facts are needed: the number of elements, and the average spacing. This formula was first presented in *CQ*, May, 1956, titled, "Calculating Beam Gain — The (W)Einstein Theory,"² a slightly humorous title for a serious formula.

Basically, the formula reads: $G_p = E + [E(1 + S)]$, where G_p is the power ratio gain over a reference half-wave dipole; E is the number of elements; and S is the average wavelengths spacing between elements.

Applying this formula to the W6KPC array, which uses 24 elements and a spacing of 0.15 wavelengths (60 inches between elements and various operating frequencies), we obtain a final figure of $G_p = 51.6$, which converts to a decibel gain of 17.126 over a reference dipole.

This 17.126-dB figure represents the maximum possible gain under ideal conditions, i.e., 1:1 SWR and mounting of the antenna at maximum effective height away from surrounding objects, as well as absence of transmission line losses, balun losses, and any other extraneous losses. Thus we can see that W6KPC's measured gain, plus all losses encountered in a real antenna as just mentioned, would very closely approach the maximum gain possible.

The beauty of the formula is not only in its simplicity, but that it can be used before construction as a design guide to achieve any desired results.

¹Clement, "The Collinear Yagi Quartet," *QST*, November, 1969.

²The referenced article was written by Weinstein. — Editor.

Now, if you are toying with the idea of a really BIG antenna, say 237 elements, all you need is a pencil and paper. You can eliminate the big bill for materials, the big construction and installation job, and the monster looming over the shack. — Bob Weinstein, K4KXR (ex-W2JAY), 1805 N.W. 187 Terrace, Opa Locka, FL 33054.

IT'S A NOISY WORLD

Technical Editor, *QST*:

The article, "Atmospheric Noise and Receiver Sensitivity", by W7IV, warrants a note of appreciation.³ Receiver designers have been breaking their backs to come up with a receiver that outshines all others under ideal laboratory test conditions. They have "souped up" the receivers with low-noise, high-gain rf amplifiers which, in most cases, merely compound intermodulation and cross modulation problems.

As pointed out by Mr. Hyder, receivers operating below 30 MHz are performance-limited by atmospheric and man-made noise. So why not design the receiver front end to provide optimum performance under these actual, realistic conditions?

Having been involved with the design and application of double balanced diode mixers, my experience shows that they can provide noise figures below 30 MHz of, typically, 5 to 6 dB. Mr. Hyder shows that this is better than needed for a receiver operating under realistic conditions in the hf bands. Therefore with proper design and today's technology and device capability, the receiver designer can and should eliminate the rf amplifier and its attendant problems and use a passive mixer which can provide very high dynamic ranges with excellent overload, cross-modulation and intermodulation characteristics.

I hope Mr. Hyder's fine article will cause receiver designers to realize that it's a "noisy" world outside the laboratory test bench. — William Ress, WA6NCT, 20 Church Street, Mountain View, CA 94040.

MODERN FILTER DESIGN

Technical Editor, *QST*:

Regarding the very useful series of filter articles by W3NQN^{4,5} and specifically the appendix to the September 1969 article, it is recognized that W3NQN was acknowledging his sources only. But for individuals wanting more filter information after mastering Geffe's *Simplified Modern Filter Design*, A. I. Zverev's *Handbook of Filter Synthesis*, J. Wiley, publishers, would be significantly more useful than just a catalog of elliptical-function filters. A reviewer's statement that Zverev's purpose to produce "a handbook of widespread usefulness has been admirably accomplished" seems to me to be completely substantiated. This handbook is worth the money and effort required for purchase and effective use. — Fred M. McCarthy, WA5SDJ, 316 Morningside Dr., N.E., Albuquerque, NM 87108.

³Hyder, "Atmospheric Noise and Receiver Sensitivity," *QST*, November, 1969.

⁴Wetherhold, "An Amateur Application of Modern Filter Design," *QST*, July, 1966.

⁵Wetherhold, "Inductance and Q of Modified Surplus Toroidal Inductors," *QST*, September, 1968.

⁶Wetherhold, "Modern Filter Design for the Radio Amateur," *QST*, September, 1969.

RECEPTION OF NIMBUS III INFRARED PICTURES

Technical Editor, *QST*:

I have recently been working on a modification to Anderson's satellite receiving system¹ to allow reception of the nighttime infrared pictures from Nimbus 3. The changes are far enough along to allow the copying of pictures; one is shown in Fig. 1. I think these are the best yet; the detail is great. If you will look closely you can see all the major rivers in the southeast United States. The warm water shows up as dark when compared with the cooler land and clouds.

The picture is made by scanning the earth every 1¼ seconds as the Nimbus spacecraft proceeds from the north to the south on its nighttime orbit. As the infrared sensor scans the earth, heat radiation shows up as a dark area and cold shows up as white. The picture is sent back to earth line by line, as in the video system, except that an IR sensor is used instead of a camera tube. The scan rate is one line every 1¼ seconds instead of four lines a

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



Fig. 1—Weather satellite photo from infrared scanner aboard Nimbus III spacecraft, taken Nov. 14, 1969. The Gulf of Mexico is visible near the bottom of the picture, and the Great Lakes, partially covered by clouds, are seen at the top.

second as in the daytime pictures (240 rpm drum speed versus 48 rpm for nighttime).

The changes to Anderson's system consist of replacing the drum motor (240 rpm) with a 48 rpm motor, and a traverse motor dictated by the circumference of the drum used. Readjustment of the amount of light striking the film is also required due to the slower scan rate.

Due to the makeup of the scanner, the picture portion of the scan occupies only ⅓ of the complete scan line, so the larger the drum the better. A 3½-inch diameter drum is used here at W4TNT yielding an eleven-inch picture of which 3¼ inches contains picture information. — *Aubrey Burton, W4TNT, 6500 Hanover Ave., Richmond, VA 23226.*

ACTIVE FILTER IN DIRECT-CONVERSION RECEIVERS

Technical Editor, *QST*:

After reading the article, "The D.C. 80-10 Receiver,"² it occurred to me that the design could possibly be improved with a combination active low-pass filter and audio amplifier using an integrated-circuit operational amplifier such as the RCA CA3029 which sells for about \$1.62. I obtained the specific design from a recent issue of *The Electronic Engineer*³ and have used it successfully in instrumentation applications. The circuit of Fig. 2 is a two-pole Butterworth filter, which should be adequate to allow reception if f_c is about 1 kHz. Although I have used the circuit only as a unity-gain filter, I believe that voltage amplification is available if $R \gg R'$. This circuit, or a suitable modified one, might very well then replace the original toroid filters and the transistor amplifier. — *Mike Howell, WB8DTT, 64 Pearl St., Oxford, MI, 48061.*

² DeMaw, "The D.C. 80-10 Receiver," *QST*, May, 1969
³ Philbrick/Nexus Research, Operational Amplifier Application Chart (pullout), *The Electronic Engineer*, June, 1969.

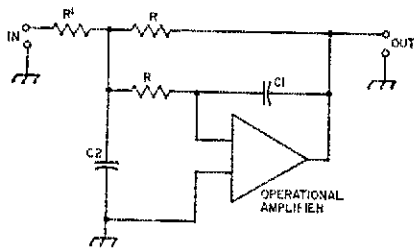


Fig. 2—Active low-pass filter. The cutoff frequency

$$f_c = f_{i-3dB} = \frac{1}{2\pi RC'} \quad C_1 = 0.471C \text{ and } C_2 = 2.12C.$$

For unity gain, $R' = R$; for high gain, $R \gg R'$. Typical values for $f_c = 1$ kHz and a gain of 25 are:

$$R' - 600 \text{ ohms.} \quad C_1 - 0.005 \mu\text{F.}$$

$$R - 15,000 \text{ ohms.} \quad C_2 - 0.02 \mu\text{F.}$$

Feedback

One of our alert readers points out that it is not possible to simultaneously transmit A1 and F1 emission (last paragraph, "Perfect Morse Code from Teletype Tape — Inexpensively," *QST*, November, 1969). A more accurate description of the keying which can result is that the cw and the frequency-shift keying modes are superimposed. As WB1GFS states, the transmitter would first be amplitude

keyed, then frequency-shift keyed while the amplitude keying of the transmitter corresponds to the key-down condition.

— . . . —

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Recent Equipment



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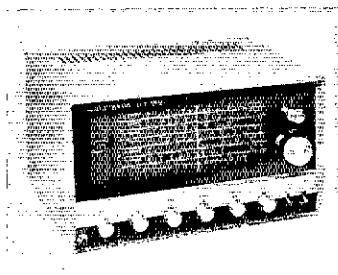
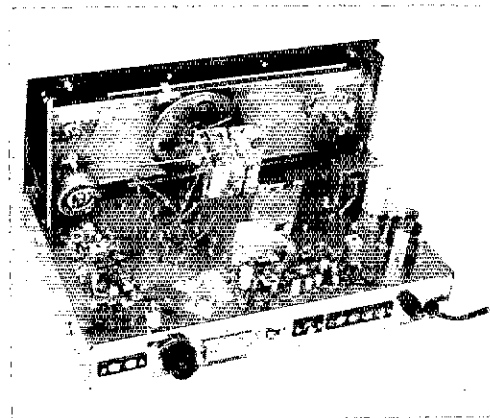
Lafayette HA-800 Receiver

ONE of several new communications receivers to appear on the U.S. market in the last few months is the Lafayette HA-800. The HA-800 is a six-band solid-state dual-conversion superheterodyne that tunes all the ham frequencies between 3.5 and 54 MHz.

Three JFETs, fourteen bipolar transistors and seven semiconductor diodes are used in the receiver, which measures $15 \times 9\frac{3}{4} \times 8\frac{1}{4}$ inches and weighs 16 pounds. A diode detector is used for a-m reception, and a tunable BFO and a transistor product detector are employed for receiving cw and ssb signals. Among the receiver's features are a 100-kHz crystal calibrator (the crystal is not furnished), two ceramic i-f filters, age, an S meter, an antenna trimmer, an a-m noise limiter, a dial-calibration control, an output jack for making tape recordings, and a built-in power supply that uses a Zener-referenced transistor series regulator. The receiver can be operated from either 115 volts ac or 12 volts dc.

Circuit Details

A block diagram of the HA-800 is shown in Fig. 1, and a partial schematic of the set's rf stages, second mixer, first i-f amplifier, and age system is shown in Fig. 2. Referring to Fig. 2, C_{201} , L_{20} and C_{202} form a high-pass filter, which presumably has a cut-off frequency just below 3.5 MHz, and C_{223} and L_{19} form a series-tuned trap at the first i-f (2.608 MHz). Rf amplification is accomplished by Q_{101} and Q_{102} in a cascode configuration. Neutralization is not employed to



stabilize the front end; instead, a small resistance, R_{101} , is used between the tuned input circuit, L_1C_1 , and the gate of Q_{101} . With R_{101} in place, there are no signs of instability in the rf stages. To determine the resistor's usefulness, we placed a temporary short across R_{101} ; as expected, all sorts of oscillations were generated.

Referring to Fig. 1, the ham-band output of Q_{102} is capacitively coupled to the gate of a JFET mixer, Q_{103} . Arriving at the source of Q_{103} is the output of Q_{104} , a JFET VFO. Q_{104} , operating in a Hartley configuration, tunes from 6.108 to 6.608 MHz for 80 meters, 9.608 to 9.908 MHz for 40 meters, 11.392 to 11.742 MHz for 30 meters, 18.392 to 18.892 MHz for 15 meters, 25.392 to 27.092 MHz for 10 meters, and 47.392 to 51.392 MHz for 6 meters. The drain supply for Q_{104} is regulated by a Zener diode.

The 2.608-MHz output of Q_{103} is transformer-coupled to the base of a bipolar mixer, Q_{105} . Also arriving at the base of Q_{105} is the rf output of a 2.153-MHz crystal oscillator, Q_{105} . The 455-kHz output of Q_{105} is amplified by two i-f stages, Q_1 and Q_2 . A ceramic filter is used between the output transformer of Q_{105} and the input transformer of Q_1 , and another ceramic filter is used between the output transformer of Q_1 and the input transformer of Q_2 . These filters provide a selectivity rated at plus-or-minus 2 kHz at -6 dB and plus-or-minus 6 kHz at --60 dB.

Depending on the position of the FUNCTION switch, the output of Q_2 is fed to one of two detectors. In the AM position a 1S446 germanium diode, CR_2 , rectifies the incoming i-f signal. When the set's ANL switch is in the OFF position, the

Top view of the receiver. Q_{101} through Q_{105} are located on the circuit board at the left, and Q_1 through Q_2 are located on the circuit board in the lower right corner. Q_7 and Q_8 are just to the left of the latter board. Along the back of the chassis, from left to right, are the antenna terminal strip, the shorting plug, a plate covering the 12-volt dc terminal strip, the pilot light switch, the tape output phono jack, the audio output terminal strip, the fuse holder, and the line cord.

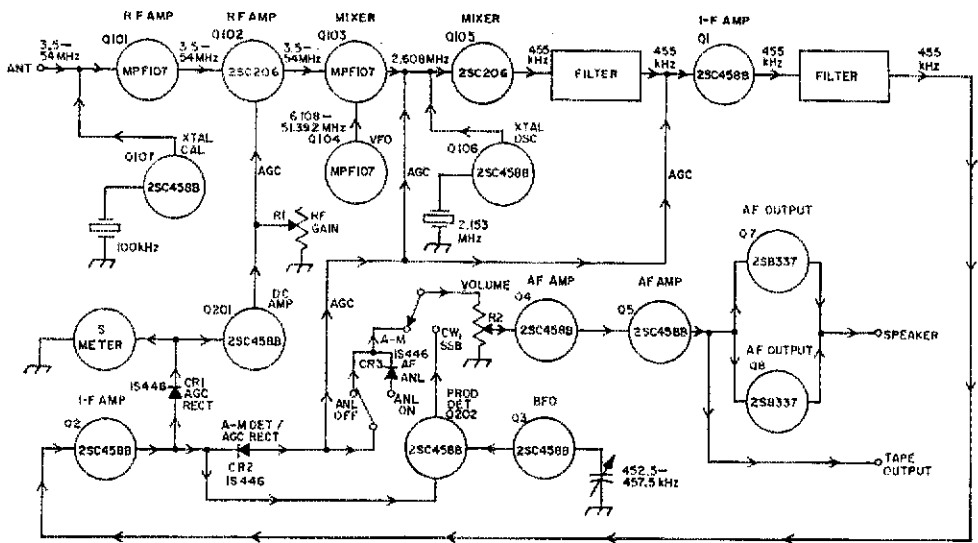


Fig. 1—Block diagram of the HA-800.

audio resulting from the detection process is fed to the base of the first audio amplifier, Q_4 . However, when the ANT switch is in the ON position, the audio output of CR_2 must pass through a conventional carrier-operated, series-type anl circuit before going to Q_4 . In the ssb cw position of the FUNCTION switch, the output of Q_2 's collector transformer is capacitively coupled to the emitter of a transistor product detector, Q_{202} . Carrier injection to the base of Q_{202} is provided by a tunable BFO, Q_3 , which has a range of 452.5 to 457.5 kHz. As with the a-m circuits, the audio output of Q_{202} is fed to Q_4 .

Four transistors are used in the three-stage audio channel. A potentiometer, R_2 , in the base lead of Q_4 serves as the volume control. RC-coupling is used between Q_4 and the second audio amplifier, Q_5 . The output of Q_5 is transformer-coupled to the audio output stages, Q_7 and Q_8 , and capacitively coupled to a phono jack on the rear of the set. The phono jack connection is provided for those who wish to make tape recordings of received signals. Q_7 and Q_8 , which are operated in Class B push-pull, are series-connected in an arrangement that requires no output transformer. Thermistors stabilize the bias on these transistors, and negative feedback minimizes distortion. A 200- μ F capacitor is used to feed the 8-ohm output of Q_7 and Q_8 to a terminal strip on the back of the set and to a closed-circuit phone jack on the front of the receiver. The capacitor is also employed to drive the primary of a step-up transformer, which in turn is used to provide 500-ohm output at the same terminal strip. Inserting a phone plug in the phone jack disables the 8-ohm connection at the terminal strip, but leaves the 500-ohm connection intact. This arrangement enables the operator to shut off an 8-ohm speaker connected to the terminal strip by plugging a pair

of headphones in the phone jack. The audio output is rated at a maximum of 1 watt.

The HA-800 has a dual agc system. Referring to Fig. 2, there are two agc rectifiers: CR_2 , which is also the a-m detector, and CR_1 . When a signal appears across the secondary of T_2 , it is rectified by CR_2 and CR_1 . As a result of this action, a negative dc voltage is developed from the anode of CR_2 to ground, and a positive dc voltage is developed from the cathode of CR_1 to ground. The negative voltage reduces the forward bias applied to Q_{105} and Q_1 , thereby reducing the gain of these two stages. The positive voltage, if it is of sufficient amplitude, forward biases Q_{201} into conduction. Q_{201} then draws collector current through R_{208} and R_{104} . This increases the voltage drop across R_{104} , thereby decreasing the forward bias applied to Q_{102} and reducing the gain of the amplifier. R_1 , the rf gain control, is used to manually vary the gain of Q_{102} . The positive voltage just mentioned above has an additional function. It is used to drive the receiver's S meter.

Once again referring to Fig. 1, the receiver has a built-in 100-kHz crystal calibrator, Q_{107} . (As mentioned earlier, the crystal is not supplied with the set.) The output of Q_{107} is capacitively coupled to the gate of Q_{101} . If operation of the calibrator indicates that the tuning dial is out of calibration, the situation can be corrected by adjusting a front-panel-mounted variable capacitor, which is in parallel with the oscillator section of the main tuning capacitor.

For ac operation of the receiver, a step-down transformer is used to feed a full-wave semiconductor rectifier. This is followed by a pi-section filter and a transistor series regulator with a Zener diode reference element. Dc for Q_6 , Q_7 and Q_8 is taken from the output of the filter while dc for the rest of the receiver is taken from the output of the series regulator. For safety a 1-ampere

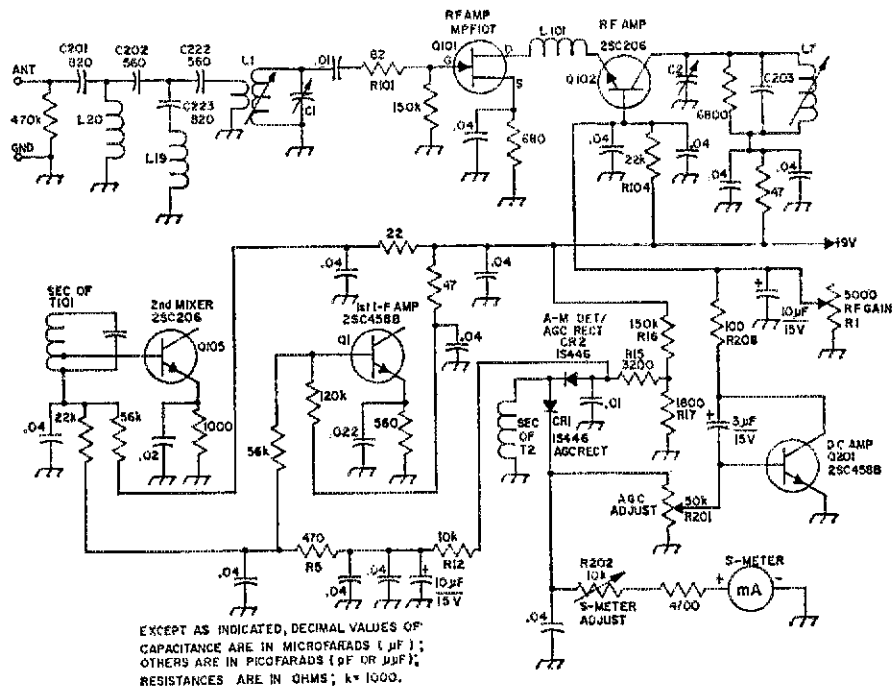


Fig. 2—A partial schematic of the front end, agc system, and S-meter circuit of the HA-800. For clarity no switching circuits are included. The component designators, which are used for text reference, are those of the manufacturer. L_1C_1 and $L_7C_2C_{203}$ form tuned circuits that are resonant in the 80-meter band. For operation on the other bands, different coils are used in place of L_1 and L_7 , and different capacitors are used in place of C_{202} .

fuse is wired in series with one side of the transformer primary.

Battery operation of the set is accomplished by feeding 12 volts dc to the input of the pi filter. In order to accomplish this, it is necessary to remove a protective cover plate from a terminal strip at the rear of the receiver, and connect a suitable battery cable to the terminals. To keep battery drain at a minimum, a rear-panel-mounted switch is provided so that the user of an HA-800 can turn off the pilot lights (during dc operation only).

For those who wish to use the HA-800 with a transmitter, a REMOTE socket is provided at the rear of the set. By removing a jumper plug from this socket and by making the appropriate connections to a transmitter that has provisions for receiver switching, a transmitter control can be used to put the receiver in standby or receive. When the HA-800 is put in standby by this method, B-plus voltage is removed from transistors Q_{101} through Q_{105} .

Mechanical Details

The HA-800 appears to be mechanically adequate for fixed-station operation. However, the HA-800 should probably not be used in a mobile installation, since lifting the front panel and dropping it a few inches to simulate mobile conditions does cause readable 50-MHz ssb signals to become unreadable. Most of the components in the HA-800 are mounted on two printed-circuit boards. Part identification is

easy, as the boards are well labeled. Because there is little crowding of components in the HA-800, servicing the set should not be too difficult.

The string-driven main tuning dial appears to have negligible backlash. On the face of the slide-rule dial, calibration marks are provided every 10 kHz on 80, 40, 20 and 15 meters, every 50 kHz on 10 meters, and every 250 kHz on 6 meters. A 0 to 100 logging scale, which is marked off in 100 divisions, is also provided on the dial. It takes one turn of the tuning knob to cover between 40 and 60 kHz of the 80-, 40-, 20- and 15-meter bands, about 180 kHz of the 10-meter band, and about 500 kHz of the 6-meter band.

The input circuit of Q_{101} is tuned by a front-panel ANT TRIM control. For optimum reception the operator must repeak this control, which is a directly-driven capacitor, when he moves from one part of the band to another.

Instruction Manual

The HA-800 instruction manual contains the receiver specifications, a general description of the unit, installation details, antenna recommendations, operating instructions, an alignment procedure, schematic and block diagrams, and two drawings that show the locations of all major components. Unfortunately, there are no voltage or resistance charts in the manual, and there is no parts list. Two errors of note appear in the manual. One is a statement that the ARRL is located in West Hartford, Conn. The other is a

statement that for lower sideband reception the BFO pitch control should be set on one side of the 455-kHz second i-f, and for upper sideband reception the BFO pitch control should be set on the other side of the 455-kHz second i-f. Actually, because of the mixing schemes used in the receiver, the BFO should be set at one spot — about 1.5 kHz on the low side of the second i-f — for 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, 10 and 6 meters. Once the correct setting of the BFO pitch control has been found for any ssb signal, the control should be left alone. It is only necessary to remember that the front-panel BFO pitch-control labels — USB and LSB — don't mean what they infer.

Performance

Tests of an HA-800 in the ARRL lab showed that the receiver met or exceeded all of the manufacturer's specifications, except the one for image rejection on 6 meters. For a 10-dB $S + N/V$ ratio the receiver we checked had a sensitivity of approximately $0.3 \mu\text{V}$ on 80, 40, 20, 15 and 10 meters, and approximately $0.9 \mu\text{V}$ on 6 meters. In on-the-air checks from three locations the set didn't seem to have any cross-modulation difficulties or overloading problems with normal signal levels. However, when the lab signal generator was used to pump a 1500- μV 3.75-MHz signal into the set, nineteen spurious signals, which weren't present when the 3.75-MHz input was at $100 \mu\text{V}$, appeared on the receiver dial. On 40 meters it took a 3000- μV signal at 7.15 MHz to produce sixteen spurious signals in the band, and on 20 meters it took a 3000- μV signal at 14.175 MHz to produce ten spurious signals in the band. On 15, 10 and 6 meters it took very large signals to cause any problems. Whether or not 1000- to 3000- μV signals will normally be encountered is hard to

Lafayette HA-800 Receiver

Height: 8¼ inches.

Width: 15 inches.

Depth: 9¾ inches.

Weight: 16 pounds.

Power Requirements: 105-120 volts, 50/60 Hz, 8.5 watts, or 12 volts dc, 6.8 watts.

Price Class: \$150.

Distributor: Lafayette Radio Electronics, 111 Jericho Turnpike, Syosset, Long Island, New York 11791.

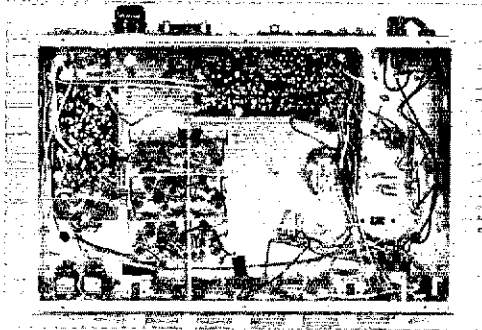
say. Backing off the rf gain control won't help very much, since the first rf amplifier always runs wide open. Of course, an input attenuator or a lower-gain antenna will help if strong signals cause difficulties. The tests we made seem to indicate that the HA-800 will be clean unless another ham is transmitting (on the same band the receiver is tuned to) in close proximity to the set.

Varying the ANT TRIM control caused a maximum shift of about 1500 Hz at 50 MHz, and varying the RF GAIN control caused a maximum shift of about 500 Hz at the same frequency. Varying the strength of a loud signal with the volume control resulted in a maximum shift of about 500 Hz at 50 MHz. Although drift wasn't too noticeable on the lower bands, it was large enough to make ssb copy difficult on 6 meters. By offsetting the BFO frequency from the center of the second i-f, it was possible to obtain fairly-good single-signal reception.

Only one internally-developed spurious signal was found in the HA-800. It is at approximately 3.62 MHz and is equivalent to a $0.1\text{-}\mu\text{V}$ signal at the antenna terminals. At this level the signal poses no problems. On the bands below 10 meters, spurious responses (including images) were down a minimum of 52 dB below an equivalent signal of $0.1 \mu\text{V}$ on the desired frequency. On 10 meters the image was down 45 dB, and on 6 meters the image was down 26 dB.

On 80 through 10 meters the receiver required about a $1\text{-}\mu\text{V}$ signal for an S1 reading, an $85\text{-}\mu\text{V}$ signal for an S9 reading, and a signal of $4000 \mu\text{V}$ or greater for a 30 dB over S9 reading. On 6 meters it took a $4\text{-}\mu\text{V}$ signal for an S1 reading, a $500\text{-}\mu\text{V}$ signal for an S9 reading, and a $3500\text{-}\mu\text{V}$ signal for a 30 dB over S9 reading.

The built-in calibrator provided good strong markers on the 80- through 15-meter bands. However, the markers were weak on 10 meters and inaudible on most of the 6-meter band. Zeroing the low end of each band against the output of the calibrator indicated that some of the other calibration marks were off as much as 9 kHz on the 80- through 15-meter bands, and 50 kHz on 10 meters. The calibrator output couldn't be used to make any positive checks on 6 meters. — W1YDS



Underside view of the HA-800. Q_{101} through Q_{104} are connected to the circuit board at the left, and Q_1 through Q_6 are mounted on the reverse side of the circuit board at the top of the photo. Just to the left of center are the input coils for Q_{101} , the output coils for Q_{102} , and the oscillator coils for Q_{104} .

AMATEUR RADIO PUBLIC SERVICE

NTS RACES AREC

In the Public Interest, Convenience, Necessity WRH

CONDUCTED BY GEORGE HART,* WINJM

Reporting Emergencies

WADING through the tremendous volume of reports on Hurricane Camille, categorizing them, evaluating them, coordinating them, paraphrasing or rephrasing some of them and making sure that the activity was covered from all possible amateur radio angles for last month's *QST* writeup was a tremendous job. It always is. And now that the article has appeared, there will no doubt be a number of "feedback" items in the "Diary" which will correct errors, present noteworthy supplementary facts and include additional reports which were not sent in previously, until the writeup "reminded" someone. Following the Alaska earthquake disaster of 1964, the last one of comparable size, supplementary reports were received for seven months.

As usual, the conclusion to be drawn is that "there oughta be a better way to do it." Reporting emergency operation is of great importance, and doing it properly helps get the facts into *QST* for the chronicle of amateur radio public service quickly and accurately. Of course, *QST* is not a newspaper, and the details of an emergency operation appearing therein are not "news" by any chronological standard. On the other hand, this should be the one place where all the facts (or as many of them as available) on public service activities by amateurs are recorded for posterity. From these records alone we should be able to make a strong case for the perpetuation of amateur radio as a service to the public, the nations and the world.

Yes, that's how important it is; and being that important, it seems fitting that the emergency reporting apparatus should be as organized and standard as the preparation for emergency communication itself. Yet in emergency after emergency the reports first trickle in, then come in a flood, then diminish to a dribble and finally cease altogether, until the *QST* writeup appears. Then come the supplementary reports and the corrections.

In an emergency as widespread in its effect as Camille, it is inevitable that reports of participation will vary in length, detail, legibility, coherence and conciseness. But it would be most helpful if each report pinpointed itself as to date, time, locale and personnel. ARRL Form 35 (31-157) was devised for this purpose and is available to anyone for the asking. It is a convenient method of setting forth the essential

basic information above while it gives all possible leeway for including whatever details are felt germane. Even if the form is unusable for a particular report because of the amount of detail the reporter wishes to give, its format can be followed.

But this is only one part of the problem. There are two additional matters which should be mentioned along this line. One is the desirability for centralization of reports to avoid the collection at the headquarters level of confusing clouds of reports from individuals as to their particular experiences. The other is the "dos" and "do nots" of reporting as such.

Most individual participants in emergency operations are in nets or AREC or RACTS groups, and can depend on their leaders to make the report. Quite a few, however, especially in Camille, are freelancers, or "loners" who frequently do not get reported at all and who occasionally complain loudly, after the writeup appears, that they were left out. While organized operation is certainly to be encouraged, the freelancer also serves and should be recognized — especially if he performs a useful or valuable function which otherwise might not have been done. What kind of centralization could be set up to make sure that such reports would be available for the *QST* catch-all writeup?

Well, the SCM-appointed emergency coordinator is supposed to be in charge of *all* emergency organization within his area of jurisdiction. This includes collection of data and submission of reports. Note we say *in charge*, not that he has to do it himself necessarily. In a small AREC group, he may well do so, but in larger groups the EC often delegates specialized functions to his designated assistant ECs: writing up an emergency report could be one of them, if someone with better than average ability in this respect is available. But centralization need not end there. The SCM is in charge of all operating administration in the section and could well be the centralizing point for emergency report summaries of ECs in a widespread emergency such as Camille. Similarly, he can delegate this function to his SEC, or to an assistant SCM if one can be found with the requisite qualifications.

The important point is to make sure the amateur radio story is complete for our journal. Most magazines, if they print anything on the subject at all, treat some particular aspect of it, or one prominent participant's viewpoint, or something sensational or glamorous. But *QST's* treatment,

* Communications Manager, ARRL.

like everything else in the magazine, is a membership effort for the benefit of the membership. We want the whole story, the *amateur* story.

And that brings up another point. Communication is only one of the necessities in an emergency situation, such as Camille. An important one, to be sure, perhaps the most important, but still only one of many. And communication by amateurs is only a part of the overall communications necessities — again, perhaps the most important, but still only one part. The extent to which it is the most important part depends entirely on how we amateurs execute it, and this in turn depends on how well organized and disciplined we are. In presenting our material, we can leave descriptive details of the general emergency situation to the newspapers, broadcast stations and general reader magazines. In *QST*, we are talking about amateurs and what they did. So, while a paragraph or two describing the general picture can be of some benefit to “set the scene,” the details of the amount of damage inflicted, number of people killed, hurt or homeless and in general activities by non-radio people or non-amateur radio people are incidental, secondary and for the most part useless for our writeup. On the other hand, *all* the details of what the amateurs did should be included — yes, even the call letters of all participants. We want not only what was done, but who did it, and as many direct references between the *what* and *who* as possible.

The completeness and conciseness of the ultimate *QST* report starts in the field, at the individual levels, funnels into local leaders, section leaders and finally to headquarters. When it reaches that last consolidating point, it should already have started to congeal. Yes, there ought to be a better way of doing it than to have to plow through hundreds of disconnected individual reports.

EastCARS

The East Coast Amateur Radio Service (East-CARS) operates almost continuously on 7255 kHz. It is a good and worthwhile operation, maturing rapidly, well disciplined and acquiring more respect from the general operating fraternity as time goes on. We had an opportunity to participate personally during a recent mobile trip. Monitor control (MC) is on a voluntary basis; that is, a particular station will assume control and keep it as long as he can, then ask to be relieved; almost invariably, one of the other stations on the frequency takes it. The operation is clipped, rapid, sometimes intense, apparently efficient, but at the same time it has an informal tinge which makes it attractive. Casual stations occasionally causing problems are contacted and diplomatically asked to join the group or move off slightly. We estimate that during any particular period of time there may be ten times as many operators monitoring the frequency as actually transmitting on it.

This makes for a most desirable situation. For example, suppose you are monitoring and hear someone check in with whom you particularly would like to speak. At a break in operation, you say “contact” and monitor control will probably tell you to go ahead. You then call your friend, arrange



Fourteen members of the Cedar Valley ARC of Cedar Rapids, Iowa, aided the local police in patrolling the streets on Halloween. KØOUU was operated by WØUJG (left) and KØVQM while Captain Arthur Zimmerman observed.

an off-frequency spot, tell MC the frequency is clear and off you go. The whole procedure takes about ten seconds, after which the business of the service may proceed. Perhaps someone will check in requesting a “two-way” (phone patch) with Philadelphia. MC may already have a station standing by for this purpose. If not, he will ask for a volunteer. If none, the requesting station is asked to stand by, and during subsequent intervals MC will request a Philadelphia station, along with any others on the list. A mobile may ask for weather conditions at his destination. Stations check in and are recorded in the log as being available for one way (message relay, by telephone without patch) or two way (patch) or mobile service, usually stating how long they will be in and checking out when leaving. When things are quiet, MC requests check-ins first by mobiles, then by fixed stations.

While without personal experience, we know that MidCARS operates on 7258 kHz and WestCARS on 7255 kHz in much the same manner and probably with even more experience, since each of these groups predates EastCARS.

These monitor service nets were not promulgated and are not sponsored by ARRL. Their net controls (monitor controls) are not assigned by any ARRL official, their procedures not set down in ARRL literature. Yet they are most worthwhile both as to services daily being performed and for their considerable potential for amateur public service in emergencies, large and small. And they represent the culmination of many years of effort on the part of your headquarters to sponsor similar service frequencies on each of the amateur bands. “They said it couldn’t be done,” but what could not be accomplished by organizational means is finally being accomplished by independent and spontaneous means, at least on 40-meter phone. If you are equipped to operate 40 phone (even a-m), keep your receiver tuned to 7255 kHz if you are in the eastern or far western part of the country, and to 7258 kHz if you are in the vast midwest. Let the MC (monitor control) know that you are monitoring and how long you’ll be around, what services

(if any) you need or could use, what services you are capable of providing, then stand by. When MC changes hands, report in again the same way. When you leave, check out. You'll get the hang of it, just listening in, as we did. On a lonely trip, you'll have lots of company, be able to contribute an occasional service and have a whole nestful of assistance in case you need help. Of an evening working on a project in your shack, you'll enjoy monitoring and making yourself available if someone needs help you can give. Try it.

Anybody for similar monitoring services on 80 and 20? — WINJM.

The Northern Ohio Storm

It was the Fourth of July, 1969; the holiday traffic was beginning to thin out as most people had arrived at their destinations. In Cleveland, the annual Festival of Freedom was taking place at Edgewater Park, with two hundred thousand people observing from the land and several thousand more from the dozens of small boats on Lake Erie.

Area amateurs had gathered at the local Red Cross Chapter House, then left in a convoy for the park, under the direction of acting EC K8MBV, to provide communications for the event. Storm clouds were gathering in the west.

At 7:30 P.M. local time a weather advisory forecasting thunderstorms had been issued; by 7:50 this advisory had been reissued as a tornado warning. Stations to the immediate west of the park were reporting high winds estimated at 80 miles per hour. An announcement was to be made over the public address system, but the throngs had seen the lightning splintering over Lake Erie and many were already trying to leave the area. All exit ramps were hopelessly jammed.

K8PKR, stationed at one of the ramps, called for help. A motorcycle policeman arrived as the storm hit with torrential rains and high winds that blocked visibility. W8IPW reported the winds were shaking his car, then a few moments later called for help as several people were pinned under a fallen tree. W8TTO comforted a lost child and tried to communicate with the police command post. K8IZL and K8YYK watched from shore as people tried to scramble from swamped boats on the lake. Communications waited while rescues were attempted. W8NLX and W8CXI soon arrived and helped rescue more people from the swamped boats.

In Sandusky, the storm had also caused heavy damage. EC K8ONV mobilized her AREC group and a party was sent to nearby Norwalk where the wall of the Memorial Lake Reservoir had crumbled, flooding the town and cutting off the supply of drinking water. All power lines were down, so a station using emergency power was set up at the Red Cross building. This station was operated for

three days around the clock by W8DIH and K88 KWO ONV under the call W8ZLZ.

In Millersburg, local amateurs set up the station of W8BWT at the base of a pay-TV tower, using emergency power. A station manned by W8EFJ, K8YDE, W488 DVN EKQ FTX QYW and YKN was set up in Wooster where more than ten inches of rain had fallen. Stark County Civil Defense was activated by K8DHJ under the call K8CMI.

In Tuscarawas County, over six inches of rain had fallen. Some roads were closed, bridges were out and many homes were damaged. The water in the Beach City reservoir was rising so EC W8SHIP activated the AREC group in case the dam broke. Assistant EC K8ZJG contacted the authorities, W8JHJ went to the local fire station, and K8UKY, K8KSN and W8DCE were all available with emergency power. The water crested with just inches to spare, some thirty feet above normal.

Akron EC W8FQW mobilized his forces and maintained a liaison to the Red Cross on six meters. On Kelleys Island people were being evacuated. W8BU was camping at the state park and immediately put his rig to work. All electricity was out and hundreds of tents were scrambled like eggs. In Vermillion, K8USW took refuge in his second floor shack and remained on the air until the rising water reached the fuse box feeding power to his station. In Bellevue, K8IQB provided communications after electric power was knocked out by the storm.

The Ohio Single Side Band Net began operating in the early hours of July 5 and remained active continuously through July 6. On the seventh the net went on hourly sessions and returned to normal the next day. About 500 messages were handled, of which 150 were of priority nature.

A preliminary survey by the Red Cross showed that 26,000 families were affected and that 26 of Ohio's 88 counties were involved. The governor termed the storm as the worst disaster in Ohio history with 20 per cent of the state under water during the emergency. — W8OUU, SEC Ohio.

Public Service Diary

At 1830 GMT on Nov. 1, EC for Jackson and Lanier Counties (Colo.) W8BPT was asked to help contact a hunter known to be in the Red Feather Lakes area and to notify the hunter that his wife was entering the Loveland hospital for emergency surgery. W8YAE at Fort Collins was alerted by telephone and provided relays for W8BPT and W488 QOY QPC RZT on two meters. A 75-meter link was also established between the hunting area and Loveland by W8KKG and W8UZE. The hunter was located and was driven to the paved road by W8KKG where W8QPC picked him up and drove to the hospital. Slightly more than an hour had passed since W8BPT had received the request for aid. — W8HLLQ, SEC Colo.

While mobiling in West Millington, N.J., W82-GTV came upon an accident in which a car had struck several trees. Using a hand carried portable

On October 25, Waseca, Minn., students held a Walk for Development to raise money for charitable organizations. Local amateurs provided communications for the walk which covered a course of about thirty miles. Pictured here are some of those who took part, left to right: K8PSG, W8WQI, W8ORUN, W8PMM, K8BKA, W8MVO, K8KCI, and K8KGR.



transceiver he reported the accident, then directed traffic until the police arrived several minutes later. — *WB2GTV, EC Millington, N.J.*

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The RACES of Las Cruces, N.M., was called out on Nov. 5 when the Dona Ana Sheriff requested aid in the search for a lost boy. W5NQC, W5KRP, W5OPN, W5VQK, W5LQN, K5YRY and WA5-ALX assisted the sheriff's search parties until midnight when the search was called off due to darkness. The boy, a deaf mute, was found the next day drowned in an irrigation canal. —

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At 2100Z on Nov. 14, Denver EC K0FLQ was notified by WA0SND that an airplane was missing and that a search was being organized. Communications personnel were needed. Using a two-meter fm repeater, WA0HLQ, Colorado SEC, was contacted as were K0DCW and W0WYX. W0HEP offered the use of a trailer camper for the control position. At 0230 the AREC calling list was activated with very good results; 29 stations checked in.

The following morning the trailer was set up near the mission coordinator. Seventy-five, 10- and 2-meter gear was available. Fourteen mobiles, three in aircraft, were used. All went well until the operation was secured at 2300. — *K0FLQ, EC Denver, Colo.*

— —
W2OCD, while mobilizing in Alplaus, N.Y., happened upon an accident involving the Schenectady Red Cross station wagon and a delivery truck. Using his mobile rig through 2-meter repeater K2AE, W2URP was contacted. The county sheriff's office was notified and a cruiser was sent to the scene of the accident. The Red Cross and the owner of the truck were notified and W2ODC stayed at the accident scene until the emergency was over. — *W2URP, EC Schenectady County, N.Y.*

— —
On Oct. 20, Hurricane Laurie was threatening the west coast of Florida. In cooperation with Florida Department of Transportation and Civil Defense, the West Florida Phone Net was placed on alert by W. Fla. SEC W4IKB. The net remained active until the 22nd when all danger had passed. — *W4IKB, SEC W. Fla.*

— —
WA5FJN intercepted a report from W5SAD in Lamarque, Tex., that a tremendous explosion had occurred in Texas City on Oct. 23. Using the WA5-QLA repeater it was determined that the explosion had occurred at the Union Carbide plant and that a number of homes nearby had been damaged and people were being evacuated. A formal RACES net was commenced on two meters at 7:34 p.m. local time. The Houston and Baytown Emergency Operation Centers were activated and six mobile units were sent to the emergency area. Word was received, however, that the fire was under control and the emergency was over. The net was secured at 9:34. — *K5QQG, SEC S. Tex.*

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During the month of October, 1969, a total of forty-seven SEC reports were received, thus establishing a new high for the year in number of reports received. The 16,332 AREC members represented by the reports, however, was slightly more than 200 less than the high number to AREC members reported during the year so far. There was an increase of four reports and about 800 AREC members over the October, 1968, level. Sections reporting: Ala, Alta, Ariz, Ark, BC, Colo, Conn, EFla, EMass, EPa, Ga, Ind, Iowa, Ky, La, Mar, MDC, Mich,

Minn, Mo, Mont, Nebr, Nev, NMex, NLI, NNJ, NTex, Ohio, Okla, Ont, Org, Oreg, Que, SDgo, SF, SCV, Sask, SDak, SNJ, STex, Tenn, Utah, Wash, WVa, WFla, WNY, and WPa.

Traffic Talk

You see a lot of receiving and transmitting gear, and transceivers, advertised as being "equipped for perfect break-in." The use of the term "break-in" has been interpreted in a variety of ways, and the manufacturers are entitled to theirs, but in cw parlance it is the same as "duplex." That is, you can hear the received signal at the same time you are transmitting. Thus, when someone says "QSK" at the beginning of a message transmission, you should be able to expect that you have but to touch your key and he will stop sending.

Phone traffic men use the term somewhat differently. To them, the use of voice-control is often termed "break-in." We have even heard "push-to-talk" called break-in. But in phone parlance, the terms are usually stated as "duplex" and "simplex," meaning the ability to talk two ways or only one way respectively. Or, sometimes, they are simply referred to as two-way and one-way.

Variations in terminology have been an annoyance in many fields of communications, wherein different services use different terminology. Perhaps this is because definitions have a tendency to be very lax and are determined by usage rather than any attempt to set or maintain standards of correctness. (The same, in fact, can be said of the English language, but that's another story.) This is not to attempt to set any standards, but simply to discuss the problem.

Traditionally, on cw break-in is arrived at by turning off your avc (or is it age?), and reducing your sensitivity (rf gain) control so that the receiver does not "block" when you press your key. If your audio gain is too far advanced, this may result in so much volume that your own signal will knock you out of your seat, so you have to find the right setting of your two gain controls to provide optimum receiving conditions. If you do this without a TR switch, your receiver input may be taking such large gobs of rf that damage can be done to your input circuit — so an overload path to ground at this point is often conducive to longer receiver life. A small neon tube usually does the trick, or sometimes a germanium or silicon diode can be used; if the latter, you have to be careful the diode does not conduct too readily or your sensitivity will suffer.

There are a number of transmit-receive (TR) switch circuits which can also be used — both those using high-speed relays and those which do the job electronically, but this is not a technical discussion. The point is that full break-in on cw can be achieved only by the ability of the receiver to recover *instantly* from the impact of your own signal.

Keying a transceiver through a VOX relay won't do it. If you are using such a system *don't* say "QSK" when you are starting to send a message, because it is not possible to break you in the middle of a word, or usually even between words. On the other hand, if you want to handle traffic the way the experts do, get yourself equipped with "true" break-in, somehow. It's the only way to fly.

Since all nets, these days (except perhaps some repeater nets) operate on spot frequencies, the nearest equivalent to cw break-in on phone is

PUBLIC SERVICE HONOR ROLL

November, 1969

This listing is available to amateurs whose public service performance during the month indicated qualifies for 25 points or more total in the time categories below. Use form CD-189 or submit equivalent information through your SGM. See page 75, Nov., '69 QST for details. Please note maximum points for each category.

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	Totals
Max. Pts.	10	5	16	12	12	20	3	—	5	Totals
WB2FHH	10	5	16	12	12					5 60
WA8VNU	10	5	16	12	12					5 60
WA8IAW	10	5	16	12	12					5 60
WA7KIU	10	5	16	12	12					5 55
WA8ETX	10	5	16	9	12		3			5 55
K4KJD	10	5	12	3	9	15				5 54
W7JWJ	10	5	16	12	12		10			5 53
WA2FRZ	10	5	16	12	6		3			5 52
W3MEFX	10	5	16		12		3			5 51
W8MI1	10	5	16	3	12					5 51
WA1HOL	10	5	16	6	12					5 49
WA2VYS	10	5	16	12						5 48
W7BQ	10	5	16		12					5 48
K7NHL	10	5	16		12					5 48
WA8UPI	10	5		12	12	9				5 48
W9HRY	10	5	16		12					5 48
WA80EJ	10	5	16		12					5 48
W3EML	10	5	16		12		3			5 46
W2MTA	10	5	16		12					5 45
W0LVB	10	5		12		18				5 45
WA8RAA	10	5	16		9					5 45
WA6VAS	10	5		12		20	3			5 45
K3ZNP	10	5	12		12					5 44
W7PI	10	5		12	12					5 44
WA2CAL	10	5	16		12					5 43
W2FR	10	5	16		12					5 43
W2RUF	10	5	16		12					5 43
W3CBQ	10	5	16		12					5 43
WA4VYS	10	5	16		12					5 43
W7DZX	10	5		12		3				5 43
WA8EPX	10	5	16		12					5 43
K6MRI	10	5	16		12					5 43
WA8WEZ	10	5	16		12					5 43
WA2HAN	10	5		12	9					5 41
W6VNG	10	5	16		12		3			5 41
W7AXT	10	5	16		12					5 41
K2KIR	10	5	16		9					5 40
W7LDSO	10	5	16		9					5 40
W1BUE	10	5	16		12	1				5 39
WA8LEA	10	5	16		12				5	5 39
W1HLJ	10	5	16		12					5 38
W2QC	10	5	16		12					5 38

K3OIO	10	16	12							38
W9MDA/6	10	16	12							38
W94V	10	16	12							38
W0H	10	16	12							38
K7CTP	10	5	16	8						37
WA7KOB	10	5	16	6						37
W6YHV	10	16								35
WA2BEX	10	12	12							34
K2KLDQ	5	5	12	12						5 34
WA2TBS	10	5	8	12	12					5 34
W6BCGF	10	3	8	12						5 33
K7GGQ	10	2	16							5 33
WA8HRM	10	5	12							5 32
WA8KUH	10	5		12	10					5 32
K8MVF	10	5	12		4					31
K8YHV	10	5	12		3					30
W0KLG	10	5	8	12						30
K2DEL	10	5		12	12					29
K7NOS	10	5			20		4			29
W6PAN	10	5	12		2					29
WA2TAF	2	5	12		4			5		28
W7UF	8	5			15					28
WA2FBI	10	5	9							27
WA2VYT	10	5		12						27
WA3JZB	10	5		12						27
K3LFD	10	5			12					27
W4NOG	10	5		12	10					27
K7VWR	10	5	4							8
W0GB	10	5		12						27
WA8IAD	10	5		12						27
K2KTK	10	16								26
W2PRY	10	16								26
K5BNI	5		6	12			3			26
W6UJ	10	5		9	2					26
W88HLH	6	5		3	12					26
W8MHO	6	5		3	12					26
WA9XA	10	5			3			3	5	26
W3TN	5		16							25
W7AZD	5			9	11					25
WA7CWL	5		3		20					25
W7JEY	6		16		3					25
WA7JMD	2	5		12	8					25
WA8FGD	2	5	12		6					25
WA8GRX	5			12	8					25

The following stations were listed by SGMs with PSHR totals above 25, but no breakdown was furnished: VE8DPO, VE3GL, WA3LYS, WA1KMR, K18XF.

Category Key: (1) Checking into cw nets; (2) Checking into phone/RTTY nets; (3) NCS cw nets; (4) NCS phone/RTTY nets; (5) Performing liaison; (6) Legal phone patches; (7) Making BPL; (8) Handling emergency traffic; and (9) Serving as Net Manager.

VOX. No problem here, since most modern sideband rigs have this. However, it should be at least noted in passing that it is always desirable to be able to use push-to-talk. If you have extraneous noises in your shack (or in your car) they can trip your VOX relay when you are receiving and cause other problems, and PTT skillfully used can be just as efficient as VOX.

Shall we have more break-in in our cw operations and more VOX or PTT in our voice nets? The old-time practice of sending a complete message, then standing by for "fills" is outmoded. In today's traffic nets, you "break" when you miss something — immediately if on cw, at the first pause if on phone. Let's get with it on this. — *W1NJM*.

National Traffic System. W2FR has issued 2RN certificates to K2KTE, WA2s BLJ HMO, and WB2s DRG and YEL. Howe also says that if he said things could only get better he was mistaken. W7BQ reports that the long skip is moving in, and although RN7 managed to hold out on the late session during November, they will soon be reverting to an "Early" late session. W9HRY heartily concurs that things have not been too great; he has formulated Grump's Law which, in simple terms, states that the percentage of representation varies in inverse proportion to the amount of traffic available to handle. From one of the other far western regions, K7NHL reports that things are looking up on the whole. K2KIR is eroding the lament, "Where Has All the Traffic Gone?" WA9RAK says traffic is about as low as his draft number. Cheer up, gang. The Christmas rush is on its way.

Net	Ses-	Traf-	Aver-	Represen-	
	sions	fic	age	tation (%)	
EAN	30	1449	1.155	48.3	96.7
CAN	30	1198	1.158	39.9	100.0
PAN	30	1255	1.037	41.5	100.0
1RN	60	480	.346	8.0	93.6
2RN	60	398	.556	6.6	96.3
3RN	60	432	.345	7.2	98.3
4RN	58	395	.415	8.5	92.2
RN5	60	555	.333	9.3	84.6
RN6	60	1006	.630	16.8	99.4
RN7	59	417	.405	7.1	38.2
8RN	60	503	.341	8.4	92.8
9RN	60	492	.415	8.2	90.0
TEN	60	516	.568	8.6	84.0
ECN	56	48	.181	1.8	89.4
TWN	57	239	.242	4.2	73.3
TCC Eastern	120	732			
TCC Central	90	735			
TCC Pacific	120	974			
Sections*	1930	10,966		5.7	
Summary	2670	23,940	CAN	17.8	
Record	3211	30,541	1,315	16.4	

*TCC functions, not counted as net sessions.
 *Section and local net reporting (62): SCN (S.C.); MDCTN (Md.-D.C.); BUN (Utah); TFN, TEX (Tex.); QMN, WSSB (Mich.); OZK (Ark.); CCN (Colo.); BWN (Wisc.); Franklin County, QSN, QUEN, BN (Ohio); EPA, PTTN, EPAEPTN, PRN (Pa.); VN, VSBN (Va.); QIN (Ind.); NYS, NLIPN (N.Y.); NCSN, SCN (Cal.); VEN, FMIN, GN, WFPN, QFN, FASN, FPTN, TPTN (Fla.); W. Que. VHF; SSZ, OLZ (Okl.); CN, CPN (Conn.); GSN (Ga.); NJAN, NJEPTN, NJSN (N.J.); FCATN, KYN,

(Continued on page 69)

Witchcraft, Goblins, Hexes and Gremlins

BY ALBERT KAHN,* K4FW, ex-W8DUS

A vital subject that has been completely neglected by the amateur radio publications is that of the effects of the supernatural. Never a QST article, not a word in the *Handbook*. It is time, I believe, that we should face reality.

Anyone who has worked with antennas will agree that there is more mystique than engineering for maximizing performance. Let's take the antenna that was dimensioned by stepping it off Boy Scout fashion and strung between any two convenient points. This is the kind of antenna that doesn't just work, either. It is the one that brings "there were at least four stations calling me but you were on top" kind of report.

This is particularly true if it was erected (a euphemism for thrown together) during a sleet storm, a phenomena which seems to give any antenna a touch of perfection. Yet, nowhere, can I find antenna formulas which have symbols for guessed-at length, sleet storms or other factors that enhance their effectiveness. Certainly a lot of research is needed on the effect of the color of the jacket worn by the installer and the phase of the moon at the time of the installation.

When you stalk some rare DX for hours and he is working your rivals all around you, is that luck? Poor operating? Poor signal? Not at all. One of your DX brethren has undoubtedly put a hex on you. I am sure that W8DZ has a permanent dolly of me on 7 MHz that he sticks pins in. Jake and a lot of others.

It is fortunate that Howy, W2QHH, wasn't active during the Salem goings-on. What with a confirmed country total of 320, all worked with 55 watts, a dipole and a lousy location, he surely would have been burned at the stake.

If it were not for hexes, goblins and gremlins, how would one explain the sleet storm that takes the beam down *before* the contest, the tube that fails when it is the only one for which you have no spare? When a capacitor goes, why is it the one *below* the chassis? There is no other explanation.

All of us have experienced supernatural behavioral phenomena. Take the non-performance-when-showing-off-to-visitors syndrome. You call CQ, no answer. You call again, longer this time. A voice announces he is attempting to set up a phone patch with Eureka, Illinois and please move. You break a QSO and find both are signing. You move to a blank spot, call CQ and find you are on a net frequency. At this point, your visitors nervously explain that they had forgotten something and although this is most fascinating, they really must leave. You mumble



something about trying again when the hands are better. They are wondering why a grown man spends his time talking to himself. "Harmless though" they tell each other.

A little pre-visit orientation about goblins, gremlins, witchcraft and hexes would save all this embarrassment and doubts about the host's mental state.

The effects of the occult are all around us. Ever buy some exotic tool designed to reach into difficult places? Ever find it when you finally needed it? Of course not. Then did it turn up right where you left it, after you spent two hours doing the job the hard way? Always, further proof of the clever work of the gremlins.

But still not a line in the *Handbook*. QST

Strays

I would like to get in touch with . . .

. . . the leader of the facsimile group in the California area. W6WMI.

. . . an amateur radio club or net of meteorologists. OE3REB.

. . . anyone interested in an on-the-air chess game on 40 meters. K3LLR.

. . . former Morse telegraph operators who are now hams. Marjorie McKinnon Vernola, 43-18 55th St., Woodside, N.Y. 11377.

. . . other funeral directors who are amateur radio operators. WB8AMY.

. . . anyone who would like to play chess over the air on cw; or is there a chess net? W40WHE.

. . . other high-school amateur radio club stations interested in participating in a nation-wide high-school net. WB8EXZ.

* Old Cartertown Road, Gatlinburg, TN. 37738.

Happenings of the Month

ARRL ADVISORY COMMITTEES

At the Board of Directors meeting in May 1968, the concept of "advisory committees" of volunteer specialists was adopted by the directors for an 18-month trial period. Initially, two committees were authorized, one on vhf repeaters, and one on contests.

Supplementing Board and staff committees already operating, the advisory committees are intended to broaden the base of League decision making and to provide an additional channel for membership participation.

The Board of Directors will meet again on May 1, 1970. If you have ideas specifically in the two fields, repeaters and contests, please get in touch soon with the advisory committee members nearest you.

V.H.F. Repeater Advisory Committee

The members of this committee are:

- Taylor Shreve, W9CXW, Chairman, 1230 Valentia St., Denver, Colo. 80220
Arthur M. Gentry, W6MEP, 7832 Jellico Avenue, Northridge, Calif. 91324
Gilbert J. Kowols, W9BUB, 216 Belle Plaine Ave., Park Ridge, Ill. 60068
H. H. Lang, VE3ADO, 12 Orchard Drive, Port Colborne, Ontario
Jon Marcinko, W7FHZ, 26501 18th Pl. So., Kent, Wash. 98031
George F. Munsch, W5VPQ, 11314 Janet Lee, San Antonio, Texas 78230



- Jon J. O'Brien, W6GDO, 8605 Fifth St., Rio Linda, Calif. 95673
George D. Rose, Jr., W4GCE, 105 Middleboro Place, Lynchburg, Va. 24502
Howard L. Lester, W2ODC, 8 Bath St., Alplaus, N. Y. 12008

Contest Advisory Committee

The members of this committee are:

- James A. Maxwell, W6CUE, Chairman, 18125 So. Santa Ana Rd., Los Gatos, Calif. 95030
Leonard Chertok, W3GRF, 8301 Temple Hills Rd., Washington, D. C. 20031
Roger Corey, W1AX, 60 Warwick Drive, Westwood, Mass. 02090
Jack duBois, K2CPR, 5667 Birch Ave., Pennsauken, N. J. 08109
Reno W. Goetsch, W9RQM, 929 So. 7th Ave., Wausau, Wis. 54401
E. V. Gulden, W8DB, 4710 E. Rte 571, Tipp City, Ohio 45371
Jack Ravenscroft, VE2NV, 353 Thorncrest Ave., Montreal 780, Quebec
Thomas A. Russell, WA9SDC, 1325 Hertz Drive, S.E., Cedar Rapids, Iowa 53403
Gene Sykes, W4BRB, 6510 Carambola Circle, West Palm Beach, Fla. 33406

The Committees Need Your Support

The director having liaison responsibility between the Board and the V.H.F. Repeater Advisory Committee is John Griggs, W6KW, while the Headquarters staff liaison is provided by Edward P. Tilton, W1HDQ.

For the Contest Advisory Committee, the Board's liaison director is Victor C. Clark, W4KFC, while Headquarters liaison will be by Ellen White, W1YYM.

However, you, the individual League Member, ought to feed your ideas and your suggestions for improvements and changes in these specialized areas directly to the advisory committee, either via some committee member with whom you may be acquainted, or via the chairman. These are *your* committees, and they will produce something of value to the extent that you support them. Your constructive suggestions are the support they are looking for.

Hard-working volunteers are an important ingredient in the League's—and every organization's—success. Here West Gulf Division Director Roy Albright, W5EYB, visits the ARRL W5 QSL Bureau, operated by Hurley O. Saxon, W5QVH at El Paso, Texas.

MISSOURI LICENSE PLATES IN DOUBT

A number of amateurs in Missouri and neighboring states have sent us clippings and other information indicating that Missouri amateurs may not be able to get call letter license plates for 1970. The most complete report at press time (late December) is from Richard M. Jacobs, WA0AIY. Here are extracts from his letter:

"Four state senators drafted Senate Bill 242 in February 1968, providing for reflectorized plates but continuing the provision for mandatory availability of call letter plates for hams. In April, Senator Clifford Jones proposed an amendment which removed the twenty-one lines pertaining to mandatory issuance of amateur plates.

"It develops now that Senator Jones had talked to one Missouri highway patrol officer who indicated that the plates didn't particularly help enforcement. Also, the senator was under the impression that the state didn't charge for the special plates. (They have, in fact, charged \$1 per year additional fee.) A Missouri ham says the Senator regretted having made the amendment and was sorry that further checking wasn't done before it was submitted.

"Although the mandatory feature is gone, the Director of Revenue, James Shaftner could still issue ham plates in 1970 under the same discretionary authority used to issue special plates to the governor, representatives and others not mentioned in state statutes. . . .

"Personally, I have sent telegrams to Governor Warren E. Hearnes urging that this matter be put on the agenda for the 1970 Special Session of the legislature, and to Mr. Shaftner requesting that he use his authority to issue the plates. I've also written my state senator and representative urging both courses be followed.

"I hope that all those Missouri hams who have plates or might get them in the future will write or send telegrams to the Governor, Mr. Shaftner and their representatives urging action to continue the call letter plates."

UTAH, TENNESSEE PLATES MORE COSTLY

M. A. Urquiza, W4SWW, tells us that the Tennessee legislature passed a bill raising the cost of call letter license plates from \$1 to \$7 — along the way, a typographical error crept in, and the bill the Governor signed says \$10! Tennessee amateurs interested in reducing the fee are requested to write your representatives right away. Tennessee SCM Harry A. Phillips, K4RCT, is trying to track down additional information which will be passed along later.

Utah now charges \$5 for call letter license plates, but Representative Jim Platt intends to seek issuance of a five-year plate for the five bucks concurrent with an amateur's FCC license. This information courtesy of *The Microvolt* published by the Utah Amateur Radio Club.

Anything like this happening in your state? Please let us know so we can pass it along.



The Baltimore District, U.S. Army Corps of Engineers, recently presented Patriotic Civilian Service certificates to a number of its volunteers who have been providing emergency radio communications. Willard J. Prentice, W3VBM receives his award for 21 years' service from Colonel William J. Love, District Engineer. Other amateurs honored were: William Bennett, W3BHK, 21 years; Charles Carter, W2BSK, 14 years; Hayes Eckard, K3AUS, 10 years; Ted Fisher, W3EOV, 14 years; Robert Horner, W3ZUX, 11 years; Silas "Dick" Koofer, W3KFD, 14 years; Helen Law, W2BNC, 11 years; Wayne Leiter, K3AKN, 10 years; Irving Lipton, K3DDV, 10 years; and Andrew Pavlowski, W3QPU, 32 years.

CLUB STATION OPERATION BY OVERSEAS VISITORS

DX Test enthusiasts, please copy — there has been confusion as to the scope of privileges offered to visiting amateurs under the reciprocal operating agreements. It is widely understood that the visitor may operate his own station (i.e., signing his own call as a portable regardless of whether he owns the equipment or not) but some amateurs, led by their natural desire to be hospitable, have assumed that visitors could operate under any call. Not so — the following recent letter from FCC clarifies the matter:

"A foreign amateur operating in the United States under a reciprocal operating permit can transmit telegraphy from a club station only if he uses the call assigned to him by his government and identifies as required by Section 97.313.

"If he is the sole operator, he must use his own call and identify as above regardless of the mode of emission. If a member of the licensee club is present and in control of the station, the alien permittee may transmit by telephony provided the club member turns the carrier on and off for each transmission and signs the station off after communication with each station is completed."

Earlier FCC policy letters allow VOX or PTT within the above restriction, and allow operation of a club station under a different call as a "portable" with the trustee's approval.

Summing up, it isn't very practical to "multi-op" a club station with an overseas guest — where it is done, the U.S. amateur must make every sign-off and be in reach of the transmitter switches at all times.



A good many mornings, any headquarters staffer may come in to his desk and find a newspaper clipping relating to a side interest he has. There's no note, no name, but the staffer knows it was put there by Edgar D. Collins, *QST*'s advertising assistant — and "Mr. Ham Ad" — for 28 years.

Ed's an avid reader — he follows the Manchester, Conn., *Evening Herald*, the Hartford *Courant* and the New York *Times* for local, regional and national news every day, and frequently picks up the *Chicago Tribune*, *U.S. News and World Report*, *Time*, *Fortune*, *Newsweek*, *Saturday Review*, the Manchester, England, *Guardian* and *Punch*. More flattering to the rest of us, he remembers our special interests and clips out items we'd like to see. That isn't the end of his reading thought; he also gets through about 25 books a year.

It's a two-way street, too — Ed has sent at least two letters-to-the-editor a month since 1926, with 90% getting published, something like a thousand in all. He was a guest, in fact, at a special dinner a few years ago, at which the *Courant* feted its letter-writers!

Ed's an accomplished illustrator, too. He created our June, 1969, *QST* cover from a sketch by Ron Hays, and collaborated with Harry Hick on the December, 1954, cover. His cartoons, sketches and advertising layouts are frequently seen in *QST* and for years he's illustrated management's Christmas message to the staff.

Beside sketching and reading, Ed's leisure activities include walking — though backpacking trips from Hartford to Williamstown, Mass. and Albany, New York are well in the past — and meeting, or corresponding with, world-famous people. He sketched Winston Churchill at the Bushnell Auditorium in 1932, and the great man graciously autographed the drawing. Lindbergh, too, is in Ed's "collection."

For nearly fifteen years, Ed spent summer vacations taking a "working cruise" aboard freighters of the Isbrandtsen Line (usually with Captain Kurt Carlson, W2ZXM, of the *Flying Enterprise*) doing the paperwork of a purser, clipping the print, handling lines and the like. When the first *Flying Enterprise* sunk, and W2ZXM became famous as "Captain Stay-Put," the crew from *QST* who went to interview the tenacious mariner included a proud friend, our Ed.

AMENDMENT TO LEAGUE REQUEST

In the Petition for Rulemaking concerned with Technicians (page 72, January *QST*), the suggested new language for Novice eligibility has been amended editorially to read:

"(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 other than the Technician Class."

This matter has been assigned the file number RM-1535, but no other action has been taken by FCC on it as yet.

EXECUTIVE COMMITTEE MINUTES

The Executive Committee of ARRL, composed of four directors and three officers, meets at least four times a year to administer the affairs of the League. Its most recent meeting was on October 31; we held the minutes over from last month because of a space problem in this department.

No. 328
October 31, 1969

Pursuant to due notice, the Executive Committee of The American Radio Relay League, Inc., met at the headquarters office of the League in Newington, Connecticut, at 2:05 p.m. October 31, 1969. Present: President Robert W. Denniston, W0DX, in the Chair; First Vice President Wayland M. Groves, W5NW; Directors Victor C. Clark, W4KFC, Charles G. Compton, W0BUO, Harry J. Dannals, W2TUK, and Noel B. Eaton, VE3CJ; and General Manager John Huntoon, W1LVQ. Also in attendance were a number of directors, present in advance of the special Board meeting.

On motion of Mr. Eaton, affiliation was unanimously GRANTED to the following societies: Bash-Hal-Nes-Ae Amateur Radio Club, Scottsdale, Ariz.; Bowie Amateur Radio Club, Bowie, Md.; Brookline High School Radio Club, Brookline, Mass.; Calvin College Amateur Radio Club, Grand Rapids, Mich.; The Coe College Amateur Radio Station, Cedar Rapids, Iowa; Columbia Amateur Radio Society, Inc., Lake City, Fla.; E.M.O. (Kings) Amateur Radio Club, New Minas, King's County, Nova Scotia; East Catholic High School Amateur Radio Club, Manchester, Conn.; Five Flags Ama-

teur Radio Assn., Inc., Pensacola, Fla.; Hazleton High School Radio Club, Hazleton, Pa.; Newark Amateur Radio Association, Granville, Ohio; Parsippany High School Amateur Radio Club, Parsippany, N. J.; Playground Amateur Radio Club, Fort Walton Beach, Fla.; Randallstown Senior High School Amateur Radio Club, Randallstown, Md.; Ronan High School Amateur Radio Club, Ronan, Mont.

On motion of Mr. Dannals, unanimously VOTED to grant approval for the holding of an Oregon State Convention at Bend on June 19-21, 1970.

On motion of Mr. Compton, unanimously VOTED to confer Life Membership upon the following, thus raising the total of that class to 605:

Robert P. Arnold, WA7EEB; James Deroy Howard, WA5VKN; Clifford Atkinson, Jr., W5KK; Jonathan L. Kirkman, W4WDH; Kenneth C. Barroll, W0LRG/SM5CTS/DJ0CI; Reynold D. McGinnis, WA0RKQ; Lawrence C. Brooks, W5PYP; John P. Meixensperger, WA9EYM; James F. Clifton, W7GMJ; Scott M. Rathjen, WA7LDZ; Paul M. Crown, Jr., WB2GXD; Joe G. Roberts, W7DRR; Francis H. Fallon, WA2YVK, Warren Rudolph, W4OHM; J. Harold Gibson, W9PQO; Philip P. Spencer, W5LDH/W5LXX; Frank J. Wisniewski, Jr., W2LXC.

The Committee next examined in detail proposed changes in the Rules and Regulations of the Communications Department as prepared by the Communications Manager. After discussion, on motion of Mr. Eaton, unanimously VOTED to adopt the new rules and publish them in QST.


Director Clark reported on the progress of Amsat




"A Direct-Conversion SSB Receiver" by Richard S. Taylor, W1DAX, won the QST Cover Plaque award for September. Director Robert York Chapman, W1QV (right), from the ARRL New England Division, makes the presentation while Mrs. Taylor looks on.

and showed several slides of the activities of this amateur satellite group.

There being no further business, the meeting adjourned, at 3:15 p.m.

Respectfully submitted:
JOHN HUNTOON, W1VQ
Secretary 

FEB		1970				
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


Hamfest Calendar

Alabama — The "Old Timers Dinner" for the Southeast U.S., sponsored by the Birmingham Amateur Radio Club, will be held at 7:00 p.m., February 14, at the Holiday Inn East, Highway 78 East. Antique equipment, magazines and hams will be on display. A license prior to 1930 entitles a ham and his wife to a free dinner! Leland Smith, W4AGI/W4KLL will be the featured speaker. For more information write the Birmingham ARC, Box 603, Birmingham, Alabama.

Illinois — Announcing the 8th Annual WCRA Mid-winter Hamfest, February 15, at Du Page County Fairgrounds, Manchester Rd., Wheaton, Ill. Open 9:00 a.m. to 4:00 p.m. Tickets \$1.50 at the door. Some space available for your own table. For further information write P.O. Box Q81, Wheaton, Ill.

Indiana — The Lake County ARC, Inc., announces its 17th Annual Banquet to be held at Teibel's Restaurant, U.S. 30 and 41 (near Schererville, Ind.) at 6:30 p.m. CST, February 14. Chicken dinner, entertainment, speeches, come with your YL or XYL. Tickets \$5.00 each from Herbert S. Brier, W9BGQ, 385 Johnson St., Gary, Ind. 46402. Positively no tickets sold at the door.

New Jersey — The East Coast VHF Society, WA2WEB, is sponsoring the 12th Annual VHF Dinner on Saturday, March 21, at 7:00 p.m. An interesting and entertaining program with W4EJ and W1HDQ as speakers is planned; K2HHS will serve as master of ceremonies. Menu: prime ribs of beef. Tickets at \$7.50 per person are available by writing the East Coast VHF Society, P.O. Box 1263, Paterson, N. J. 07509. Ticket deadline is Wednesday March 11; no tickets will be sold at the door.

Oklahoma — The 23rd Annual Lawton-Ft. Sill ARC Hamfest will be held on February 22 at the Lawton National Guard Armory. For information and advance reservations write the club at P.O. Box 892, Lawton, Okla. 73501. 

COMING A.R.R.L. CONVENTIONS

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

June 19-21 — Oregon State, Bend.

July 4-5 — West Virginia State, Jackson Mills.

September 25-27 — NATIONAL, Boston, Mass.

October 17-18 — Hudson Division, Tarrytown, N.Y.

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



Correspondence From Members -

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

NEW FILM

☐ I was fortunately able to see your fine new film, "The Ham's Wide World," last night. Our local educational station, WLVT-TV, carried this from the Pennsylvania Public Television Network. I have been quite critical of the ARRL on occasion and will continue to be; however, it is only fair that I give praise when praise is due. In this case, I think the League has finally done something very worthwhile in fostering better public relations. This film was excellent and I hope that you continue in this direction. — *John Weiss, Jr., K3QDV, Easton, PA.*

☐ This morning I fired up the TV and couldn't believe what I saw: Hiram Percy Maxim, then Barry Goldwater and Arthur Godfrey! Sincerest gratitude to the ARRL for doing so much to help maintain our bands and privileges. I'm sure the new film will materially aid your effort. — *SPI, Kenneth C. Hopper, K2GNY, Fort Eustis, VA.*

☐ We enjoyed very much the ham program on WWLP-TV, Tom Colton's show. I'm very glad that my suggestion to contact him for use of the new ARRL film worked out so well.

The Valley Amateur Radio Club is planning to follow this up on his show in the near future with a highly visual presentation, and it is in the works. With this kind of "happening" amateur radio is surely not dying — it's just been spanked and gasped its first breath of fresh air! — *Mrs. Carol Ann Gault, WN1LGU, Easthampton, MA.*

WON'T RENEW

☐ We are writing this letter to explain why we have not renewed our membership for the coming year (and why all ARRL members should resign immediately).

We vehemently oppose ARRL's cooperation with and glorification of the United States Armed Forces. Cooperation with the military institution of the United States is in violation of the Amateur's Code which says that "the amateur is friendly;" a friendly person does not support an institution whose purpose is the slaughter of other human beings. The fact that the code says "the amateur is patriotic" means that he has loyalty to his country without regard to morals or personal conscience. Armed Forces Day is a perfect example of how the ARRL glorifies the existence of the U.S. military. In the *QST* article on Armed Forces Day, it is stated that there is an attitude of "mutual respect . . . between U.S. amateur radio operators and the U.S. military." (*QST*, May, 1969, p. 62) Respect should not be granted to an institution which is imperialistic, oppressive, and fascist in theory and practice.

In conclusion, ARRL's cooperation with the military is in the worst interest of the people of this country and of the world. And, for this reason, we are renouncing our ties with the League.

All power to the people. Peace, freedom and justice. — *Marty Lesser, WB2BCI, Alan Rosenfeld, WB2ZZZ, Oceanside, NY.*

TRANSISTORS

☐ I was very happy to see more articles on transistors like the one in December *QST*, "Let's Talk Transistors." I think in short order transistors will be the sole component of all types of rf and audio equipment and tubes will be a thing of the past for hams. — *Frederick W. Schirer, Jr., K3JMU, Macungie, PA.*

☐ I appreciate very much the first Stoffels article on transistors and look forward to later ones. So far as I am concerned, this is the first readable information on the subject I have seen. — *Elmer E. Preston, K2KNP, Front Royal, VA.*

LETTERS AND NUMBERS

☐ "N" can be used in place of the numeral nine because of the analogous construction of the two characters in Morse. The numeral consists of four dashes followed by a single dit; the abbreviation cuts the number of dashes to one. As long as it is understood that numerals are being sent, there is no confusion. Consequently, "A" is the abbreviation for the numeral one, "D" for eight, and so on. This usage is quite common among JAs, though the first to spring it on me was a G.

The use of "O" for zero is an unrelated phenomenon that has its counterpart on phone and in common usage of the spoken language. In many circles, "three oh five" is preferred to "three zero five," and its meaning is universally recognized.

The much-more-common abbreviation for zero on cw is "T", which is related to the ancient use of a long dash for zero. The widespread acceptance of electronic keyers has made the long dash impossible to send. "T" also fits into the abbreviation set mentioned in the first paragraph, but I believe this is more by accident than design. — *Dave Sumner, K1ZND, East Lansing, MI.*

☐ There seems to be some diverse opinions prevalent as to the origin of the practice of sending the letter "N" to indicate a "9" in cw transmissions. As far as I can learn this started with the British merchant marine during WW-II.

At that time most radio messages were enciphered in number codes and operators faced with sending and copying pages of numbers adopted the unofficial convention of simply omitting unnecessary dashes. Thus 1 was sent as A, 2 as H, 3 as V, 7 as B, 8 as D and 9 as an N. 4, 5, and 6 were sent as straight numbers, and the long dash, or Morse equivalent, was used for 0. This was done only when the message text was all numbers, and both operators understood the convention was being used.

Speaking of using the long dash for 0 brings to mind another WW-II story of a rather heavy-fisted young operator at a small weather station in the

Aleutians. It seems that he sat down one day to send a message requisitioning supplies that included 20 barrels of flour, 10 cases of beans, etc. In due time a convoy of cargo ships pulled into the harbor bringing — you guessed it — 200,000 barrels flour, 100,000 cases beans, etc. — *F. V. Kohl, W4NAM, McLean, VA.*

INTERESTING HOBBY

☐ I am sick and tired of this endless nonsense from certain sources about amateur radio not being a hobby. It is well and good to talk about what *kind* of a hobby it is but let's not pretend it isn't what it very obviously is. My hobby is amateur radio and amateur radio is my hobby. I'm just as interested, convenient and necessary as the next feller. — *Roy S. Williams, W6VON, La Mesa, CA.*

50 HOURS EXPERIENCE

☐ I would like to see, instead of a 2-year or 1-year requirement for Extra, a requirement of, say, 50 hours logged on the air. This way, there would actually be an experience requirement. A license can sit around for two years and never be used, while a very active ham who may be able to pass the exam after a couple months, doesn't have "experience" by definition. — *John Haskins, WA6VKW, Lincoln, NE.*

TECHS ON TEN

☐ I am especially pleased to see League support for allowing Technicians a portion of the 10-meter band. It's rather ironical I suppose that I have spent a good deal of my operating time as a Technician monitoring the 10-meter band (for any signs of a possible sporadic-E opening on the 6-meter band) and yet have never been able to operate on 10 meters when it had sporadic-E openings! — *John J. Chumpe, K8OCL/4, Gracetown, GA.*

☐ I endorse your efforts on the part of Technicians as outlined in your December editorial. Admittedly, this class was not established as a communications service, but I feel that this group should be given some Novice cw privileges in order to assist and encourage them to qualify for higher class privileges. It is not consistent with the step-license structure, to consider the Technician's grade as a class apart from all other amateur licenses. Maybe it should be considered a stepping stone for those who are technically qualified for the General but have little aptitude for learning an auditory technique (i.e., cw). — *Phares W. Calliham, W4ZIO, Memphis, TN.*

☐ First you say that the quality of ham radio can be improved by taking frequencies away and letting us win them back by passing stiffer exams. It's like making us turn in Cadillacs, Lincolns and Imperials until we pass an advanced driver's license test.

Now you say since Technicians are not living up to the purpose of their licenses (experimenters), we should change that purpose (make CBers out of them) and award them more frequencies!

I don't see any logic in it. — *Hal E. Dietz, WA8ZYH, Willoughby, Ohio.*

☐ When the League brought to light the need of incentive licensing I agreed completely! And actively supported it, went on to study and beat an old head against the wall and passed the Advanced Class, for only one reason, to have more room to move around the band.

Now, I read where you want to give (not create a desire for) the Techs more frequencies, plus the privilege of maintaining two licenses, which is taking some of my and my fellow amateurs' privileges down the drain. — *Charles H. Taylor, K5UUN/4, Fort Walton Beach, FL.*

☐ I must add my support, as well as the support of the other Technician licensees in my area. Please include another aspect to state that Technicians who have previously held a Novice license, and wish to reapply for it may do so.

Thx for your help to the Techs and all other licensed amateurs. — *Thomas W. Herrick, WA9VJW, Evanole, IL.*

INCENTIVE LICENSING

☐ You certainly have created a monster with your incentive ideas. Just listen on the bands and understand why I say this. Those who have become Advanced and Extras are more unhappy than any one else as they can not talk to their old friends. As I see it the ARRL is doing just as the SDS is up to all over U.S.A. It's too late now. 73s and you need it. — *Sanford E. Pope, W1KGU, Brockton, MA.*

☐ I really can't understand all the hickering over incentive licensing. I received my Novice ticket in May and today passed the General and Advanced. Thanks, FCC, for my incentive. — *John W. Dabelstein, WN9BJC, Moline, IL.*

☐ For those who fear the Extra, tell them that I, who had only one year of high school, and far from being an engineer or professional electronics technician, found little or no difficulty in passing that Extra test. Further, I am 60 years old and had suffered a severe heart attack, which forced my retirement from the NYC Fire Department. — *Jacob Dubinsky, W2LVR, Flushing, NY.*

☐ Today I received my Extra Class license. Many thanks to ARRL for the fine publications and the WIAW code practice without which I know this would not have been possible. — *Philip Scott Sullivan, W3AIC, McKeesport, PA.*

☐ Four months after initiating my "incentive licensing" project, I was able to pass the Advanced Class amateur radio license examination. Another benefit derived from this self-study project was that my wife became interested in ham radio. While helping me with my studying, she learned the theory and acquired the necessary code speed to pass her General Class license examination.

We are now looking forward to using our new privileges, making new acquaintances, and enjoying our hobby. The work was well worth the effort. — *Robert A. Bulusek, K5OZF, San Antonio, TX.*

☐ I am one of the silent group who is in favor of the recent changes in band usage (incentive licensing, that is) and have seen some hams forced to learn some more, which it turned out, they rather enjoyed, once it was accomplished. Something like having a sore tooth. It sure does hurt and not very enjoyable until it has been taken care of. But to get some people to the FCC is like getting a little boy to the dentist. — *Bob Bingham, K9WMP, Streamwood, IL.*

QST

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

NEW MEMBERS

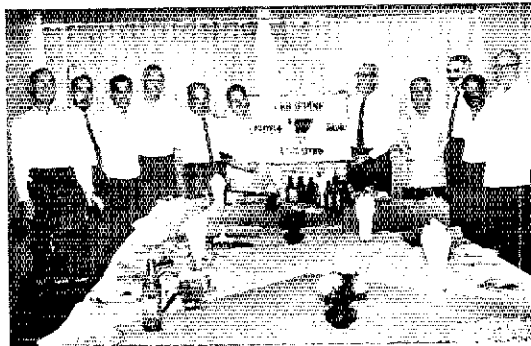
Membership in the Union has grown to 83, with the admission of amateur radio societies in Hungary, and Trinidad and Tobago. *Magyar Radioamator Szovetség* now represents IIA amateurs — in fact, all of the 627 licensed Hungarian amateurs are members of *MRS*. Trinidad and Tobago is represented by the *Trinidad and Tobago Amateur Radio Society* with a membership of 53. A list of the 81 other IARU societies appeared on page 81 of *QST* for November, 1969.

NOTES

A reciprocal operating agreement has been in effect between France and the United States since July 1, 1966. This initial agreement did not provide for operation in territories or possessions of either country. Thanks to work behind the scenes by *Reseau des Emetteurs Francais*, the agreement has now been extended to cover all areas where licenses are issued by the two governments.

— —
The *Union Belge des Amateurs Emetteurs* wishes to call attention to an inappropriate ON QSL Bureau address which was reported in the *Callbook*. The correct address is: UBA QSL Bureau, Postbox 634, Brussels 1, Belgium.

— —
The *Club de Radio Experimentadores de Nicaragua* reports that their Government Communications Department has authorized the use of the prefix HT in place of YN by Nicaraguan amateurs during 1970. *CREN* says, "This authorization is part of the Government's participation in our Silver Anniversary."




Richard P. Scott, W3EFZ, visits briefly with his friends of the *Philippine Amateur Radio Association*, after 5 years of absence. The felt banner is one of Scott's many parting gifts to the club, of which he is Honorary Member. He "invented" the now famous "DUØDM" and "DU5DM" DXpeditions to Corregidor and Leyte. L to r: ex-ØP1GZ, ex-KA1DL, DUISA, VK3ZLU, DU1EA, DU1GF, W3EFZ, DU1OR, W3EIV, DU1BEN, and Earl Hornbostel of DU1FH.

OVERSEAS VISITORS

During 1969, IARU/ARRL headquarters was honored by many overseas visitors, including a number of officers of member-societies. Prefixes represented were: HB, VE, DL, G, PY, OA, CX, EL, VK, GM, SR1, OH, OK, JA, EA, LA, 6Y5, HR, IT, and HC. All overseas amateurs are invited to visit IARU headquarters while in the USA. Normal visiting hours are Monday through Friday, 8:30 to 4:00; other times by appointment.

WORKED ALL CONTINENTS?

The IARU WAC award continues to enjoy high popularity. During 1969, headquarters issued about 2000 awards. They included 883 for ssb, 5 for RTTY, 3 for 3.5 MHz, and 1 for 30 MHz. If you are interested in applying for this award, send to the IARU society in your country, a confirmation from each of the six continents (North America, South America, Europe, Africa, Asia, and Oceania) along with your name and address and sufficient return postage. Canadian and U.S. amateurs should, of course, send theirs to ARRL, Newington, Conn. 06111. 

Japan Amateur Radio League officials present 1969 ARRL International DX Competition awards to JAIAEA. From left are JA1KIS, awards and QSL manager; JA1XMK, secretary; JAIAEA; JA1AC, president; and JA1AN, vice-president.

ARPS

(Continued from page 60)

KSN (Ky.); WSN, WARTS, NTN (Wash.); RISPNI (R.I.); ILN (Ill.); MJN, MSN, MSPN (Minn.); NCNE (N.C.); MTN (Main.); AENB, AEND, AENH, AENR (Ala.); WVN (W. Va.); MNVN (Mo., N.H., Vt.); QKS (Kans.).

Transcontinental Corps, November reports.

Area	Func- tions	% Suc- cessful	Traffic	Out-of-Net Traffic
Eastern.....	120	87.5	1936	732
Central.....	90	92.2	1614	735
Pacific.....	120	89.2	1948	974
Summary.....	330	89.6	5498	2441

The FCC Reater: Eastern Area (W3EMI, Dir.) — W1s BJG NJM YKQ, K1ESG, W2s ER GKZ PU QC, K2s KIR RYH, W4s BLV CAL JMO UWA, W3EMI, K3MVO, W4s NLC SQQ, UQ, K4KNP, W5s JXJ HM, K8KMQ. Central Area (W6LCK, Dir.) — W4OGG, K4AT, W5MI, W6s CXY VAY, W4s RAK VZM, W6s HI INH LCN UCE ZHN. Pacific Area (W7DZX, Dir.) — W6s BGF BNX EOT IPC IPW VNO VZT, K6DYX, W4s BRG LFA ROF, WB6HYA, W7s GHT KZ, WA7-CLF, K6JSP.

Independent Net Reports.

	Sessions	Check-ins	Traffic
Northeast Traffic.....	30	353	486
Clearing House.....	35	373	221
North American 20 M.....	25	608	318
20 Meter ISSB.....	19	426	3740
Mike Farad E & T.....	25	325	261
All Service.....	5	89	44
7290 Traffic.....	38	1662	700
Hit & Bounce.....	30	342	450

QST

Let's Talk Transistors

(Continued from page 40)

4. Is the center, or base layer, thicker or thinner than outside layers?
5. In the pnp transistor, what happens to many of the holes that migrate toward the base, across the forward-biased emitter-base junction?
6. What percentage of the holes that migrate from the emitter region toward the base region actually combine with excess electrons in the base region?
7. On a transistor symbol, does the arrowhead on the collector lead point inward or outward?
8. In a transistor, if 98 per cent of the current flowing into the emitter actually leaves via the collector, what current rating must a toggle switch in the base lead have if the collector current to be interrupted is 294 mA?

Answers:

1. In a pnp transistor, the first and third layers are of p-type material while the second, or middle layer, is n-type material. In an npn transistor, the opposite is true.
2. The junction between the first and second layers is forward biased (thus it is little more than a forward biased diode), and the junction between the second and third layers is reverse biased (again, little more than a reverse biased diode).
3. Exactly the same as with the pnp transistor. The first junction is forward biased and the second junction is reverse biased.

4. The base layer is very thin. This thinness is extremely important to the operation of the transistor.
5. A large percentage of these holes diffuse completely through the thin base region and are captured by the negative ions in the collector region.
6. With careful manufacture, it is possible to cause more than 98 per cent of the holes to migrate completely through the base region — thus, only two per cent of the holes combine with excess electrons in the base region.
7. In the first place, the arrowhead is on the emitter lead, not the collector lead. In the second place, it points outward on an npn transistor; that is, in the direction of conventional current.
8. Six mA; (if 98 per cent of the current leaves via the collector, then two per cent leaves via the base. Thus, the amplification, or gain, of the circuit is $98/2 = 49$. Consequently, if 294 mA flows in the collector, than $294/49 = 6$ mA will flow in the base).

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, the application will be presented to the Executive Committee for approval.
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.



CONDUCTED BY BILL SMITH,* KØCER

Geminids, 1969

YOU 144-MHz meteor scatter buffs who sat out the December Geminids shower because of poor meteor activity during the past four years missed a good show at the end of 1969. In fact, most of November (with the notable exception of the Leonids shower period) and December were excellent.

The Geminids, like the August Perseids, is a more-or-less evenly distributed shower, with not too much variation in year-to-year activity, and doesn't normally have a "peak year." This year, however, may have been an exception. Several contacts were reported in late November and early December on random meteors. Random meteors are not normally associated with the known and somewhat predictable showers. One of the more notable contacts was made November 21 when W5ORH, Oklahoma, and W6WSCJ exchanged reports on 220 MHz over a 1152-mile path.

But things really got rolling December 11 when KØMQS, Iowa, worked W4CKB in south-central Florida. The Geminids apparently peaked the morning of the 13th, but numerous contacts were reported the night of the 12th and through the morning of the 14th. The finest showing, at the time of this writing, was from KØMQS. Dick made at least 10 contacts, from Connecticut to Florida to Utah!

What we're getting at is this. If you want to work 144-MHz meteor scatter DX you had best work every shower — and those random meteor schedules pay off also. Many stations are running random schedules, especially Saturday and Sunday mornings.

The Sunday night 75-meter vhf nets, which meet on 3.980 MHz, are a good place to learn who's doing what. Usually they become active after 9 p.m., local time. The largest is probably the midwest group which meets at 9:30 p.m. with W5UGO or W5HFV as net control station. Stations on both coasts are regularly active in this gathering.

If you're just beginning the meteor scatter fun, select a station 800 to 1100 miles from you and make a schedule. The 800- to 1100-mile range is optimum for random meteors and is likely to produce some return for your efforts any morning around dawn. Leave the longer paths for shower periods. The old-time (that should draw some reaction) ms operators are regularly mentioned in this column and welcome new ms prospects.

*Send reports and correspondence to Bill Smith KØCER, ARRL, 225 Main St., Newington, Conn. 06111.

Records

From time to time we run a list of recognized two-way DX records for the amateur bands above 50 MHz. The records box in October, 1969, QST contained an error, pointed out to us by Ed Munn, W6OYJ. The DX record for 4300 MHz communication, held by W6LFE and W6VIX, is 190 miles, not 100. There are other records connected with Don Thompson, W6LFE, now deceased, that should be recognized.

The 110-mile contact, made in June, 1956, is the longest-standing of all our microwave records. But it is only one of six such records for microwave work shared, at one time or another, by W6LFE, W6OYJ says that an examination of W6LFE's log shows over 600 two-way QSOs on frequencies above 2300 MHz since 1960 — and Don began his microwave career in 1946.

W6LFE was the first to implement the "beer-can polplexer," now widely used in amateur microwave work, and he used a version of it to receive 2300-MHz signals from the Lunar Orbiter, near the moon, in 1966. Appropriately, the San Bernardino Microwave Society applied for, and has received, W6LFE as a club call; surely a fitting tribute to an outstanding amateur.

While on the subject of records, once over lightly about the standings boxes for 144, 220 and 420. Nearly three years ago we revised the boxes, attempting more accurately to record current activity while retaining some of the more noteworthy previous achievements. The boxes were started again fresh after asking everyone listed who wished to remain so, to jot down the states he had worked, the call of the station contacted and the best DX. Those who did not reply were dropped *only* because the lack of a reply indicated to us no further interest in being listed. I'm still hearing some repercussions.

All that is necessary to be included is your list, as long as your total exceeds or equals the lowest ranked station in your call area. U.S. stations may claim state and call area credit *only* for states, not Canadian provinces. Canadian applicants may also claim only U.S. states and call areas. Best DX worked is independent of countries; if you have worked 31 states in 8 U.S. call areas, but a European is your best DX, as is the case with some moon-bounce operators, you may claim the distance to Europe as your best DX.

What this all leads to is hopefully the first WAS on 144 MHz, and perhaps on one of the still higher frequency bands. ARRL has a WAS award rule that all contacts must be made within a 25-mile radius of the original location. If you relocate more than 25 miles away, you must start over on your WAS. This rule has especially hard-hit some vhfers, the latest being KØMQS. Dick recently moved about 100 miles south of his previous location, from which he had worked 45 states on 144 MHz. It so happens that Dick is probably less than 10 miles different in distance from any state than he was at

his first location. But his station location was moved more than the 25 miles allowed under the rules, so Dick has to start again. Surrendering a record of 45 states in all 10 call areas is not easy, but we know that KØMQS won't be missing long from the 2-meter box. He already has enough worked to be relisted.

Another long-time vhf'er affected is Don Brown, WJSM. Don, like KØMQS, was the leader in states worked from his call area. Certainly 35 states worked from Massachusetts represents no small effort on Don's part, but Don recently moved to New Hampshire where he is again at work accumulating states on 2 meters. K1HTV had perhaps the worst break of all. Rich moved from Thompsonville to Meriden, Conn., just over the 25-mile limit. He is already back to top position in Connecticut on 144, and is leading the first call area on 432 — all in less than a year!

Activity Nights

Let me stress *activity* — not contest. We introduced the Activity Nights in the September, 1969 column, after much prodding from individuals who wanted specific nights of concentrated activity on 144, 220 and 420. These nights are the first, second and third Saturdays of each month (except months of regularly-scheduled ARRL vhf contests) for 144, 220 and 420, respectively. We requested that participating stations quickly mail a list of stations contacted and the best DX worked, so we could see how well the idea was being received. Early indications were not favorable, but as VE2DFO pointed out, the activity night idea is new and will require months to become generally known. The December 6 2-meter activity night showed a marked improvement in reporting and activity.

It drew reports from W1AZK, W2WGL, WB2SIH, W3HB, W8DGF and VE2DFO. From their logs we note 51 other stations reported active. WB2SIH reports the best DX worked — W4FJ, in Virginia, 325 miles; not bad for a winter night of poor tropo conditions. Just goes to show what can be done if one just gets on the air.

Again, these are *not* contests, but rather nights of concentrated *activity*, that if properly used can serve well the purposes of trying out new equipment and holding interest in consistent vhf operation.

432-to-1296 Tropo Correlation

WA9HUV has sent an interesting report on tropo correlations between 432 and 1296 MHz on skeds with W9JLY, a path distance of 175 miles from Chicago and Indianapolis. WA9HUV kept records of weather conditions and signal level comparisons, always beginning their schedules on 432, then switching to 1296. These schedules have been carried on for nearly one year, but until September, frequent equipment changes at both stations made accurate comparisons difficult. During September, October and November their equipment remained static so the comparisons became more meaningful.

Norm, WA9HUV, plotted data from his log on a graph, see Fig. 1. Schedule dates are shown on the abscissa. Signal strengths plotted are median values, the mid-range of the signal level on his S-meter, to compensate for fading. Values are referenced in dB above the noise at Chicago. Notice that for each schedule the S-meter reading for 432, on the left, and for 1296, on the right, are compared. The dashed extension normalizes 1296-to-432 on the basis on equal effective radiated power. This was done by adding 7 dB to each 1296 amplitude since W9JLY has an estimated 11 dB more rf power on 432, but

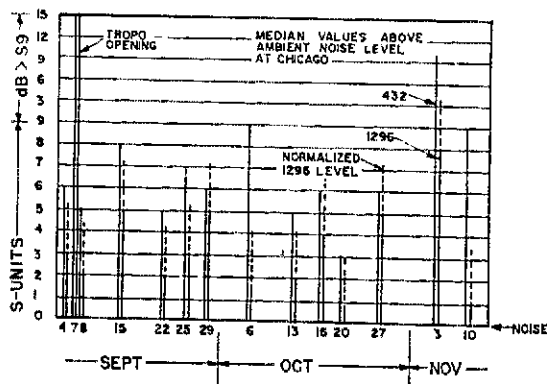


Fig. 1—Comparison of 432- and 1296-MHz signals over a 175-mile path, Chicago to Indianapolis, Fall 1969. The left line is 432 MHz, the right line 1296 MHz.

about 5 dB less antenna gain. Additional feedline loss at 1296 is estimated to be 1 dB. The chart is encouraging in terms of point-to-point 1296 communication. It says if you can work on 432, you can also work on 1296.

Both stations use 7-foot dishes fed with 6-inch circular horns and horizontal polarization. W9JLY's dish is 45 feet high, WA9HUV's at 35 feet. Both use 3/8-inch Heliax cable.

Referring again to Fig. 1, notice the tropo opening (perhaps it was a duct) on September 7. Similar conditions were noted on May 19 and June 9. WA9HUV says one surprise to him is the fairly close correlation between the two bands. Norm did not expect the propagation loss on 1296 to be so consistently close to that on 432. Indeed, the chart shows 1296 to sometimes be superior to 432.

Thanks, Norm, for the data. Anyone have similar experience for comparison to WA9HUV's and W9JLY's results?

Moonbounce, New Zealand Style

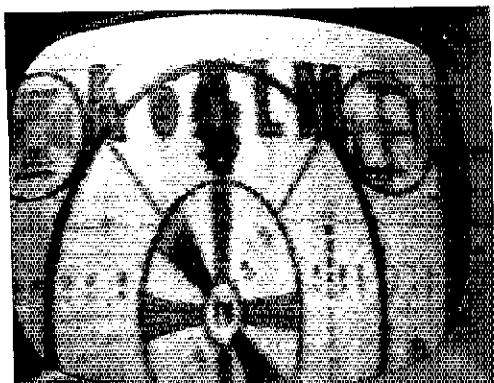
Ordinarily, we avoid quoting long excerpts from received correspondence. But a recent letter from John, ZL1AZR, co-holder of the world's DX record on 144 MHz, is too interesting to paraphrase — and the challenge he offers is certainly worthwhile.

"Have still been carrying out schedules with Kjell, SM7BAE, and had successful 2-way QSOs on Sept. 25, Nov. 6 and Dec. 2. This brings my tally up to 5 contacts with SM7BAE and 1 contact with Dick, KØMQS. SM7BAE also had a couple of near misses recently with Ray, VK3ATN.

I am now receiving my own echoes frequently during schedules with Sweden, no doubt because of the several dB ground-reflection gain I apparently obtain at the low-elevation angles; however I don't have much success with echoes at the higher angles. I am still using the same 8 bays of 6/6 slot-Yagis but now have the new 4CX250s final amplifier going very well.

When I eliminate my 2 1/2-dB feedline loss, some of the other fellows may be able to hear me better, but I have reached the limit for receive capability, because the antenna is now the limiting factor. It is not possible for me to erect a larger array so I guess I'll have to start getting more exotic in the way of special weak-signal receiving techniques.

The following notes may be of interest to anyone wanting to try EME work in a far-from-ideal loca-



Test pattern of K6VLM, as received at K6KTP. The 15-watt video picture was transmitted on 435 MHz. Audio is on 146. Both operators are associated with the 58-member Southern California ATV Club, WA6EVQ president. (photo via W6ORG)



The ATV signal of W6CMQ, as received at K6VLM over an 80-mile path. Video output power at W6CMQ is 2 watts!

tion such as mine, in a built-up suburb of a large city.

The first thing is to build the largest feasible array for the available space. My experience shows that an array physical area of some 20-by-20 feet is about minimum, and the number of elements is not too important, providing they are properly matched and driven. Liberal use of universal stubs and a careful endeavour to keep the impedances high throughout the phasing system has proved, at least in my case, to be of utmost importance.

The height of the array does not appear to be of major significance; mine is only 20 feet high in the centre. The site for the array should be chosen (if you are lucky enough to have any choice!) to allow a clear take-off at low angles in at least one direction, preferably east or west.

My low-height, low-gain array has a clear take-off only to the north of west where the main lobe manages to sneak through a gap between my house and my next door neighbour's through a maze of power and telephone lines out on the street. My greatest ground reflection gain occurs between 10 and 14 degrees elevation. My antenna is not motor-driven and I seldom bother to track the moon during a schedule. This is a serious drawback because Faraday rotation maybe most unfavourable during a

particular part of the schedule when the antenna is actually on the moon. However, I have had a lot of enjoyment and enough success to keep my interest by the primitive expedient of presetting the array to be on the moon at the centre of the schedule time, and trusting to luck.

The next most important item is a *good* rf preamp mounted as close to the antenna feed point as possible. There is no doubt in my mind, after trying all sorts of exotic FETs and transistors, that the 3N140 dual-gate FET is probably the best 2-meter rf amplifier. From the point of view of the home constructor, the fact that no neutralising is required and best noise figure occurs very close to the maximum-gain tuning adjustment means that the average bloke can be sure his preamp is doing just as well as anyone's. I am in the fortunate position of having access to a fine collection of uhf test equipment through my job, and results always lead back to the same conclusions regarding the 3N140. This device produces far too much rf gain at 2 meters so almost any coax can be used back to the main converter. I also use a 10 dB pad at the converter input. It is fatal to hit the first mixer with too much noise, when most of the signals are in there amongst it somewhere. The main converter here uses a 3N140 rf stage and a 3N141 mixer, with output at 14 MHz. A 1.5 to 2 dB noise figure is consistently obtainable.

The most important point regarding the tunable i-f is that it must be very stable, and preferably have a limited total tuning range of about 10 to 20 kHz. With a marginal set up such as I have here, it is impossible to tune more than a few kHz from the nominated frequency with any hope of finding these weak signals. An i-f bandwidth around 500 Hertz is desirable, although recently schedules using a 3-kHz i-f bandwidth have proved successful. The audio output should be fed through a filter of about 30 to 50 Hertz bandwidth, and, for best readability, centered on an audio tone around 350 to 550 Hertz. It is a great help if the audio filter is tunable in frequency.

I believe many fellows lose interest in EME work because of the hair-raising articles they read about tracking systems, 100-acre lots, parametric amps and so forth. I would like to tell these chaps that a lot of success and personal satisfaction can be gained by persevering with the best possible system you can afford within the confines of yard space available.

As long as you possess sufficient technical knowledge to make sure each separate part of your system is performing to its limit, one can be certain to hear EME signals, but it is essential to realize your system limitations. For instance, by taking advantage of the magnificent signals radiated by the fellows with the big rhombics, it is possible to get good results with the most marginal setup, because of the excess gain at one end of the circuit. Similarly by scheduling others at either extreme distances or at the particular elevation angle where ground reflection can add the extra dBs, the chances of enough regular contacts to retain interest are very good. My own EME equipment is all home-brew and the antenna was built and erected with only the aid of my wife. The problems involved in the building of equipment and antennas can be overcome mostly by perseverance!

Personally, I found the most difficult part of the whole EME business was learning how to read azimuth and elevation tables to establish the position of the moon. However, this problem has not been overcome by the good efforts of my friends in the U.S. who provide me with computer data for the

rather tedious calculations involved in working out times for long distance tests where mutual moon-fine is pretty limited. EME work on any band is difficult, but it is not so difficult that it should prevent anyone who believes he knows what he's doing from having a go.

Another aspect which requires some comment is the widely held and often quoted view that one is wasting time unless he can hear his own echoes. This is utter rubbish; it is very much more difficult to hear your own echoes than it is to detect someone else's signals, particularly with marginal EME capability. With such a system, the antenna has to be aimed exactly at the moon. There can be no frequency change anywhere in the system due to ac mains variation during send/receive intervals, and, until some experience is gained, it is difficult to "guessimate" doppler shift, particularly when narrow-bandwidth audio filters are used. In view of my inability to find space to extend the present array, I've given thought to the idea of using two separate arrays, one on each side of the house, perhaps using polarization to establish a greater physical aperture. The adoptive array scheme, using some form of automatic phasing between arrays, is a very promising field of experiments for the receiving

side of the system. I don't fancy the idea of trying this sort of phasing problem for transmitting, though."

OVS and Operating News

50-MHz DXers are finding pickings mighty slim this winter. No foreign openings have been reported since early fall, and that includes the expected night-time TE paths into South America, at least from the southern latitudes of the U.S. However, our friends in Mexico and South America have been working each other. WB6UYG notes the muf running around 41 MHz most days to the east coast.

The winter E season has been somewhat more fruitful. WB4BND, Florida, says the best opening was Nov. 29 when he worked as far north as Massachusetts and west to the 8s. In Oregon, WA7GFP reports working 6s Nov. 6 and 21. K7ICW, Nevada, says November was a complete blank — no DX of any description, except some meteor scatter during the Leonids on the 16th.

In Colorado, W0MTK reports Es on Dec. 14 and 15, during which he worked from Illinois to Texas to Washington. Bill has recently completed an array of four 4-element Yagis spaced 14 feet apart in both planes. With that array, and a Swan 250, Bill works successful scatter with many 6s, including K6PYH, K6LBY and WA6AKM.

The Greater Pittsburgh Vhf Society is offering a handsome certificate. The award is issued to stations submitting a list of stations worked in 25 different ARRL countries. The list may be sent to the Society at 3302 Hazelhurst Avenue, Pittsburgh, Pa. 15227, and should give the call of the station worked, the city and country where located, date, time and mode. The Society apparently does not request an application fee, but I'm sure a stamped, legal-sized envelope for mailing the certificate would be appreciated.

144-MHz DXers did well during the December Geminids meteor shower, as previously noted. Contacts reported at deadline include the following:

W2CUX: K9IMX/4, W9MAL, WA9DOT
 WB2SIH: K9IMX/4, K0MQS
 W4CKB: K0MQS
 W4TSS: K0MQS
 K9IMX/4: W2CUX, K2RTH, WB2SIH, W4YYT, VE3ASO
 K7VTM: K7ICW, W9MAL, W9YYF, K0CER
 W0LER: W4VHH, K7NII
 K0CER: W3BHG, K7VTM, W8NUM, VE2DFO
 K0MQS: K1BKK, W1LNLJ, WB2SIH, W4CKB, W4IFS, W4VHH, W5GVE, W7RQT, K0AWU, VE2DFO
 VE7BQH: W0ENC

We have received also these additional reports on the November Leonids. VE2DFO worked W9VWY and WA9UHB on a single 1½-minute burst the 16th. W0LER worked W2CUX, also on the 16th, after hearing a 17-second burst while W2CUX was tuning-up prior to the schedule. And likewise on the 16th, K7VTM worked VE7BQH on a 52-second burst. W1AZK reports another random ms contact with K4GL, the latest on Nov. 9. K4GL has one of the finest ms signals in the east.

Much moonbounce activity was expected in late December as the moon passed through the window of the large array at W1FZJ/KP4. A number of stateside stations were expected to be active as well as KH6NS with a 4-layer rhombic, SM7BAE and VK3ATN. K6MYC was rushing to complete a 4CX1000K final for the test. More on that next

2-METER STANDING

K1ABR...34	8	1478	W5LO...28	7	1254
W1AZK...34	8	1412	K6PTK...18	6	1330
K1HTV...33	8	1310			
K1VHT...31	8	1300	W6GDO...18	5	1326
E1UGQ...30	8	1370	W8W8Q...16	4	1390
K1VHS...29	8	1300	K6HAA...13	4	1380
K1BKK...28	7	1275	W6NLZ...12	5	2540
W1VTU...28	7	1266	K6FYO...12	4	1240
K1BKK...28	8	1275	K6HMS...11	4	1258
W1FJH...27	7	1100			
W1HDQ...24	7	1040	W1RIG...27	6	1320
K1RTH...21	7	1450	K7NII...35	5	1200
K1MTJ...20	7	1225	K7HW...16	4	1246
K1JLX...18	6	800	K7VTM...10	6	950
W2NLY...37	8	1390	W8PT...41	9	1260
W2CXY...37	8	1360	K8AXU...38	8	1276
W2ORL...37	8	1320	W8YD...36	8	1100
W2BLV...36	8	1150	VE2DP...35	5	1150
W2AZL...36	8	1390	K0DEO...32	8	—
W2ZFK...34	8	1340	W8UDU...27	8	1150
K2RTH...33	8	1215	W8NOH...26	8	1165
W2ZCH...31	8	1160	W8TJU...24	8	1000
W2CUX...27	8	1334	K8ZES...22	8	678
W2ORS...26	8	1270	W8SVH...15	6	540
K2ZDN...24	7	1208			
W2RTH...24	6	1000			
W2CNS...23	8	1150	K8SGD...42	9	1300
W2DWJ...23	6	860	WA9DOT...41	9	1303
W2ZEM...23	8	1335	K9AAJ...41	9	1200
W2ZFX...21	6	915	K9ULF...41	9	1150
K2YCO...20	7	750	W9AAG...39	9	1200
W2ZPMW...19	6	1000	W9YYF...36	8	1050
			W9PBP...32	8	820
W3RIE...36	8	1100	W0RFR...45	10	1380
W3KWH...35	8	1335	W0NKF...44	10	1350
W3GKP...32	8	1108	W0DQY...41	9	1300
W3BHG...30	8	1140	W0LFE...40	9	1100
K3CFA...25	8	1260	W0TER...38	9	1440
W3BLP...25	8	1100	W0TER...35	9	1380
W3HR...23	8	1310	W0ENC...35	9	1360
K3CFY...21	7	950	W0EMS...33	9	1320
K3OBU...21	7	930	W0LGN...28	8	1000
W3TFA...20	8	1342	K0CER...27	8	1205
W3LRF...19	6	793	W0DKL...25	9	1296
W3GFL...19	6	625			
W4HJQ...39	9	1150	FD0...1	1	5100
W4WNH...38	9	1350	KH6UK...2	2	2540
W4HHK...38	9	1280	OHNL...1	1	5850
K4EJQ...37	8	1125			
K4XG...36	8	1403	VE1AUC...7	2	500
R4GL...34	8	1325	VE2DFO...28	7	1340
W4CKB...35	8	1440	VE2BQH...17	6	976
K4QIF...35	8	1225	VE2HW...11	5	800
W4FJ...34	8	1150	VE2ZG...33	8	1283
W4VHH...33	8	1100	VE3BON...31	7	1250
W4AWS...29	8	1350	VE3ALB...29	8	1340
			VE3ASO...28	8	1285
			VE3EVW...25	8	1190
			VE7BQH...8	5	1248
W5UGO...43	10	1398	VK3ATN...3	3	10417
W5RCL...42	9	1289			
K5WAZ...36	10	1450			
W5HPY...36	10	1285			
W5AJG...33	9	1360			
W5UKQ...29	8	1150			

The figures after each call refer to states, call areas and mileage of best DX. Revised January, 1970.

220- and 420-MHz. STANDING

220 MHz.					
W1HDQ...13	5	450	K31UV...16	5	720
K1JTX...12	4	600	W3RUE...14	7	585
K1BFA...13	3	225	W3UJC...19	4	400
K2CBA...17	5	1080	W4FJ...20	7	995
W2DWF...15	5	740	K4QLE...19	7	1085
K2DWF...13	5	600	W4HLZ...13	5	560
W28BU...12	5	325	K4EJQ...12	5	550
K2RTH...12	4	600	W4VHH...12	4	750
W2C8K...10	4	440	K4SUM...11	5	420
W3UJG...14	6	460	K3NTD...19	2	2
W3RUE...10	3	480	K4GL...17	2	—
K31UV...10	4	310	W6RCI...19	6	880
K4IXC...3	2	1090	W5ORH...12	4	700
K4GL...3	2	—	W5AJG...7	3	1010
W5RUI...10	5	910	W5UKQ...8	2	580
W5AJG...10	3	1050	W5AWK...8	2	222
W5LO...2	2	660	W6DQJ...4	2	360
W6WSQ...5	4	1142	K7ICW...4	2	225
K7ICW...4	2	250	W7JRG...2	2	420
W7JRG...2	2	859	W8YTO...19	7	650
W8FT...11	6	660	K8DEG...20	7	675
W8EYE...9	4	910	K8REG...20	7	700
VE3AIB...7	4	450	W8HVX...16	8	680
420 MHz.					
K1HTV...15	4	610	W8CVA...13	5	625
K3EAV/L...14	6	700	W8MYC...13	7	600
K1BFA...13	5	710	W8RUL...10	6	425
W1JTK...11	4	715	W8VHG...8	6	625
W1QVF...10	5	400	W8FWF...17	4	450
K1JTX...10	4	460	W9WCD...19	7	825
W1HDQ...10	3	250	W9AHU...17	7	780
K2ACQ...23	8	925	W9AAC...14	5	830
K2CBA...20	8	2670	W9BNCT...12	6	560
W2ZEMB...18	6	720	W9JUY...12	6	550
K2UYH...17	6	540	K9AAJ...12	5	425
W28LV...17	8	732	K9CNC...12	5	—
W21JL...17	6	693	W0DRL...18	6	1185
W2ONS...14	6	525	W0LER...8	3	709
W2DWJ...13	4	330	W0LGN...8	3	700
K2YCO...9	6	525	W0EYE...7	2	703
K2ARO...9	5	580	W0ZHW...4	3	750
W2EUS...8	4	260	W0DKW...12	7	940
K2RHW...9	3	—	VE3BZC...7	5	510
W2E8U...6	4	220	VE3AIB...13	4	450

month, but we do have these earlier EME observations. K17FNL reportedly heard Sam, W1FZJ/KP4, on Nov. 25. The Alaskan is using an array of 8 stacked Swan Yagis. Three days later VE7BQH made his first EME contact, working Sam on an 80-element collinear array. VE3NA worked Sam the same day using an array of four Yagis.

A lengthy letter from K4GGI/1 describes EME activity in New England. Lew says that when W1QXX worked W1FZJ/KP4 on September 2, Jack was using a 96-element collinear array supported on an extension ladder which leaned against his garage. Power input was one kilowatt. November 2nd found W1MX working Sam with an array of sixteen 3-element cubical quads and a kilowatt.

Now these 2-meter notes. W5ORH told VE2DFO a good way to check his receiving system is to sweep the antenna across a setting sun. Don's system shows 3 to 6 dB sun noise, confirmed by his recent successes. W4ISS is a good bet for those needing Georgia. Frank has stacked 6-element Yagis and 150 watts. W2WGL is one finding the activity nights interesting. Charles runs 500 watts and 24-element J-beam configuration. W8DGE, also making use of activity nights, sports a kilowatt and long Yagi. And on the West Coast, W6UYG asks, "where is all the local activity?" Stan has a kilowatt and 36-element array in Kingsburg and is listening for activity around 144.1.

220-MHz meteor scatter is still being investigated. Both W5ORH and W6WSQ report their contact on November 21 using random meteors. W5ORH says, "ms at 220 is much more difficult than at 144; the stuff just isn't there!"

K2CBA, who is preparing to work WB6NMT on moonbounce, heard his first EME echoes on Nov. 23. Jud runs 600 watts output to a 28-foot dish. WB6NMT says November and December were used preparing for the EME tests with K2CBA. Louis built several preamps, worked on the antenna, and on an amplifier built around a pair of 4CX300As. He says W7CNK will soon join the growing group of 220 moonbouncers. W7CNK should have a 160-element collinear array completed just about now.

432-MHz, as well as the other vhf/uhf bands, suffered from the holiday season and the seasonally reduced tropo conditions. W6WSQ, having just completed a kW. for 432, ran a Leonids ms schedule with W0EYE, but nothing was heard either way. K4EJQ and W0DRL also tried Leonids m.s., but in 2 hours Bunky heard only a 2-second burst from Kansas Says Bunky, "m.s. at 432 is likely, but hard work!" K4EJQ wants schedules with Alabama, Georgia, Mississippi and West Virginia.

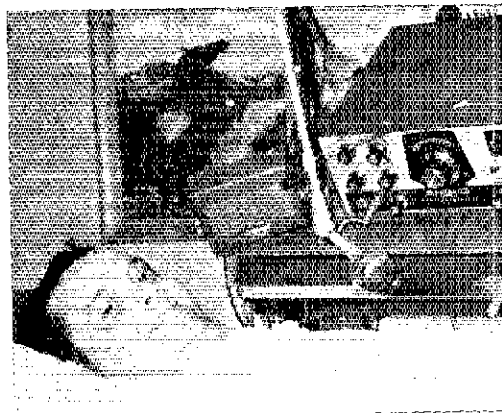
W8ULG, Michigan, is a newcomer to the band. Ted runs 20 watts and a 16-element collinear, his best DX is K9HMB at 150 miles. W8UCVQ says, "activity generally low." But W9J1Y, Indianapolis, reports working W3RUE, Pennsylvania and W4PQU, Kentucky, in late November to bring his totals to 12 states worked.

1296 and Up. On Nov. 21 W4HHK received the S-band (2286.25 MHz) voice channel from Apollo 12 just after the Yankee Clipper left its lunar orbit for the return flight to earth. The reception began just as the moon rose above the eastern horizon at Collierville, Tenn. Paul was using an 18-foot dish antenna. He has completed a kilowatt klystron amplifier for 2300 MHz and when tests on the rig are done, Paul will resume EME tests with W3GKP.

W9J1Y says he is working on a 2300 MHz pulse setup and would like to hear from those similarly equipped.

W9J1Y keeps Monday night 1296 schedules with WA9HUV and on Thursday night with W9ZIH. Signals are heard on every schedule, regardless of weather conditions. QST

Strays



QST congratulates Buddy Boyd, WA5VTA, an organizer of the Handicappers Information Net, on being recognized by the State of Texas as a handicapped citizen who has made "an outstanding contribution to our society."

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

How:

Here we go again — your annual ARRL DX Test coming up! Rare operating sport for one and all whether you go for score or just poke around a bit to swap 73 with some overseas friends.

This world-wide wireless frolic now has forty years of tradition behind it. W2GP fondly recalls the very first. "Did better in that contest than any since," he says. No. 1 ran a couple of weeks and required formal registration of intended participation. The League's Communications Department issued serial numbers to entrants, along with several sheets of questions of sentence length. QSOs in that one were really QSOs!

The specified queries, which had to be transmitted along with said serials, are interesting in themselves. They etch an image of 1920s hamdom. A few examples show what DX men of yore had on their minds:

D-14. How many binding posts to you have on your receiver?

G-17. Is your transmitter panel mounted or breadboard?

L-22. Do you use vernier dials and what ratio are they?

Z-11. Please describe the insulators in your antenna.

I-21. How do you control oscillation in your receiver?

U-33. Please describe grid leak and condenser in your receiver.

W-11. Do you believe in radio frequency amplification for short waves?

Y-13. What is the best number of tubes to use in short wave receivers?

H-22. Do you use C battery on either receiver or transmitter?

M-24. How many plates are in your antenna condenser and what metal?

X-36. Please give all meter readings in your transmitter.

Those jobs were fairly simple. Others got more complex. How would you like to have to get rogers from Asia on *these* propositions, even with 1970 equipment and technique? . . .

E-15. Name a delegate of your country who attended the International Radiotelegraph Conference.

Q-28. Was your country represented by a delegate at the 1927 International Radiotelegraph Conference?

E-16. What do you think of the results of the International Radiotelegraph Conference held at Washington, D.C., in 1927?

Some things never change, though. A good number of the recommended test transmissions

* 7862-B West Lawrence Ave., Chicago, Ill. 60656.

concern topics of interest today as then. Such as

I-19. What wavelength do you consider best for working the U.S.?

M-25. Are you troubled with power leaks at your station?

C-16. What do you think of work on or near ten meters?

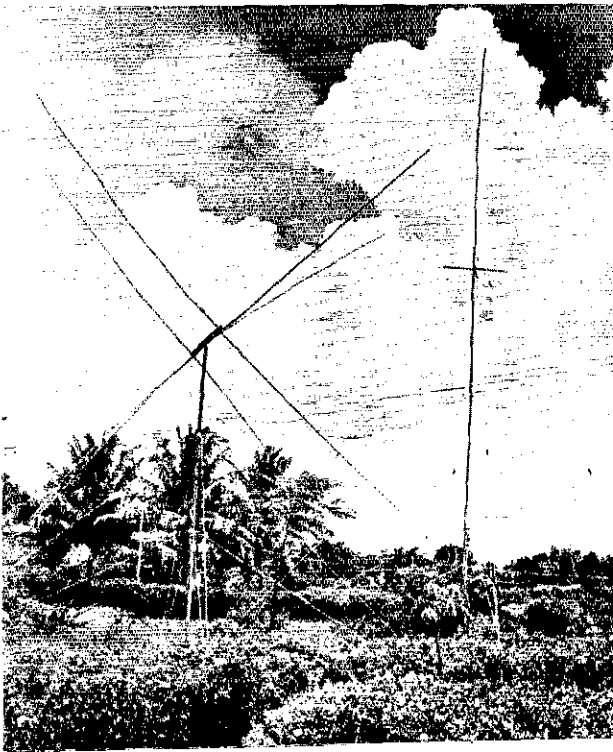
J-23. What is the proper way to use CQ?

Gee, no questions on sex, religion and politics. Possibly hams of those days were more concerned with their craft. Anyway, nu2GP (the informal lower-case prefixes were called intermediates then, oa for Oceania-Australia, eg for Europe-Great Britain, ei for Italy, etc.) succeeded in shipping almost forty of these gems to far-away colleagues eh4AU, eg5BY, one-armed eg5BD, eg5ML, eg6QB, ei1BD, ei1FP, oa2HM, oa3HL, oa4GO and others, some of whose suffixes still ring. The art indeed still lives — long live the art!

What:

Fifteen meters is very much alive and kicking, too, as voluminous correspondence attests. One live-wire group still very concerned with the craft can be found daily in the

15 Novice notch where WNs 2DRS 2FQF 2HFB 2JAM 4JYB 5YAV 5YMW 6JUJ 8DSF 8VJG and 0WOW trade felicitations and wallpaper with CEs 1AT around 4 hours GMT, 2RM 2, CO2CN 21, CR6s CK 17, KV 22, LK 20, CTs 18H 17, 2AC CX9BT 23, DJs 1KK 1WR 1WU 2PF 3BE 4SK 5GG 7HZ 8PA 9HB 0FRI, DKs 1AR 1WV 2CT 2JO 2YU 3FA, DLs 1DQ 1NA 1VT 1XZ 3RK 4BW 4EP 4MG 4QP 4UU 5DC 6GY 5SB 5HJ 6HJ 6SB 7BC 8OB 8WA 9FG, DMs 3BG 3KFC 4GH 4VH 4ZWD mostly 15-20, EAs 2HR 8GP, Fs 2XY 3AT 3NB 5RK 5SR 5FQ 6KY 6NF 5WA 5XP 6AAX 6AER 8AX 8GD 8JH 8WK 9AC 9EP 9MC 9VO, Gs 2GK 2IM 3QR 3DJF 3DMJ 3HUT 3ILS 3MWP 3OZO 3OZT 3RDY 3RHP



5H3LV's antenna farm, facing this landscape of DXotic Tanzania, is your "How's" QTH of the Month. (Photo via WAIKQM)

17, 6AF (35) 12, 6BC 13, 6EK (8) 13, 6DX 6FX 13, 9MB (32) 15-17, VU2s AJ BEO KV LJO (5) 12, OLK 8, VZ (39) 15, W01Z/UL7 (128) 0, WY6ASE (116) 12, WP41/PM, XE1s AAG (20) 22-23, DC, XW8s BP (10) 14-15, CD 23, CR (37) 15, C8 (55) 14, YAZHWI, YB8s AA AAR 13, AAF (10) 14, YOs 3JA 7VF 8DD 8ME 91D 9HI and others, YS10 (18) 22, two dozen YUs, YV4s 4ID (86) 20, 5BNR (60) 21, 5CKR, ZB2s BO (30) 20, BS (37) 16, ZC4BX (7) 17, ZDs 5X (30) 19, 81B (23) 21-20, 9BM (62) 20, ZEs 1BT (33) 13, 1DJ 2JH 8JW (43) 16, ZFLAA, ZLs (and ZMs) 1AH 1HW 1IL 1TZ 2ALZ 2CJ 2GH 2HY 3ADP 3GQ 3IS, ZPs 3AL (50) 19, 5CE 5EA (75) 19, 9AC 22, 9BG (40) 22, ZSs 1ACD 1EJ 1EK 1OU 1PH 2RM 4KC 5NF 5LB 5BY 6CR 6J all 14-22, 3V8NC (31) 16, 4M5AT 17, 4S7s 5X (30) 19, 4A (14) 18-19, NG (25) 23, 4U1TU (24) 13, 4X4s CJ 15, FU HQ (60) 17, JY KJ (6) 22, WN 18, 4Z4s BR 18, FH (50) 16, NBS (26) 17, NCC (35) 21, 5As PTN (49) 16, 4TP (50) 15-16, 5H3KJ (10) 9, 5Z4s LS (30) 4, LW (27) 12-13, LY (13) 21, 6W8s BJ (12) 0, CQ (54) 18, DY (70) 18, GE (29) 17, XX 19, 6Y5CM (6) 18, 7P8AB (33) 20, 7QZAM 21, 8P6s AE (50) 20-23, BU (30) 21, 9F3USA (25) 23, 9G1s GE (9) 22, HM (30) 18, 9H1s AY (9) 17, AZ (23) 21, BM (38) 16, BT (85) 13, BV (65) 13, Q (50) 19, 9J2s BR KW (73) 19, MG (36) 16, WR (36) 21, 9M2LN (28) 9, 9N1RA (77) 9, 9O5s EH (87) 15, W8 (37) 21, 9USDL (95) 12, 9V1s OY (37) 16, PC PD (25) 14 and PL 13.

* * *

Fifteen phone ought to be the next step for the "How's Bandwagon, courtesy Ws 1ARR 1VRK 2DY 3HNK 4YOK 6YRA 8YGR 9BF 9LNQ, K4TJW, WA 1FHU 1JHQ 1JKZ 2BHH 2FOS 2YWR 6EQW 9SQY, WBs 2DZZ 2GVE 4KZG 4LIL and reporters now filing. Then we'll have to spot-check other slots with (10 phone) Ws 1DAL 3HNK 4YOK 6YRA 8YGR 9LNQ, WA 1FHU 2FOS 4ZUW 6EQW 9SQY, WBs 2DZZ 4KZG; (10 cwt) Ws 1D1TY 3HNK 3JZL/5 4YOK 8YGR, Ks 3CUI 5MHG; 9 8DHT, WAs 2FHU 2YWR, WBs 4EPJ KZG; (20 phone) Ws 3HNK 4YOK 6YRA 8YGR 9LNQ, K4TJW, WAs 1FHU 2FOS 4ZUW 6EQW, WBEKZG; (20 cwt) Ws 1DAL 4YOK 8YGR, Ks 5MHG/6 8DHT 8TRF 9G8V, WAs 1FHU 2FOS 2YWR 9SQY, WBEKZG; (40 cwt) Kss DHT TRF, WAs 1JKZ 2YWR; (40 phone) WAlJKZ; (80 cwt) WISWX, K8DHT; (160 cwt) W1BR and K8DHT. Hey, DX on 75, anyone?

Where:

HEREABOUTS—"QSLers of the Month" CP5FB, H EA6BD, H1ZBE, ET3USA, FB8ZZ, GCs 3UQM 5AGA, G14RY, HBX9V, HP1IE, KC6CT, KH6NR, KH6, KL7GJY, KP4s ANCA, TA1RF UA3AV, UW3ZO, VK1LN, VPs 1RC 2VI 2VF, VR1L, XE1TX, YAs AB GNT, Y81IL, ZD3D, ZL2AFZ, ZM1AAT/k, Z83BS, 487J, 5R8AS, 7Q7WW and 9G1CM, plus QSL lenders Ws 2CTN 6FQ 6NJU 9VW, K8s BCK BQ, WA9UVE, WBs 2RLK 8ABN, VEs 3ACD 3IG 4SK, D14SK and P8US, are commended for postboard promptness by "How's" correspondents Ws 18WX 4JUK, K8s DHT TRF, WAs 2HHU 9ZCP, WBs 2BMQ and 4KZG. Any praiseworthy possibilities in your postbox lately? WB2BMQ, out to balance his QSL books, seeks current QTH clues on EAs 6AR 6B, 8FD '66, H1C5EJ '65, TU2BE '67, UC2KMZ '67, VE8MC '66, YS1JCSE '65, 3C8MA '67 and 5A2TZ '67 WB8BTU volunteers his services as QSL manager for needful overseas ops. FM7WF will take care of the others himself," says W4OPM, Stateside QSL helper for that one. Joe gets logs monthly and requires the customary s.a.s.c./GMT (self-addressed stamped envelope Greenwich Mean Time) cooperation. W6CCD disclaims QSL managerial connections—save your stamps—and W6HS tells WA4YJH he didn't use his F8B tag in late October despite contrary evidence. Ws 8IBX and 9DY claim DXcellent results in patronizing outbound QSL services. "Sure saves time, energy, postage and nerves," asserts Kurt. "KZ5I-HPIXWS is back in Virginia as W4WSP," advises W4KZG. "I'll continue to handle QSLs for his C.Z. and Panama QSOs." VP2s EA EM and EQ radiate the new Anguilla suffix effectively. Portuguese stations may try their CS-CU labels occasionally. HT tags are mentioned in Nicaraguan connection. CV is another Uruguayan species, and Russians lately display calls like U4L7G and UK8A. DX News-Sheet hears that ILS.R. club co-op callsigns such as UP2KAA and UG6-KAB may change to UK2PPA and UK6GAB under proposed revision. Meanwhile, back on our farm, prefixes also slip away from purposeful identification norm. Wf and Wx? No, not rare Novice DX, just New York and Pennsylvania.

ASIA—"QSLs accompanied by four International Reply Coupons (IRCs) can be answered direct," says TA2AE, promising 100-per-cent response on that basis. W5Q1PX hears from the *Callbook's* DX editor Helen White that the Turkish government is periodically interrogated for QTH information. "In order to avoid getting anyone in trouble . . . we have agreed not to publish individual listings until we hear direct from them." This also may hold for a few other countries whose amateurs are not listed though patent-

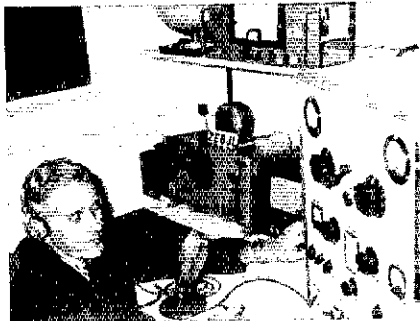
ly active. WB2BMQ wound up in the hospital for fourteen months before he had a chance to use his HL9UK tag. "Either the call was pirated or there was some misunderstanding somewhere. As original holder of HL9UK I understand it will not be reissued before August." 4J is another prefix sometimes used by contest hounds in eastern Russia, and YERON's DXpress has it that VU2NT intends to make Yemen's new Seven-Oscar label audible while on government assignment there. K6OZL/1, no right hand man on WICW's ARRL DXCC Desk, instructs that he no longer handles VU2DIA cards. Ron suggests the address in the list to follow.

AFRICA—"5U7AC, QRT since June, is now F9CJ with no plans to return to Niger," appraises QSL aide W9RKP. "I have all his logs back to 1961 plus a good supply of QSLs, S.a.s.c. and GMT QSO data will do the trick." FB8WW QSL hunters be advised that ex-W4MYE does the job back in Jersey as K2MGE again. WB2UHZ 2, another XL QSL rep, is hamstringing by lack of CR6CK logs. Beverly writes, "For lack of something better to do I'm forwarding 150 cards to Tony with an offer to drop his return QSLs into the nearest mailbox. Please tell the gang to go direct." WA9UET affirms, "I'm ZS1ACD's QSL manager for North and South America QSOs since October 25, 1969. S.a.s.c. applications receive reply direct, others via bureaus." "I've temporarily retired from QSL managerial work," announces W9JVF, turning ZD3D chores over to WA9UVE, 5H3MA duties over to VE3DLC. But note that VE2DVCY also claims responsibility for ZD3D QSLing since October 1, 1969. Regarding overdue ZD8JL confirmations W9JVF states, "No answer to my mail for eight months so I have no logs for the job." Try your luck direct, men. "EASGK's cards are too large for standard-size envelopes," cautions K6GAK, Antonio's Stateside QSL agent. VE2DVCY, who also handles wallpaper for FG7TC, FO8BY and VP9KK, reports he has all logs for TL8GL, now back in Canada. "As of November 3, 1969, I'm QSL manager for ZS3R," informs W3HNK. Re FL8s, ISWL's *Monitor* reminds us that French Somaliland now is formally known as T.F.A.L., Territoire Francaise des Afars et Issas. Try that on your mailman. DX Report of P1XX tips us off that 5T5AD likes additions to his stamp collection. Usually reliable sources agree that Spanish Guinea EAB areas have been allotted Canada's old 3C prefix for Equatorial Guinea use.



CR9AK is guest-operated by qualified DX journeymen from time to time. Here's visitor JAJAER spreading more Macao DXCC cheer from the station's new console. (Photo via W1CW)

OCEANIA—CR84I writes VE7PY, "Your envelope arrived via Jakarta surface mail, opened and empty. Please advise everyone to QSL CR84I only via Darwin or Lisbon." And even then it would be wise to minimize radio reference on cover. A few lowly IRCs still could buy a pair of shoes in some regions. "My QSL manager for W/K QSOs is W5AGJ," confirms VK6IZ. "Otherwise send two IRCs with QSL via the VK6 bureau, or direct to 16 Cowrie Creek, Mt. Pleasant, W.A. 6153. Twenty thousand special Cook Bicentenary QSLs were printed for VK6-land, 500 maximum per station. No worry here, though; QSL printing is my sideline." West Coast DX Bulletin mentions special November 22, 1969 20-meter sideband activity by Solomon's exhibition station VQ4499. "I'm VK8KK's QSL manager for the western hemisphere," affirms W5ONL. "Doug takes his



ZE6JL likes 21-MHz sideband with this Gwelo layout plus an 80-ft-high three-element Yagi. Gerry works in the broadcasting game. (Photo via WICW)

time with logs, so replies may take a while." . . . Now our usual speeches, but be mindful that each datum is necessarily neither "official", accurate nor complete. Just might clinch a DXCC, though. Help yourself. . . .

- GZJW, R. Wirth, Radio Stn., Nauru
 CR8AL, Torres, Radio Naval, Dili, Timor (see text)
 OUIZAW, W. Long, 1941 Kamias st., Dasmariasan Village, Makati, Rizal, P.I.; or, % U.S. Embassy ATO, APO, San Francisco, Calif., 96528
 FA6BG (W/Ks via WIRLV)
 EA8KG (via K6GAK; see text)
 FK8BN, Box 352, Noumea, New Caledonia
 FL8RC, P.O. Box 372, Djibouti, Fr. Somaliland (see text)
 FM7WF (W/K/V/E/VOs via W4OPM)
 GM5APK, CW02 T. Warden (K5AAB), W-4 Dvn., USS *Simon Lake* (AS-33), FPO, New York, N.Y., 09501
 GM5AQA, ET2 T. Schiffer (K8DJZ), W-4 Dvn., USS *Simon Lake* (AS-33), FPO, New York, N.Y., 09501
 HK4XL, Box 50128, Medellin, Colombia
 HL9VV, J. Watson (WA8YDJ), Hq. Btry., 1st Bn., 17th Arty., APO, San Francisco, Calif., 96224
 JA2ECP/mm (via W8KCC)
 JW7UH, E. Oyan, N-9173, Ny-Aalesund, Svalbard, Norway
 KC4AAF, Box 407, Beltsville, Md., 20705
 KR6KN, K. Morris, % REFC CPO, Box 344, Naha, Okinawa
 MP4TCE, P.O. Box 176, Sharjah, Trucial States (or via DJ2AM)
 OA4LM, Box 575, Lima, Peru
 OA8D, Apto. 216, Iquitos, Peru
 OK2BN, P.O. Box 60, Zdar, Czechoslovakia
 PHLCG/mm (via W8BFTU)
 PY7AW/PX, % J. Filho, PY7PO, Box 341, Recife, PE, Brazil
 SK8TM, Tekniska Museet, S-115, Stockholm, Sweden
 SV8s WE WG, Box 6X, VOA, Rhodes, Greece
 TI8PE/TI9 (via WA5QFS)

- TU2CS, Box 1900, Abidjan, I.C.R.
 UA3DR, L. Sharapov, P.O. Box 111, Moscow, U.S.S.R.
 UA3FF, P.O. Box 45, Dolgoprudny, Moscow, U.S.S.R.
 UA9VH/JT1, P.O. Box 639, Ulan Bator, M.P.R.
 UK8A (via CRC, attn. UW3HV; see text)
 VK8KK, D. McArthur, 4417 Bul Bulst., Ludmilla, Darwin, N.T., Australia 5790 (see text)
 VP1HG, 121 Amara av., Belize, Br. Honduras
 VP2EQ, Royal Sigs. ARC, BFPO 643, London, England
 VS9MZ, BFPO 180, GPO, London, England (or via G3KUB)
 VU2s DI DIA, B.S. Hegde, A-73, D-2 Flats, Moti Bagh — 2, New Delhi, India
 VU2DK-2DKZ-8DK, Z. Kabraji, P.O. Box 104, Poona, India
 VU2JV, J. George, Box 725, Madras, India
 YU8GJ, D. Dhalla, Box 5588, Bombay, India
 XF4s FB J KS (via XE1J)
 ZS1ACD (via WA9UET; see text)
 ZS3R (via W3LINK; see text)
 ZS3XQ, A. Smit, P.O. Box 3736, Windhoek, S.W. Africa (or via WA4UX1)
 7QZJG, P.O. Box 352, Blantyre, Malawi
 9K2AY, J. Keosathan, Box 4743, Kuwait
 9N1RA, Jinny Beyer (W4IDG), Box 81, Katmandu, Nepal (or via K6OE)
 9U5DL, P.O. Box 92, Burundi
 9X5MG, P.O. Box 564, Kigali, Rwanda
 CZ1AG (to KH6AG)
 CP8IZ (via CP1AA)
 CR6K (see text)
 DM9ABH (via DL1YQ)
 FB8WV (via K2MGE)
 FG7TC (via VE2UCY)
 GG5AGA (to K41)
 GD3TXF (to G3TXF)
 GW6GW (via GW3XNT)
 KC4USP (via K2BPP)
 KR6KW (via OARC)
 LU1ZR (via LU2CN)
 VK8HM (via WA6EAM)
 VP8JV (via W2GHE)
 VP8H, H (to G3LRZ)
 VS6HK (via HKART8)
 WINU/VP9 (to WINU)
 WF2IIB (via WB2FJZ)
 WX3MAS (to W3OK)
 ZD3D (see text)
 ZDRJL (see text)
 ZF1AN (via W2SUC)
 ZM1BN/a (to ZL2AFZ)
 ZS1AMB (via ZS6BBK)
 LX1JAN (via LX1CG)
 LX8BD (to G3BIL)
 M1I (via 11BNZ)
 MP4BGX (via G3RHQR)
 MP4TDA (to G3HSE)
 5H3MA (via VE3DLC)
 ex-5U7AC (see text)
 8Q4YL (to 487YL)
 9U5RH (via ON8TO)
 9X5SP (to DL8YA)

Any benefits accruing from the foregoing catalog must be credited to Ws INWX 3HNK 4JUK 5ONL 6CCP 9JVF 9LMQ, Ks 40CE 6OZL 8DHT 8TRF, WAs 1FHU 1JKZ 9ZCP, WBS 2BMQ 2HTE 4EPJ 4KZG, WN5YMW, TA2AE, Columbus Amateur Radio Association *CARA-scope* (W8ZCQ), IARC's *DX-MB* (DL3ERK), *DX News-Sheet* (G. Watts, 62 Bellmore rd., Norwich, Nor. 72 T, England), Far East Auxiliary Radio League (A1) *News* (KAZLL), Florida DX Club *DX Report* (W4PRO), International Short Wave League *Monitor* (A. Miller, 62 Ward In., Selly Oak, Birmingham 20, England), Japan DX Radio Club *Bulletin* (JASU), 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), *QSL Managers Directory* (W6GWS), Southern California DX Club *Bulletin* (W6GGLL), *USA's On the Air* (ON8 4D 5VA), *VERON's DXpress* (PAs FX LOU TO VDV WVP) and West Coast *DX Bulletin* (WA6AUD). Peppy bunch, our DX fourth estate!

Whence:

ASIA—"I've been in Nepal with my husband for eighteen months," writes W4IDG, formerly K6RQB. "Tried to get a ham license since I arrived, and finally became 9N1RA in early November. We'll probably be here another six months." Jinny fired up on 15 and 20 cw with a vertical and transmitter borrowed from neighbor 9N1MM. Watch for her now on 10 through 20 with Yaesu gear on voice and code. Jinny's pop is K6OE and she's also proud of a pair of sons, two and three. . . . "Since beginning operations here in '67 I've been interested in trying to do something a little different," comments XW8C's (W3DBT). "Eighty meters seemed to present a good challenge. Much time, expense, labor, wire and many 7-through 28-MHz contacts at last resulted in a November 21st QSO with W1EVT on 3530 kHz at 1123-1125 GMT. My neighborhood is decked with six antennas for 3.5 and 7 MHzs, long-wires, dipoles and verticals. Even tried loading my 60-ft tower for DX but an ordinary folded dipole did the job. I'm look-

9N1RA (W4IDG), sunning at left, excites the DX world on code and voice. What's pert Jinny doing 'way off in Nepal? Her economist husband is on Ford Foundation assignment there. The famous other half of the country's ham population, good friend Fr. Moran, 9N1MM, appears at right with Jinny's dad, K6OE.

ing for more W/Ks around 7005 kHz at 1100 GMT, 3630 at 1115-1145, especially those east of the Mississippi. Have any other XW8s worked the States on 80 in years past?"

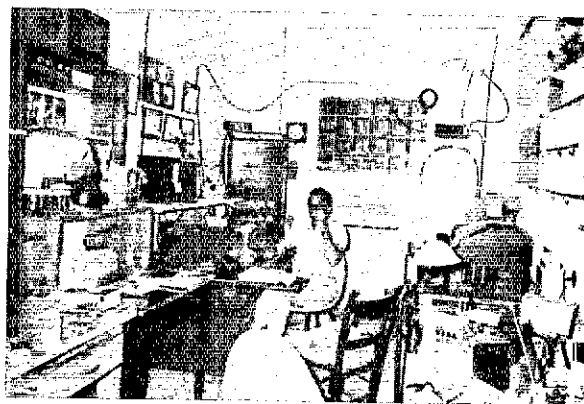
"I use a V-nak-III and homebuilt triband quad a bunch of us Army boys threw together in two hours of a Sunday afternoon," reports HL9VV (WA8Y1DJ). "The wood and wire antenna's performance amazes me though it barely clears the ground. You'll hear me mostly around 21,050, 21,300 or 14,275 kHz, 1100-1400 GMT." Perhaps you worked Jim previously as KL7FRX or KL7FRX/3

..... WIs ALP and ZJE hear that KIAAG is to sign KA9AG on 15 and 20 cw from Chitose ARSI (India) issues a Gandhi Centenary version of the Worked Republic of India certification under revised 1969-70 rules for sufficient contacts with VU brethren. Consult VU2CZ for details. "9M2FK wants U.S.A. cw QSOs on 14 or 21 MHz around 0100 or 1100 GMT," says ARRL Minnesota SCM W8PAN WA9ZCP, gathering bundles of convenient Asians on 10 sideband, commends the sock of JH1AJT's 7-element Yagi TA2AE scampers down a list of active young Turks: TAs 1KT 1NC 1M1 2SC all have HW32s, 11B has a 753, 2EA an HW100 plus NC-200 and homebuilt sender. Oriental chatter via aforementioned periodicals: 8QAYL, with VU2KV and pals running block, showed on 20 sideband from the Maldives in December courtesy 487YL, JT1s AD AE AG AH AJ KAA KAF, JT3s 2AA 2AF 2KA, 3KAA and 4KAA are all supposedly functional in the M.P.R. On vhf? ... IISICB and rare friends pop up in the Southeast Asia Net, 14,320 kHz at noon GMT. ... This could be the month for O15BZ's threatened Qatar junket as MP4QBK.

OCEANIA — "VK9BS of Papua is usually on the Pacific DX Net every Friday," observes W3HMK. "Rob is often QRV for W/Ks around 1100 GMT, 14,200-14,275 kHz." Via VK6IZ: "VK6NK, sporting a new 70-ft tower, works the U.S.A. on 1803 kHz. I've been sampling 14,030-kHz cw with 50 watts lately but will become more active for 5B-DXCC QSOs on 40 and 80 code and voice with my new FTDX-400 and FL1000. By the way, VK6LT will spend two years in the Tonga islands with limited funds. Anyone caring to help a new VR5 become active can reach him c/o J. J. Broe, P.O. Box 49, Nakulofa, Tonga." VK8A-F-W50NL clarifies, "VK8AV, pictured in your December pages, has moved to South Australia, VK5 call unknown to me as yet, VK8KK, famed on vhf, is now located in Darwin." "ZL1AYG tells me he puts 50 watts and a 130-ft-high 1250-ft long-wire on 1856 kHz week ends at a spot twenty miles north of his Auckland home," relays WA9UET. "With that antenna a K2 gave Tony RST 569 on seven watts input. ZL1AYG welcomes top-band skeders." Pacific patter courtesy DX literature of clubs, groups and individuals: Ex-KW6EJ is reported behind KC6EJ emanations from Ponape on 20 phone. VK0HM should be heard from Heard Isle for a few more months, mainly 14-MHz voice. Multimode ZM1BN/a of the Snarens may get over to the Antipodes, Bounty and/or the Campbells on occasion before imminent shutdown.

EUROPE — REF's 1970 French Contest will be going great guns on cw as this QST gets around. Participation particulars appeared here last month — don't forget the voice portion due February 28th and March 1st. In the '69 version cw entries exceeded phone filings 236 to 62 among non-F participants. Vaok rank by code score: Ws 2MEL 3BYX 9JQD, WB2BUU, Ws 4WSF 3G1D 4HOZ 5KC 2NGG 2ALP 9QWM 8IBX/2 and 2SRZ. By mikeit went F2YS/W2, Ws 4WSF 3BYX 9LKI and 5QNG. VE2NV, VO1AW, VE1s AE and DB finished in that cw order for Canada; VEs 2AFC 2BR 3BS and 6GN ran 1-2-3-4 on phone. Leaders by country included (cw) CR6EI, CT1MO, DL6WE, DM4ZXI, EA2HR, G2WQ, HA8UD, HB1F, JA2IAA, LA2Q, LU1BB, LZ1SS, OH2BDL, OK2QX, OZ1LO, PA3WAC, SM5BNX, SP8HR, UA1CS 2KBD 9BZ, UB5MZ, UC2WP, UD6BW, UF6BD, UG8JJ, UJ8SX, UL7JT, UP2CT, UQ2AS, YG1BCD, YU4HA and YV10B; (phone) CT1WB, DL8EJ, EA3RF, GB3AA, GM5AMB, HA3MH, HP1JC, HS3AL, HP1N, JA6AD, JX3DH, LA5RJ, OH2SOP, OK1AHZ, OZ1RH, PY1BM, SM6CRS, SP8AJK, UW3CX, UV9PP, UB5WB, YO4KCE and YU3TXI

..... K4II enjoyed three operational trips to GC5AGA last year. "Made some 2100 QSOs with 125 countries, nearing DXCC from Guernsey." "CT1s UA UD and UE are gunning for Californians on 21,300-21,315 kHz at 2000-2100 GMT," discloses W3HMK F9KJ can supply scoop on the Albert Schweitzer Diploma issued by REF in conjunction with Gabon TR8s. Thirty QSOs with specific global points, plus a couple of TR8 contacts, and you may be in WIKE, DLs 1PL and 6DS call attention to DL6G1, DARC's beacon marker on 28,200 kHz. A vertical radiator sprays 200 watts continuously within a 50-Hz tolerance. Reception reports are welcomed at Interessen-Gemeinschaft Ionosphaere, Secretary Frau R. Seidler, D461N, Lindenstr. 14, 4813 Bethel, Germany OHs 2HDP 2BH 2BW 2EK 8NI and Swedish friends aim for more DX excitement from the Baltic light-house island called Market reef.



HH9DL bears the brunt of Haiti-hunters QRM these days. Don's ham shack obviously serves as storehouse and workshop for other varied activities. (Photo via WA6AUD, West Coast DX Bulletin)

HEREABOUTS — "FM7WT is again active and maintains schedules on 21,390 kHz at 1700 GMT, Tuesdays or Wednesdays," declares W40PM. "Breakers are recognized." Ex-W1OJR opines, "An Extra ticket and new two-letter call is just like starting all over again." Vic frolicked as W1NU/VP9 in October courtesy RSB's recent Bermuda contest. Five-Band DXCC pursuit comes next on the W1NU agenda WB2HTV and WA2EIV, son and pop, manage plenty of DX with a dipole and 75 watts on 10, 15 and 20 Lawrence High School of Cedarhurst, N. J., sponsored almost a thousand QSOs from Liberty Isle as WF2IB over October 12th-13th, according to club vep WB2EJZ. Similarly Delaware Lehigh A.R.C. multibanded on Christmas from Bethlehem, Penna., as WX3MAS "Hate to see what's happening to the cw portions of our bands," protests W8BS with our Gripe of the Month. "What's left of 20 is getting swamped by isk RTTYs." "VK2AOU's March '69 QST piece on QDUs could have saved me some time and trouble," admits K8TRF who does very well with his own version of a one-loop tribander L1DXA understands that HCBFN desires to DX tend his Galapagos stay and open up DX-peditionary possibilities there for other interested parties.



VP2AZ's Antigua outfit is guest-operated by many a visiting W/K DXer. Bill is popular proprietor of the island's famous Beachcomber Hotel. (Photo via W3VBM)



YL news and views

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

“Où sont les belles dames . . . ?”

HISTORY, as a word, connotes things past. Usually the deep past in which events and persons assume the misty quality of legends long forgotten except in reference material. Amateur radio began and grew to its present status within the lifetime of many of us who are still very active on the air, and yet the early days with the weird huge equipment are unknown to many, and names have long since been forgotten.

In the search for the women of amateur radio who first held a call in their particular country, not all the ladies are just names on an official list. Many of them who are very well known on the air are able to claim that they were the first to receive the privilege of a license and call.

Ruthe Ferguson is W1SCS in Massachusetts most of the year, but when she is operating as ZF1RF she holds the very great distinction of not only being the first woman to receive a ZF call, she is still the only YL operator in the Cayman Islands. In 1954-1955, Claire Bardon, whom we all know well as W4TVT, was the first YL in Trinidad, operating as VP4BC.

The barrier of language is always a problem to those of us who are not linguists, but it is believed that Nancy Broeder, better known as WA2FQX, is the first YL in Turkey with the call letters

*YL Editor QST. Please send all news notes to WB6-BBO's home address: 1036 East Boston St., Altadena, Calif. 91001.

TA1AW. So, unless some student of languages can correct this assumption, “YL News and Views” will accept this as being correct.

Korea's first YL received her call in 1957, when HMIAM was assigned to Mrs. Jung-hyuk Cho.

The effects of the past clouding the official lists is most felt in the several changes in the International Prefixes. The real puzzler lies in 1927 when the radio conference in Washington, D.C., for the first time assigned official prefixes to go into effect January 1, 1929. One of the earliest gals to become the first YL in her country to receive one of these new prefixes is Katherine C. T. LaPierre who is still active with her original call OA4CM from Lima, Peru.

Not all the gals who were the first to give the feminine aspect to amateur radio in their respective countries are still active, nor are they more than names on a list. In our search for the beginning of what has been termed “the distaff side of amateur radio,” we must depend, not on those who can hand us their proof, but rather on the dry printed columns of names and dates. Many of the gals who were licensed, such as amateur radio's first three women operators — FN, Miss Glass, and OHK, Olive Heartberg, of the United States, in 1910; and IXI, Mrs. Ingram, of England in 1913 — are merely names, unremembered by anyone except the historians who must dig deep to find them. Yet by the very fact of the official listing they did exist and therefore were the first in their countries.

Sweden's first YL is among these unremembered women for there is only the government listing that on September 30, 1925, the call SMTA was assigned to a Mrs. Madeline Kreuger. The 1924 *Callbook* gives us 3QT, Miss M.C. Cross, who, as far as can be discovered was Canada's first YL. Another strange sounding call, because its IARU-type intermediate has long since been forgotten, is BZ7AB, held by Odette Chavez in Brazil in 1927 before the newer ones were adopted.

9N1RA, Jinny Beyer, received her license to operate in Nepal in November 1969. Originally licensed as K6RQB, Jinny later held W4IDG before she went to Nepal with her OM. Jinny works mostly 15 and 20 meters, and is presently doing volunteer work in Nepal at the school for deaf children.

QST for



The poet Swinburne once wrote:
"Can I forget? Yea that can I,
And so can all men, so will you."

In order that we don't forget, "YL News and Views" is anxious to be able to record these gals, so that some day, if we are asked, we will not replay with Francois Villon, "Mais, où sont les neiges d'autan?"

More on the YL Suffix

Theodore Hannah, K3CUI is responsible for the lifting of the language barrier and adding three more distinctive calls to the list of YLs who hold that exclusive suffix. In Czechoslovakia, there is OK2YL. Russia has UA3YL, and UA4YL. He also suggests that possibly UB5YL in the Ukraine, and UF6YL in Georgia could be YLs if the masculine-feminine name pattern is followed there as in other Slavic countries.

In answer to several requests that specially assigned call used by YLRL at the International YLRL Conventions was W1YL in 1960, W8YL in 1964, and K0YL in 1968. The time period that these calls were in use was during only the three day period covering each convention.

Carolyn Currens, W3GTC

How many of us decided to get our license because the OM confessed he'd "always wanted to be a ham," and finally was getting around to doing something about it? This was the case with W3GTC, who thought "what's sauce for the gander can be just as tasty for me, so I'll go along for the ride." Carolyn got her Novice in 1956, and dropped her N early in 1957 when she passed General Class.

Of all the certificates she has earned, and the many awards she has received, the one most highly prized is the award from the Chapel of the Four Chaplains for her outstanding Public Service. This Legion of Honor Membership award is given for Public Service rendered via amateur radio, and in 1967, Carolyn was honored for her work in coordinating and planning the communications work of the annual Powder Puff Derby.

When she is not up to her ears in preparation and planning of AWTAR, Carolyn's favorite on the air activity is "just plain rag chewing," preferably with other YLs. She can be found on 75 "except when 10 meters is open and 'hot'." She holds YLCC, Lads and Lassies, Grandmothers", Blue Ridge Net, and Penn-Jersey certificates, and is a member of YLRL, and the Penn-Jersey YLs.

Plan Ahead — Mid West YL

The 18th annual Mid-West YL Convention will be hosted by the TASYLs this year at the Ramada and Voyager Inn in Flint, Michigan on June 19, 20, 21, 1970. The Automotive State YLs have promised something for everyone who attends, and extends a particularly warm welcome to the OMs who like to accompany their ladies to this annual event.

Remember Mid-West YL is not limited to YLRL membership only. It represents all licensed women amateur radio operators. Nor is it necessary to live in the mid-west to attend. The theme is radio, and the setting is feminine, so say the TASYLs, so, if you're a gal, and have a license — come join them.

Will You Be Part of It?

The period of time from February to July seems endless, but not to the busy women who are working for another successful Powder Puff Derby in 1970.



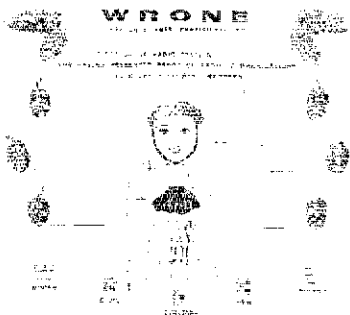
W3GTC, Carolyn Currens.

Communications is the lifeline of this annual event, and amateur radio maintains that vital link with the women flyers. Operators are needed not only at the beginning and the termination points, but along the route that these ladies will fly. Any YL who wishes to become a part of this quite unique service to the woman flyers is requested to let Carolyn Currens, W3GTC, P.O. Box 523, Norristown, Pa. 19404, know of her availability so that all plans may be completed well in advance.

Meet the Club — WRONE

W1 YLs met informally as early as 1950, but it was not until 1955 that serious consideration was given to the idea of a formation of a club for New England YLs. In October of that year a tea was held in Boston with W1TRE as chairman, and 31 YLs attended. The official name, Women Radio Operators of New England, was chosen, dues were set, and W1TR0, W1SVN, W1QON, W1RYJ, and W1VOS were elected as a five member executive board. That first meeting also saw the beginnings of a YL net on 3890 kHz to keep members and other interested women operators in touch with YL doings.

WRONE was growing rapidly by 1958 when it was decided to try to spark interest in all five New England states. It was this year that also saw these gals decide to host the Third International YLRL





MINOR Net members who attended the 1969 Walla Walla Hamfest. Front row: K7UBC, Verda, WA7DXI, Dixi, WA7BDD, Joan, W7WLX, Ethel, and W7MFS, Gladys. Back row: K7PVG, Freida, W7ONL, Dot, K7RAM, Bobbie, WA7FRM, June, W7IXR, Esther, W7FDE, Alma, WA7IRD, Willie, and WB6RFE, Lucy. WRONE certificate.

Convention in Boston in 1960. In 1959 the club certificate was adopted and "Miss WRONE," who began as a favor at one of the meetings, was adopted as the club emblem. The emblem, symbolic of New England's oak trees and winter sports, is used on the club certificate, stationary and newsletter.

WRONE sponsors two nets. Yankee Lassies on Wednesday mornings, on 3910 kHz, at 0830 EST, and the New Englanders, on Wednesdays, on 50.65 MHz, at 1400 EST. The club newsletter is called Miss WRONE's Chatter.

WRONE holds two luncheon meetings a year, the first Saturday of November, and the first Saturday of May. Any and all YLs are welcome to attend.

WRONE holds an interesting distinction, over the past 10 years, members from this very active YL club have been busy, not only with their own club affairs, but also in YLRL holding all of the executive offices in YLRL at various times. Three of the members — W1ZEN, K11ZT, and K1EKO — have been YLRL President.

There are two membership requirements: first, the applicant must be a YL, and second, she must hold an amateur radio operator's license. The custodian of the WRONE certificate is K11ZT.

30th YL Anniversary Party 1969

Club Winners

WA8EKQ	1720*
WB6QMD	1632
WA9TVM	1632

Top Combined Scores

K6DLL	7163
WA9TVM	5569.50
WA5OVX	4965*
W4HWE	4774
K4RHU	4862.25*
WB2OQU	3636.25*
W9GHO	3092.50
VK3KS	2575.50
ZL2JO	2329.50*
WA8SFX	2320
WA6JFZ	1235*
WA8USU	1650*
WA2FGS	1005*
VE7ADR	2581*

Club scores

K1QFD	1125*
WA2WHE	1400
WB2OQU	1202.50*
WB2FYI	726
WA2FGS	292.50*
K3SQX	400*
K4RHU	1156.25*

Phone Winners

Top scores not indicated by YLRL Vice President.

Corcoran Award

World DX, Hager Award

North American Hager Award.

W4HWR	168*
WA5OVX	1215*
WA6VJW	864
W5JFZ	593.75
WB6QMD	1632
WA6MIW	920*
K6DLL	380*
WA6ISY	36

WA7BDD	625	K5PFF	375*
K9QGR/7	540	K6DLL	6783*
WA8EKQ	1720*	W6AOE	4567*
WA8USU	1500*	WA6ISY	600*
K8ONV	884	W7RVM	6612
WA8SFX	580	K7UBC	6000
WA8ARK	450	WA7FLC	1749
WA9TVM	1632	K9QGR/7	400
W9GHO	687.50	WA8ARK	4601*
WA9KVL	4472*	K8PXX	4927*
WB6FW	660*	K8ITF	4125*
KP4DGP	143	WA8SFX	1740*
VE1AMB	712.50*	K8TVX	1667.50*
VE5DZ	797.50*	WA8USU	150*
VE6ATH	664	K9LUI	6050
VE7ADR	493	WA9TVM	3937.50*
G2YL	150*	W9GHO	2405
VE3KS	1417.50	WA6KVL	4418
Y5CKR	840*	W9UUV	3105*
ZL2JO	237	K8EPE	2013
<i>Phone Scores</i>			
WB2OQU	2433.75*	WA9TNI	1157.50*
WA2FGS	712.50*	K8JFO	990*
K2OYG	165*	WA6MVO	630*
WA3ATQ	4950*	K8BTY	852*
W3TNP	3515*	VE3GTI	3486
W3MDJ	2832	VE8ST	1203
K3TNL	630	VE7NW	4350
W4HWE	4606	VE7ADR	2088
K4RHU	3526	KL7PPM	285
W4EHN	3159	KP4DGP	2850
K4DNL	3018.75*	DL8LS	3720
WA4UWK	907*	G8LY	383.75*
K5HJU	7085	HK5AZA	2218.75*
K5OPY	4753	JH1GMZ	442
WA5OVX	3650*	PY2SO	3992
WA5TYH	3520*	VK3KS	1155*
K5MIZ	1518.75*	ZL2JO	2092.50*
WA5JFZ	641.25*	Z85OB	2114

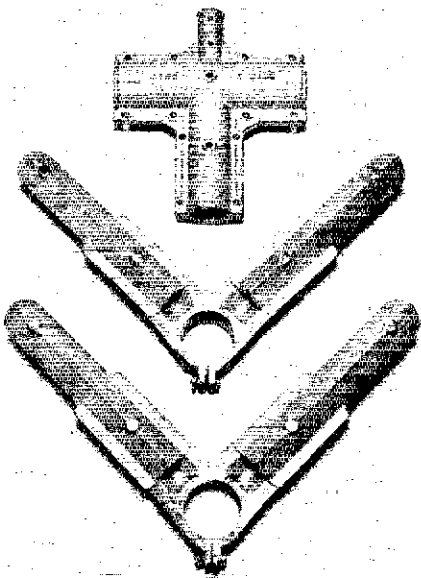
* Indicates low power multiplier claimed. Confirmation logs submitted but no claimed scores. Cx-W3CDQ. Phone — W5ZPD, K1EKO, W7NJS, W6-NAZ, W4BLL, YV5CKR. "YL News and Views" congratulates all the winners of this celebration of the 30th Birthday of YLRA.

Strays

Marie de Forest, widow of Dr. Lee de Forest, inventor of the vacuum tube and many other electronic devices passed her General class and holds the call WB6ZJR.

The ARRL film, "The Ham's Wide World," has cropped up all over on TV. Now radio broadcast stations can get into the act, too. David G. Flinn, W2CFP, of Stellar Industries, is making available to broadcasters at cost the series of 40 ten-minute programs on amateur radio which he used on an Ithaca radio station. He's also launching a new series of five-minute shows. Mimeographed information on the programs can be obtained directly from Dave, at 10 Graham Road West, Ithaca, New York 14850.

• New Apparatus



Kirk Delta-Loop Hardware

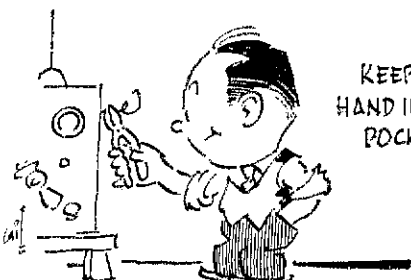
FOR those amateurs interested in constructing the Delta-Loop beam,^{1,2} Kirk Electronics, 6151 Dayton Liberty Road, Dayton, Ohio 45418, manufacturers of beam hardware, have come out with a line of element and boom supports. Shown in the photograph is a pair of V element supports and a boom-to-mast mounting fixture.

Hubs for the V supports are available in three sizes: 1½, 2 and 3 inches (the 2-inch size is shown in the photograph). The angle of the supports, which is 90 degrees, allows for element warping to put tension on the top wire.

The 1½-inch mount is priced at \$4.95, the 2-inch mount is priced at \$6.95, and the 3-inch unit is priced at \$9.95. Kits consisting of two V supports and a boom-to-mast unit are also available. They are priced at \$13.85, \$18.85 and \$26.85 for the three sizes mentioned above. — *W1ICP*

¹ Habig, "The HRH Delta-Loop Beam," *QST*, Jan., 1969.

² McCoy, "The Delta Loop On 15," *QST*, Jan., 1969.



KEEP ONE
HAND IN YOUR
POCKET

Silent Keys

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

- WA1BEH, James Loring, Jr., Bethel, Maine.
 W1DHB, Clifford L. Hunt, Marshfield, Mass.
 W1FTU, William Boyd, Newcastle, Maine.
 WA1HKP, Harold Frost, Holden, Mass.
 W1UOB, Dean F. Waldron, Rosindale, Mass.
 K2BYG, Burt Gardner, Pompey, N. Y.
 WA2DKL, William Prato, Valley Stream, N. Y.
 WA2DZE, Anthony Imbimbo, Sr., Bergenfield, N. J.
 WB2EJR, Nelson Tucker, North Beach Haven, N. J.
 W2HAM, Louis Battaglini, Union, N. J.
 W2JPV, August A. Greber, Paramus, N. J.
 WB2JXV, Zeno Tokazewski, Trenton, N. J.
 W2LAX, Russell C. Schilling, Little Falls, N. J.
 W2TWP, Paul A. Yerger, Bloomsbury, N. J.
 W2YNE, Paul H. Walton, Glassboro, N. J.
 WA2ZCR, Robert M. Lewis, Peekskill, N. Y.
 W3EWT, Jacob Charles Meier, Nokesville, Va.
 K3FRF, Robert W. Pattison, York, Pa.
 W3ME, Robert E. Lorentson, Broomall, Pa.
 W3OHK, Arthur E. Vosnal, Pittsburgh, Pa.
 W3UQR, John A. Maskol, Baltimore, Md.
 W3WE, William C. Ellsworth, Oxon Hill, Md.
 W4AHL, Roy L. Lambert, Florence, Ky.
 W4HHX, Eugene W. Eggleston, Orlando, Fla.
 WB4ITV, Monroe D. Godsey, Memphis, Tenn.
 WB4KAJ, Roy R. Whitted, Sarasota, Fla.
 W4RPF, Horace L. Kincaid, Louisville, Ky.
 K4UOA, V. Robert Boltonley, Greeneville, Tenn.
 WA4YDT, Lloyd M. Shelton, Chattanooga, Tenn.
 K4YEE, James B. Racey, Clifton Forge, Va.
 W4ZLS, Frederick H. Allen, Winston-Salem, N. C.
 W5CDU, Joseph G. Buch, Dallas, Texas.
 W5MDF, Robert M. Butsch, Bay St. Louis, Miss.
 W5TIK, Alonzo W. Kendall, Austin, Texas.
 W6AOU, Frank J. Trammell, Spring Valley, Calif.
 W6AQ, Charles Huntley, Belmont, Calif.
 W6BGR, Robert V. Pitts, San Francisco, Calif.
 W6DAA, Cdr. Wilfred Munter, USNR Ret., San Diego, Calif.
 W6MUN, Jess Popanz, Quincy, Calif.
 W6NKZ, Clark Anderson, Fresno, Calif.
 W6PNJ, Robert S. Dewire, Alhambra, Calif.
 W6RSQ, Harlan M. Gregg, Northridge, Calif.
 W6TYU, Gyle Cullumber, Torrance, Calif.
 W6ZWI, Roy Roskilly, Lake View Terrace, Calif.
 W7CBE, Elwyn A. Eastman, Seattle, Wash.
 W7DNT, Alfred K. Zambakian, Phoenix, Ariz.
 W7LWB, August Kerzie, Seattle, Wash.
 K7SIN, Kermit M. Carlson, Oak Harbor, Wash.
 W8AUD, John R. Thorburn, Lansing, Mich.
 W8CIT, Roger B. Johnson, Dayton, Ohio.
 W8CKJ, Victor R. Davy, Elkins, W. Va.
 K8DUO, Martin B. Pettit, White Sulphur Springs, W. Va.
 W8EEL, Wilson T. Leatherman, Rittman, Ohio.
 K8MYV, William A. Robb, Grafton, W. Va.
 W8OGY, Margaret R. Pettee, Marquette, Mich.
 W8SCA, Raul (Paul) C. Lopez, Detroit, Mich.
 W8WM, R. H. Bahney, Put-In-Bay, Ohio.
 W9GHX, Orin T. Graves, Valparaiso, Ind.
 WA9JAO, Montgomery May, Sr., Wilmette, Ill.
 W9NAV, Hugh W. Wilson, Milwaukee, Wis.
 W9OXF, Lowell E. Colclasure, Pekin, Ill.
 W9RNW, Robert A. Larson, Elmhurst, Ill.
 W9SJY, Vionel Woodard, Chicago, Ill.
 W9YAC, Walter W. Peterson, Villa Park, Ill.
 W8CGY, Clarence M. Moulder, Davenport, Iowa.
 W8JV, George S. Carson, Jr., Iowa City, Iowa.
 W8VFI, William H. Whitton, Jr., St. Louis, Mo.
 W8YEV, Edmond Donze, Omaha, Nebr.
 VE3CMO, Boyd Parke, Ottawa, Ont.
 VE4GV, James F. McKay, Brandon, Man.
 VE7WZ, J. T. Mather, Victoria, B. C.
 G3JEL, Waldo B. Hartog, Louth, Lincs, England.
 VK3AJQ, J. R. Kling, Frankston, Vic., Australia.
 VK3KX, Ron Tandy, Colac, Australia.

Operating News

GEORGE HART, WINJM
Communications Manager

ELLEN WHITE, W1YYM,
Deputy Comms. Mgr.

Administration: LILLIAN M. SALTER, W1ZJE

DXCC: ROBERT L. WHITE, W1CW

Training Aids: GERALD PINARD

Contests: ALBERT M. NOONE, W1KQM

Public Service: WILLIAM O. REICHERT, WA9HHH

Sign Your Call. We amateurs are sometimes prone to forget that we are amateurs and think we are ordinary people in their right minds. Again and again, letters, reports, applications and other types of communications are received in which the amateur sending them does not indicate his or her call letters. Even some ARRL officials have reverted to this.

Time was when amateurs knew each other by their call letters alone. You often heard things like, "His call is WINJM, but I forget his name." The name was unimportant, because chances were good that there were about a million or more people with the same first name and hundreds or thousands with the same last name. The call positively identified him as an amateur, and the only person holding that call.

Preaching this philosophy in March '58 QST, we were chided by one correspondent for making such a big thing of call letters, which he said carried no more significance than his social security number or the number on his Sears Roebuck credit card. We felt sorry for him, and we feel sorry for *any* amateur to whom the call letters are merely an arbitrary "number" assigned solely for the purpose of identification on the air. To amateurs with real ham spirit they are a great deal more than this. They are a badge of accomplishment, of membership in a

fraternity, a kind of status symbol, as well as your identification both on the air and in person at gatherings of amateurs. One could compare the novice license with a grammar school diploma, tech as high school, general as college (conditional an equivalent correspondent course?), advanced as a masters degree and extra a Ph.D. If you as a doctor of medicine, for example, would sign your name John Jones, M.D., as an amateur you would sign it as John Jones, W9XYZ, with the same kind of pride in the amateur field as the M.D. indicates in the field of medicine — and be specifically identified besides.

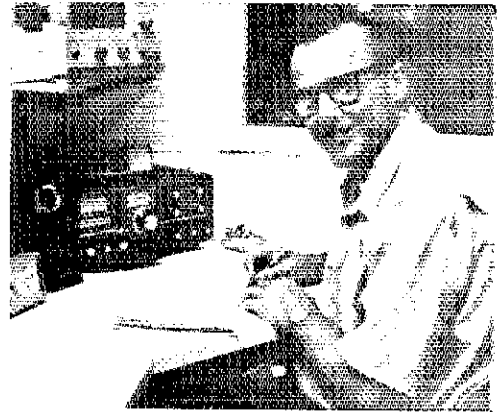
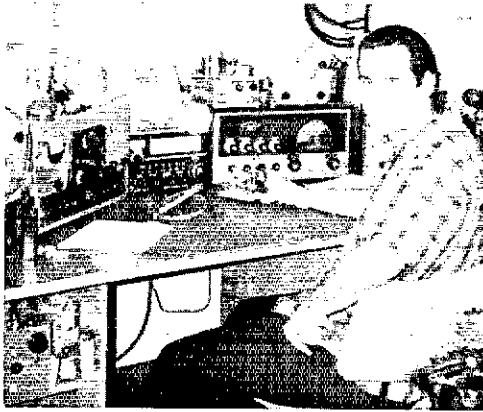
Sign your calls after your names, OMs. It not only identifies you much better than a mere name does but sets you apart as an achiever of status not everyone can attain.

Club Assists. A letter received recently expresses astonishment at the amount of assistance and information available from ARRL, through its headquarters, to high school and college radio clubs. The same letter also wonders why this fact isn't better known.

The League's affiliated club program is probably unique among membership organizations in the extent to which the parent organization lends assistance in various ways to the affiliates, which pay no dues. There are and always have

OPERATING EVENTS (Dates in GMT) ARRL-IARU-SCM-Affiliated Club-Operating Events

February	March	April
<p>4 Qualifying Run, W6OWP 7-8 DX Competition phone, p. 62 Dec.</p> <p>7-22 Novice Roundup, p. 45 Jan. 12 Qualifying Run, W1AW 14 Frequency Measuring Test, p. 102 Jan.</p> <p>14-15 YL/OM Contest phone, p. 97 Jan. QCWA Party, p. 43</p> <p>21-22 DX Competition cw, p. 62 Dec.</p> <p>28-Mar. 1 Vermont QSO Party, p. 104 YL/OM Contest cw, p. 97 Jan. French Contest phone, p. 86 Jan.</p> <p>28-Mar. 15 IARC DX Contest, cw/RTTY p. 78 Jan.</p>	<p>5 Qualifying Run, W6OWP 7-8 DX Competition phone, p. 62 Dec.</p> <p>13 Qualifying Run, W1AW 14-15 Virginia QSO Party Wyoming QSO Party 21-22 DX Competition cw, p. 62 Dec.</p> <p>24 Morning Qualifying Run, W1AW 28-Apr. 19 IARC DX Contest phone, p. 78 Jan.</p>	<p>4-5 New Mexico QSO Party Florida QSO Party 8 Qualifying Run, W6OWP 11 Qualifying Run, W1AW 11-12 CD Party, cw* 18-19 CD Party, phone*</p> <p>* League officials and appointees, only.</p> <p>June 13-14 VHF QSO Party 27-28 Field Day</p>
<p>NOTE: Possible W6OWP Qualifying Run "alternate" (same schedule) is W6ZRJ.</p>		



Meet Your SCMs

On the left is the energetic young SCM of East Bay, Paul Parker, WB6DHH. Paul was first licensed in January of 1963 as WN6DHH and has been interested in amateur radio as long as he can remember. He attended Diablo Valley College and currently is employed as an Electronics Technician by Zeta Research. Gear at WB6DHH includes a Valiant and HT-32B. In fact, he claims that he "almost" has to buy 6146s by the case! A Drake 2-B/BC-779A-RBM 5 supplements the station inside and a 150 foot longwire antenna decorates the yard. He is active mobile on 2-meter fm as well as 40/80 cw. Sports interests include sailing, bowling, chess, trap shooting, fishing and hunting. Farther down the coast, in the Southwestern Division, we find the San Diego SCM Richard E. Leffler, WA6COE. Dick graduated from UCLA with a B.A. in Musicology and Composition and an M.A. in Education from San Diego State College. Dick teaches in the La Mesa-Spring Valley School District and spends his long vacations traveling and photographing. His father-in-law (W6OUQ) helped him along the Novice (1958)-Technician-General Class route leading to his currently-held Advanced Class license. He was the El Cajon Amateur Radio Club Ham of the Year in 1968 and spends considerable time both in Civil Defense and all-band hamming. Side interests include photography, art, writing, music and sports. Not the least of his time-consuming projects concern two young daughters, age 5 and 9.

been two principal requirements, however: one that 51% of the club's membership be ARRL members and the other that 51% of the membership be licensed radio amateurs. The aim was mainly to serve, as groups, amateurs who are already licensed and formed into organizations. Following World War II there was established a training aids program for affiliated clubs, and this has grown in size and scope to include a fairly large film library of sound motion picture films, film strips and slide collections as well as audio tapes and other training items for use by affiliated clubs on a "booking" basis.

Naturally, the program contained much of interest to would-be amateurs. Most amateur clubs include a certain contingent of these, but it soon became apparent that there was a demand for these training materials from high school and other institutional radio clubs whose membership consisted mainly of students often without the financial wherewithal or incentive to be ARRL members. Consequently, a few years ago the League's Board of Directors took action to exempt high school amateur radio clubs from the 51% membership rule, requiring only one club member to belong to the League. In 1969, this rule was extended to include college radio clubs. However, the requirement that 51% must be licensed amateurs still remains, and this appears to be as hard as or harder than the 51% membership requirement for most such clubs.

The League's brochure entitled "Licensing Classes," comprising lesson plans and much other information on presenting courses leading to the various echelons of amateur licenses, is

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for November Traffic:

Call	Orig.	Recv.	Del.	Total	
K6RPI	5060	1702	1535	167	8464
W3CUL	417	3721	3581	133	7852
W7BA	12	803	754	44	1613
W6LTX	22	648	556	31	1257
R1BCS	1013	99	31	43	1186
W3VR	134	322	496	23	1172
K6FEY	1	540	538	2	1076
K6RSX	5	495	481	10	991
W6RSY	14	457	352	103	926
W6VNU	22	422	416	7	867
K6BNH	8	440	397	16	862
K6VIG	5	408	339	18	770
W6EAL	23	420	325	0	768
W8UPH	3	385	345	35	768
W4WZF	11	372	346	18	747
W4RTX	38	321	310	35	704
W4AIW	24	345	305	28	703
W4KDI	97	274	268	6	645
W8TQ	57	288	161	105	619
W6BHO	26	309	261	15	611
W4IYS	27	299	243	31	600
W7DKR	0	286	253	17	556
E6LNE	8	290	253	11	562
K7RQZ	61	250	234	16	561
W7LZX	7	284	240	5	536

Late Reports:
W7LZX 7 250 240 5 536

W7LZX 7 250 240 5 536

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are not generally available to non-affiliated groups. Occasionally, where an item is not in great demand, exceptions can be made, but the affiliated groups have first call.

What is also available to any group wishing to form a club and/or become affiliated with ARRL is a "club kit." This is a portfolio of various documents and publications which any amateur radio club or prospective club would find useful. Among its contents are a copy of *Operating an Amateur Radio Station*, the latest "Affiliated Club Bulletin" issued by headquarters, a sample club constitution, Articles of Association and By Laws of the League (including complete Rules & Regulations Concerning Affiliated So-

cieties and of the Communications Department), separate brochures regarding program ideas and a club safety program, a letter from the League's Circulation Manager outlining a procedure by means of which the club treasury can benefit from ARRL membership dues collected through the club, complete details on how to affiliate with ARRL, a complete list of ARRL training aids and a brochure entitled "Your Radio Club" which contains information on organization, dues and finances, incorporation, maintaining interest, conducting "hamfests," putting out a club bulletin, setting up a training program, setting up BCI and TVI committees, issuance of certificates and conducting contests.

DX CENTURY CLUB AWARDS

From November 1, 1969 through November 30, 1969, DXCC certificates based on contacts with 101-or-more countries have been issued by the ARRL Headquarters to the amateurs listed below.

New Members

K4VOX 218	K8WEE 109	W8BQ 107	W8EAD 104	VE3WV 101	UW3ZO 100
K2AAC 208	U2EGW 108	W7PZ 107	W4UUL 104	W4AOKS 101	V65N 100
K1AGP 149	W8ZTOU 109	W8ZCO 107	W4UQZE 104	W8SSWA 101	W2WQ 100
W8AEDC 148	K8AYA 108	DJ9DJ 106	CK9BT 103	W8TQT 101	W8ZGDN 100
K9MIE 138	WBONG 108	DK2RT 106	EA4ZH 103	W8PFT 101	W8TSS 100
VE1WP 133	YU1KO 108	OK3CR 106	UA8WN 103	D42AUD 100	W83BLE 100
JA8CI 126	LICBU 107	WB4KW 106	F8HN 102	K4ARF 100	W8BWA 100
UA3JD 125	J8YAF 107	K9MUF 106	EA1VB 102	W4DNZ 100	W8YNI 100
OE3DT 122	Y23BU 107	LA9DL 105	W8VOL 102	PK1BQ 100	W7IV 100
W8FCX 120	UA8LI 107	W8K9G 105	F8XB 101	1H8Z 100	WA7FKV 100
W8ASQ 116	W8ZDY 107	OH6AB 104	UA9LS 101	UQ2KAX 100	Y02AFB 100
VE3FXZ 112	WB4JNZ 107	W1EEF 104			

Radiotelephone

W6IN 163	DR1QA 115	CE3OE 108	W8GCK 104	WB6FGI 101	VE3EAC 100
W2UFS 159	W8KGG 112	YV4PA 107	049NO 103	W8CZW 101	W8ZDY 100
OZ1RH 152	TF3WLN 111	DJ6KW 104	DK2UN 101	K4INF 100	W3UKZ 100
DL3OM 151	W8KFJ 111	K9MUF 104	W4LOJ 101	K5PHL 100	W8TAX 100
K4VOX 136	D8EJ 110	W8ZEU 104	W4RNC 101	K7VTR 100	W8ROU 100
W8VKW 128	W8ARU 109				

Endorsements

Endorsements issued for confirmations credited from November 1, 1969 through November 30, 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.

330	W1MM	260	220	SM6AFH	W8QHG	W4EH	W1CYT	K6MG
K6DC	YV5BZ	DL1QT	JA8ZO	UA3KAO	W8BF	W4MI	W48D	K6RIP
	290	K9WEH	K9WJU	W2NR		W7ZHZ	W8RO	K7AHO
320	K4EDF	VP7NA	V83CDP/	W8QWW	160		W8ZWX	UA3GO
W8GLD	W7DY	W4OEL	W9	W9ZWH	HPIAC		W8JVD	UW3IN
	280	W8KJG	W1NTH		K3JLK	340	W8MXO	W8SJM
310	W42FQG		W4OMW		K4JS	F5NW	W8ABN	WA2BHJ
JA3UI	W8MUG	250	ZE4JS	180	K6DYQ	JA1ERB	W8ADO	W3ADO
	W8MCR	EA4CR		K4DK	K6GAK	K2BMI	W8VXV	W84PJ
305	W8MCR	W1PYM	200	K8RWL	K9GEL	K6QBW	W8FC	W8HXZ
K6AHV			HB9T	W2GTP	OZ2NU	K6TWT	W8PSP	W8KOS
W48EU	270		K30TY	W8RSW	OZ7DX	K8NQP		2E3JX
	JA1ZZ	240	K4BBK	W3CRS	OZ8JD	SP9PY	120	
300	K1LWI	W8JHV	K4YXJ	W7DH	W8H8X	VE1ZT	K1AGB	
DL7AP	VE3AIU	W9ALI				VE3DNR	K2TKR	
	WA4MVB							

Radiotelephone

300	260	240	K2RAP	W8YBB	W2MBU	160	140	HW3IN
ON48Z	VE3AIU	YV5BNR	K3RFP	W9ZWH	W8RSW	DL4CQ	VE8DNR	K5UKN
W2QK	W42FQG		K3OTY	Y8KY	W4AFDR	OZ7DX	W8CDL	K5Z8C
	290	220	K6AHV	6W8DY	W5KJG	W42H8X	W4SD	DL7KX/
	U28Q	9G1DY	K6A0		W8GRV	W8HKN	W8RO	W2
270	K8RBB		K6WEH	180	VE8CDP	W8MUG	W8PWF	W3CRE
W8EUV	W8PN	200	UA3CT	CF1UA	W9	W8DXU	W4CQ	W4CQ
W4MTB	W8CKM	E8KW	W1DD	K4HMS		W8Q5G	W8SN	W8SN
		G8AFA	WA4LMD	K7YDO			W8BQ	W8BQ
								W8PVW
							120	
							F8BY	
							1MY	

Yes, it's quite a package, and it's only the beginning. Once affiliation has become official there are more services available.

In this day and age of "gimmicks," the question naturally occurs: "What's the catch?" Have no doubt that there is one, but not the kind you may think. The "gimmick" in this case is the obvious advantage of having as many amateur groups as possible in basic support of the League's aims and objectives, for it is realized by our governing directors that local organized amateur groups are one of our greatest sources of strength. This is the catch — unity and mutual support. Don't you wish all "gimmicks" were based on such motivations? — WINJ.M.

Five-Band-WAS Record Keeping. The actual "application" forms for the new 5RWAS "cost" ten dollars a throw. As you may remember from back issues, this fee covers processing, return of the cards by first class registered mail and — mostly — that beautiful personalized plaque shown in the January issue. (Full rules appeared in the October '69 issue.) How do you keep track until you're ready to submit the cards and pay your money? Easy! Send an addressed stamped envelope and ask for Operating Aid No. 8. Though specifically tailored for regular WAS, the reverse side of this sheet has an alphabetical listing of the states with five adjacent columns. Got the picture? Send for your copy of Operating Aid No. 8 today — W1YYM.

ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed by members in the following Sections, completing their election in accordance with regular League policy, each term of office starting on the date given.

South Dakota.....Edward Gray, WAWPX.....Nov. 1, 1969
 Arkansas.....Robert D. Schaeffer, WA5IIS.....Nov. 1, 1969
 Indiana.....William C. Johnson, W9BUQ.....Nov. 1, 1969
 Orange.....Jerry L. VerDuit, WA6RUF.....Nov. 10, 1969
 Wisconsin.....S. M. Pokorny, W9NRJ.....Dec. 10, 1969
 New York City &
 Long Island.....Fred J. Brunjes, K2DGL.....Jan. 2, 1970

In the Eastern Florida Section of the Southeastern Division, Mr. John F. Porter, W4KGI, and Mr. Ronald J. Locke, W4YPX, were nominated. Mr. Porter received 561 votes and Mr. Locke received 490 votes. Mr. Porter's term of office began Nov. 28, 1969.


ELECTION NOTICE

To all ARRL members in the Sections listed below:

You are hereby notified that an election for Section Communications Manager is about to be held in your respective sections. This notice supersedes previous notices.

Nominating petitions are solicited. The signatures of five or more ARRL full members of the Section concerned, in good standing, are required on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must meet the following requirements prior to deadline date listed below: (1) Holder of amateur Conditional Class license or higher. (2) A licensed amateur for at least two years immediately prior to nomination. (3) An ARRL full member for at least two years immediately prior to nomination. Petitions must be received on or before 4:30 p.m. on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given herewith. The complete name, address, zip code and station call of the candidate and signers should be included with the petition. It is advisable that eight or ten full-member signatures be obtained, since on checking names against head-



No. 1 W4QCW
 No. 2 DL7AA
 No. 3 W1EVT
 No. 4 W8GZ
 No. 5 W8BT
 No. 6 W4IC
 No. 7 W1AX
 No. 8 W4BRB
 No. 9 K2BZT

5BDXC NEWS

quarters files, with no time to return invalid petitions for additions, a petition may be found invalid by reasons of expiring memberships, individual signers uncertain or ignorant of their membership status, etc.

Petitions will take place immediately after the closing dates specified for receipt of nominating petitions. The ballots mailed from Headquarters to full members will list in alphabetical sequence names of all eligible candidates.

The following nominating form is suggested. (Signers should be sure to give city, street address and zip code.)

Communications Manager, ARRL [Place and date
 225 Main St., Newington, Conn. 06111

We, the undersigned full members of the.....
ARRL Section of the.....
 Division, hereby nominate.....
 as candidate for Section Communications Manager for
 this Section for the next two-year-term of office.

You are urged to take the initiative and file nominating petitions immediately.

— George Hart, WINJ.M., Communications Manager

Section	Closing Date	SCM	Present Term Ends
Connecticut.....	Feb. 10, 1970	John J. McNassor.....	Apr. 11, 1970
Saskatchewan.....	Feb. 10, 1970	Gordon C. Pearce.....	Apr. 11, 1970
Nebraska.....	Mar. 10, 1970	V. A. Casion.....	May 29, 1970
San Francisco.....	Mar. 10, 1970	Hugh Cassidy.....	Resigned
Western			
Pennsylvania.....	Mar. 10, 1970	J. F. Wojtkiewicz.....	Resigned
Louisiana.....	Apr. 10, 1970	J. A. Swanson, Jr.....	June 10, 1970
Eastern New York.....	Apr. 10, 1970	Graham G. Berry.....	June 10, 1970
Quebec.....	Apr. 10, 1970	James Ibeby.....	June 11, 1970
Eastern			
Massachusetts.....	Apr. 10, 1970	Frank L. Baker, Jr.....	June 15, 1970
Wyoming.....	Apr. 10, 1970	Wayne M. Moore.....	June 25, 1970
South Carolina.....	Apr. 10, 1970	Charles N. Wright.....	June 26, 1970
Alaska.....	May 11, 1970	Albert F. Weber.....	July 10, 1970
Utah.....	May 11, 1970	Thomas H. Miller.....	July 15, 1970

OCTOBER CD PARTIES

Due to circumstances beyond our control, high-claimed scores for the October Parties could not appear in January QST. For the benefit of you record keepers, the following are the top ten high-claimed scores. They read, from left to right; appointee, total score, number of QSOs, number of sections, number of hours of operation. Final adjusted scores have already appeared in the January CD Bulletin. — W1KQM

	CW	PHONE
W1BGD/2	317,120-861-73-20	W9WVC (W9AQW, opr.)
WA0MLE	272,285-765-71-20	160,320-501-64-15
WABSDC	261,000-719-72-18	WB2NTH
K4PUZ	252,195-724-69-20	K2EJU/9
WA9QBM	241,500-685-70-19	W0IYP
K4BAI	234,150-662-70-20	K9ZMS/6
K6ORK	232,050-657-70-18	WA0MLE
W8SH (K7NHW, opr.)	229,500-650-70-20	WA3BGE/8
W4IQ	226,440-622-72-18	K2OQJ (WA2BAN, opr.)
VE7HDM	216,860-621-69-18	99,840-308-64-18
		K4FU
		W4UDS/9

WIAW SCHEDULE, FEBRUARY 1970

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 1 P.M.-1 A.M. EST, Saturday 7 P.M.-1:00 A.M. EST and Sunday 3 P.M.-11:00 P.M. EST. The station address is 225 Main Street, Newington, Conn., about 7 miles south of Hartford. A map showing local street detail will be sent upon request. If you wish to operate, you must have your original operator's license with you. The station will be closed February 23, in observance of Washington's birthday.

GMT*	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0000	RTTY OBS ⁷						
0030	← CODE PRACTICE DAILY ¹ 10-13-15 wpm →						
0100	CW OBS ¹						
0120-0130 ⁴			3,700 ⁶	7,020	3,520	7,150 ⁶	7,020
0150			3,700 ⁶	7,080	3,555	7,150 ⁶	7,080
0200	← PHONE OBS ² →						
0205-0230 ⁴			3,820	50,120	145,600	(820)	3,820
0230	← CODE PRACTICE DAILY ¹ (35-15 wpm TThSat), (5-25 wpm MWFSn) →						
0330-0400 ⁴			3,555		1,805		3,555
0400	RTTY OBS ³						
0410-0430 ⁴			3,625	14,095	7,095	14,095	3,625
0430	← PHONE OBS ² →						
0435-0500 ⁴			7,220	3,820	7,220	3,820	7,220
0500	CW OBS ¹						
0520-0530 ⁴			3,700 ⁶	7,020	3,945	7,150 ⁶	3,520
0530-0600			3,700 ⁶	7,080	3,945	7,150 ⁶	3,555
1400	← CODE PRACTICE ¹ (5-25 wpm MWF), (35-15 wpm TTh) →						
1800-1900	21/28 ⁶		21/28 ⁶		21/28 ⁶	21/28 ⁶	
1900-2000	14,280		7,255	14,280	7,255	14,280	
2000-2100	14,280		21/28 ⁶	14,095	21/28 ⁶	7,080	
2130-2230	14,100		14,280	14,100	14,280	14,100	
2330-2330	7,255		21/28 ⁶	21,1 ⁶	21/28 ⁶	7,255	

¹ CW OBS (bulletins, 18 wpm) and the code practice on 1,805, 3,52, 7,02, 14,02, 21,02, 28,02, 50,02, and 145.6 MHz.

² Phone OBS (bulletins) 1.82, 3.82, 7.22, 14.22, 21.27, 28.52, 50.12, and 145.6 MHz.

³ RTTY OBS (bulletins) 3,625, 7,095, 14,095, 21,095 and 29,015 MHz.

⁴ Starting time approximate. Operating period follows conclusion of bulletin or code practice.

⁵ Operation will be on one of the following frequencies: 21.02, 21.08, 21.27, 21.41, 28.02 or 28.52 MHz.

⁶ WIAW will listen in the Novice segments for Novices, on the band indicated, transmitting on the frequency shown.

⁷ Bulletins sent with 170-Hertz shift, repeated with 850-Hertz shift.

Maintenance Staff; WIA QIS WPR. * Times-days in GMT. Operating frequencies are approximate.

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 wpm) you will receive a certificate. If your initial qualification is for a speed below 35 wpm, you may try later for endorsement stickers. Each month the ARRL Activities Calendar notes the qualifying run dates for WIAW and W6OWP (W6ZRJ, alternate) for the coming 3-month period.

WIAW will simultaneously transmit a qualifying run on 1,805 3,52 7,02 14,02 21,02 28,02 50,02 and 145.6 MHz, at 0230 GMT February 12. (In converting, 0230 GMT February 12 becomes 2130 EST February 11.)

W6OWP (W6ZRJ, alternate) will transmit a qualifying run on 3590 and 7123 kHz, 0500 GMT February 4. (In converting, 0500 GMT February 4 becomes 2100 PST Feb. 3.)

Code Practice

WIAW 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 wpm transmissions. (Each tape carries a checking reference.)

Speeds	Local times/days	GMT times/days
10, 13, 15	7:30 P.M. EST daily 4:30 P.M. PST	0030 daily
5, 7½, 10, 13, 20, 25	9:30 P.M. EST \ SnTTh 6:30 P.M. PST / Sat	0230 MWFSa
"	9:00 A.M. EST MWF 6:00 A.M. PST	1400 MWF
35, 30, 25, 20, 15	9:30 P.M. EST MWF 6:30 P.M. PST	0230 TThSat
"	9:00 A.M. EST TTh 6:00 A.M. PST	1400 TTh 1400 TTh

The 0230 GMT practice is omitted four times a year on designated nights when Frequency Measuring Tests are made in this period. To permit improving your list by sending *in step* with WIAW (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 December QST
- Feb. 11: *It Seems to Us*, p. 9
- Feb. 17: *In-Line RF Power Metering*, p. 11
- Feb. 20: *Some Common Questions and Their Answers*, p. 24
- Feb. 26: *Amateur Radio Public Service*, p. 66
- Date Subject of practice text from *Understanding Amateur Radio*, First Edition
- Mar. 2: *Mounting the Components*, p. 123
- Mar. 6: *Soldering*, p. 124

QST



QST congratulates . . .

Earl Lewis, WN1KXS, now president of the Hartford Division of Emhart Corporation.
 Charles Hale, WA4ZAC, elected Mayor of Loyall, Ky.
 Marshall H. Ensor, W0BSP, on the dedication of Marshall H. Ensor Field at the senior high school football stadium, Olathe, Kansas.
 David E. Weinstock, WA3HUJ, named a semi-finalist in the National Merit Scholarship competition.
 Max Galloway, K9OXA who received the Charles J. Lynn Award as male volunteer of the year of the Indianapolis Area Chapter Red Cross.



Strays

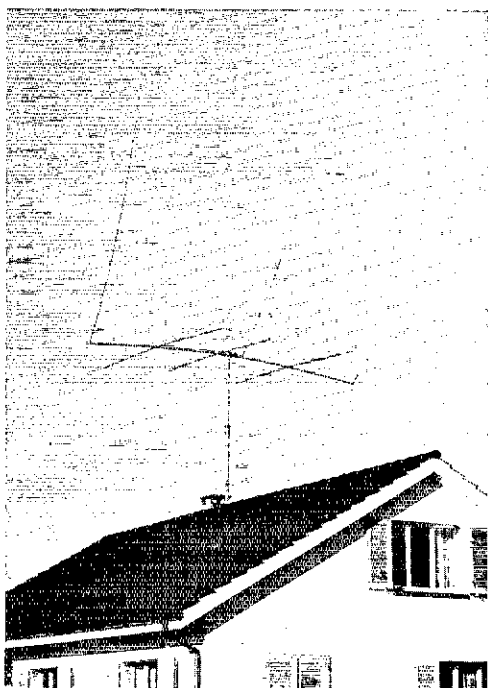


1969 ARRL SWEEPSTAKES

High Claimed Scores

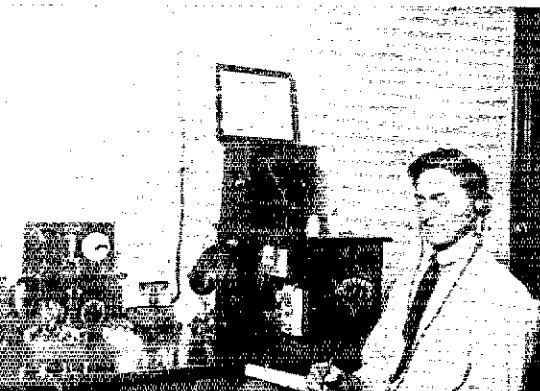
Following are high claimed scores of SS entries received by December 19. From left to right: call, claimed score, number of contacts, number of section-multipliers. Official results will appear in a later issue. — WAIKQM

PHONE		K0UKN (6 oprs.)	
K9LBO/7	155,326-1053-74		146,448-1119-72
W5RUB	142,672- 970-74	WA7IFD (WA7s IFD ISP	MAW)
W5QQQ/7	142,503- 961-73		120,984- 858-71
K6UYO (K9ZMS, opr.)	141,286- 982-74	W5AC (4 oprs.)	
W5JAW	137,048- 928-74		112,554- 788-74
W8SH (K1ZND, opr.)	135,150- 903-75	K8RME (W4CJR, K8RME)	
K4BAI	131,202- 887-74		105,554- 734-72
W3AZD	129,300- 862-75	CW	
K8DOC (WASLEO, opr.)	128,908- 871-74	W6RW (W6DQX, opr.)	
W46IVN	128,025- 864-75	K4GSU	120,525- 805-75
W9YT (K9KGA, opr.)	127,425- 856-75	W8SH (K1ZND, opr.)	118,104- 803-74
WA3GJU	126,000- 840-75	K2KIR	117,675- 783-75
K26AT	125,100- 837-75	K6EBH (W6CUP, opr.)	117,457- 805-73
K4WAR (K8UQA, opr.)	119,550- 797-75	K6AHV (K9ZMS, opr.)	117,144- 838-72
K5RHZ	118,640- 810-72	WA7KUW	115,950- 778-75
WA6LUM	118,180- 789-74	W7DI	112,176- 780-72
K4LPW	112,050- 750-75	W4KFC	111,470- 785-71
W4KPC	110,250- 738-75	K5YAA	109,980- 736-75
K1LPL/3	108,894- 756-72	W8QXQ	109,062- 766-73
W8QXQ	108,375- 725-75	W5JAW	108,040- 741-73
WA4FFW	108,332- 745-73	W1BPW	107,250- 718-75
K1PKQ	108,075- 725-75	VE7BDJ	106,950- 713-75
K5ZJK	107,840- 795-72	K9ORR	105,485- 726-73
WA4JFW	107,321- 742-73	W8IVN	105,160- 701-75
K4CG	107,025- 717-75	K4BAI	105,080- 720-74
W2MB	106,500- 754-71	W9RQM	104,250- 698-75
K1THQ	105,361- 745-73	K8UDJ (K7NHV, opr.)	104,171- 718-73
W1PBY	105,450- 703-75	W3CRE	103,650- 691-75
WA8NDI	105,000- 700-75	W1BGD/2	102,784- 704-73
W3IN	104,448- 765-68	W40CVS	102,000- 680-75
K1NWE	103,729- 558-74	WA1JTM	100,992- 713-71
W86FRD	103,320- 732-72	WA1DSZ	100,566- 684-74
K4PUZ	103,230- 703-74	K4PTZ	100,492- 679-74
W3GHM	102,816- 714-72	W5RDB	100,368- 702-72
K5AEU	101,025- 679-75	K5LZO (4 oprs.)	100,344- 680-74
W8EFA	100,512- 699-72		152,550-1034-75
K1KDP	100,326- 730-69	WA7IFD (WA7s IFD ISP	MAW)
K5LZO (4 oprs.)	183,076-1264-74		108,770- 747-73



Here's an antenna combination for you. HB97L's 3-element 20-meter Delta Loop beam with a 10- and 15-meter Yagi mounted on the same boom.

The Post Office Department promises faster mail service with the Zip codes. Use yours when you write Headquarters. Use ours, too. It's 06111.



Something old, something new. That's Joe Romine (l.) manning 8ANW. Now, 52 years later, Joe's station (r.), WN8EQL. Joe mentioned that the 1970 station out-performs and out-classes 8ANW . . . but he's not sure that it is as much fun!

• 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.

Traffic: W3CUL 7852. W3VR 1172. W3EMI 768, W3MPX 420. W3GLI 158. W3ATQ 156. W3LAK 155. W3HBT 150. W3MKQ 141. K3PIE 141. W3ENW 119. W3JZB 118. K3OIO 108. W3MKQ 97. W3HK 91. W3AFI 76. W3HNK 70. W3JKB 51. W3JXN 37. W3FMI 33. W3LMO 32. W3LVC 22. W3VA 30. W3VAP 28. W3CRH 25. K3KTH 25. W3AXA 24. W3FPC 23. W3JWL 22. W3BNR 18. K3MVO 14. K3KAI 13. W3CKA 11. W3IYC 10. W3FPN 9. W3JX 9. W3RUR 8. W3EXB 8. W3JKO 4. W3NLY 4. W3CL 2. W3BEG 2. W3CC 2. W3OMI 2. W3BJQ 2. K3FOB 2. W3EU 1. W3IAZ 1. W3KFK 1.

ATLANTIC DIVISION

DELAWARE—SCM, John L. Penrod, K3NYG—SEC/PAM: W3DKX RM: W3EEB. W3HKS reports that he certainly enjoyed this year's Delaware QSO Party. We welcome W3KGV and W3KFK to the DEPN. K3NVV has returned to Delaware after visiting many states in his radio-equipped Air Stream. W3ZNF is doing research on amateurs who have operated in Kent County. The Delaware Air Force MARS has graduated twelve Novices because of new regulations and increased activity the DEPN may not be exactly on 3905 kc., so if you don't find it, please tune around a few kc. on each side. ORS and OPS appointees still are needed in Kent and Sussex Counties. Net reports: DEPN, QNI 47. QTC 6; K3ECP, QNI 25; DTMN, QNI 29. QTC 5. Traffic: W3EEB 34. W3DKX 32. W3AGY 30. W3HWC 14. W3TRC 11. K3NYG 6. W3DUM 5. W3GSM 1.

EASTERN PENNSYLVANIA—SCM, George S. Van Dyke, Jr., W3HK—SEC: W3CC. RMs: W3EMI, K3MVO, W3MPX, K3SLG, W3GLI, V.H.E. PAAL; W3FGQ. OO reports were received from W3KFK, W3IUV, K3RIT, K3HNP; ORS reports from K3WEU, W3AFI, W3JRO, W3BEC, W3ZML, W3CBH; OPS reports from W3JWL, W3NLY, W3ABQ, W3CL, K3WEU, W3IAZ, W3FMI, W3AIOB. HPLers: W3CUL, W3VR, W3EMI, W3MPX, W3HBT.

Net	Freq.	Operates	QNI	QTC	R/M/PAM
EPA	3610 Daily	6:45 P.M.	282	299	W3MPX
PTTN	3610 Daily	8:00 P.M.	223	293	W3MPX
EPA/PTN	3917 Daily	8:00 P.M.	126	297	W3GLI
PRN	3960 Mon.-Fri.	5:30 P.M.			K3HNP
ENTN	3726 Daily	7:30 P.M.	70	50	W3IUV
VHF (6)	50.64 Mon.-Fri.	7:00 P.M.			W3FGQ
VHF (2)	148.35 Mon.-Fri.	8:00 P.M.			W3FGQ

Field Day messages were received from W3AIX, W3D8Z, W3GHI, K3HNP, K3HTZ, W3JRY, W3KKB, W3KTK, W3LAR, W3LMO, W3LVC, W3LVR, K3RFB, W3VR and K3ZJU. New officers of the York ARC are K3FOB, pres.; W3HYE, vice-pres.; K3BWR, secy.; W3EDO, treas.; W3AMQ, assl.; W3NGN and W3EXZ, trustees. PAM results this time show our usual experts: W3HFF 11 p.p.m., K3MVA 2.0, W3NNC 4.6, W3YO 16.5, K3HNP 17.3, W3IUV 27.7. Claims for the New Public Service Honor Roll are W3HML, W3MPX, W3FMI, W3IYC, W3RML reports TCC is busy again. W3MPX is busy rebuilding. W3HBT has a new HW-100 mobilizing. W3AFI and W3CBH are keeping their OBS skeds intact. W3JKB is back in school. W3AXA is moving to a new QTH. W3JWL has a new beam and an HW-100 going. W3MVO is globe-trotting again. W3NEM is the new mgr of 3RN W3MKQ and W3CKM are looking for chess players via ham radio. Any takers? W3CKA has his WAS, W3JX operated W3GM during the WW DX Test W3HIX, holder of No. 1 Extra Class license in the 3rd call area, is now a Silent Key. W3JKO got his WAS. W3NLYC made Tech. W3IUV got his DXCC. W3RFB has a new HW-100. K3PIE got his 1st-class commercial phone ticket. W3HBT has been appointed Asst. EC for Bucks Co. K3HNS got the PWA "Ham of the Year" Award. W3KTK reports the Bucks Co. AREC provided communications for the Halloween Parade with the following stations participating: W3KTK EC, W3MPX, W3MJH, W3SWG, K3VRP, K3PHJ, K3JQH, W3CC and W3HBT.

MARYLAND-DISTRICT OF COLUMBIA—SCM, John Almholland, K3LED—SEC: W3LDD.

Net	Freq.	Time	Days	Sex.	QTC	QNI	Mgr.
MDD	3643	1000Z	Daily	30	278	12.0	K3JYZ/RM
MDD5	3643	0130Z	Daily	28	26	1.5	W3CBG/RM
MDCFN	3920	2300Z	FTN	18	74	17.5	W3GAM/PAM
MEPN	3920	2300Z	MWF	—	—	—	K3IAU
MTMTN	145,206	0200Z	FS	19	11	8.8	W3IFW

PSNR claimants (Nov.): W3CBG, W3IYS, W3TN, K3LED. Appointments: W3LWT and W3KCK as ORSes; K3CMI as EC Montgomery Co.; W3ROP as EC Washington Co.; W3GAU as EC Baltimore City; W3GDC as EC Frederick Co.; W3GXN as PAM MDCFN; W3MVB as QLI. W3GN operated in the CQWW DX Contest. W3ZNV keeps AREC operators "on the go" in Calvert County. W3AJR rang the BPL gong for his first time. The OM at W3FA is beginning to feel his age—the summers are getting too short for him to complete all his antenna work. According to W3KCP, W3CME has moved to Norfolk, Va., W3EWP is now W3NNG. W3KCK is overseas in Germany and W3HFE has returned to Vermont after completing his Air Force service in Maryland. The OM at W3TOS got his Extra Class ticket and is now helping harmonic W3MML build an SR-301 so he can get his WAS, W3ADO and the USNA ARC hope to top Army's ARC when the Sweepstakes scores are posted and average Navy's tribulations in the Philadelphia Story of 1969. A hearty welcome to Bowie ARC and Randallstown Senior High School ARC on joining the family of ARRL affiliated clubs. W3JPT is assembling a new Heathkit transmitter for the VAISAT club station. W3DMS, K3PEQ again is portable 3 and happy to be back in Maryland after a month's leave back home in Connecticut. As we go to press, W3EOV is combing southward for 2 weeks in Miami. W3AJR is busy-busy with pre-med school work. K3NCM is back on the air with his mobile rig. W3EBU's school work is OKing his on-the-air operations. Congratulations to MTMTN on a real fine *Permit to Stay* this month. Many thanks to W3ATQ for a fine job as PAM, MDCFN. We hope he will visit our nets often from his new QTH in WPA. Traffic: W3IYS 600, W3TN 340, W3ATQ 296, W3AJR 221, K3LED 149, W3CBG 122, W3DYA 97, K3GZK 92, W3BLW 68, K3ZLE 42, W3ADO 41, W3FA 34, W3ECP 31, W3ZNV 26, W3JPT 20, W3IHW 17, W3ROV 14, W3GXN 14, W3MJJF 7, W3AJR 6, K3PKQ 3 2, W3GN 2, K3NCM 2, W3GEB 1.

SOUTHERN NEW JERSEY—Acting SCM, Charles E. Travers, W3VPZ—SEC: W2LWV. RMs: W3KJP, W3BLV, PAMs: W2UVB, W2ZL. Nineteen stations from the Southern N.J. section participated in the 88 and the highest score submitted to your SCM was 59.214 by W2PAU with 419 contacts while W2DVU was runner-up with a total score of 42,780 with 345 contacts. The NJEPTN reports: QNI 598, traffic 202 in 30 sessions. Look for the Cherry Hill H.S. West Amateur Radio Club, W2URU, on 6 and 2 meters any school day as well as after school hours. W2DRG and W2PEH are busy with their new project, an all-state newsletter for the various amateur radio activities of contributing groups. Words of commendation are in order for K3JLE, operator of W2PU, for his continued activity in message-handling along with a very full university program. W2JJ, is operating a new quad from his Pennington, N.J., QTH. Among the recent OPS,

OBS and OO renewals are K2ARY and WB2APX. K3CPE, chief operator at the DVJCA station, has been recuperating after surgery. W3EZE, ex-WB2BGF, wishes to be remembered to the New Jersey fraternity. The incoming officials of the Hancock Valley Amateur Radio Assn. are WB2JUN, pres.; WB2PZF, vice-pres.; K2YBN, secy.; WB2LWZ, treas. The Harmonics staff of the S.J. Radio Assn. follows: WA2VEY, W2FTF, editors; W2BBN, WB2TLQ, circulation; W2GET, DX column; W2RRR, v.h.f. column; WA2FVV, Swap Shop. Regular skeds are kept with W4YLR, former member of NJEPTN now living in Deltona, Fla., on 15 and 20 meters by W2PEV, W2HIA, W2CLOZ and others each Sat. at 10 A.M. and 1 P.M. Traffic: WB2VEJ 162, W2ORS 110, WB2DRG 103, K2RKB 61, W2YPZ 36, W2PO 29, WA2KIP 20, W2BLM 18, W2DNE 10, W2IU 10, WB2RFX 8, WA2BPL 3, WA2APX 2.

WESTERN NEW YORK—SCM, Richard M. Fitzruss, K2KTK—Asst. SCM: Rudy W. Ehrhardt, W2PYL SEC: W2RUE. RMs: K2KIR, W2MTA, W2FR, W2RUF. PAM: WB2VSL. Section nets:

Net	Freq.	Local Time	Days	Mgr.
NYS	3675	1900, 2200	Daily	W2MTA
NYSPTEN	3925	1800	Daily	K2SPO
NY PON	3912	1645	Daily	K2KQC
NYSOCN	3677	1945	Mon., Thurs., Fri.	W2RUF
ESS	3590	1800	Daily	WA2VYS
NYSOCN	3677	1000	Sun.	W2RUF

A new appointee is WB2VUO as OVS. Renewals are W2QHQ as ORS and K2UOQ as OVS. Congratulations to our new Atlantic Division Director, W3EPC, Harry succeds W3YA, who did such a magnificent job for a good many years. W2CUL, W2DRY, W2KLF and W2JPE have arranged classes for Advanced and Extra Class tickets for the RAWNY. W2EQH is recovering from a cataract operation. W2OZR is putting down an all-band antenna, underground. W2EMX vacationed in Europe. WB2YEM Q8Yed from Liverpool to North Tonawanda. New officers of the North Country Radio Club are WA2MWF, pres.; WN2KEH, vice. WA2HEC, secy.-treas. Very sorry to report the passing of K2BYG. Burt was licensed in 1933 and was 82. K2YAH is busy remodeling the shack. WB2FHS is working on a high school physics problem using the 2400-Mc. band. W2CFP reports his tri-band quad now is aimed at the moon as a result of one of the stronger breezes that blow around these parts. WB2VEE has his extra and now has his sights set on his 1st phone. K2IMI is having a bit of transmitter trouble. NYS reports a traffic total of 344 with 760 check-ins. WA2LPR and WB2VZV are putting out a fine looking publication for the NCARC. Recipients of the first ARPS Honor Roll award are K2KIR, W2FR, W2MTA, W2QC, W2PRY, WA2BEX, W2RUF, WA2CAL and K2KTK. W2O9 remains the lone BPLer for the third month in a row. Traffic: (Nov.) W2OE 375, W2FR 279, WA2CAL 250, W2RUF 170, K2KQC 165, W2QC 145, W2MTA 143, WA2HEK 112, K2DNN 90, K2KIF 87, WB2YND 84, W2PY 77, W2HYM 73, WB2ZDK 44, WA2AV 32, WB2HLI 31, W2RQP 31, WA2YJ 28, WB2QK 26, W2PRY 21, W2MNM 20, WA2DHS 18, W2EVH 16, K2UIR 15, W2DBU 14, W2AFB 11, K2KTK 11, W2PZL 10, K2DTQ 8, K2IMI 8, W2RFP 6, K2RYH 6, WB2YEE 5, WB2RHJ 5, W2CFP 4, WA2GLA 4, WA2PZD 3. (Oct.) K2RYH 62, W2DBU 11. Total 2301. Last year 2682.

WESTERN PENNSYLVANIA—SCM, John F. Wojtowicz, W3GJY. SEC: W3KPI. PAMs: W3WFR, K3ZNP. RMs: WA3AKL, W3KUN, W3LOS, WNEM. Traffic net: K8SSN, 2330 GMT; WPA, 0000 GMT 3545 kc.; WFP, 0300Z 3995 kc. This column is saddened to record the passing of W3YIT. Upgrading to General Class: WN3KAY and WN3LJA. K3JMP has moved to Florida and is now K4BKK. New officers of the Beaver Valley Amateur Radio Assn. are K3ZNP, pres.; WN3JPI, vice-pres.; K3HCT, secy.; K3LGM, treas. WA3EPQ and WA3IFC joined the USAF MARS program. K3LQN mobiles on 28 Mc. WA3JLU is now WB8E8M at Ann Arbor, Mich. K3QJE made the "Dean's List" at Gammon College. The ARPS program is looking for ECs in counties not covered. If "you" are interested in serving as an EC in your county drop SEC W3KPI a line for details. WA3COB is pres. of the Carnegie Mellon University Radio Club. K3ATZ serves as net manager for the Tri-State Net. A new phone net has been activated under the guidance of PAM K3ZNP. The net is known as the Western Pennsylvania Phone Net (WPP). It operates daily at 0300Z on 3955 kc. Phone stations wishing to check in may do so at any time and are welcome. The initial month of WPP

shows 23 sessions, 46 stations, 20 pieces of traffic handled. Congratulations to WA3IPU on making the BPL with 146 messages originated. I have assigned as SCM of the section because of the pressure of other business and my outgoing DX QSL Bureau, which is growing by leaps and bounds and keeps me quite busy. WA3AKH has been appointed as Acting SCM until an election can be held. Thanks to all those who supported me in the past as well as those clubs who sent me their club bulletins regularly. Future reports should be sent to G. R. Stonebuner, WA3AKH, 314 Coraopolis Road, Coraopolis, Penna. 15108. Endorsement: W3UGV as OO. Final reminder: Check your license expiration date. Traffic: WA3IPU 403, K3ZNP 379, W3LOS 135, WA3AKH 129, W3KUN 105, W3NEA 82, K3HCT 69, W3GJY 41, K3SJM 18, W3LDO 17, K3SMB 14, W3YA 10, W3UHN 8, WA3JBN 2, W3UT 2.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—SEC: W9RYU. PAMs: WA9CCP and WA9PDI (v.h.f.). Cook County RC: W9HPG, RM: WA9ZUE. Net reports:

Net	Freq.	Times	Days	Tfc.
LEN	3940 kc.	1400Z	Sun.	No report
ILN	3760 kc.	0100Z	Daily	212
NCPN	3915 kc.	1300Z	Mon.-Sat. }	202
NCPN	3915 kc.	1800Z	Mon.-Sat. }	
III PON	3915 kc.	2215Z	Mon.-Fri. }	642
III PON	3915 kc.	1430Z	Mon.-Fri. }	
III PON	145.5 Mc.	0200Z	M.W.F.	43
III PON	30.28 Mc.	0200Z	Mon.	0
Great Lakes Emgey Net	3932 kc.	0230Z	Daily	917

The Ninth Region Net had a traffic count of 387 messages during Nov., according to net manager W9HRY. This column's sympathy is extended to RM WA9ZUE and his family, whose mother passed away Nov. 30. K3JFE, W9HSD, W9HPG, K9DQU, W9JUV/K9OSO, W9WYB, K9WAP, K9RAN and W9OXO participated in the League's latest Frequency Measuring Test. W9KFC is now mooting on 2-meter 1m. WB9AKO and W9HWJ are awaiting their Advanced Class tickets. W9OEQ of Mokena, is exhibiting his Extra Class certificate. W9DQU would like to hear from those interested in 10-meter 1m. W9QET's new QTH is Decatur, Ill. WN9CVH is a new Novice in the Clinton area. W9KRH has a new TR-4. The Deerfield High School Radio Club reports a 30-county confirmation within only a few weeks operating time. WA9QBM has been accepted at Purdue University. K9TXU is DL5JW for the next three years and can be heard on 10 and 20 s.ssb. Sinton ARC has graduated 6 new Novices from its class. After thirty-five years of trying, WN9CQU received his ticket. W9CA retired from Commonwealth Edison in Chicago. New officers of the Six Meter Club of Chicago include K9ENZ, K9ZVU, K9YJQ, K9ZVW, W9BWR, W9WIC and WA9NTA. WA9LRC presented an "Australian Nite" at the York Radio Club's Nov. 21 meeting. WB9AOF is a new General Class licensee. New officers of the NIDXA (Northern Illinois DX Assn.) are W9DY, W9DWF, WA9VLT and W9WYB. Mr. Anton Grinska, of Seneca, spoke at the Wheaton Community Radio Amateur's meeting. W9ACE has been named U.S. Ambassador to Japan. WA9MQY is now WB4NPX. WA9LNR is the new trustee for the Chicago Amateur Radio Club (CARC). WN9BZL is a new Chicago call. WA9WPT received his CP-25 certificate. WA9SLU is a new 18-year-old General. Traffic: (Nov.) K9AVQ 334, W9NXC 271, W9EJV 219, WA9WNH 208, W9JXV 141, WA9RTB 127, W9WH 124, W9LNG 50, W9HVF 48, WA9ZUE 47, WA9BRC 42, W9DQ 41, W9LJU 37, WA9NZF 30, K9RAN 29, WA9DLD 27, W9CFV 23, K9H8K 14, W9PRN 14, W9HPG 7, WA9ORP 7, WN9CTG 5, W9BY 3, WA9QBM 3, K9UQU-WB9ALE 2, W9FLF 2, WA9LHU 2. (Oct.) W9EVJ 102.

INDIANA—SCM, William C. Johnson, W9BUQ—Asst. SCM: Mrs. M. Roberta Kroulik, K9IVG. SEC: W9BUQ.

Net	Freq.	Time	Nov.	Mgr.
IFN	3910	1330Z Daily	2300 M-F	270 K9IVG
ISN	3910	0000Z M-F	2130Z M-S	640 K9CRS
			2300Z S-S	
QIN	3856	0100Z Daily		177 WA9FDQ
Ind. PON	3910	1245Z Sun.		97 WA9YXA
Ind. PON V.H.F.	50.7	0100Z M-T		481 WB9AMB
Hoosier V.H.F.				105 W9PMT

Goshen ARC's new officers are WA9NYU, pres.; K9JBC, vice-pres.; WA9HNT, secy.; WA9PEU, chmn. Clark County ARC's new officers are WA9TJS, pres.; WA9TMM, vice-pres.; W9HRY, secy.; WA9PCM, treas.; WA9WML, dir. WA9PI E has a new editorial quad. K9IVG received the Public Service Award for her part in the Midd. Spring Flood. The Indianapolis Radio Club held its Annual Award Dinner. W9HS received the Award of Appreciation. This award is made in recognition of many years of outstanding work for the club. The Indiana Radio Club Council has a new editor for its paper, *The Beacon*. All amateur radio club news should be sent to The Beacon, Box 59, Kokomo, Ind. 46901. W9JYO is home from the hospital and back on the air. Reports on the Nov. 8 ARRL EMT were sent in by K9WGN, W9UC, K9MAN and K9GEL. K9LAG, Chief of Communications, American Red Cross, was in Indianapolis to see the operation of station WA9LGP and had a meeting with the members of the local chapter about emergency communication. I hope you read page 75 Nov. QST "Frathe Talk" about Public Service Honor Roll. Only two reports were sent in. Don't forget the Lake County Banquet in Feb. QLN Honor Roll: WA9KAG 25, K9VHY 24, WA9WMT 23, WA9UMI 20, W9QAF 20, K9HYV 17. *Amateur radio exists because of the service it renders.* BPL certificates went to K9PZX, K9IVG, W9JYO and WA9YXA. Oct. IFCN V.L.F. listing was incorrect. It should have been 235. Traffic: (Nov.) K9PZX 991, K9JG 770, WA9YXA 325, W9JYO 271, W9HRY 241, W9PWH 187, WA9KAG 172, W9JBO 159, W9HAM 147, WA9TJS 145, W9UMI 132, K9PEY 102, WA9ZM 97, W9BUC 96, WA9WMT 92, K9CRS 67, W9ICU 60, K9YBM 47, WA9UMI 34, WA9OHX 33, W9JZO 32, K9VHY 22, K9JLK 23, WA9QJZ 28, WA9KOH 26, WA9AXF 25, W9YXK 25, W9CMT 22, W9PFW 21, W9LQ 18, W9SNQ 17, WA9BHQ 16, WA9QFQ 15, W9DOK 13, K9RWQ 11, K9WGN 11, WA9WSX 11, W9PMT 10, WA9RNF 9, W9RTH 8, WA9WJA 8, K9JQY 7, WA9CHY 6, WA9VBG 6, WA9JIC 4, WA9JNX 4, WA9OAL 3, W9HDP 1, K9YBZ 1. (Oct.) W9QLW 91, WA9KOH 68, K9QVT 8.

WISCONSIN—SCM, Kenneth A. Ahnster, K9GNC—SEC: W9NGT, PAMS: WA9ZK, W9NRP, WA9QNI, W9AYK, WA9QKP. RMs: K9KSA, WA9TXN.

Sta	Freq.	Time	Date	QNI	QTI	Mgr.
BWN	3985 kc.	1245Z	Mon.-Sat.	363	206	W9AYK
BEN	3985 kc.	1800Z	Daily	737	118	WA9QKP
WSBN	3985 kc.	2300Z	Daily	1291	165	WA9QNI
WIN	3982 kc.	0115Z	Daily	361	114	WA9TXN
WSSN	3780 kc.	0030Z	Tue.-Thurs.-Sat.	63	13	K9KSA
WRN	3820 kc.	0130Z	Sun.	33	7	K9GSC
SWRN	50.4 Mc.	0300Z	Mon.-Sat.	166	—	W9NRP
SW2RN	145.35 Mc.	0300Z	Daily	—	—	WA9ZK

Net certificates went to WA9WGT for WIN, WA9ZTY and WA9TPQ for WSBN, W9ZGQ and WA9ZTY for BEN. Renewed appointments: K9PKQ, W9VHA, W9SQU and K9UTQ as ECs; W9NRP, K9LGU, K9UTQ and W9YT as OPSs; WA9RAK, WA9WQ, WA9QKP, K9DIN, WA9TXN and W9YT as ORSs; W9KCR, K9GSC and K9AIK as OOs; K9GSC, W9EVC, W9YT, K9PWF, WA9PHW and W9FBC as OVSs. EMT results: K9GSC with 3.5 p.p.m. error. WA9ZTY has a new phone patch. K9GSC led the CCs with 41 notices sent. W9BNS received his General Class ticket. A net certificate for WIN went to WA9VKI9. The WNA Picnic will be held July 12 at Baraboo, Wis. New officers of the WNA are K9GSC, chmn.; K9PHL, secy.; WA9QNI, treas. Officers of the Yellow Thunder ARC are K9YHO, pres.; K9GSC, vice-pres.; K9PKQ, secy.; treas. As this is my last report as your SCM, I wish to thank all for the assistance and help you have given me the past eight years. Traffic: (Nov.) W9CNY 446, K9CPM 289, W9ESJ 202, WA9VKY 9 133, WA9RAK 121, WA9QNI 115, W9SUF 109, K9TRY 87, K9JPS 47, K9EHL 42, W9THV 40, W9DND 38, W9KRO 38, K9KSA 22, W9HCH 18, W9DXV 18, W9RPT 18, WA9ZTY 15, K9GSC 14, W9NRP 10, WA9PKM 10, W9QNT 8, W9SQM 4, WA9SAB 3, K9GDP 1. (Oct.) W9CXY 389, WA9RAK 129, K9JPS 29, WA9ZTY 25, WA9WOC 3. (Sept.) K9JPS 21.

DAKOTA DIVISION

MINNESOTA—SCM, Larry J. Shims, W9PAN—SEC: WA9MZW, RMs: WA9TAW, WA9RRA, PAMS: WA9HRM, WA9OEE, WA9MMV, K9GYO, V.H.F. PAM: WA9DWM.

Section Nets	Freq. (Mc.)	Time (GMT)	Days
MSPN (noon)	3.945	1805Z	Mon.-Sat.
MSPN (noon)	3.945	1500Z	Sun. & Holiday
MSPN (evening)	3.949	2345Z	Daily
MSN	3.685	0030Z	Daily

MJN	3.685	0100Z	Tue.-Sun.
MSTN	50.100	0130Z	Daily
MINN RTTY	3.620	1800Z	Sun.
MINN ARCC	3.912	3300Z	Sun.
PCNREP	3.354	1900Z	Sun.
MPON	3.910	1830Z	Sun.
MINN 40 CW	7.080	2300Z	M-W-F

MSPN evening session has changed frequency to 3940 kc. on a permanent basis. The Minnesota RTTY Net is in need of more traffic outlets around the state. The SCM received 17 c.w. and 14 phone Sweepstakes messages. Appointments endorsed: WA9RRA as MJN RM, WA9TAW as ORS, WA9JKT as OPS. New appointees: WA9VIS as ORS, W9RYM as EC Olmstead County, WA9RIJ as EC Steele County, WA9UAH as EC Nicollet County. Our thanks to W9ZSW and WA9DFT for their services as ECs. WA9JKT has a new Henry 2K3 linear. WA9TQP has a new quad in operation. WA9WEZ recently completed an 8R-101 construction project. WA9JPR is a new Army MARS member. K9EKR was the top scorer in the 1969 Minnesota QSO Party. K9JLH was only 7 QSOs behind to wrap up 2nd place. The 1970 QSO Party will be held June 6. I would like to encourage anyone to check into one of the c.w. nets. MJN is the slow-speed net which is used to train newcomers to c.w. traffic-handling. After some experience is obtained, you are invited to check in to MSN, which runs at 18 w.p.m. During disasters, c.w. is one of our mainstay modes of communication. The movie "Hams Wide World" is available for non-amateur group showings. Contact the SCM or Division Director if you would like to show the movie. Traffic: (Nov.) WA9VNS 412, WA9OTQ 194, WA9EPX 149, WA9RRA 136, W9PAN 113, WA9WEZ 110, K9MVF 55, WA9TAW 84, WA9TYL 53, WA9NMY 79, WA9OJ 52, W9EHH 46, WA9IRA 39, K9ZRD 35, WA9JPR 31, WA9HRAI 29, WA9RKF 29, WA9OTM 27, W9OYV 27, WA9RW 26, WA9VY 25, K9GYO 24, K9SRK 24, WA9IAD 23, W9LJK 23, W9BUC 22, WA9VTZ 21, WA9HRY 20, K9JTA 19, W9KNR 16, W9MBO 14, K9ORK 14, WA9RAG 14, K9EFL 13, WA9TO 12, W9BE 11, WA9DFT 11, W9HIO 10, W9GB 10, WA9YMU 10, WA9DIT 8, W9QEO 8, WA9NH 8, WA9GR 7, WA9CJH 6, W9UFX 6, WA9OV 5, W9OTFC 4, W9OYV 4, K9ZBI 4, W9AAU 3, W9SBJ 3, K9ZWG 3, W9DK 2, WA9AINE 1, W9SZJ 1, WA9DWC 1. (Oct.) K9JTA 15, K9ZWG 12.

NORTH DAKOTA—Harold L. Sheets, W9DM—W9NMV spent Thanksgiving with relatives in St. Paul. K9MSPN spent his leave on a trip to the Carolinas. W9CXC is in Florida and operates at 10 a.m. on 21.4 Mc. looking for N.D. friends. K9PYZ went to Chicago and can be heard on 40 meters and RACES frequencies. WA9VMA recently put together an HW-100 and tested it out over at WA9HRT's QTH on all bands. W9MQA made it home for a few days at Thanksgiving from the Twin Cities. WA9YFF sounds PB on that new inverted "A" on 75 meters. There is a new amateur radio club in the Breckenridge area named the Three Rivers Radio Amateur Club. K9AAJ reports a new 5R-101 on the air. WA9MND spent Thanksgiving in the hospital but is back home and feeling much better. WA9GRX and W9GB attended the Hamfest for the Handicapped at Fairbault. WA9AYL reports that the funds are available for a new station for the University radio amateur club. It will be housed in the Student Center with the various antennas on the roof. The Fox Radio Amateur Club elected WA9AVE, pres.; WA9QV, vice-pres.; K9OSL, secy.; treas.; WA9BIT, net mgr. The club meets the 2nd Tue. of the month at Valley Junior High School. If you have of N. Dak. and Minnesota communities nearby are interested in a listing of old unused gear for Novice or otherwise let me know and possibly we can work out something. We need some in Grand Forks for the large interest in Novice licensing this winter.

GOOSE River	160m NET 5 Sess.	85 check-ins	QTC 1	W9CDO NCS
ND CW Net	3545 kc.	1h "	" "	WA9HSR RM
YL WX NET	3944 kc.	20 "	567 "	QTC 42 WA9GRX, WA9MND W9NMV AIL
NDPON	3996.5	15 "	324 "	QTC 41 WA9HUD
NDRACES	3996.5	39 "	806 "	QTC 101 K9SPH RO

Traffic: WA9HUD 160, W9NMV 55, K9SPH 55, WA9TBR 28, W9DM 25, W9WWL 17, WA9SJB 13, W9RF 12, WA9AYL 11, W9DNC 11, WA9GKD 11,

WA0GRX 10, W0EJ 9, WA0JPT 8, WA7IRT/0 4, WA0MND 4, W0CDO 3, WA0RSH 3.

SOUTH DAKOTA—SCM, Edward C. Gray, WA0CPX SEC; WA0FUZ, PAM; WA0CWW, RM; W0PPE, Net managers; W0ZWL, WA0LLG, WA0PNB and WA0MWN. WA0QMP has moved from Minnesota to South Dakota to work as a full-time announcer at KSDR radio in Watertown. The following stations reported Sweepstakes activity: W0PPE, K0ZTV, WA0SHA, WA0LYO and WA0MLL. The AREC membership is increasing; if interested, contact your local EC or the SEC. WA0CPX and WA0CKH have been on 160 meters. Net reports: Morning Net, 115 QNI and 11 QTX; NJQ Net, 499 QNI and 52 QTX; Early Session Evening, 611 QNI and 48 QTX; Late Session Evening, 1459 QNI and 80 QTX. The AREC Net now meets at 1530Z Sun. at about 3955 ke. WN0VJG is active on 40 meters from Centerville. Traffic: K0KXR 402, WA0SKA 184, W0ZWL 166, WA0PNB 146, W0HJO 53, W0IG 52, WA0SHA 27, W0CAS 25, WA0FUZ 25, WA0UGN 17, W0DJO 1, WN0VJG 1.

DELTA DIVISION

ARKANSAS—SCM, Robert D. Schaefer, WA5HS—SEC; W5PBZ, RM; W5NND, PAM; WA6KJT, K5TCK and WA5NUO are putting out a fine statewide newsletter called the *Ozark Amateur*. W5YM held a RACES communications drill Dec. 7. A new informal tag-team net for Arkansas stations meets on 3900-3908 ke. at 2030 CRT Sat. and Sun. evenings. Welcome to new hams WA5VLR, WA5VVS, WA5WLL, W5SZXP, and W5ZBT in Springdale. The ARCUA is holding Novice classes. W5PBZ is using a new HW-100 as a mobile rig. W5SZGI made WAC. WA5REU, of ADXA, assisted in sending equipment to looms in several rare DX countries and is helping set up a DXpedition to Albania. Net reports for Nov.:

Net	Time	Freq.	Tls.	Mins.	QNI	Mgr.
RN	0030Z	3995	8	498	575	WA5KJT
OZK	0100Z	3790	29	564	166	WA5TLS
AFN	1200Z	3937	6	1296	189	W5VFW
EC Net	0000Z Sun.	3995				W5PBZ
DX Info	0045Z Mon.	3860				WA5EFL

Traffic: WA5TLS 48, W5NND 17, W5YM 15.

LOUISIANA—SCM, J. Allen Swanson Jr., W5PM—SEC; W5OB, RM; K5ANS, V.H.F. PAMS; WA5DXA, W5UQR. At the Lafayette Annual Banquet, W5EXI was awarded a Certificate of Merit for his contributions to amateur radio and W5WMLU was presented the W5PM Trophy for winning the 1969 La. QSO Party. WA5WBZ reports traffic on LAN is slow for this time of the year. WA5QYN says the Twin City gang has started a General/Advanced class which is being well attended. W5CEZ has sent his 200-V to the factory for reconditioning. W5EA says the going is slow with his RTTY installation but eventually he will be on the air. The GNOARC graduated its 1969 amateur radio class with seven passing the Novice, four the Tech., seven the General and one the Extra Class exam. WA5WPY and W5CZI were the fine instructors. K5YMM would like anybody working 160 to contact him. It is with deep regret we report the passing of W5MCC. Your new Director is W4VHN and the Vice-Director W4WRK both up Tennessee way. Incidentally, the GNOARC gang is getting ready to issue balloons. Contact WA5CZF for further information. Congrats to WA5LHC and his XYL on the arrival of a baby daughter. W5YFQ and W5SZZA are newcomers to the Jefferson ARC. The following from the Ozark ARC were cited by the State C.D. Communications Office, K5GLA: WA5WPK, W5RFW, WA5SNS and WA5TKF. W5QB still is trying to raise his total DX count. Traffic: W5MI 276, W5CEZ 56, WA5WRZ 38, WA5QYN 15, W5EA 14.

MISSISSIPPI—SCM, Clifton C. Comfort, WA5KEY—The first W5 call heard here is W5BAHE, the second call of WA5JWD. W5WJ has a new son-in-law. W5AMZ has a new kw. home-brew linear. From the sound of his signal WA5BNH has a new one, too. We welcome WA5ZLO to Mississippi from Tennessee and W3CID/5, now in Ocean Springs. I hear that on Dec. 24 Old Santa was patched into the Mississippi State Band Net. Santa's call was NPTSC. WA5WJP is consistently averaging less than a 3-point average on the PAMs. If you get an QSL report from him re-calibrate! At this writing K5QXH is doing as well as expected with his new gifted veins. I regret to report that WA5POO, of Hernando, Miss., has joined Silent Keys. The simulated emergency was conducted by

WA5UBQ, WA5YJA, WA5WJP and others in McCumb was for the purpose of training city officials, etc., in the use of amateur radio communications. Check into our nets:

MSBN	3990 ke.	8:15 p.m.	CSF	Daily
GC8BN	3925 ke.	6:30 p.m.	CSF	Daily
CG8HN	3935 ke.	7:00 p.m.	CSF	Daily

Traffic: W3CJD 5 37, WA5SKI 7, WA5KEY 3, WA5REG 1.

TENNESSEE—SCM, Harry A. Phillips, K4RCY—SEC; W4VJH, PAMS; W4PFP, WA4EW, K4MIQI, RM; K4AMC.

Net	Freq.	Days	Time	Seas.	QNI	QTC	Mgr.
TSSH	3980	Tue.-Sun.	0030Z	25	1184	58	K4MCI
TPN	3980	M-Sat.	1245	30	1316	50	W4PFP
		Sun.	1400				
ETPN	3980	M-F	1140	20	576	17	WA4EW
TPON	3980	Mon.	0030	5	192	36	K4RTA
TTN	3980	Daily	2200	28	193	23	
TN	3635	Daily	0100	30	160	63	K4AMC
ETVHF	50.4	M-W-F	0000	12	199	1	WA4TJJ
RTVHF	145.2	Tue.-Th	0000	8	71	0	WA4TJJ

WA4NEC is considering publishing *QRQ* (newsletter) on a state-wide basis. I received 18 Sweepstakes reports with scores as high as 112,500. ORS WA0GG has gotten some competition started by putting the Delta ARC against the Oak Ridge Radio Ops in a two-month WAS Contest. I attended the Tri-Cities meeting (Bristol, Johnson City, Kingsport) held in Johnson City. ORS WB4JFT reports that Explorer Post 15 (Nashville) has applied for a call and is setting up a station at the Red Cross Building. ORS/EC, WA4YFG reports the Humboldt ARC has completed another successful school. OPS WB4EKI is taking advantage of a TV tower for 2-meter operation. WA4YBT was out of commission for a while because of a heart attack but is recovering nicely. Traffic: WA4IAZ 240, WA0GG 221, K4AT 171, WB4JFT 152, WA4WBK 59, WA4YFG 40, WB4FGR 37, K4AMC 22, WA4CGK 18, W4PFP 17, WB4ANX 16, WB4JTS 15, WA4GLS 14, WB4EKK 9, WB4DYJ 8, WA4VJ 7, WA4FVW 6, W4HSS 6, WB4EKI 5, WB4HLH 5, WA4JTI 5, W4LBD 4, WB4GSS 2, W4SGI 2.

GREAT LAKES DIVISION

KENTUCKY—SCM, George Wilson, W4OYI—SEC; W4VYS, Appointments; WA4MEX, WA4UAZ as ECs; K4DZM as ORS; WB4ILE, WB4GCV as OPS. Endorsed: WA4MEX as OPS; W4VYS as ORS; WA4OMH as OVS, RPI; W4ABK/4, WA4VUE.

KRN	452* QNI	37* QTC	KYN	392 QNT	377 QTC
MKPN	471	136*	RTATN	245*	267*
KTN	734	209*			

An asterisk will indicate improved performance over the comparable month last year. WA4LTP is a Silent Key. WB4KER made it to s.s.h. with a 101. WB4IOU has been running emergency power as a matter of choice while hosting KSN as NCS. Ron says home-brewers can take heart—he found a bottle of WW II hootch in a GI surplus antenna tower. Our SEC says K4YZU's membership drive has boosted AREC over 3K. WA8COA gave Kentucky hams a big boost with a flattering article on our public service activities. Reporting, AREC and active appointments are up nicely; traffic and net attendance are slightly off. Traffic: (Nov.) WA4AGH 316, WB4KPE 283, WA4VZZ 225, W4BAZ 211, W4ABK 157, K4DZM 134, WA4VUE 112, WB4ILE 103, W4OTP 102, W4OYI 88, WB4WSW 81, WB4EOR 79, K4MAN 79, WA4GHQ 74, WA4DYL 68, WA4MXD 67, WB4DQAI 56, K4YZU 53, WB4FLA 52, W4VYS 47, W4CID 45, WB4KER 30, WB4GQY 29, K4UMN 29, W4UK 27, W4GZB 23, K4FPW 22, WB4RDK 19, K4YDO 18, W4ADO 17, WB4GCV 17, W4KJP 17, WB4IOU 13, K4VX H, K4OAE H, WA4GA 10, WB4FZ 10, WB4HFY 9, WB4LKP 9, W4BTA 6, K4HOE 6, WB4HTN 5, K4VCH 3, (Oct.) K4OAE 21, WB4IOU 13, W4VYS 9, WB4HTN 6. (Total: 282)

MICHIGAN—SCM, Joseph L. Pontek, K8HKM—Asst. SCMs: Rodger C. Phillips, WA8LWK; Howard A. Walker, WK8TQ. SEC: W8MPD. RMs: WK8TQ, W8RTN, K8KMQ. PAM: K8GOU, V.H.F. PAMS: W8CVQ, K8AKM. Appointments: W8SCW, W8SJP, K8QJL, W8BDDT as ORSs; W8FSZ as OPS; W8CCS as OBS; W8DCT as EC. Silent Keys: K8HQT, W8PTZ and the wife of W8FNT.

Net	Freq.	Time	Days	QNI	QTC	Sess.	Mgr.
QMN	3663	2300	Daily	972	480	89	—
WSSB	3935	0000	Daily	879	214	30	K8WRJ
EPEN	3920	2230	Daily	872	25	18	W8ALHC
PON-DAY	3937	1800	Daily	762	608	30	K8ONE
GLFTN	3932	0230	Daily	917	126	29	K8HJ
PON-CW	3645	0000	M-Sat.	169	33	25	VE3DPO
MBMTN	5014	0000	M-Sat.	198	28	25	W8LRU
BR/MEN	3930	2230	M-Fri.	777	93	25	K8LJS

W8MPPD gave the new rig a real try in the SS. W8L & W8JTQ both celebrated 50 years in ham radio recently. New officers: Central Mich. ARC—W8CKK, pres.; W8VPC, vice-pres.; W8KGL, secy.; K8GZ, treas. Twin-Sun RC—W8ADLO, pres.; W8FYX, vice-pres.; K8LJN, secy.; W8CAA, treas. Genesee County RC—W8WQJ, pres.; W8XNP, W8KFK, W8WVW, K8BPQ, vice-pres.; W8B0T, secy.; K8KMQ, treas. The Wolverine V.L.E. net meets at 9 P.M. EST every Sun. The frequency is 50.115 and the net has 8 states checking in on s.s.b. W8PSV had lots of welcome help getting up his new quad. W8SS made a tour of Europe and visited 41TTU. The Catalpa ARS is looking for an Address-O-Graph, K8EMK has new W8S and WAC awards. Traffic: W8WZF 747, W8JTQ 619, K8LNE 562, K8KMQ 243, W8XJZ 191, W8NOH 157, W8HRH 134, K8MXC 117, W8CM 116, W8MO 110, W8REZ 98, W8B0TT 92, W8WZ 85, W8XQC 69, W8RTN 60, W8LXY 56, W8TBI 50, W8MGM 47, W8TIC 44, W8SPM 44, W8ACW 31, W8RAN 29, W8XONZ 29, W8MPPD 26, K8PTU 22, W8WV 15, W8AQGI 14, W8FX 12, W8AGQ 9, W8ZJM 5, W8SS 2.

OHIO—SCM, Richard A. Egbert, W8ETU—SEC: W8OUU, RAJ; W8IMI, PAM; K8UBK, V.H.F. PAM; W8ADU. I report with sorrow the passing of 2nd. SCM Roger A. Barnett, K8DGG. For all of his short life, Roger gave unstintingly of himself to amateur radio and to radio amateurs. Nov. reports:

Net	QNI	QTC	Sess.	Freq.	Time	Mgr.
OSSBN	2030	1238	63	3972.5	1530 & 2345Z	K8UBK
BN	670	133	59	3580	0000 & 0300Z	W8MI
06MtrN	553	94	55	50.61	0000Z	W8ADU
				50.16	0200Z	
OSN	191	92	29	3580	2325Z	W8VNU
Apricot	240	699	30	51.0	0000Z	K8ONA

RPL for Nov. was earned by W8UPH, W8BETX and W8ADWL. 06MtrN certificates were awarded to W8RRR, W8BNT, W8CKL, W8CQC, W8CX, K8LW, W8KKE, W8CUN, W8VPC, W8COA, K8ACD, W8VWM, W8JFH, W8VWH, W8VWZ, W8ZUT and W8ZRH. BN certificates went to W8ID, W8LZE, W8BALU, W8CKL, W8ZNC, W8BZR and W8TYP. Welcome to the newly-affiliated Newark ARC. Is your club an ARRL affiliate? Drop me a card for details on the benefits of League affiliation. K-W Society's new officers are W8BE, pres.; W8BU, vice-pres.; K8KLN, secy. Parma RC's officers are W8DPL, pres.; W8EPT, vice pres.; W8R0K, secy.; K8ZTO, treas. R7W ARC's new officers are W8BCB, pres.; W8BOX, secy.; W8C8N, treas. The Inter-City RC held an Old Timers' Night with W8GZ as the featured speaker. I visited the Westpark Radios in Nov. and discussed ARPS and the Field Organization with this fine group. The Eighth Region ARPS conference in Huntington, W. Va., was attended by K8DGG on my behalf. The ARPC areas of jurisdiction have been lined up by W8OUU. There still are some areas without organized ARPC activity. We need to fill these vacancies if we are to have complete coverage of the section. How about some volunteers? EC W8FQW reports on a detailed and well-organized drill conducted in the Akron area. Congratulations to new Advanced Class W8BKM. We received eight reports for the new Public Service Honor Roll listing. It is suggested that all making reports on PSRR check Jan. 1970 QST for details on requirements. Most of the Sweepstakes radiograms were in good shape and should merit the 1000 point bonus. W8TBE was stricken with a stomach ache during the 88, but continued operating. Several hours later he was rushed to the hospital for an emergency appendectomy. W8ZNC won the Ohio section award in both the New Jersey and Minnesota QSO Parties. W8RG reports mobile operation on a 6000-mile trip to Los Angeles and back. Traffic: W8UPH 768, W8BETX 704, W8UPL 256, W8ADW 221, W8VNU 220, K8ONA 214, W8MI 208, W8QCU 187, W8B0H 174, W8SUS 165, W8R8V 154, W8BAKW 143, W8QKZ 140, W8RALD 127, W8S8D 125, W8S8T 116, W8ZTY 116, W8RCY 105, W8VQY 103, K8UBK 101, W8TYP 96, W8PMI 95, W8WAK 82, W8YLV 76, W8DUL

74, W8RYP 71, W8YIB 71, W8CHT 68, W8JD 65, W8KPP 62, W8VWH 61, W8JH 58, W8AKU 56, W8ETT 51, W8ADU 47, W8PLD 47, W8CKL 44, W8LRE 43, W8LFE 42, W8XOK 41, W8OE 40, K8QVR 40, W8GNI 38, W8DAE 36, W8GRR 34, W8ZNC 34, W8B8Z 33, W8F8X 33, W8LT 33, W8UX 33, W8FQJ 31, W8QFK 31, W8OUI 29, W8AJZ 28, W8G0E 27, W8GRG 27, W8SXI 27, W8LAG 24, W8XJZ 24, W8LUG 24, W8CHW 23, W8COA 21, K8EHE 21, W8TKM 21, K8BYR 19, W8CQC 19, W8NOQ 17, K8PHE 16, W8U 15, W8NSP 15, W8FCQ 14, W8LAM 14, W8PNP 14, W8B8Z 13, K8ONY 13, W8KPN 12, K8LPI 12, W8DZ 11, W8JEH 11, K8DHI 10, W8MHO 10, W8NAL 10, W8N8S 10, W8C8H 9, K8EUI 9, W8ERT 9, K8WZ 9, W8YUR 9, W8J8W 8, K8S8R 8, W8B8P 7, W8ARW 6, K8CKY 6, W8MGC 6, W8RU 6, K8TUC 6, W8TV 6, W8WEG 6, W8ABE 4, W8AJW 4, W8BZ 4, W8MCR 4, K8YEP 4, W8LZE 3, K8BFX 2, W8CHT 2, W8EHI 2, W8ELE 2, W8FMG 2, W8O 2, W8UPD 2, W8ZNC 2, W8NCWD 1, W8DYF 1.

HUDSON DIVISION

EASTERN NEW YORK—SCM, Graham G. Berry, K2SN—Asst. SCM and RAJ: Ruth E. Rice, W2VYS. SEC: W2ZGC, PAM; W2VJB, V.H.F. PAM; W2YQL. Section nets: NYS, nightly on 3675 at 2300Z; ESS, 3590 nightly at 2300Z; NYSPTREN, nightly on 3925 at 2300Z. *Appointments and renewals:* K2ATP reappointed OBS; K2HNW renewed as OPS; W2FBI appointed OBS. *On the club front:* The Hudson Council has lined up dates for the Biennial HARC Convention to be held in Tarrytown Oct. 17-18, 1970. Westchester ARA heard W2KP on "Getting Most from Equipment" and W2AH on "Getting Thru the Pile-ups" at its Nov. meeting. Election night in New Rochelle resulted in K2SN, pres.; W2TEQ, vice-pres.; W2YLE, secy.; W2VJZ, treas.; K2EBX, trustee for K2YJ; K2QJR, W2VEG, W2VYF, W2DPV and W2ZVJ, directors. Schenectady ARA heard W2TV on "Antenna and Feedline Measurements" in Nov. The SARA reports W2VJZ, K2AAD, W2KYF, W2DTC, W2PBI, W2KLY and W3JDE 2 as new members. The Holy Cross Radio Society is running regular schedules with K5A Time, and Fri. on 21.300 at 1530. *Individual station activities:* W2ABH now is HARC director. W2TPV now is 1 at Otis AFB on Cape Cod; W2FEDG turned in the "N" for W2. Advanced Class, W2QGW is 2 call area service coordinator for ECARS. W2S8H reports networ seaffer 2-meter contact with K4IC. The Schenectady Co. AREC organization, under EC W2URP, has W2ACR for 5, K2RDS for 6, W2ICP for 2 meters and Asst. h.c.s. and W2PWF handling PR. New ESS members include K4GX 2 and W2VLS. W2QEG was "drafted" into the communications setup for the 67th Annual Antique Car Show and Speed Week in Albany Beach, Fla., over Thanksgiving. Schenectady-Albany area residents note FCC exams now are held in Albany. All ENY members: Remember the new qualifying rules for Public Service Award (PSHR). The first candidate is W2FBI with 27 points. W2FBI has been busy—first place for N.Y. in both the Illinois and Mid.-D.C. QSO Parties. Welcome from ENY to K2DGI as the new NYC H. SCM. More PSRR candidates: W2VYS and W2VYT. Traffic: (Nov.) W2EAF 190, W2FBI 113, W2VYT 92, W2VYS 79, W2QGW 65, W2VJB 41, K2SN 29, W2VLS 28, W2URP 19, W2ANV 18, K2YJ 18, W2PTV 14, K2YK 10, W2WGX 9, W2CRW 7, K2HNW 3. (Oct.) K2HNW 3.

NEW YORK CITY AND LONG ISLAND—SCM, Bruce S. Johnson, K2DOR—Asst. SCM: Fred S. Brunjes, K2DGI. SEC: K2OVN, PAM; W2EW.

N1*	3630 kc.	1915/2200	Nightly	K2UAT	RM
N1YHP*	145.8 Mc.	1930	MTWTF	W2RQF	PAM
N1Phone*	3925 kc.	1800	Daily	W2UWA	PAM
Clearline	3925 kc.	1100	Daily	W2GPT	Mgr.
Mid-Parad	2925 kc.	1300	Ex. Sun.	K2UBG	Mgr.
Clear US	3683 kc.	0900	Nightly	K2UBG	Mgr.
All Svc	3925 kc.	1300	Sun.	K2AAS	Mgr.
N1SPEN	3925 kc.	1800	Daily	K2SD	Mgr.

* Section Nets. All times above are local. Eison, in wrapping up the affairs of the section we had that this one's term runs out to Jun. 2, 1970. Since it is only Dec. 15th, at this writing, he owes one more Station Activity Report and this is it. W2VLK still is plugging away at dental school and getting to like it more and more. W2PF was elected treas. of the Radio Club of America at its 60th Anniversary Meet-



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.



EIMAC 3-500Zs are Heath's Choice.



John Morgan near Auckland, New Zealand, has had three QSOs with Kjell Rasmusson near Lund, Sweden, via 2 meter moonbounce. Both John and Kjell use EIMAC radial beam power tetrodes in their transmitters.



tubes, and the fact you don't need acres of land and unlimited resources to experiment with moon-bounce techniques.

John points out that he has only a quarter-acre suburban homesite, a homemade rig, wife-and-son engineers and

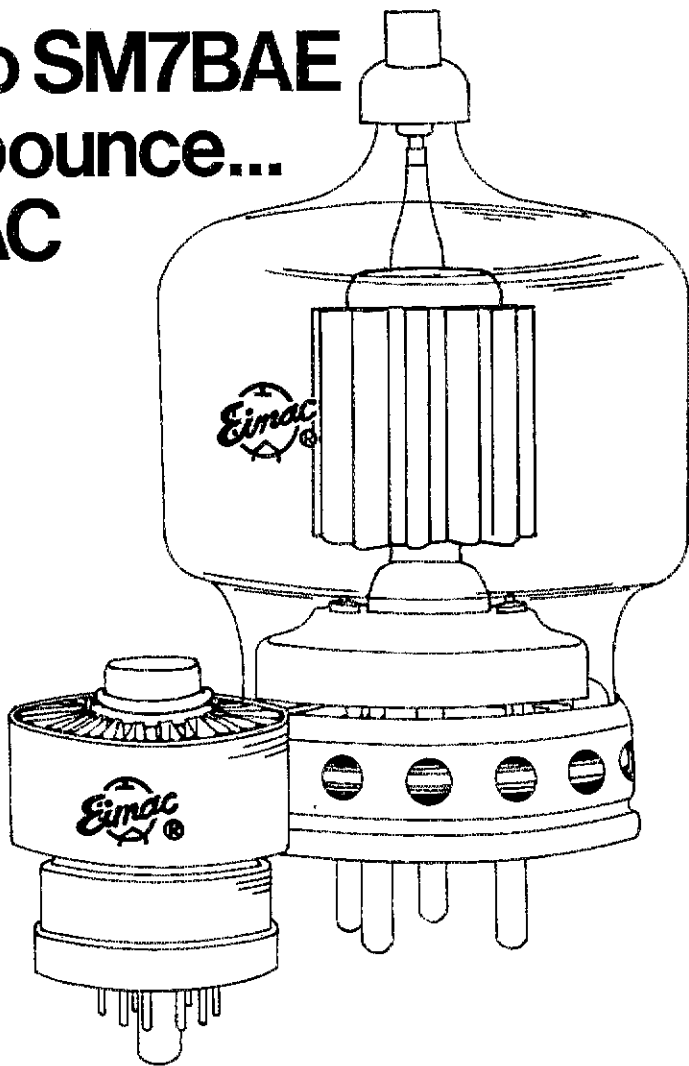
ZL1AZR gets a measured 550 watts output with 80 watts drive at 1 kW input. He uses two EIMAC 4-400A tetrodes, cathode driven, with grid and screen grounded. His antenna has 8 bays of 6 over 6 slot-fed Yagis spaced one wavelength. SM7BAE uses two EIMAC 4CX250R ceramic tetrodes, grid driven, with 1000 watts input. His antenna is an array of sixteen ten-element Yagis. Both amateurs have proven the ruggedness and dependability of EIMAC

dozens of curious neighbors. Next step is to QSO Kjell on 144 MHz RTTY.

Put up your 2 meter antenna and listen to these record-breaking schedules. Make it a three-way QSO with EIMAC tubes! And for more information on EIMAC tubes at VHF write Amateur Service Dept., EIMAC Division of Varian, San Carlos, California 94070.



ZL1AZR to SM7BAE by moonbounce... with EIMAC tubes



ing. WB2WFJ has transferred to Stony Brook and is busy looking up the ARC. The WB2PJH activity crew took a nose-dive recently because of family illness, but is now reported to be on the way back up. W2NKB, Eastern Long Island 160M OBS, reports that the band is pleasantly active during this winter season. New officers of the Massapequa RC are WB2NLM, pres.; WB2IVK, vice-pres.; WA2HUE, secy.; WA2DUS, rec. secy.; WA2EAN, treas. W2UAL took his rig into the EPA section over Thanksgiving to flout it a little, but found they have a Murphy's Law too! W2HAB has up and moved back to Northport. The feverish activity over at K2HTX has to do with a beam which must go up before the ides of March. On the other hand, the back doorway over at WB2TOK is full of bent antennas, but it works like the dickens. Did you know that K2PHS is running RTTY over on 20? WB2DRW didn't figure it was necessary to tote the good old keyer all the way home for the Thanksgiving holidays and now there's a cadre of stumped ear pans in the neighborhood still wondering what the Wading River Straight Key said! The Hall Hollow Hills High School ARC could use donations of any old parts or equipment to get started. If you can help, please contact WA2LMO, WN2JWE or WB2ULY. After 40 years in the garage business, K2YSK has now gone into radio repair. K2BYV is in the seaplane business flying passengers betwixt Island Park and Wall Street. WB2QLP is going to college down Miami way. A little while back the good old home rig at K2LFG went west and the Mike Beard Net opened with K2HGG mobile as NCS. NLI's first RAL, W2DBQ, did it again and renewed his ARRL membership for the 41st consecutive year. Venerable K2AAS sashayed off to his annual Las Vegas jaunt at the beginning of Nov. Congratulations to WA2GMD on passing the Advanced Class exam. Well, that about shoots it so best of luck to one and all and hope we see you down the road. Traffic: (Nov.) WA2HMO 333, W2GKZ 126, K2AAS 67, WB2DRW 24, WA2VLR 20, W2EFC 12, WA2BRF 10, W2RPF 10, W2DEQ 4. (Oct.) WA2HMO 241, K2HGG 213, W2EFC 25, W2DBQ 21, K2AAS 15, WA2GLR 12, W2RPF 12, WA2DNO 3, WA2BRF 2.

NORTHERN NEW JERSEY—SCM, Louis J. Amrosio, W2ZZ—SEC, K2KDQ, RM: WB2RKK, PAMs: W2PEV, K2KDQ, WA2KZF and WA2TBS.

ARRPS Section Net Schedules

Net	Freq.	Time	Days	Sess.	QNI	Tfr.	Mgr.
NJTEN	3625 kc.	7:30 p.m.	MWF	11	33	11	WA2TAF
NJN	3685 kc.	7:30 p.m.	Dy	30	385	250	WA2RLV
NJN	3685 kc.	10:00 p.m.	Dy	30	292	52	WA2RLV
NJ8N	3740 kc.	8:00 p.m.	Dy	11	32	9	WB2FEH
NJEPN	3960 kc.	6:00 p.m.	M-Sat.	30	598	202	W2PEV
NJPON	3960 kc.	6:00 p.m.	Sun.	5	129	42	WA2TBS
NJAN	50,425 kc.	8:00 p.m.	M-F	21	221	48	WA2KZF
PVETN	145,710 kc.	7:30 p.m.	Dy	30	128	104	K2KDQ
BCTN	146,700 kc.	9:00 p.m.	Dy	30	172	66	WA2TBS

New appointments: WB2FEH as OVS, Endorsements: WB2TTL as ORS; W2PEV as PAA1; WA2KZF as OVS, PAM and EC for Stanhope and vicinity. Again we ask you to note the new teletype net. Pass the word around to the green keyers. New officers of the Knight Riders V.H.F. Club are: K2BDQ, pres.; WB2VLC, vice-pres.; WA2CRF, secy. WN2JLM now is operating on 80. WA2HDS, WA2KWV and WB2KPD joined Navy MARM. WB2WID put up a new quad. W2DDH is moving to Ocean County. He will be a big hit in the N.J. QSO party from that spot. WA2EIN has a new home-bow TU for his RTTY setup. WB2NYK reports DXCC totals of 157,143 and waiting for QSLs. The Carteret HS RC again is in operation. WA2LHV is building an s.s.b. rig. WB2FEH made WAS in the recent SS Contest. WA2GOC has a new SB-300, SB-400 station. W2JDH, WA2CCF and WB2NYK submitted reports for the Nov. FMT. W2NGX is recuperating from a recent illness. WA2AB is on 2-meters and is planning a 1296 rig. W2JZC is putting up a new 50-ft. tower. WB2MEB added a new invader to the shack. WB2DRJ reports a DXCC total of 131 confirmed. WA2CCF ordered a TR-4 for his mobile. The W.E. Club now has 21 members with call-letter license plates. New officers of the BARK are WB2RJJ, pres.; WB2GTM, vice-pres.; WA2ZG, treas.; WN2KNW, secy. We wish to thank everyone for the SS messages. NXJ was all over the bands. Good luck in the ARRL DX Test. Traffic: (Nov.) WA2HAN 426, K2KDQ 260, WB2FEH 242, WA2RZF 239, K2DEL 173, WA2TBS 92, WA2CCF 80, WA2TAF 77, W2PEV 55, WB2TTL 56, WA2HCT 38, K2CQJ 37, WB2WVZ 35, WA2DRH 28, WA2DQE 26, WA2GHL 26, WA2HSJ 26, W2ZZ 28, WA2NJB 20, WN2FVH 19, WA2LDX 17, WB2WID 17, K2DQT 15, WA2EUX 15, W2CU 12, W2RWZ 10,

WA2KZF 10, K2MFX 8, WB2BCS 7, WA2GOC 7, WA2HF 5, W2JDH 4. (Oct.) WB2HAN 76, WA2GIE 55, WA2TAF 14. (Sept.) WA2EIN 5, WB2PUW 2.

MIDWEST DIVISION

IOWA—SCM, Wayne L. Johnson, KOMHX—SEC: KOLVB, PAM: WOPZO, RM: WOLGG, OBSS: WOLCN, WQJAO, WOLR, WAQJIT. New tickets: Advanced—WQJIG, KQIDM, WAQJEG, WAQOTQ, WAQPHB, WAQZTI, WAQRGQ, WAQOAI, WAQWQ, WAQWVW. General—WAQWSI, WAQZY. Reports of Sweepstakes activity were received from WOLCE, WOKB, WQGHZ, KOGXR, KOAZI, KOYU, WAQVBM, WAQVJD, KOUKN, WAQLEW and WNOYJW. Coe College has a new ARRL affiliated club with WAQTON as coordinator. WAQEPN reports state will be available for the ARRL in the Clinton law enforcement center. KOAZI measured 40-meter frequency precisely in the Nov. FMT and average 1 p.p.m. overall. Dave consistently has outstanding scores. WQDIT also participated in the FMT with an excellent score. KOTDO is now sporting a Collins S-Line. KOJH, WAQNNR and WAQJCE have started a Novice class in Ottumwa. WQFZO reports the "3900" Club is a big success and growing daily. It meets Sun. at 1500Z. Help! Yours truly has limited operating time these days so must depend on correspondence for news. How about it, clubs? Time spent complaining on the air about incentive licensing is time lost that could be used to study for an Advanced Class ticket—and a little code practice might even bring an Extra Class. That should get some response. Hi!

Net	Freq.	Day	GMT	QNI	QTC	Mgr.
Iowa 75	3670	M-Sat.	1830	1372	286	WOPZO
TLCN	3560	Daily	0030	213	108	KOAZI
Iowa 160	1875	Daily	0100	776	12	KOTDO

Traffic: (Nov.) WOLCN 1257, WQJFX 222, WOKB 143, WAQMLE 139, WAQVZH 7, WQJCE 88, KOAZI 60, WOPZO 56, WAQVJD 44, WAQOTQ 36, WAQVJG 25, WAQPOE 24, WAQVJZ 19, WAQOZL 2, WAQVBG 7, WAQYVR 5, WAQVDP 4, WQMOQ 2. (Oct.) WAQAW 11.

KANSAS—SCM, Robert M. Summers, KOBXF—SEC: KOEMB, PAM: KOMMF, RM: KOMRI, V.H.F. PAM: WAQCCW. The report for Aug. activities went astray somewhere between Kansas City and the desk of our QST editor. Extracted from the Aug. report we find renewed station appointments for KOEMB as SEC; WAQCCW, WQFDL, KOMRI as ECs; WQINH as ORS; KOEMB and KQZGP as ORSs and KQHFH as OO. Aug. net reports included K8BN, QNI 742, QTC 97 in 30 sessions; KFN, QNI 168, QTC 35 in 17 sessions; KPON, QNI 982, QTC 418 in 31 sessions; QKS, QNI 388, QTC 171 in 62 sessions. The Ks. PI Net reports were caught up by WAQCCW showing a QNI of 31 for Aug., 67 for May, 18 for June and 27 for July. Nov. finds KQZGE thinking of going to Southern Texas for the winter. WAQVWN, reporting from Manhattan, says that WAQOTI is the pres. of the KSU ARC this year. WAQOQ, the college station, is activated again, showing up with a full 24 hours of operation in the recent SS. WQSOE, at Wichita, is undergoing a new face-lifting job. V.H.F. activity appears to be on the move. Activity by the members of the Tri-State ARC should give us something new to talk about occasionally. KOAYO and KOOCB are sporting new eleven-element 2-meter beams in the Kansas City area. QKS, the Kansas c.w. net, is going great guns under the leadership of KOMRI, who reports 459 QNI, 195 QTC, 60 sessions. Traffic: (Nov.) WQFH 327, WQINH 271, KOMRI 132, WAQLIC 121, WAQUTT 121, KQPSD 75, WQGCJ 39, WAQVWN 39, WQOQO 28, WQCHL 26, KOBXF 23, WAQVWH 19, WQKXG 17, KOLPE 15, WQFDJ 10, KOYTA 10, KOYVH 9, WAQOZP 7, WQVVC 5. (Aug.) WAQTHQ 444, WQHXA 394, WQCGZ 118, KOMMF 113, WQINH 111, KOMRI 107, WQLXA 88, KOBXF 56, KQPSD 48, WQGCJ 43, WAQLIC 40, WQCHL 36, WAQVWN 36, WQFHT 26, WAQVWH 25, WAQOIT 25, KOLPE 19, KQGTI 13, KQKVF 13, WAQSEY 9, WAQJG 8, KOYVH 8, WQKXG 7, WAQSHG 6, WQFDJ 3, WQVLC 2.

MISSOURI—SCM, Robert J. Pender, WQBV—SEC: WQPTL. Appointments renewed: KQWVE as OPS. Net reports:

Net	Freq.	Days	Time	Sess.	QNI	QTC	Mgr.
MEN	3605 M-W-F		2330Z	12	198	17	WQPTL
MNN	7063 M-Sat.		1900Z				WQOUD
MON	3585 Daily		0100Z	24	145	59	KQAMB
MOSSB	3963 M-Sat.		2400Z	28	1083	121	WQRTO

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When the time comes for a new rig, most hams approach the task with enthusiasm... until financial reality invades their dreams. An ordinary 5-band transceiver, wired and ready to go, costs around \$500. Much of the reason for this price, of course, is that you are paying to have someone else wire your rig.

Heath also sells \$500 worth of transceiver — the HW-100 — but our price is a bit more realistic — \$250* — and the performance is better! We reason that if you can handle the FCC exam, you can also handle a soldering iron. And because we don't use any of your money to wire your rig, we can use more of it to provide advanced engineering. Check out a realistic \$500 rig... the Heathkit HW-100... another hot one from the hams at Heath.

- 80 through 10 meter coverage • Solid-state (FET) VFO • 180 watts input PEP SSB — 170 watts input CW • Switch selected USB, LSB or CW • Crystal filter for sharp 2.1 kHz selectivity • Full coverage on all bands with 500 kHz per band segment • Better than 1/4 uV sensitivity • Smooth vernier control of frequency with patented Harmonic Drive® dial mechanism • Outstanding frequency stability • Excellent image and IF rejection • Built-in 100 kHz calibrator • Separate offset CW carrier crystal • Triple Action Level Control® for reduced possibility of overdriving & distortion • Built-in S-meter • Quiet, enclosed relays • Run fixed or mobile with HP-23A or HP-13A power supplies • Built-in VOX • Easy circuit board — wiring harness construction

Kit HW-100, 18 lbs. \$250.00*
 Kit HP-13A, DC power supply, 7 lbs. \$69.95*
 Kit HP-23A, AC power supply, 19 lbs. \$51.95*
 Kit SB-600, 8 ohm speaker, 6 lbs. \$19.95*

HW-100 SPECIFICATIONS — RECEIVER. Sensitivity: Less than 5 micro-volt for 10 dB signal-to-noise to noise ratio for SSB operation. Selectivity: 2.1 kHz minimum at 6 dB down; 7 kHz maximum at 60 dB down (3.395 MHz filter). **Inputs:** Low impedance for unbalanced external input. **Output impedance:** 8 Ω speaker, and high impedance headphones. **Power output:** 2 watts with less than 10% distortion. **Spurious response:** Image and IF rejection better than 50 dB.

TRANSMITTER. **DC Power input:** SSB: 180 watt P.E.P. (normal voice-continuous duty cycle); CW: (41 emission 1/4 watts (50% duty cycle)). **RF Power output:** 100 watts on 80 through 15 meters; 80 watts on 10 meters (50 Ω nonreactive load). **Output impedance:** 50 Ω to 75 Ω with less than 2:1 SWR. **Oscillator feedthrough or mixer products:** 55 dB below rated output. **Harmonic radiation:** 45 dB below rated output. **Transmit-receive operation:** SSB: PTT or VOX, CW: Provided by operating VOX from a keyed tone, using grid-block keying. **CW Sidetone:** Internally switched to speaker or headphone, in CW mode. Approximately 1000 Hz tone. **Microphone input:** High impedance with a rating of —45 to —55 dB. **Carrier suppression:** 45 dB down from single-tone output. **Unwanted sideband suppression:** 45 dB down from single-tone output at 1000 Hz reference. **Third order distortion:** 30 dB down from two-tone output. **RF Compression (TALC):** 10 dB or greater at 1 ma final grid current. **GENERAL.** Frequency coverage: 3.5 to 4.0; 7.0 to 7.3; 14.0 to 14.5; 21.0 to 21.5; 28.0 to 28.5; 28.5 to 29.0; 29.0 to 29.5; 29.5 to 30.0 Mhz.

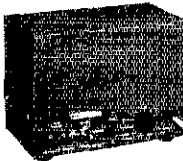
(hertz). **Frequency stability:** Less than 100 hertz per hour after 30 minutes warmup from normal ambient conditions. Less than 100 Hz for ±10% line voltage variations. **Modes of operation:** Selectable upper or lower sideband (suppressed carrier) and CW. **Dial calibration:** 5 kHz. **Calibrations:** 100 kHz crystal. **Audio frequency response:** 350 to 2450 Hz. **Front panel controls:** Main tuning dial; Driver tuning and Preset/Retinal tuning-trial loading; ALC and CW Level control; Mode switch; Band switch; Function switch; Meter switch; RF Gain control; Audio Gain control. **Side controls:** Meter Level control; Bias; VOX Sensitivity; VOX Delay; Anti-trip. **Internal controls:** Carrier null; neutralizing; Tube complement: OA7 Regulator (150 V); 6AU6 RF amplifier; 6AU6 1st receiver mixer; 6AU6 isolation amplifier; 6AU6 1st IF amplifier; 6AU6 2nd IF amplifier; 6BN6 Product detector and AVC; 6AU6 VFO Amp.; 6C86 2nd transmitter mixer; 6CL6 Driver; 6AR8 Speech Amplifier and cathode follower; 6EAB 1st transmitter mixer; 6EAB 2nd receiver mixer and relay amplifier; 6EAB CW sidetone oscillator and amplifier; 6G58 Audio amplifier and audio output; 12AU7 Heterodyne oscillator and cathode follower; 12AT7 VOX amplifier and calibrator oscillator; 12AU7 Sideband oscillator; 1466 Final amplifier (2). **Diode complement:** 6 Germanium Diodes: balanced modulator, RF sampling, and crystal calibrator harmonic generator; 9 Silicon Diodes: ALC rectifiers, anti-trip rectifiers, and DC blocking; 1 Zener Diode: cathode bias. **Transistors:** MPF-105 FET-VFO; 2N3393 — Voltage regulator. **Rear apron connections:** CW Key jack; 8 Ω output; ALC input; Power and accessory plug; RF output; Antenna; Spare. **Power requirements:** 200 to 850 watts at 250 ma with 1% maximum ripple; 300 watts at 150 ma with 1% maximum ripple; —15 volts at 10 ma with 5% maximum ripple; 12 volts AC/DC at 4.7a amps. **Cabinet dimensions:** 14-13/16" W. x 6-5/16" H. x 13-3/8" D.

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HP-13A Solid-State Mobile Power Supply... now with a higher DC input voltage range for compatibility with newer cars. All solid-state circuitry produces high, low & bias voltages from a 12-16 VDC (negative ground) input. Primary & filament lines are circuit breaker protected.

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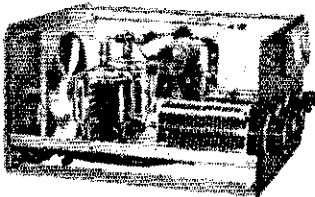
Kit HP-23A, 19 lbs. \$51.95*

*Mail order prices; F.O.B. factory. AM-231R

The New Heathkit® 2-KW Linear Is Here (at last)



New SB-220 . . . \$349.95*



Two rugged, dependable Eimac 3-500Z finals for top performance. Zener regulated operating bias reduces idling Ip for cool running.



Reliable power supply . . . plate transformer on right, capacitor bank in center for excellent regulation, filament & bias circuitry on left.



Continuous monitoring of Ip plus switch selected monitoring of Rel Pwr., Ep & Ig.

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: —50 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 — SSK, 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), 4x Input (50-250), Ground post, RF output (50-250). Tubes: Two Eimac 3-500Z. Power required: 120 VAC, 50-60 cycles, at 20 amperes maximum; 240 VAC, 50-60 cycles of 10 amperes. Cabinet size: 14 1/2" W x 8 1/2" H x 14 1/2" D. Net weight: 48 lbs.



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AM-230

8MN	3585 Sun.					W80UD
MoPON	3933 M-Sat.	2300Z	26	423	85	WA0TAA
M4VN	5585 Daily	0345Z	30	159	121	WA0RVR
PHD	50-45 Tue. (GMT)	0130Z	4	99	7	WA0KHU
MoC/D/CW	3531.8 Alt.Sun.	1400Z	3	15	6	K0RPH

Phone SS messages were received from K2HIL/Q, WA0BJE, K0FEG, K0ETY, K0BZT and W0VJN; C.W. SS messages were received from K2HIL/Q, WA0BJE, K0DEQ, WA0BMS, W0ULJ, WA0VJN, WN0WR and WN0YBV. K0LJ reports his living room ceiling fell in while he was working DX. W0BUJ, still is working DX on 10 meters. WA0EML and WA0HQR are both at the University of Missouri at Rolla. New officers of the OMB Radio Club (W0FBE) are: WA0NOK, pres.; WA0PQR, (vice-pres.); WA0HQR, secy.; WA0TKM, treas. Officers of the Student Amateur Radio Club (WA0QWW) at Northeast Missouri State College are WN0UNR, pres.; WA0WQV, vice-pres.; WA0UOX, secy.; WA0RAQ, treas. Congratulations to: WA0VQD, ex-KLIDLD, who passed General, Advanced and Extra Class in one session; to WA0GYO and K0IKZ on Extra Class; to WA0WBJ, who has Advanced Class at 14; and to W0HTL, who has three months' perfect check-in on MoPON. Traffic: K0AEM 369, WA0TIN 130, W0BY 105, WA0RV 74, WA0YRI 71, K0RPH 69, WA0TAA 52, W0BUL 37, WA0VJN 20, W0RTO 17, WA0KOH 16, W0BYL 11, W0GBJ 9, W0JKF 1.

NEBRASKA—SCM, V. A. Cashon, K00AL—Since discontinuing the Nebraska C.W. Net (NEB 1), Nebraska operators are participating in the Kansas C.W. Net (QKS). K0MRL, RM of QKS, reported six Nebraska stations totaled 53 QNI for Nov. The S.D. ARBC Net meets Sun. at 1530 Z on 3960 kc. W0LVO has the county-hunting bug and is active in the 20M Independent County Hunters Net. W0YMU and W0LJD are improving from their illness. K0KJK retired from Postal Service. Best wishes for another successful year to the new Lincoln ARC officers, WA0KGD, pres.; WA0YHE, vice-pres.; WA0OCW, secy./treas. When applying for the Public Service Honor Roll (PSHR), please be sure to categorize your points. Nov. 1968 net QTC 732; individual stations 2355 QTC. Nov. 1969 Net QTC 720; individual stations 1192 QTC. Nov. net reports:

Net	Freq.	GMT	Days	QNI	QTC	Mpr.
NSN I	3982	0030	Daily	1260	48	WA0LOY
NSN II	3982	0130	Daily	945	32	WA0LOY
Neb. 160	1995	0130	Daily	309	5	WA0BJ
NFB 11	3500	0400	Daily	23	5	WA0RVR
NMN	3982	1330	Daily	963	26	WA0JUF
WNN	3950	1400	M-Sat.	563	37	W0NJK
AREC	3982	1430	Sun.	236	6	W0RZ
CHN	3982	1830	Daily	960	71	WA0GHZ

Traffic: K0UWK 300, WA0DOU 188, W0LOD 122, W0RVE 40, K0DFE 40, WA0CJ 35, WA0HWR 32, WA0GHZ 25, WA0IBB 25, K0JFN 22, W0GEQ 21, WA0FGV 20, WA0IND 20, K0JTW 20, K0DGV 18, W0HTA 16, W0ZOU 15, WA0BK 14, W0AGK 12, WA0JH 12, WA0TJA 11, WA0UPK 11, WA0LOY 9, W0NJK 9, W0RJA 9, W0RQB 8, WA0PCC 8, WA0QEX 8, WA0TMM 7, W0VOG 7, WA0QX 6, K0HNT 5, WA0JUF 5, WA0VJN 4, K0RBU 4, WA0JAV 4, K00AL 4, WA0GLE 4, WA0RPH 4, K0UDW 4, W0VZJ 4, W0BPN 3, W0HOP 3, WA0SOP 3, W0NWG 3, W0VEA 3, WA0BJ 2, K0HYK 2, WA0KC 2, W0YFR 2, WA0IBL 1, WA0JKN 1, W0URC 1.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, John J. McNassar, W1GVT—SEC: W1HHR, RM: W1HSN, PAM: K1YGS, V.L.F. PAM: K1SXF. Activity report for Nov.:

Net	Freq.	Days	Time	Sex.	QNI	QTC
ON	3640	Daily	1845	30	282	276
OPN	3965	M-S	1800 Sun.	1000	30	151
VHF 2	145.98	M-S		2200	20	78
VHF 6	50.6	M-S		2100	20	144

High QNI: CN—W1HSN, W1HOL and W1JZC. CPN—K1YGS 20, W1GVT and K1SXF 28, W1DJJ 22, W1YBH 21, W1FXS 20, K1DGH 18, W1NBP 15. The Public Service Honor Roll is a new traffic award with the first listing in this issue. Full details were in Jan. QST. SEC W1HHR will appreciate EC reports and can be contacted on CPN. Clubs are requested to answer W1QV's Director Club-letter. All ARRL members are urged to express their views to him, W1KEM is edi-

tor of the East Catholic ARC Newsletter. W1KMR sent the EC Bulletin to all ARCC members in his area. I enjoyed attending the Candlewood ARA Annual Dinner Meeting. This is a very active club of dedicated and capable amateurs with an outstanding club program. My thanks to the many who submitted Sweepstakes reports. K1SXF would like more check-ins on the 2-Meter Net-aid for Connecticut traffic delivery. W1GPH is QRP on c.w. W1QV is DXing on 160. W1HDI is considering an I.m. net. Congratulations to: W1HOL, W1KMR and K1SXF on making the first PSHR listing; WN1MEO and WN1LD, new Novice Class licensees; Murphy Marauders on FD High Score; W1BLP, the new Navy MARS Coordinator for Connecticut! The "Freedom Frequencies" are available to all with Extra Class tickets. Get yours now! Traffic: W1EFW 247, W1HOL 227, W1EJI 160, W1HSN 132, W1KMR 86, W1GVT 53, W1AW 73, W1KUO 66, W1HJQ 55, W1JZC 54, K1SXF 47, W1JSSU 36, W1NBP 26, W1GPH 20, K1YGS 20, W1JGA 10, W1OBR 11, W1BNB 10, W1AGS 10, W1CIT 9, W1YB 8, W1QV 5, W1CUH 4, W1HHR 4, W1BDI 3, W1LLB 3.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, Jr., W1ALP—SEC: W1AOG received reports from Wis LE, ZOM, K1c PNB, DZG and W1DXI. Silent Kites: W1HVV, W1AGR and W1UOB, the brother of W1PCR. W1JKR, Barnyard Net mgr., reports 524 QNI's, 25 traffic. EMN for Oct. had 49 sessions, 241 traffic. W1MEL is the call of the newly-discontinued Brookline HSRC. G3IDK/E1 is building a Heath 301. W1EC gave a talk on "Underwater Reception of Radio Signals" at the South Shore Club. W1NPF made a 20-meter Loopstick DF to spot bootleggers. The New England Chapter of the QCWA had a meeting at Lord Wakefield Motel and the O1TTC met at the Firehouse in Sackwich. W1JFU is W1AKN's son. KC K1DZG says the Somerville ARC has been organized. The TR RC met at W1TYP's. W1LE is asst. coordinator for training in the Mass. Navy MARS area. W1QFO moved to Quincy. W1LWI reports members of the Tewksbury Memorial HSRC, which is run by K1VEP, are W1A1 KAJ, KVK, LHE, LWI and W1KWA. W1BHF is our first Honor Roll station with 39 points. W1FHU is a busy man in all the contests. Wis BPW and DAL worked all 75 sections in the C.W. SS. K1CLM is active in the Intruder Watch. W1FNM has a beam for 10, 15 and 20. W1FMW, the new Radio Officer for Sector 19, has a TR4 on 20, is on 2 and 6 for the e.d. and is in YL System on 30. The 6-Meter Crossband Net had 13 sessions 38 QNI's, 1 traffic. W1LFE is a new OPS/OVS; W1ABC is a new OHS. Appointments endorsed: W1DPX as OVS, K1PRB as OHS. Wis AVG, RGW and W1EHW took part in the Nov. EMT. The EM2MN had 20 sessions, 142 QNI's, 176 traffic. The following received their 50-year awards from the QCWA: Wis BB, CD, CL, RP and BPH. W1OIN is feeling better after a heart attack. He is s.s.b. on all bands. W1EHT reports that the NEEPEN, which meets Sun. at 0830 on 2945 kc., had 5 sessions, 105 QNI's, 5 traffic. W1AWA is back in Narragansett, Fla. for our winter. W1ZJW is ex-W1EAG. W1MPF and W1PS are on their way to Florida. W1LJL has his General. The Waltham RC had 2 films on transistors and has a code class. W1WJR is on 6 BPTT. W1DPX worked 4-and 5-Land on 6 s.s.b. W1MX worked W1JFU on 2. The Massachusetts ARA held its 8th banquet. W1CUY is back on 2. W1LJH works his friend Ray in Cape Town, So. Africa. Sun. on 10. W1ZND is on 2 with a dual beam and a Gonset. K1FF is home after an operation. W1KYT was in the hospital. The Middlesex ARC had a good auction. The Capeway RC met at W1ZPT's. W1LOH has his new rig on the air. The Framingham RC had a fine presentation of Heath equipment by K1RAW. W1LE reports a drill held on 6 with these QNI's: Wis LE, UID, D1V, W1S DNM, 1P.N, CRM, K1s VJP, MTK. The W1AEC Club has a newy little paper, Zero Bent. Whitman ARC has a fine paper, The Spectrum. K1UCT is editor. W1HII has his General. W1DDN got married. The KIRNCS have a new son. W1HKJ is our second Honor Roll station with 38 points. W1DYW is on many bands. Traffic: W1OJM 412, W1EYV 411, W1PEX 347, W1ALF 181, W1EMG 142, W1LJL 140, W1HJK 101, K1JRE 82, W1CTR 79, W1UX 79, W1HFE 69, K1ESG 62, W1ARC 51, W1BVF 50, W1EHW 39, K1PRB 39, W1LJL 34, W1LJK 19, W1AGC 14, W1DPX 14, W1JDP 14, K1LQC 14, W1DOM 13, W1ALY 10, W1AIR 9, W1LJQ 8, W1DAL 8, K1CLM 4, W1AKN 3, W1AIFL 3, W1AFNM 3.

MAINE—SCM, Peter E. Sterling, K1TEV—SEC: K1CLF, RM: W1BJG, PAM: W1ELG, W1AIOG is

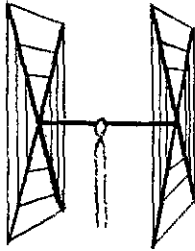
AHA! YOU THOUGHT GOTHAM

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 fool-proof 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' x 1 1/4" 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' x 1" OD aluminum 'hi-strength' alloy tubing, with telescoping 3/8" 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
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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

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; 3/8" 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

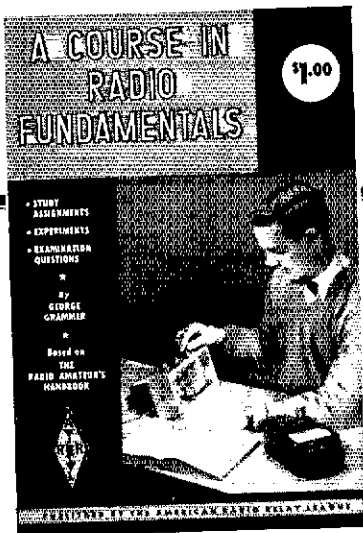
ALL-BAND VERTICALS

"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, T12FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MNV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWI, VE3KT. Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4-AQL, SM5BKG, G2AOB, YV5CLK, OZ4fl, 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

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in the Navy stationed in the Philippines, and is working toward getting a permit to operate on the air. W2NYU has a summer camp in Winthrop, and also holds the call WAJLV. He works 80, 10, 20 and 2 meters. WAIFY, West Newfield, is presently home-brewing a 6-meter rig and hopes to have it going by next spring. I am sorry to report that W1LOA is a Silent Key. New hams in Maine are WNIMBL, WNIMBM, WNIMAX, WNIMAL, WAIMAH and WAIMAF. The Sea Gull Net meets Mon. through Sat. at 1700 on 3940 kc. K1BAZ has been transferred to J.A. Land from the Philippines and hopes to be active soon. Interested in an appointment? If so, drop your SCM a line. The Portland Amateur Wireless Assn. meets every Tue. night at 227 Spring St. Code and theory classes are held every week. K1BAY is back operating at his home QTH in R.L. Traffic: (Nov.) W1BAG 367, WA1KLO 61, WA1PLG 51, WINND 43, WA1JFX 37, (Oct.) W1BAG 232.

NEW HAMPSHIRE—SCM, Donald Morgan, K1QES—SEC; K1RSC, RM; K1BCS, PA1; K1APQ. Welcome to WA1YQ and WN1AR. W1JB did very well in the recent PMT Class I as usual. OO reports were received from W1KRF and W1SWX. GSPN reports 795 check-ins and 129 traffic. The Manchester Radio Club is on the ball with most of its yearly programs planned. WA1JTM scored over 100,000 points in the C.W. Sweepstakes. Six- and 2-meter activity is anticipated with a kv. on 6. In the Bow Radio Club report it is noted that six-letter call plates for the car are available. The Nashua Mike and Key Club reports the following officers: WA1IQ, pres.; WA1EY, sec-treas.; WN1AF, secy.; WN1LYG, treas.; W1MUL, net. mgr. Its report shows 24 active members and 25-plus not so active. Code and theory classes will start after the holidays. A tower has been purchased and erected complete with beam. Club cuts air on 28.75 and 50.82. K1BCS still is very active handling traffic with his other duties. W1FZ and W1SWX participated in the Scandinavian Contest recently. K1NBN will be in California for three years. W1YWC took time to get himself an 8-point buck. Traffic: K1BCS 1186, WA1JTM 102, K1PQV 66, K1QES 5.

RHODE ISLAND—SCM, John E. Johnson, K1AAV—SEC; K1LIL, RM; W1BTV, PAM; W1TXL, VLF, PA1; K1TPK. R1SPN report: 30 sessions, 514 QRL, 105 traffic. WA1QH is setting up another station and plans to be on 2 meters soon. He just recently joined the c.w. net with the assistance of W1BTV. WA1CQ will add the c.w. 88-220 to his station for use on his contacts with the South Pole. K1CBO is experimenting with K1TY and has finished a successful contact with his new RPTV equipment. W1WAC is working on a new antenna and hopes to complete it so he can work the W1AQ 10-meter net. W1DK continues to work DX with several new countries added to his list. K1HMO, recently married, hopes to be on the air soon. Traffic: W1YKQ 146, W1TXL 76, K1QFD 33, K1VYC 38, WA1CRF 21, W1BTV 19, K1TPK 10.

WESTERN MASSACHUSETTS—SCM, Percy C. Noble, W1BYR—C.W. RM; W1DWW, SEC and PAM positions still are open. The YARC's guest speaker was W1QFB, area radio officer e.d., who spoke on the Amateur and Civil Defense. Editor W1NPI has an excellent account of a visit to ARRL Hq. Al Duncan, of the FAA, was the YARC's Oct. guest speaker. New members of the OMARA are Leo Savage, Raymond LaRue, Sigmund Kordek, Llewellyn Pomeroy, James Cole and George Paradis. The club has a Sun. net at 10 a.m. on 50.7. The Montachusett ARC reports that Leonard e.d. henceforth will use CR radio for Ward Hq. to the MARC. W1LKQ and W1FYM are active on 2 meters. W1ZPB's 55-ft. tower is now up! W1FGJ is active on 5 different nets. Southwick AREC assisted the police department in Halloween patrol under the direction of EC W1ALL. C.W. RM W1DWW reports the following for W1N (c.w. duty on 3660 at 7 p.m.): 160 QNIs, 148 messages handled, 17 stations reporting. The top 6 in attendance were W1BYR, W1DWW, W1ZPB, K1IJV, K1WZY and W1FGJ. We now have three county Emergency Coordinators: W1W Herkshire County; W1C Hampden County; K1SSH Worcester County. K1KNQ reports the following 8S results: 715 contacts, 73 sections, 102,295 score. K1KDP 730-69-100,326, W1YK C.W. 824-73-91,104. W1YK phone: 396-68-81,056. My responsibility is getting write-ups in to ARRL; the appointee's responsibility is getting reports in to me. Also, reports are welcomed from any active West. Mass. hams. My deadline is the 7th of each month. Traffic: (Nov.) W1ZPB 193, W1HH 70, W1BYR 67, W1DWW 64, W1FGJ 156, W1UPH 37, K1WZY 30, K1IJV 27, (Oct.) W1UPH 16.

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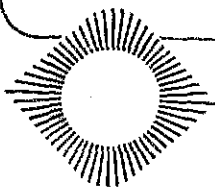
SPECIFICATIONS

Frequency range: 143-149 MHz. **Antenna Impedance:** 50 Ohms Nominal
Power Req'ts: 12-14 VDC (or optional power booster)

Transmitter: **Power Input:** 5 watts (10 W. with pow. booster) • **Freq. Control:** 3 Chan. crystal controlled • **Microphone:** High Impedance req'd. • **Deviation:** Adj. narrow or wideband with clipper filter also adj. for optimum clipping level.

Receiver: **Sensitivity:** SINAD .5uv for 12db. 1uv provides 20 db quieting. • **Adjustable squelch** • **Modulation Acceptance:** FM wideband (narrow band available) • **Type:** Dual Conversion, FET front end for minimum cross modulation and overload • **IF Frequencies:** 10.7MHz and 455 KHz • **Freq. Control:** 3 chan. crystal controlled • **Audio Output:** 3 watts (intr'nl 3.2 spkr.)

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VERMONT—SCM, E. Reginald Murray, K1MPN—

Net	Freq.	Days	Time	QST	QTC	N. Mgr.
Gr. Mt.	3932	M-S	2230Z	360	31	W1FQD
Vt. Fone	3955	Sun.	1400Z	92	3	W1EDU
MNV	3985	M-F	2330Z	156	123	W1BJG
VPCD	3990½	Sun.	1500Z	39	12	W1AD
Carrier	3945	M-F	1400Z	306	85	W1KKD
VTSH	3909	M-S Sun.	2330Z 1330	707	99	W1H8U

W1VSA (NEC) has started the C.D. RACES Net on 2-meter 1m, every Sun. at 10:00 a.m. W1AIM, currently with the Air Force, passed the Advanced Class exam. The Mt. Snow repeater should be in operation—146.31 in and 146.88 out. Welcome to W1LYR, Vt. Tech. College (Randolph), and W1MAG (Bennington). Don't forget the Vt. QSO Party Feb. 28-Mar. 1, 1970. Traffic: K1BQB 204, W1GKS 72, K1MPN 46, W1FRT 45, W1JGK 11.

VERMONT QSO PARTY

Feb. 28-Mar. 2, 1970

All amateurs are invited to participate in the Vermont QSO Party, sponsored by the Central Vermont Amateur Radio Club.

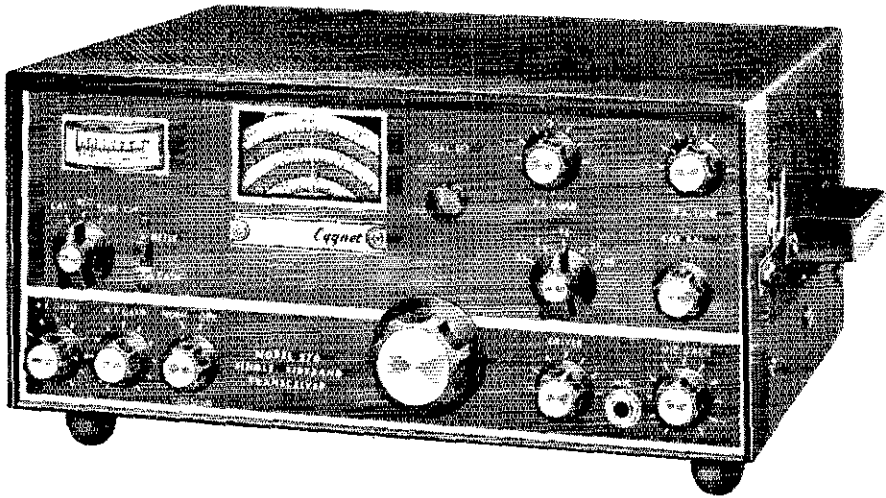
Rules: 1) Time, the 28-hour period from 2300 GMT Feb. 28 to 0300 GMT Mar. 2. 2) No power restrictions, all bands can be used and contact credit with the same station on different bands and/or modes will be given. 3) Vermont stations score 1 point per contact and multiply by the number of ARRL sections and foreign countries worked. Outside stations score 3 points per Vermont station and multiply by the number of Vermont counties worked on each band. 4) Certificates will be awarded to the highest scoring station in each ARRL section, plus a trophy to the highest scoring station outside Vermont. A trophy will also be awarded to the top Vermont scorer, with 2nd, 3rd and 4th place stations receiving a special certificate. The W-VT (Worked Vermont) certificate will be awarded stations working 13 out of Vermont's 14 counties, provided the station has not previously been issued this award. A special certificate too, for multi-operator stations. 5) Suggested frequencies: 3685 3932 3909 7060 7265 7290 14060 14290 14325 21,060 21,375 28,100 28,600 50,250 50,360 144-144.5 145.8, and Novice frequencies. 6) Vermont stations send number of QSO, report and county. Others send QSO number, report and section. 7) General call to be used "CQ VT" on c.w. and "Calling any Vermont station" on phone. 8) Logs should be postmarked no later than March 31 and sent to the CVARC, c/o L. Reg Murray K1MPN, 3 Hillcrest Drive, Montpelier, Vermont 05602. Stations sending an s.a.s.c. will receive a copy of the results.

NORTHWESTERN DIVISION

ALASKA—SCM, Albert F. Weber, K17AEQ—K17s EMP and PKX report that during the Nov. cold snap and Aurora event they watched Edmonton on TV Channel 3. Could this mean some v.h.f. does get into the Chena Valley? Did you know that K17AHB, at Harrow, is the U.S.'s farthest north permanently-escorted ham? Had a nice visit with that flying Dutchman, PA0UM. He visits with K17FCH quite frequently in Fairbanks. K17FLU is reported mobilizing all over those smaller states. K17FHJ and E17GFT have one thing in common, they both dropped their quads during the reaction phase, and both now have in the air cubical protocols. K17FNL, at Tanana, has heard W1EJZ, K17 on 2 meters via the moon. This could be a first. Contrary to reports in another magazine, there is 60 activity in Alaska. Look for the Fairbanks gang, K17s YU, DJI, FNL, GFT, AEQ, AZL. EVO are some we are sure of. 1890 is the frequency. Look for us. Traffic: K17CAR 108.

IDAHO—SCM, Donald A. Crisp, W7ZNN—The FARM Net meets on 3965 kc. at 0200 GMT 7 days per week. The Idaho RACES Net meets on 3991 kc. at 1815 GMT week days. The new FARM Net others are W8TGSB, mgr., and K71LLK, chief net control. W47JZ has a new tower and plans to install a quad. W7KFP is now on s.s.b. and

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260 watts P.E.P. input on 10 through 80 meters. A complete amateur radio station including 117 volt and 12 volt DC power supply and loudspeaker in one package with a handle. Has 100KC crystal calibrator, Dial Set, A.F. Gain, R.F. Gain, AGC, ALC, S-meter, side-band selection, all the features required for home station operation with enough power to work the world. Yet, the Cygnets is small and light enough for mobile or portable operation; an ideal traveling companion on business or vacation trips. **\$525**

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is using a 300-ft. long wire on 180 through 10 meters. W6KAJ is organizing an N.I.U., net on 3830 kc. using 1 kc. deviation. W7WU reports a new net on 1980 kc. Sun. at 9 P.M. MST K7GQP is net control. RACES credit is given for check-ins and if no traffic, the net is open for rag-chews. W7ZNN, Idaho SCM, attended the Gem State Amateur Radio Club meeting at Boise. K7CXG has built several station accessories. K7VVU moved from 11ah to Rigby. Hob teaches an electronics course at the high school and has organized a ham radio club. FAHM Net report: 15 sessions, 361 check-ins, 75 traffic handled. Traffic: W7GHT 181, WA7BDD 50, W7YJ 14, K7CSL 8, W7ZNN 8.

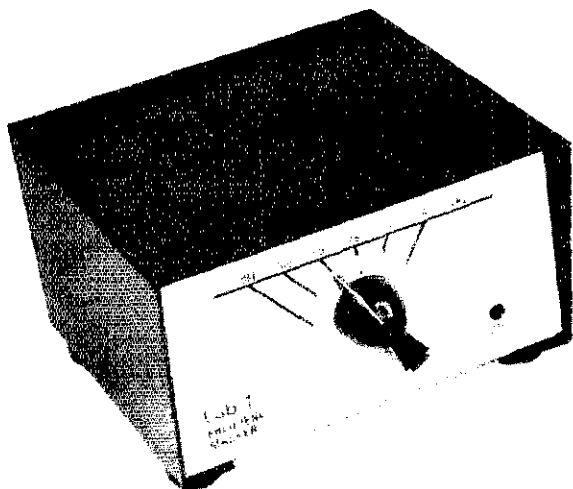
MONTANA—SCM, Joseph A. D'Arcy, W7TYN—SEC: W7RZY. PAM: W7ROE. Nets:

Montana PUN	3950	0245 GMT	Daily
Montana Fratric Net	3910	0100 GMT	M-F
Montana section Net	3950	1709 GMT	Sun.

Appointments: WA7ZR as OPS. If you hold an appointment in the section, please check and see that the endorsement date is current. If it is not, please send to me for updating. W7CGG has moved to Billings. W7MLZV and W7MZW recently made the rank of Eagle in the Boy Scouts. W7YB, the station at M.S.U., has the new Drake Line equipment on the air. W7QCW, in Helena, has a new 30-meter antenna up. W7MAK is trying to get the Helgate Radio Club started up again. The Butte area 2-meter fm. rebroadcast, WA7YR, is on the air on a maximum time basis; input is 146.340 and output 146.700. The Anaconda area unit is on also on a part-time basis with WA7MKY, K7OEK and W7YV. A new call in the Butte area is WA7NEE. We need still more news and traffic reports from the section. Traffic: WA7ZR 187, W7LBB 16, K7EGJ 11.

OREGON—SCM, Dale T. Justice, K7WWR/WA7KTY—SEC: W7HLF, RM: W7ZFH. PAM: K7RQZ. Nov. net reports: W7HKV reports for the BSN noon sessions 30, traffic 91, contacts 78, check-ins 424. K7VQM reports for the AREC Net sessions 30, traffic 24, contacts 80, maximum number of counties 18, K7GGQ reports for the OSN sessions 20, traffic 46, check-ins 97. WA7FTN reports 728 phone patches to S.B. Asia in Nov. Al has a TD running now for his RTTY setup. W7HLF helped W7LPM iron the bugs out of his rig, and installed transistorized changeover circuitry. WA7JKT has troubles with his s.s.b. rig. WA7JMD gave out some contacts from Grant County while on a hunting expedition. WA7LJO is the first Oregon station to operate slow-scan TV two ways, and has contacted KH6BAS. WA7ACV has returned from his tour with the Navy. W7LI sends in a nice report. WA7KRH has received his Advanced Class ticket. W7BNS has a new 2-meter antenna. K7YIA reports for the Salem area AREC Net sessions 30, traffic 14, check-ins 206. Traffic: W7KDU 648, K7RQZ 561, WA7FS 823, WA7HKV 277, W7ZB 169, K7NLS 114, K7OUE 63, WA7KIU 53, WA7IOW 48, K7WWR 35, K7VQM 32, W7BNS 16, W7MLJ 14, W7BFX 10, WA7JAU 7, WA7JMD 7, WA7KRH 3.

WASHINGTON—SCM, Harry W. Lewis, W7JWJ—K7LET, one of the reliable OEs of Washington State, is now 75-meter mobile. New owners of the Walla Walla Club are WA7JXL, pres.; W7GVC, vice-pres.; WA7LOQ, secy. K7NKZ, EC of Area 4, reports AREC members K7CZF, K7NPG, WA7JPC, W7RED, K7BSC, K7OSN and K7NKZ as providing communications for the annual Santa Claus Parade. W7AXT is the new manager of the Washington Section Net and participated in frequency measurements with average parts/union at 17.0. W7UDR, now is checking into area nets from Lopez Island. W7NDJ is an old railroad man who occasionally has to "push" W7QQC over Steven's Pass. Listen for them on 180.85 Mc. K7BBO is sending OEs on the AREC Puget Sound 2-Meter Net and on 6-meter nets. Frequencies are 145.35 and 50.85 Mc. WA7GJW, one of Seattle's attorneys, is now on with a new imported mobile rig. W7BUN is a regular with OEs on WARTS. W7NDN is a new AREC member from the Spokane area. WA7FVT is trying to start a v.h.f. club paper and is now working on a 2-meter linear. WA7JF is attending school but working as a baker afterwards, and is working on his c.w. with K7OUE giving him a lot of help. W7JWJ now is teaching a General Class license course at Seattle Community College and also is working there as c.e. A/V systems. WA7HKR has been elected net manager of the Noontime Net for another year. The Radio Club of Tacoma and the BEARN club of Hoquiam challenged one another to an annual 88 contest. The winner will take home a trophy to keep for one year. Should either club win the trophy for three years in a row, they will keep it permanently, and a new trophy will be purchased. Traffic: (Nov.) W7BA 1613, WA7HKR 566, W7DZX 536, W7PI 369, W7AXT 277, W7KZ 250, WA7KOB 243, W7BQ 85, WA7LMO 84,



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K7CTP 70, W7APS 59, W7GVC 55, W7LLO 53, W7JWJ 37, W7GYF 35, W7JFX 35, W7ACQ 31, W7BJN 29, W7DZL 28, W7USO 28, K7GZJ 18, W7BLB 15, W7DXI 13, W7AIB 12, K7SUX 10, W7IEU 8, K7YFJ 8, W7JY 6, W7GWL 5, W7UWT 5, K7BBO 3, K7LRD 3, K7OKC 3. (Oct.) W7DZX 598.

PACIFIC DIVISION

EAST BAY—SCM, Paul J. Parker, WB8DHH—W6RGG/W6T1 is finally getting set up and should be observing the bands soon. W6IPW has had so much fun away from his radio that his usual high traffic count has slipped some. W6DKP finally got his new quad in the air. K6DMI reports that he is enjoying traffic-handling very much on the Northern California Net. The East Bay Radio Club had a communications trailer available during the holidays for those people who wanted to send a piece of traffic overseas. W6UZX is teaching a math course out where he works and is finding the occupation very time-consuming. K6PJ reports that his attempts at the WWDX Test on c.w. were rough because of poor conditions. W6CBF has returned from a very enjoyable 37,000-mile trip to the Orient. K6LRN, WB6ABK and W6DIL were just a few from this section who enjoyed this season's SS. Two new Novices in our section are WN6LUS and his wife, WN6LUV. WN6LUS's first QSO was with LU6ED on 15 meters. November seems to have been the month of elections and we have been getting cards from just about all the clubs reporting their new officers. Among those removed so far are the officers of the SARO: K6HVN, pres.; K6UWR, vice-pres.; K6AWM, secy.; W6CMZ, treas.; and W6CMZ, comm. mgr. In the Mount Diablo Amateur Radio new officers are W6LNK, pres.; W6JLF, vice-pres.; W6TZR, secy.; W6TYG, treas.; W6ANE, emergency coordinator.; WB8DHH, board member. Hope everyone had a very good Christmas. Traffic: W6IPW 147, W6UZX 15, K6DMI 10.

HAWAII—SCM, Lee R. Wial, KH6BZF—SEC: KH6GQW, RM: KH6GHZ, PAM: KH6AD, QSL Mgr.: KH6IQ, ECs: KH6GQ, KH6GLU, KH6BAS, KH6GKY, KH6GKD and W7UZH/KG6 (on Guam). RACES nets coordinate with KH6AIN.

Nets	Freq.(Mc.)	Times(GMT)	Days
Friendly Net	7.290	2030Z	M-F
Boy Scout Ham Radio Net	21.360	1800Z	Sat.
Pacific Interstand Net	14.330	0830Z	M-W-F
S.E. Asia Net	14.320	1200Z	All
Marianas Islands Net	3.850	0830Z	2, 3, 4th Tue.
Pacific Typhoon Net	14.265	During Typhoon Alerts	All
Confusion Net (phone patches)	21.400	0130Z	Thurs.
Ceeko Net (KG6 Islands)	14.315	1000Z	Thurs.
Pacific DX Net	14.265	0800Z	Thurs.
Marine Corps Net	21.380	1900Z	All

Wanted: ECs for the Island of Hawaii, one for each section Hilo, Kona and Kohala areas. KH6GKD, EC Leeward, Oahu, was one of the several mobiles operating at the time of the North Shore Wave Disaster in Dec. Recently K6QPR, who's with USASPR/TCOM SIG GRP TAIWAN, was in town. KH6NO/KH6, passed the Advanced Class exam. KH6BWT passed the Amateur Extra Class exam. Wally reports that VK6AI passed through town on his way to G-Land. KH6AHP reports that he's going to KP4-Land for a visit. KH6GQW now has 80-meter capability with a new inverted "vee" dipole. KR6NR, new KR6 DXCC record holder (273) and family, visited KH6GQW and Denise prior to returning to the Mainland. We all mourn the passing of KH6GRP, operations manager at KGMB. He voluntarily took a searchlight to the North Shore during the wave disaster where he suffered a fatal heart attack. Send your Form 1s to your SCM on the first of the month. Traffic: (Nov.) KH6BZF 29, W7UZH/KG6 25, KH6GRG 16, KH6GQW 13, KH6BAS 3. (Sept.) KH6NO/KH6 40.

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: W7BEU, W7OK advised it may be necessary to move the W7AKE t.m. repeater off Mt. Charleston. WB8ADA/7 is active on 40-meter c.w. W7VE will schedule anyone DX or stateside needing a Nevada contact. W7BEU has devised another method of sending c.w. using a TD on RTTY. W7MOX presented a commentary with color slides of his army medical tour in Japan and Korea to RNARS members and guests at the Nov. banquet meeting. W7FM transferred to Phoenix with the FAA. Frank designed and built the W7DDB and W7AKE FM repeaters. K7ZAU and K7YVN arranged for a no-host dinner meeting for NARA members and guests. K7ICW is active on v.h.f. and u.h.f. W7KQJ is active again with a Swan-240.

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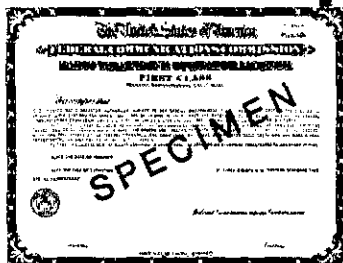
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CONVENTION and EXHIBITION
MARCH 23-26, 1970

SACRAMENTO VALLEY—SCM, John P. Minke, W6KYA—WB6AUEI has been busy operating on 1.32 Mc. Listen for him at 6:30, 7:30 or 8:30 in the morning using the call KCRH. W6VUZ has been designing tully automatic break-in for my rig using homebrew time delay relay. WA6OWH finally got his 80-meter vertical antenna working after making numerous adjustments and watt-meter readings. I've heard gripes and complaints about the bands being crowded in the General portion of the bands. What are you going to do about it? Send petitions to the FCC? Write letters to other magazine editors condemning the ARRL? A complete pop-out by quitting amateur radio? Or, are you going to take a positive step and improve yourself to get that Advanced or Extra Class ticket so that you have the room to breathe again? It's your choice—no one else can make it for you. It sure would be nice if I could receive some interesting news from individuals and clubs in the section. Traffic: (Nov.) W6VDA/6 23R, W6LNZ 99, K6YBV 79, W6KYA 41, WA6RBD 9, WB6BAG 4, WA6OWH 4, W6VUZ 3. (Oct.) WA6UIT 21.

SAN FRANCISCO—SCM, Hugh Cassidy, WA6AUD—SEC WBWLV completed a whole year in 1969 without missing one ARRL report—twelve in a row. His consistency is matched by WA6BYZ, who made the BFL every month in 1969, twelve in a row. W6BIP is expected to be the winner for the c.w. section of the SS again. WB6QVI has returned home to Eureka after two years in the Navy, mostly in the Far East. W6RQ continues to turn in those perfect readings in the PMTs. Al did it again in the Nov. test with an average error of 0.0003%, and continued his unbroken string of PMTs, the longest going in the ARRL. W6KVQ, from the new QTH at Navarro, has his rig operating again and is handling more traffic. W6JJJ is a mainstay in the Mission Trail Net, frequently handling the net control duties. W6EAL broke a long-standing self-discipline of 160 meters out as fire chief at Imola State Hospital after 45 years on the job. W6EAW kept up the section's good name with his article in Dec. QST. The San Francisco Radio Club held its Annual Christmas Dinner Dec. 13 with a good turnout of the old-timers. WB6PQE showed a firm hand at the Marin Club's Dec. dinner by wielding the gavel so vigorously when he took office that dinnerware was smashed to pieces. W6WLV is working with the 6-Land QSL Bureau to originate traffic to those with large accumulations of cards in the Bureau. The Valley of the Moon Radio Club elected new officers at its Jan. meeting. WN6HSD is a new Novice out of the Sonoma Valley area. WB6UJO was elected to the executive committee of the Northern California DX Club at its Dec. elections with WA6AUD being reelected as pres. W6ZC hosts an old-timers luncheon at the Pepperwood in San Anselmo the 3rd Thurs. of every month. W6PVC has retired from his communication duties with the County of Marin. W6UDL has acquired a Swan linear and is being heard on s.s.b. WA6ALK and OM W6UDL were in the Midwest for the Christmas holidays. Traffic: WA6BYZ 285, WBWLV 154, W6KVQ 74, W6BWW 24, WA6AUD 18, WA6QXV 12, W6CYO 2.

SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W8JPU—The Pacific Division Convention will be held here in Fresno May 14-15 at the Hacienda Motel. You can address any communications to WB6OSH, the general chairman. The following scores were obtained in the recent SS: WA6CIP-11,065; WB6WQV-34,985; WA6JDB-1900; W6UZF-30,888; WA6LVN-105,154. WA6AGS is experimenting with antennas. W6KOB has a Drake line. WB6OWI has an SR-42A. WA6KCU is heard on 75 s.s.b. WA6JDB is a new ORS and has an SR-401. WA6ALLQ has a Link 1.m. rig on 2-meter f.m. WA6APP moved to Clovis from Oakland and is active on 2-meter f.m. W6UYR is active in Navy MARS. W6WZP is active in Navy MARS. W6VSV is the new editor of SSip and also is active in Navy MARS. WA6EPP is on the air using an SR-401 and 201 amplifier. W6URK has a new tower up with a three-element beam. WB6KUD and W6JRL have some loop antennas for chasing hidden transmitters. The Fresno Amateur Radio Club held its Annual Christmas Party Dec. 5, 1969, with 35 in attendance. WA6YEP was awarded the Boner Trophy. The Proulx Radio Club held its Christmas Dinner and had 25 in attendance on Dec. 5, 1969. K6SEV is the pres. of the Trowel Radio Club. Traffic: K6KOL 125, WA6SCE 90, WA6JDB 82.

SANTA CLARA VALLEY—SCM, Albert F. Gaetano, W6VZT; SEC, W6VZE, RM; WA6LFA, W6AUG has been keeping regular skeds with K6FF/MM who is the operator aboard the S.S. J. N. Haman, a tanker, for phone-patch work. WA6OXE has added a Model 28 RTTY to his station. W6BVB has taken the NCS spot

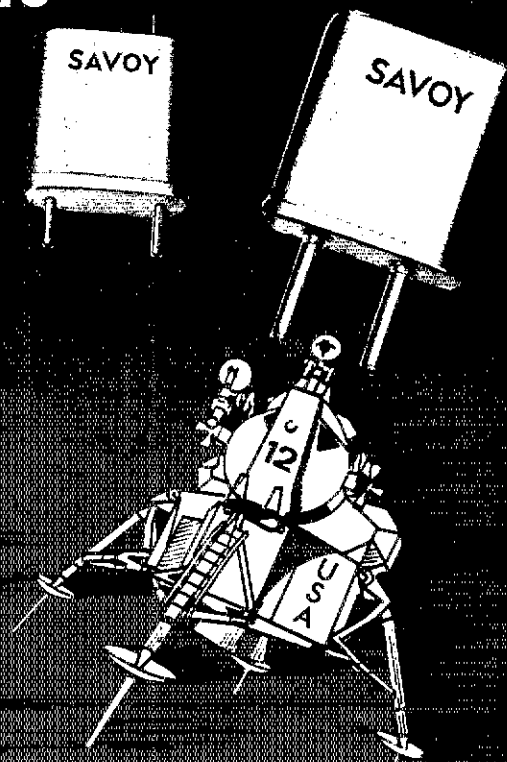
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on NCN for Fri. nights. WA6AVS is moving to the Island of Truk and has applied for a DX call. W6JOV is the new pres. of the San Carlos C.D. Radio Club. A memorial scholarship fund is being set up by San Jose State College in memory of Harry Engwicht. All the clubs in the area are soliciting funds for this worthwhile project. K8KOL's household has been blessed with a new harmonic. W6ZRJ and W6VZT have been heard on 2 meters. W6MVL has now worked 117 countries from his mobile rig. 3xKUM is starting to renew his interest in ham radio and might even get on the air again. WA6LFA and W6YBV were the first two in the section to apply for the new Public Service Honor Roll award for traffic work other than handling messages. The old 2-meter traffic net has been started again by WA6YDF. It will be on every Tue. at 8 p.m. PST on 146.80 Mc. This is an excellent way to give some of the new-comers practice in handling traffic. Liaison operators to put the traffic into NT8 are also being set up. Traffic: W6KSY 229, W6YBV 186, WA6LFA 173, W6NW 104, W6VZT 84, W6DEF 55, W6AUC 30, W6BYB 17, W6OIL 12, W6ZRJ 10, W6RFF 6, WA6GTE 3.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Calvin M. Dempsey, WA4UQJ—Asst. SCM: James O. Pullman, W4VTR. SEC: W4EYN, RM: W4IRE, PAM: W4AJT, V.H.F. PAM: W4HJZ. The Cape Fear Radio Society has 20 members. Officers are WA4VBC, pres.; K5TGA/4, vice-pres.; W4EHP, secy.-treas.; W4FUT, mgr. We have 3 new AREC members: WB4NRN, WB4JLP and David Wood. The Raleigh Radio Amateur Society promoted Radio Amateur Week. Governor Robert W. Scott proclaimed Nov. 17-24 as Amateur Radio Week in N.C. It was a real nice affair. We met in the press room at the Capital Building in Raleigh, N.C. A rig was set up there and the Governor talked with various hams in N.C. We had real good news coverage all over the state via TV, radio and newspapers. A message was sent by amateur radio to all the other 49 governors and was signed by Governor Robert W. Scott. It told them of his proclamation. The N.C. Phone Net has been formed and meets on 3865 kc. at 0230Z daily.

Net	Freq.	Time	Days	QTC	Mgr.
THEN	3923	0030Z	Daily	104	WA4VNV
N.C. S.S.B.	3938	0030Z	Daily	17	WA4KWC
NCN (L)	3573	0300Z	Daily	63	WB4GHC

Traffic: (Nov.) W4EYN 159, K4MC 88, WB4HGT 55, K4BO 48, WB4MQC 46, WB4MLI 42, K5TGA/4 40, W6AVS/4 36, K4URQ 33, WA4GMC 30, K4TTN 24, W4VNV 23, WA9JRX/4 23, WA4AKX 11, WA4UQC 9, W4KWC 3. (Oct.) K4MC 21.

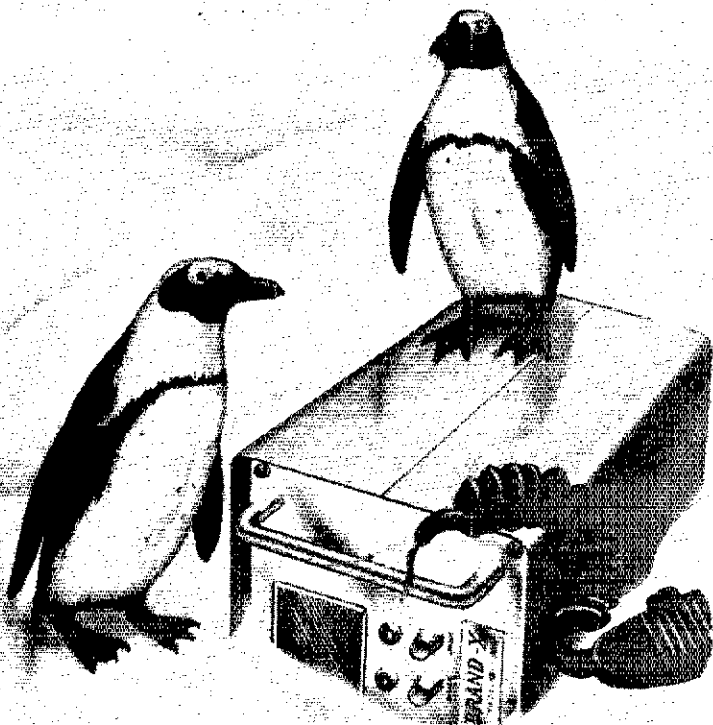
SOUTH CAROLINA—SCM, Charles N. Wright, W4PBD—SEC: WA4ECJ, PAM: W4VFO, RM: WA4OWY.

SCPN	3930 kc.	0630 and 1630 EST Sun.,	12 Noon Daily
	3795 kc.	Daily 2345Z	Nov. Tfr.: 35
SUSSEN	1915 kc.	Daily 0000Z	Nov. Tfr.: 95

The SCN joined the NCN in a single net, the "Carolinas" Net, Jan. 1. The net meets daily on 3795 and has liaison with both S.C. and N.C. phone nets and 4RN. The joining of the nets enables distribution of functions among a larger number of stations while still allowing full coverage. W4IRE, N.C. RM, will act as net manager through June when the S.C. RM will take over for six months. The S.S.B. Net has successfully been using upper sideband as an alternate frequency on which to pass traffic, thus relieving some of the pressure for space on the band. This works only if your lower s.b. is fully suppressed, so watch your modulation and clean up those signals. Only two station activities reports were received. Traffic: K4OCU 37, W4PBD 21, W4NTO 19.

VIRGINIA—SCM, Robert J. Slagle, K4GR—SEC: WA4PG, Asst. SEC: WB4CVY, RMs: WA4EUL, K4MLC, W4SHJ, PAM: W4OKN. I regret to begin this month's column by announcing the passing on Oct. 31 of K4EE, of Clifton Forge. I was surprised to have W4HM report only one contact in the phone and one in the CW. SS until I learned he did it with a fist broken by the crank on his tower windlass. W4ZM got so trained he still is putting SS on his CQs. Somebody dropped a zero in Dec. 1987 from WA4JL's county record—it passes 1240 this month! WA4JL expects shore duty in the Norfolk area soon and promises to be back with us. WB4DRB is monitoring the nets from college so watch the gossip. WA4EUL has the Virginia

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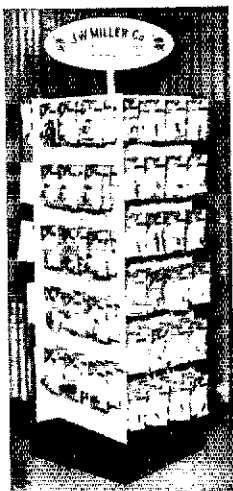


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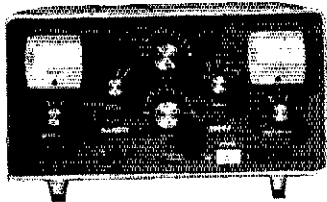
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Ham back in business. WB4FJK is doing double duty as vice-pres. and chief operator at K4KDJ. He drew No. 4 in the draft lottery and is worrying about additional duty in 3W8-Land. Our Director, W4KFC, was active in the Phone and C.W. SS, attended a board meeting, two club meetings and the AMBAT annual meeting. He climaxed the month by operating PJ0CW with W4GF and WB4GTS and even checked into VN from Caracas! K4TSJ is moving and is mobile only. WA4JUT, K4CGY, WA4WKB, WA4FGC and W4KRX are active as NCSs on VN. SEC WA4PBG is getting real interest going in the AREC. K4SDS is on the air from a new QTH. We urgently need NCS support in the VSBN.

VSBN	1800 and 2200	3935 kc.	Daily
VFN	1930	3947 kc.	"
VSN	1830	3860 kc.	"
VN	1900	3680 kc.	"

All times local. Traffic: (Nov.) W4SQQ 250, W4NLG 237, W4UQ 196, K4KDJ 165, WB4CVY 163, K4RNP 142, W4FD 96, W4RHA 82, WA4JF 69, K4GR 60, K4PSS 53, W4OKN 50, WA4EUL 45, WB4FJK 43, WA4PBG 32, K4TSJ 26, W4SHJ 24, K4PQL 17, WB4FD 15, W4OBE 15, WB4IRA 12, WA4NJG 12, W4ZM 12, W4GEQ 11, W4ZYT 11, K4SDS 10, K4JM 9, WA4WQG 8, W4THV 7, W4KFC 6, W4MK 6, WA4YRH 6, W4KX 5, WA4MJF 4, K4VCY 4, W4JUT 2, W4KA 2. (Oct.) WB4CVY 273, W4RHA 108, W4SQQ 66, K4PSS 34, WA4PBG 22, K4VCY 8, W4ZAU 8, W4ZYT 1.

WEST VIRGINIA—SCM, Donald B. Morris, W8JM—SEC: W8EY, RM: W8BBG, PAM: W8LYD, K8CHW. Net Mgrs: W8BBG, W8RAE. New officers of the Kanawha ARC are K8HGM, pres.; K8YBU, vice-pres.; W8HFL, secy.; W8HJC, treas.; W8UHL, W8YTP, act. mgr. The Northern Panhandle ARC plans 29480 repeater and 29.6 to 2-meter repeater setup. W8SEDE, W8BBG and W8WX reported Sweepstakes scores. W8NDY was elected trustee for the State Radio Council station for Jackson's Hill. W8WCK attended the Council and ARPSO meetings. WVN C.W. Net report 39 sessions, 174 stations and 84 messages. W8TWE and W8ZNH operate portable from WVU. Officers of the Mountain State ARC of Elkins are W8AKK, pres.; W8ZGX and W8CJG, vice-pres.; K8TPF, secy.-treas.; W8CDX, act. mgr.; K8CHW, pub. I regret to report the passing of W8CKJ, of Elkins. WVN Phone Net, 30 sessions, 424 stations and 88 messages; Mountain State Emergency Net, 5 sessions, 45 stations, 3 messages. W8DUV has been appointed publicity chairman for the YLRK, MAAK ARC officers are W8CKE, pres.; W8BATT, vice-pres.; W8MJ, secy.; W8HJ, treas.; W8BMY, publicity. W8BBG is a newly-appointed RM. Traffic: W8BBG 93, W8HZ 53, W8NDY 48, W8ZZI 35, W8KX 21, W8WCK 18, W8TWR 10, W8JM 9, W8DUV 8, W8LFW 7, W8BAE 5, W8RQB 5, K8QEW 4, K8MYV 2, W8TGF 2, W8WEJ 2, W8WLX 2, W8YWK 2, W8AKR 1, K8CHW 1, W8DUV 1, K8MSP 1, W8TOL 1, K8TPF 1.

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, Charles M. Cotterell, W0SIN—Asst. SCM: Neal Morris, K9TIV. SEC: W0HLQ. RM: W0LRN. PAM: W0CXW. V.H.F. PAM: W0LTK. Denver area amateurs assisted the CAP in the search for a downed plane and the W0WYX and another repeater on 2 was used. K0SPR has a new TX4B. W0LVM was able to assist in an auto accident. W0LG is a new traffic man from Boulder. K0SPR is away from home quite a bit. The Colorado Slow Speed C.W. Net is beginning to make some headway. W0WYX reports that the RMRL repeater on 420 Mc. is picking up more mobiles. With the repeater at 11,500 feet, coverage is good. Who would like some 160-watt activity? W0SIN and W0KBR will be on 160 s.s.b. hopefully soon. Election skip is dropping out early on 75 so 160 looks like a good bet. Net activity is up. Net reports: Colorado Emergency Phone, QNI 180, QTC 21, time 288 minutes. CCN, QNI 167, QTC 114, 633 minutes. H-Noon, QNI 275, QTC 181, 1310 minutes. Columbine, QNI 1175, QTC 110, 1577 minutes. The new PSRR should be in full swing now. Let's have the reports. OOs W0LRW and W0GIL are doing FB. W4UDS reports an emergency patch from Air Academy to Uruguay. EC K0RLQ, Denver, reports AREC full members 59, limited 37, 7 net sessions. Traffic: (Nov.) W0WYX 206, K0JRP 180, W0MNL 104, W0LG 100, W0LRN 94, W0LVM 58, K0SPR 38, K0MNG 34, K0EOR 31, W0UAT 23, W0SIN 22, W0PQM 13, W0KFB 6, W0LCE 3, W0HLQ 1, W0KOQ 1. (Oct.) W0LRN 63.

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NEW MEXICO—SCM, James R. Prine, W5NUI—The New Mexico phone nets have moved to 3940 kc. at 0100Z. The c.w. net, NMN, is on 3750 kc. at 0230Z. If you are not active in one of these nets, why not check in and get acquainted? These times and frequencies should be noted and used to originate traffic. A bit of practice will insure that you can do the job when that emergency occurs. Stations reporting Sweepstakes scores to the SCM were W5QJH, 8400 points, and WA5PBP, 2808 points. Other stations were heard during the SS but missed the bonus in failing to send a message to the SCM. W8SOX now has the call WB5ALP. The Los Alamos repeater, 146,34-94, provides good coverage into the southern edge of Colorado. The traffic reports continue to reflect the high volume on the c.w. mode, is there a challenge from the h.f. phone or v.h.f. group? WA5UJY has been elected net manager of the New Mexico Net for 1970. Traffic: K5MAT 89, WA5TWT 41, W5ZYWJ 26, W5NUI 22, W5MYY 18, W5DMG 12, WA5JXU 10, W5MYM 10, WA5JNC 8, K5IFJ 6, WA5OHI 6.

UTAH—SCM, Thomas H. Miller, W7QWH—SEC: W7WKF, RM: W7OXC, W7OHR, at B.Y.U., has worked 29 states and VP9 on 160 meters. The station also has 170 countries in about 8 months operation. K7RAJ has 20 states on 160, including KH6. New officers of the Ogden ARC are W7GPN, pres.; K7DOT, vice-pres.; W7AGO, secy.-treas.; W7OXC and W7NHQ, directors. Officers of the Utah ARC are K7HPH, pres.; W7ATON, exec. vice-pres.; W7EU, vice-pres.; K7SOT, secy.; K7HEV and W7JLM, editors. Reported SS scores: W7HQU/7 22,232 phone, 8 c.w. K9LBO/7-W7KUY 112,176 c.w., 155,000 phone. W7MEL recently dropped the "N" from his call and is active on 80-15 meters. W7ELL, W7MUG and W7DYH have been awarded the BUN certificate. W7OXC scored 56 points in the Public Service Honor Roll in the first such report sent to the SCM. W7ETA now has a new trihand beam and 30-ft. tower up with the help of W7HTL. W7HTL is active on 160 meters regularly. Please send reports to the SCM before the 7th of each month. Traffic: W7OXC 109, W7EM 83, K7SOT 79, K7CLO 8, W7QWH 2.

WYOMING—SCM, Wayne M. Moore, W7CQL—SEC: K7NQQ, RM: K7K8A, PAMs: W7TZK, K7SLM, OBs: K7SLM, K7NQQ, W7SDA, K7TAQ, W7FHA. 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 0830 on 3920; PG Net, 1900 Mon. through Fri. on 3950. K7K8A has been having very good luck with his 100-milliwatt rig. Lightning knocked out W7ALOW's rig last Oct. W7CLE is going to school at Rose Poly Technic, Terre Haute, Ind., while W7CLD is going to the U. of Wyo. Wyoming is going to have its first QSO Party, so get in on the action next Mar. 14-15. Exchange is reported and county. A real nice certificate is being offered for the high scoring phone and also c.w. stations. W7HEB/K7WRS have a new transceiver now and had to get a new car to carry it around. Let's have more Wyoming hams participate in the upcoming DX Competition. Traffic: W7CLF 192, K7TTH 68, W7GMT 50, K7K8A 54, W7TZK 39, W7YWW 38, K7YWA 53, W7BLL 32, W7NDA 30, W7HLL 23, K7SLM 22, K7TAQ 14, K7CXZ 9, K7QJW 8, K7WNE 7, K7WRS 4.

SOUTHEASTERN DIVISION

ALABAMA—SCM, Donald W. Bonner, W4WLG—SEC: K4KJD, PAM: WA4EFC, RM: W4EFU. Congratulations to W4JQS, our new Director, and to K4KQ, our new Vice-Director. I received lots of Sweepstakes activity reports. Thanks to everyone who participated this year. This is a good contest and gives good message-handling experience and proficiency. Try it next year. W4LUC has a new 88-101 and beam antenna. WB4IQS has his Advanced Class ticket. WA4AZC is net manager of AKNO now. WB4GTM is net manager of the teenage net, AENT. Total traffic for the section was 618 this month as compared to 620 last month. Anyone interested in building a new antenna (30 db. at 150 Mc.) and doing some moon bounce, should contact WA4SPG and W4WLG. Traffic: W4FVY 211, W4EFU 74, W4LAL 74, K4AOZ 56, WB4JMH 56, WB4BLX 35, K4BHW 23, WN4NJG 21, WB4LH 18, WB4LNM 12, WA4YXW 12, K4EJD 7, W4LUC 6, WB4NCT 5, K4UMD 4, W4WLG 4, W4DGH 2.

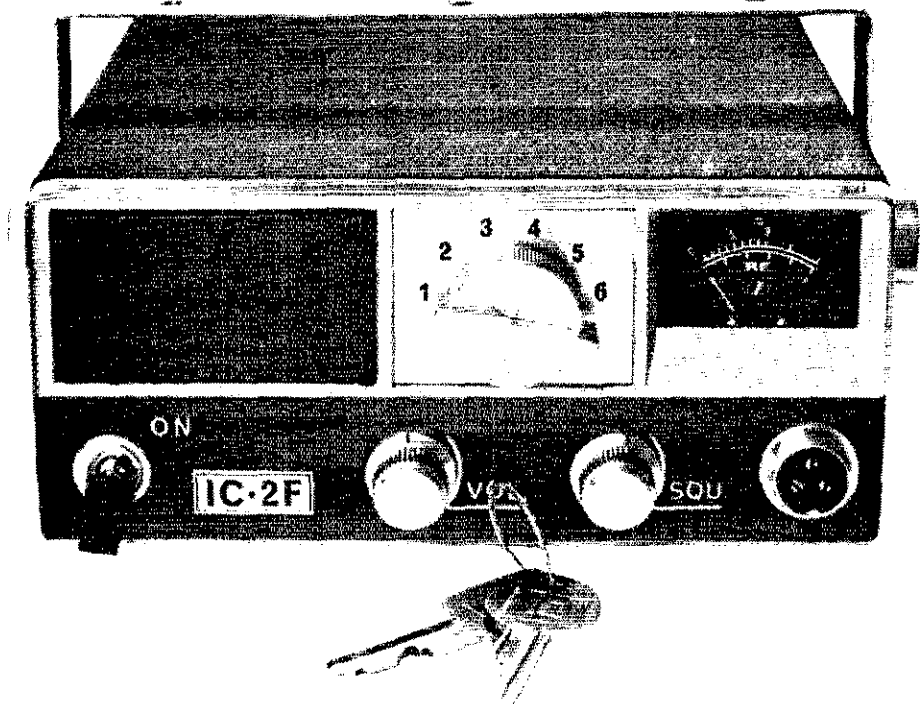
EASTERN FLORIDA—Acting SCM, Ronald J. Locke, W4YPX—SEC: W4IYT, Ass. SEC: W4SMK. RMs: K4EHY (C.W.), W4RWM (RTTY), PAM 73; W4OGX, PAM 40; W4SDR, PAM V.H.F.; WA4BMC. Official Bulletin reports were received from W4EYU

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and K4LPS. WB4HJW mentions that as QFN mgr. he works harder and handles less traffic—too true. The Daytona Beach Club hosted the SCM in Nov. What a bunch of go-getters! Thanks to Proxy K4GJ and all for a great time. Newly-elected SCM, John Porter, W4YQJ now will be steering the ship. All traffic reports and games should be sent his way. NOFARS, W4IZ, in Jacksonville and Panama City ARC, W4JJ, received their trophies from W4YTT, editor of *Florida skip* at the Tropical Harbour in Miami in Jan. for their PK Field Day showing. This makes the fourth year in a row for the NOFARS group, topping all of Florida. W8BZY4 sends a report with a large "Extra Class" printed on front. The Dade Radio Club made the BPL, says Vice-Director K4KQ—the first time for W4NVU. Tropical and Florida Phone Traffic Nets have both moved to 3940 kc. to make it unanimous for all-Florida frequency. Net managers advise this makes it easier for out-of-state QNTs to find us and to allow closer monitoring for mobile emergencies. Send all c.w. news to WAILE for his *QFN/Gator Bulletin*. C.W. NCSs are requested to hold down speed to a reasonable 18-20 w.p.m. to attract more QNTs. As my swan-Drake song I want to thank all the guys for the support they gave me during a difficult and confusing take-over period. I know John can be assured that he's got a great bunch to give him a hand. Traffic: (Nov.) WB4AIW 703, WA4IHL 209, WB4HJW 178, WAILE 169, WA4FGH 145, W4SDR 119, WA4HED 91, K4GJ 89, WB4IFR 81, W4EHW 73, WA4FIA 68, K4QYV 63, W4YXP 63, W4DVO 55, WB4FJY 40, K4IKX 38, WB4GHD 37, W4NGR 37, WA4HDH 35, W8BZY4 32, W4LSR 30, WB4HJV 29, WA4SCB 28, WA4BBE 25, W4YVT 23, K4QCG 23, W4ZAK 23, K4LPS 22, W4SOM 21, W4ROA 20, W4LK 19, W4SLK 19, W4GDK 18, K4OER 18, WB4DEL 17, W4HFR 17, K4HS 17, W4YNM 16, WB4FLW 15, W4VPO 15, WA4BGW 14, W4OGX 13, WA4EYU 12, W4BNE 9, W4TJM 9, WB4HNL 8, W4IAD 8, W4RQR 8, K4EBE 5, K4SJM 5, (Oct.) W4NVU 156.

GEORGIA—SCM, Howard L. Schonier, W4RZL—SEC: WA4WQU. RM: W4FDN. PAMs: K4HQI, W4LKR. The Georgia Southern Area Amateur Radio Club, which sponsors the W-10-U Award, has issued the following: W5OB, W1FJN, W1KVA, Nathan Rosen—SWL, WA2DNO, W4VEN, W6BUTC, VO2GD, W8AN, K2LFG, W4AQL, W9YR and W2LDD. During the Ogeechee Fair the club station worked about 900 stations in 32 countries. A letter from WA4UPP/K17 indicates that he will be returning to Georgia May 8 complete with a new wife. K4HQI reports conditions on 2 only fair during the month. W4YDN finds it necessary to resign as PAM because of his new work. He reports new officers of the Ga. S.S.B. Assn. are WB4DTY, pres.; W4YDN, vice-pres.; WA4VWV, sec.; W4WKP and WB4DMO, board members. WA4QL is the new bulletin editor. GSN reports 389 checked in to handle 180 messages. W4LHR is getting a new rig for the lower bands and says WA4CNG moved to Atlanta from Columbus and is active on t.m. W4HYW is active as OBS. W4LQD has a new 40 doublet and OPS appointment. WA4GXZ enjoys the crowd on GSN. K4BAI operated with a group in Cuzaco (PA0CW) during the DX Contest with good success. W4WLX has a new 8B-101 and W4BTW a new 2-meter rig. W4FEW is on with a TA-33 and 2 meter collinear. Traffic: WA4RW 148, WA4GXZ 93, W4FDN 73, K4BAI 68, W4NSO 63, W4CZV 34, WB4DMO 29, W4TYE 24, WB4KKM 21, WB4NQA 20, W4UVP 19, WB6UTC 12, K4HQI 5, W4RZL 5.

WEST INDIES—SCM, Jose Medina Hernandez, KP4CO—KP4ZC went mobile around the island. KP4WD is actively digging DX with a tri-bander and a new tower. KP4GI promises his power supply for a linear coming up. KP4AT is building an electronic clock so that all KP4s can be on the dot for their scheduling. KP4CO has a new SP-600 JX17 but had to remove all antennas. KP4JM has been appointed Regional Coordinator of Zone 2-B, including P.R. and V.I. KV4BA was appointed local coordinator of the Caribbean Emergency Net Region II Zone 2-B. UIRA's

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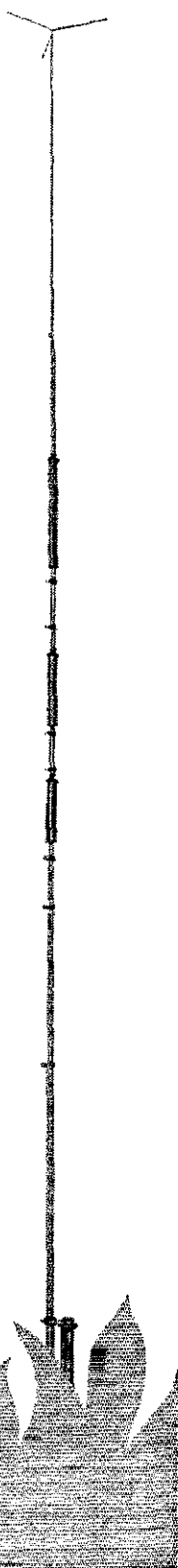
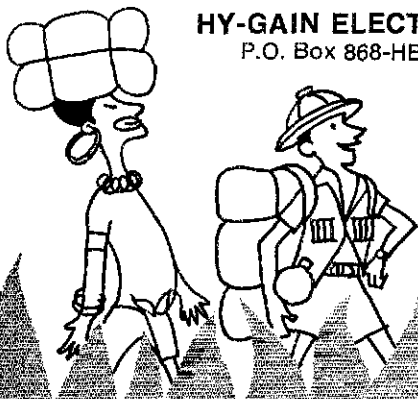
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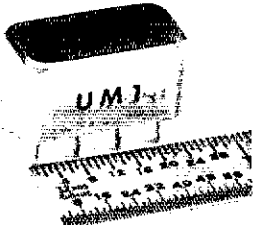
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100% cooperation certainly will help them to improve the radio communication efficiency of our W.I. section. KP4SV is active on all bands again. KP4ABT and KP4CO still are looking for a new radio QTH. KP4JM is heard fixed portable from Cidra Lake, N.Y. Colego San Jose is coming up with a new tower and antennas. Antilles Emergency Weather Net meets at 1100 GMT on 3925 kc. daily. HI8HV will act as net control. WB4POT/KP4 now is on with an SB-101 from Ramey AFB. Traffic: KP4WT 133, KP4CO 40.

WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4RKB. PAM: W4MQQ. RM: K4UBR. RM-RTTY: W4WEB. Nets:

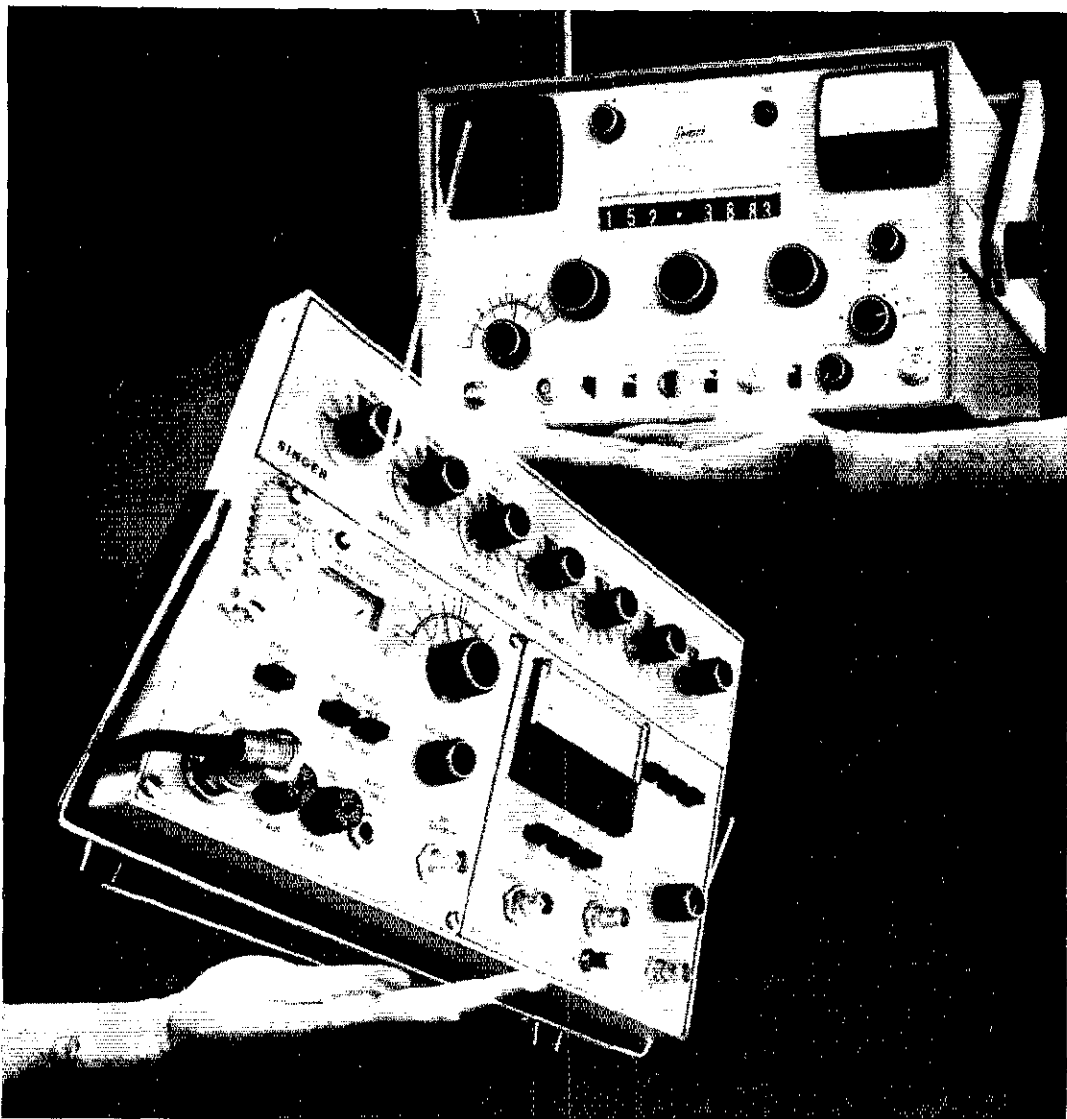
Net	Freq.	Time	Days	Secs.	QNI	QTC
WFPN	3957 kc.	2300Z	Daily	30	587	63
QFN	3851 kc.	0000/0300Z	"	50	438	287
NW FLA FM	146.94 Mc.	0130Z	Thurs.	—	—	—

Pensacola: WA4SSB is active on QFN. WA4ECY is getting new antennas. W4JLW was appointed OPS. New Novices include: WN4 GYP, OYQ and OYT, two of whom are YLs. Ft. Walton: WB4EQU's KYL received her ticket. WB4OZF, A ham radio exhibit and traffic booth was set up at a local shopping center. K4UBR, W4BVE, W4ZGS and members of all 3 local clubs assisted. WB4HEM and WA8FQT are working on 1296-Mc. gear. WN4OUB is a new ham in Freeport. Crestview: WA4YCO and K8RQO/4 are active on 20- and 2-meter a.m. here. Marianna: W4KCA added a P.A. to his f.m. rig; he now runs 800 watts on 146.94! Fountain: WA2FMD bought a home here and plans to retire early next year. Tallahassee: WB4LOQ has a new GT-550, and has been running patches for foreign students at F.S.U. W4MQQ has prepared an SOP for the WFPN, including a list of addresses and phone numbers of net members. WA4EOQ has his Swan going again. WB4GTY keeps the mobile rig hot. Horseshoe Beach: WA4EYT is active on 40 meters a.m. and c.w. Traffic: (Nov.) WA4ECY 362, K4VY 282, WB4LOQ 40, WB4DVM 29, WB4LXK 24, W4FDJ 20, W4RKH 10, WB4NHH 5. (Oct.) WA4ECY 302, K4VY 266.

SOUTHWESTERN DIVISION

ARIZONA—SCM, Gary M. Hamman, W7CAF—SEC: K7GPZ. PAM: W7UXZ. RM: K7NHL. The state RACES group participated in a CAP exercise Nov. 16. Most of the activity was sending messages between the Capitol and the Pima County communications van operating portable at Marana Air Station. The Pima County ARCC/RACES group continues to be of service in search and rescue missions in addition to participating in test exercises. The 1970 Scottsdale ARC officers are W7FCQ, pres.; W7IM, vice-pres.; W7DLL, treas.; WA7JDR, secy. The Arizona Repeater Assn. held a picnic Nov. 16 at Squaw Peak Park. The meeting place for the group has been changed to the First Federal Savings Office on 19th Ave. near Bethany Home Rd. in Phoenix. The Arizona ARC had an outing at the new Alamo State Park over the Thanksgiving week end. W7OPS has added a tri-band beam and SB-301 to his station. K7UYW has an SB-200 behind his SB-100 now. Sweepstakes participants included W7DI, WA7FD and WA7SP. WA7KYT is the call of the repeater in Cochise County and operates on 146.34/146.94 Mc. Don't forget to report your Public Service Honor Roll (PSHR) statistics in addition to the regular traffic count and other items of interest to your SCM. The Copperstate Net handled 160 messages. PSHR: K7NHL 48, K7NOS 29, W7UXZ 22, WA7EQC 20, W7CAF 15. Traffic: K7NHL 296, W7GEP 51, W7OUE 33, K7RDH 30, W7UXZ 30, W7IMQ 16, K7ZMA 15, WA7ISP 14, WA7EQC 11, W7CAF 4, W7DLF 2, K7EXF 1.

LOS ANGELES—SCM, Harvey D. D. Hetland, W6RZ1—Asst. SCM, Donald R. Etheredge, K6UMV. SEC: W6QZY. K6ODW is active on SCN again with a "marginal" antenna. WN6EEM says he has 18 confirmed toward his WAS, and W6EL reports having a ball working Novices during the SS. W6DQX has some new Drake gear at his "electric radio station." W6EJJ is active on 6 and 10 meters mainly in traffic nets. W6LNH has plans for better so as to be ready for the Santa Ana winds. W6IVC is "manufacturing" time to stay active in the SCN. W6JET reports minor damage to his linear. K6KA is busy with the Intruder Watch and a color TV course. K6KUQ again is active following a move to a new location. Carlos, ex-LUBDEK, now is active under the call of WB6MCW. Members of the Pasadena RC provided reserve deputies from the Altadena Sheriff's Station with Halloween mobile communications under the banner of the Los Angeles County RACES group. WB6PAV is back in the southland after two and a half years in Saigon. K6SNH has a 1-watt c.w. homebrew station working in



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-5 to 50°C	Construction	0° to 50°C devices
110/220 vac, 12 vdc	Power	110/220 vac, 12 vdc

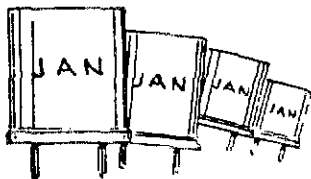
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the car. K6NA is building a new 4-1000 20-meter final and also is rebuilding his h.v. power supply. WA6ABP now has a 32V2 in use. Nov. SS reports were received from W6VPZ, W6BUHF, W6APXY, W6NEIM, W6RW, W6ZKN, W6BAB and W6ZVC. K6CL is now representing the Palisades RC at the Council of Radio Clubs. K6LZB has undertaken the Volunteer job of Chief of L.A. City RACES. The So. Cal. ATV Club has adopted 140.052 Mc as its primary 2-meter calling frequency, and the 432-Mc. frequency coordinator, WA6CDR, has suggested 439.0 Mc. for the group's TV audio. Several So. Cal. V.H.F. Club members are converting APX-6 surplus radar gear for amateur use on the 1296-Mc. band. Club meetings have featured displays of the APX-6 units in various stages of completion, and the club bulletin has included instructions for the conversion. WB6RLP reported a 1230-Mc. contact between Lakewood and San Diego with APX-6 gear being used at both ends. WB6ISM is working on a parametric amplifier for the 1200-Mc. band. Our thanks to SCN manager W6LCP for the following Nov. report:

Net	Freq.	Time	QNI	QTC	Mgr.
SCN	3600 kc.	7:00 p.m.	503	502	W6LCP

WA6KZB is running phone patches to WA6HWB/E2 on 21 Mc. WA6KXT now has a 14AVQ in the air. W6FP is working at channel nine. W6LL showed "Ham's Wide World" at the Inglewood RC. Members of the Crescenta Valley RC and the Palisades RC recently were treated to a discussion on "Amateur Radio Behind the Iron Curtain" by W6YY. Your SCM would appreciate hearing from you in the form of monthly reports on your amateur radio activities. My address is on page 6 of this issue of QST. Traffic: (Nov.) WB6BBO 811, W6MLE 334, W6INH 201, W6QAE 172, W6BHG 38, K6CL 38, W6CKK 25, W6JPH 17, W6DQE 16, W6FD 16, W6EOE 6, W6TN 4, W6FJJ 6, W6RZT 4, W6PAV 4, W6GTWS 4, W6USY 4, W6ZVC 4, W6SSZ 3, W6BWX 1, W6DQH 1, W6NEIM 1, (Sept.) W6EOE 4.

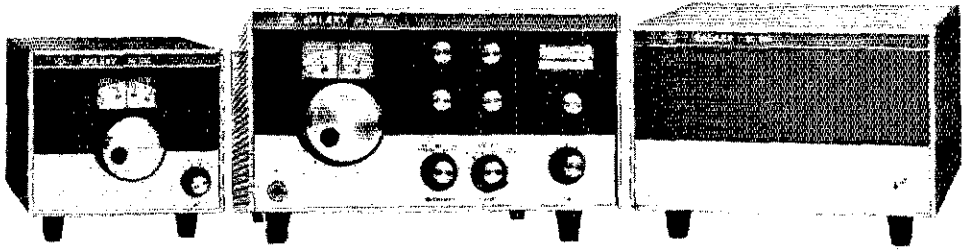
ORANGE—SCM, Jerry L. VerDuft, WA6ROF—Asst. SCM: Richard W. Birbeck, K6CID. SEC: W6CQH. RMs: W6LCP, W6BNX. PAM: Vacant. We all owe W6DEY a great deal of thanks for his fine leadership and devotion to the Orange section since its inception. Max will be resting and hamming from his new QTH at Vista, Calif. I have appointed K6CID in Riverside as Asst. SCM. He will help represent my office in the outlying areas of the section. W6QAT is the new EC of the Orange County 75-Meter AREC Net, which meets every Sun. at 0900 local time on 3965 kc. (s.s.b.). W6LCP is a new RM and mgr. of the Southern California Net (SCN), which meets daily on 3600 kc. at 0300 GMT. K6YNE is a new OVS and had an excellent article on Field Day innovations in June (1969) QST for which he was awarded a QST Cover Plaque. SEC W6CQR has formulated a list of ECs and AREC nets within the section which he will make available to anyone upon request. We were all saddened by the death of K6MJU. Although blind, Willie was devoted to amateur radio public service. The Orange County Council of Radio Clubs is being reactivated and the clubs are making plans to sponsor the 1972 Southwestern Division Convention at Disneyland. W6CPB is acting chairman of the convention planning. Our Director, W6KW, is now a resident of Costa Mesa. WA6FOQ got a keyer for his birthday and operated it in the Sweepstakes, making 24,490 points. WA6WFW stacked up 39,934 points with a kilowatt on s.s.b. Your monthly reports of activity are invited regardless of your operating specialty. How about some of you DXers reporting? Support your club and section AREC and NTS nets. Traffic: (Nov.) W6BNX 177, WA6FOQ 127, W6LCP 113, WA6ROF 95, W6WRJ 67, K6OT 7. (Oct.) W6GB 7, W6ZEC 2.

SAN DIEGO—SCM, Richard E. Leffer, WA6COE—Asst. SCM: Art Smith, W6NI. Send reports of activities to my new address: 5119 Manchester Rd., San

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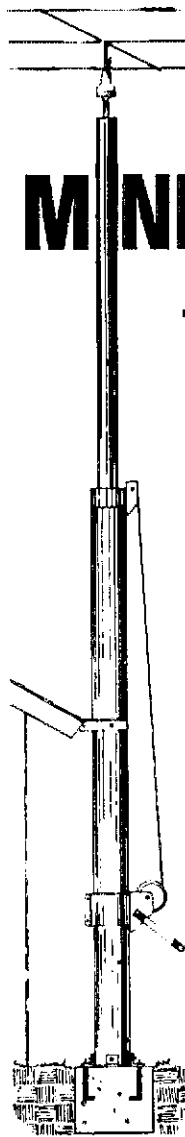
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Diego 92115. Concerning AREC growth here, all amateurs are invited to join with us in preparedness before a natural disaster comes. Registration forms are available from the SCM, Asst. SCM and other AREC officials. Section clubs: The SOBARS members are ready to work other area club members on their net at 3900 Mc. each Mon. eve at 1900. El Cajon club members take note, as you are looking to give away WAMO points! The QCWA elected K6PM as chairman. The net now meets each Wed. eve at 1900 on 3905 Mc. All club secretaries are reminded that information for QST should reach your SCM by the fifth of each month. Be sure to forward your list of new 1970 officers to me. Section News: WB4CYP/6 has located in Florida. WN6LSO now is Asst. EC for the Novice Net. First PSHR listings go to W6VNV and W6BGF. W6BRSW is back on 40-80 phone between classes. WA6ZGT passed the Advanced Class exam. Anyone else on 1240 Mc. besides K6BTO? WB6WHM reports he completed WAS. K9ZMS/6 operated K6UYC in the 88 and reports high scores on both c.w. and phone. Special thanks to WA6KHN, for his work as SEC, and to WA6TJK as EC for 2 meters. WB6SOK has been appointed EC for Central District. Silent Keys: W6DAA, WA6QMY. Traffic: K65P1 8464, W6VNV 887, W6BOT 392, W6BGF 189, W6LRU 186, K6HAV 39, W6YKT 32, WA6KZN 14, WA6TJK 10, WA6COE 7, K9ZMS/6 2.

SANTA BARBARA—SCM, Cecil D. Hinson, WA6OKN—SEC: K6GV, RM: W6UJ, WA6KRA, now living in Lompoc, has been active in past years with emergency work as W2JVV. WA6HOM, of Camarillo, is now on 20-meter s.s.b. and working some DX. WB6FXX, the NYL of W6ORW, again is active after recovering from an auto accident. W6ORW has installed a new inverted "V" for 80-40. WB6FXW, of Santa Susana, has a new tower up. WA6DEI lost his beam when a tower cable broke and is in the process of putting up a new beam. While on the subject of new beams, the Estero ARC also has a new tri-band job. WB6IXW has been working aeromobile using his Cessna 150 and a 2-meter Communicator III. He reports that the activity is great at 10,000 feet over Los Angeles. WB6FXX, in Simi, is teaching code for Novices. WB6YCH has her 2-meter beam at 64 feet atop the tower she got at the Fresno Hamfest. W6RFU reports 100 contacts in 41 sections using 250 watts in the sweet-spikes C.W. effort. The operator was WB6DPV. Traffic: (Nov.) WA6DEI 156, W6ORW 15, WB6FXX 8, (Oct.) WA6DEI 60, WB6FXX 12, WA6OKN 8.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. E. Harrison, W5LR—Asst. SCM: Gene Pool, W5NFO, SEC: W5JSM, PAM: W5BOU, RM: W5QZG, Asst. SEC East Tex/V.H.F. PAM: WA5KHE. Plainview RC's officers are K5IQN, WA5MOK, W5AURY and W5NURX, pres., vice-pres., secy. and treas., respectively. Texoma RC's officers are K5PQB, pres.; W5MBO, vice-pres.; W5CDS, secy.; W5SQT, act. mgr. W5JSM's AREC/EC newsletter contains a brief and comprehensive report covering the imagined conflict with RACES-MARS. K2ELU/5, former No. Tex ORS is headed for airline training on the West Coast. W5PBN complains that QST reaches his home QTH two weeks late. W5EYB advises that if you have the same problem to get the facts by way of delivery records over several months then complain officially by writing your congressman with a copy to your Director. Better yet, inspect your P.O. personally and see how 2nd-class mail is handled. Many stations in this area are submitting nice 88 scores. The Texoma Ham-o-rama held Nov. 14-16 was attended by 300 or more. W5GM ran a nice show. W5EYB and all SCMs, RPs, etc., were there. The Kitecycle Club of Ft. Worth will sponsor the Explorer Scout Post with the objective ham license. Our SCM's recent letter to leadership appointment people brought forth discussion relative to section goals. Our top OO, W5QPK, continues with 147 observations in Oct. and 132 in Nov. RM W5QZG reports a 2-meter t.m. repeater in the planning state for use between Dallas and San Antonio via Killeen (1800-ft. tower). We understand the Lake Murval gathering consists of the

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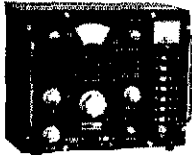
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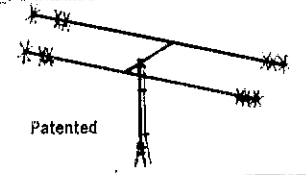
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Delta Sideband crowd. OO W5MISG says there are many key chks in the Norvic band. North Texas Area Operations consists of 144 counties and generally speaking runs along the thirty-second parallel. Get a copy of the 31st edition of *Operating an Amateur Radio Station*, turn to page 8, obtain a map and start drawing lines. You'll be surprised. OIGs W5GQU, W5DW, W5HBD, W5CY, W5GUD and W5AHC have been cancelled because of inactivity. Did you make the Public Service Honor Roll this month? Traffic: K5BNH 862, W5AKIV 82, W5JSM 47, K5LZA 41, W5LKR 30, W5PBN 21, K5QKM 12, K5BDC 6, W5VES 6.

OKLAHOMA—COM, Cecil C. Cash, W5PML—Asst. COM; W. L. (Smoky) Stover, K5OOV, SEC; W5AFN. RM: W5QMJ. P.A.Ms: W5MEX, K5LEY, W5JGU and K5ZCJ. The big event of the season, the Texoma Hamarama, had approximately 300 registered for the three-day event. Among those attending were Director W5EYB, Vice-Director W5BNG, each of the COMs and two SECs. The Annual ACAR Christmas, held Dec. 5 in Oklahoma City, was enjoyed by 100 hungry hams and wives. Thanks to the president, W5HLX, for the invitation. The LFSARC Christmas Dinner was held at Underwoods in Lawton Dec. 20. W5FW was in the hospital; he had a stroke Nov. 25. W5WGI is back from overseas and at MARS station K0WBG. W5BZYI is building a new 2-meter amplifier. On a recent trip to Stillwater the director and SEC and I spent a lovely evening with W5NZM. Then in Ponca City the next day we had dinner with W5MDN and his wife, W5NYCQ. Net reports:

Net	Freq.	Time	Days	Secs.	QNI	QTC
OLZ	3685.5 kc.	0100Z	T-Sun.	16	36	31
SSZ	3685.5 kc.	0345Z	T-Sun.	16	24	20
OPEN	3915 kc.	1400Z	Sun.	5	126	8
OIQN	3915 kc.	2300Z	M-S	19	346	50
STN	"	2300Z	M-S	29	656	92
OWXN	"	0001Z	T-Sun.	25	315	—

Traffic: K5TEY 1076, WA5YRO 112, W5QMJ 52, W5ZOO 42, W5JGU 40, W5LMO 34, W5MEX 28, W5FKL 21, W5PML 17, K5WFF 8, W5FSN 4, W5NZM 2, W5IQ 1.

SOUTHERN TEXAS—COM, G. D. Jerry Sears, W5AIR—SEC; K5QGG, PAM; W6KLV, RM; W5EZY. Points claimed on the new Public Service Honor Roll were received from W5EZY, K5HZR, W5QJA and W7WAH/5 for Nov. W5AC, W5CET and W5HXD reported Sweepstakes scores. 7200 Net Mgr. K5HZR reports over 100 net certificates issued to deserving members of the 7200 Traffic Net. W5QKE, K5SBR/5 and W5TCP report long hours and school interfere with their hamming. The *Houston ARC News* reports K5AMA got his new car on a Sat. morning and had the Swan installed and operating mobile in two hours. How about that for speed? EG W5ICL as NCH at W5ND with W5NMV, W5QLE, K5BBN, K5UAH, W5DIK, W5GYQ and W5HBD provided communications for the Orange Area Goodwill Industries; EC W5TFW from adjoining Jefferson County along with W5HYV, W5PCD, W5ND, W5NVH, W5DUG/M, W5BVD/M, W5OD/M, K5INE/M, W5NJW/M, W5APX/M and W5FTJ with W5FCD coordinating operations on 2 and 6 meters and W5SSV/5 as liaison between 2 and 6. El Paso's W5BS *Bulletin* reports W5BBR is returning to El Paso, W5RAF is back on the air after a stroke, K5YVD and K5YVC now have modified their calls in El Paso to W5RKA and W5RQZ. W5LQP has orders to go to Korea. Note: *Homecoming Week is Feb. 28, 1970 for the TEX Traffic Net.* W5QJA, mgr. of the TEX Tlc. Net invites all past and present members of TEX to check in to rag-chew and reminisce. Meet old friends and make new ones on TEX Homecoming Week Mon. through Fri. on 3770 kc. at 1900 and 2200 CST. They will handle your traffic, too. See you there. W5TQN has been promoted to Communications Service Inspector in the Inspection and Planning Division-Texas Dept. of Public Safety.



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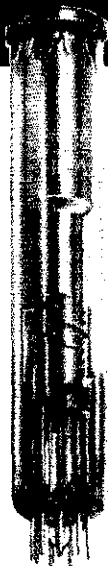
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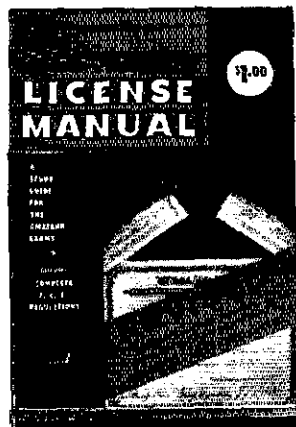
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CANADIAN DIVISION

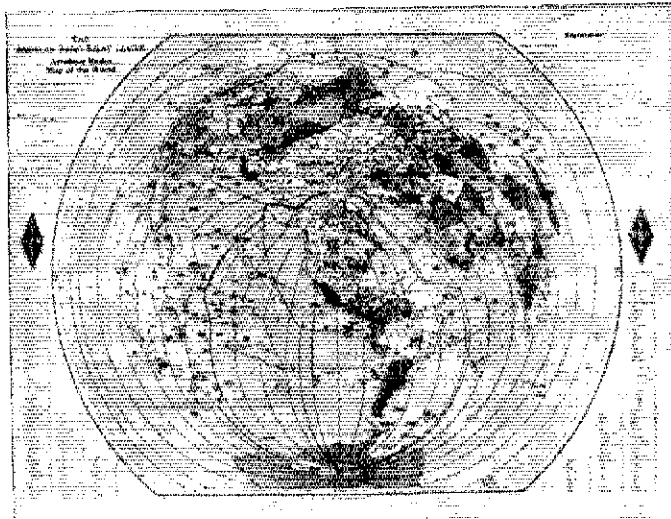
ALBERTA—SCM, Don Sutherland, VE6FK—SEC: VE6AER. PAM: VE6ADN. The excellent satellite tracking work done by VE6NT was honored by an invitation from NASA to attend the Apollo 12 launch. The incoming officers of the CARA are VE6ADX, pres.; VE6ABZ, vice-pres.; VE6AID, secy.; VE6AJS, act.; VE6BR, jr.; VE6AWF, VE6AKV, VE6XJ, dir. VE6AWF was presented the Ham of the Year Award by the CARA. Headquarters for the 1970 Alberta Hamfest on July 11 and 12 will be the Westgate Motor Hotel, Calgary. VE6AHE, Cold Lake, recently worked a K1 and several VE3s on 6 meters. VE6MJ has completed his 8H-830 console to complete a very FB station. VE8NWT made a nice score in the C.W. SS. The Western Polar Net operates Tue., Thurs. and Sat. at 0200Z on 14,140 kc. and 3760 kc. at 0300Z. Please note that the above-mentioned days are advanced one in this area by the use of GMT. VE6ADS reports an average daily QNI on the APN of 45. I wish to thank you all for your help in '69 and best wishes for '70. Traffic: (Nov.) VE6FK 18, VE6XC 7, VE6ALU 4, VE6SS 4, VE6AER 2, VE6HF 2, VE6JK 2, VE6UD 4, VE6YW 2, (Oct.) VE6MJ 8.

BRITISH COLUMBIA—SCM, H. E. Savage, VE7FB—VE7AQW was presented the annual BCARA cup as the amateur who has done the most for amateur radio. Alan has over one hundred new amateurs to his credit. VE7QQ reports Three new hams in November. VE7UJ has a new 80-meter antenna and worked three ZIs the same night. East Kootenay ARC reports great progress and is setting a communication center in its new headquarters. Nanaimo ARC officers are VE7MG, pres.; VE7BXN, vice-pres.; VE7ABR, secy. Congrats to the VSWC on its efforts to be top dog in Canada for 3 transmitters on FD. VE7TH has 22 in her code and theory class. VE7NH is progressing well after ma-

ior surgery. VE7DU is coming on 2 meters. The second edition of the B.C.F.M. News is out and reports have it that membership is increasing fast. VE7LT was ill with theumps. SCM VE7FB was guest at the Provincial Fire Marshal's meeting in Victoria. They are depending on the amateur for their emergency communications. Also, I am instructed to pass to all the amateurs their sincere thanks for past cooperation in both emergency and tests. Traffic: VE7BLO 40, VE7AXH 16, VE7QQ 16, VE7GG 14, VE7TL 13.

MANITOBA—SCM, Keith Witnev, VE4EI—Congrats to VE4s RO, YC, RI, and KE on receiving MTN Net certificates. VE4HI on his V.H.F. PAM appointment and VE4Q as RM. VE4SR reports 33 members and VE4OL an overflow crowd for their classes. The BARC helped out the Brandon Police on Halloween. I am sorry to report the death of SPARCS. It is replaced by the *Manitoba Amateur*, edited by VE4QK. Condolences to the family of VE4GV on his sudden and untimely death. Let me know if you wish the Manitoba PSIR reported in this column. The Winnipeg Repeater Society has a new slate of officers. For those who were present, the WARC auction was a success. If you missed it, remember the Swap and Shop Net on 3765 kc. every Sat. evening after the phone net. Traffic: VE4FO 40, VE4RO 25, VE4CR 5, VE4NE 6, VE4QJ 3, VE4EF 4, VE4JA 4, VE4RW 4, VE4FO 2, VE4RB 2, VE4UJ 1, VE4XN 1, VE4YQ 1.

MARITIME—SCM, William J. Gillis, VE1NR—SEC: VE1HJ. VE1APG reports that VE1FMO, the Kings County ARC, with 12 members, is currently running a 9-month course with 13 VE1s enrolled. The club also repairs surplus BC sets for distribution to newly retired persons and gives financial assistance to the White Cane. The NBARA also aids the sightless through participation in the CNIB program. The Memorial University of Newfoundland ARC has the following slate: VO2EH, pres.; Clyde Buffett, vice-pres.; WA2LBO/VO1, secy.; VO1CK, custodian of club station VO1GN. The ARCON slate for the current year: VO1DO, pres.; VO1AK and VO1IK, vice-pres.; VO1GI, secy.; VO1JE, treas. APN reports sessions 60, QNI 272, QTC 65. Traffic: VE1AMR 61, VE1RO 54.



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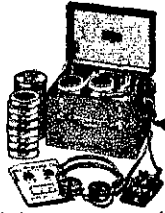
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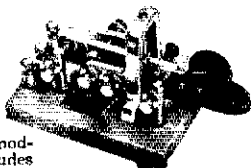
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ONTARIO—SCM, Roy A. White, VE3BUX—This is my final bulletin as your SCM for Ontario. My term of office expired in Dec. and it is not my intention to seek reelection. I am indebted to those amateurs who gave me their whole-hearted support and to the several clubs who were kind enough to send me their bulletins each month. My grateful appreciation to you all. We were sincerely sorry to hear of the tragic death of VE3MO. Our SEC, VE3EWD, made big plans for the SET in Jan. Close to 400 attended the RSO Convention in Toronto and concerts are due the Scarborough ARC for a splendid effort. VE3EJF was awarded the Cliff Marsh Trophy as the outstanding amateur of the year. Toronto amateurs were busy preparing for the CFTF Annual Toy Drive. Last year more than 117 mobiles took part and over 30,000 toys were gathered for needy children. VE3CWR is now VE3PJ and VE3BRE is VE3BR. VE3GMA, VE3GGU and VE3AYZ are recuperating after illnesses. VE3AQI and VE3ZG are active again after long absences from the bands. Your SCM was guest speaker at the Nov. meeting of the Peel ARC. The CQ World-Wide Contests are over for another year and some of the boys had a ball. How would you like to give Llantarnwllygwynylllogerwghwyndrobwhllantysdiogoch, Wales, as your QTH? Of course, you could move to Ye, Burma! VE3PHE has a new S/S-900. (That's a S/S-200, 300, and 400!). My most sincere good wishes for your health, prosperity and peace of mind. Traffic: (Nov.) VE3GJ 98, VE3DPO 85, VE3ERU 70, VE3BRE 59, VE3DBG 51, VE3EBH 51, VE3OYR 32, VE3DU 29, VE3ANO 24, VE3MWD 20, VE3EAM 18, VE3CWT 17, VE3AWB 15, VE3EHL 14, VE3VD 13, VE3GHO 9. (Oct.) VE3EBC 9.

QUEBEC—SCM, J. W. Bay, VE2OJ—VE2AOK is very busy taking H-Mc. traffic. We all wish VE2AJD a speedy recovery from his most recent sojourn in hospital. VE2TL, VE2OV and VE2TK are newcomers to RTTY. An avid newcomer to 2 meters in Trois Rivières is VE2OM. VE2BY sends his usual nice report. The Canadian Division Director is VE3CJ, the Vice-Director is VE2MS and the Assistant Director is VE2AP. Dates for the 1970 RAQI Convention have been announced as July 10-11-12 and you are asked to make a special attempt to attend this year. From VE2ASU with thanks: Québec sera le site du Congrès de RAQI pour 1970. Les dates: 10, 11 et 12 juillet. Préparez-vous dès maintenant. VE2BPT est très actif en c.w., sur 40 mètres. VE2DLQ est un membre régulier du réseau des gas-lurons, toutes les nuits sur 40 mètres à 10 heures. Félicitations à VE2ADZ qui a gagné le RTDX-400 du Comité des Handicapés de RAQI. La vente des billets a connu un grand succès; merci à Tous. Traffic: VE2DR 60, VE2BRD 54, VE2BYV 19, VE2EC 19, VE2CP 13, VE2OJ 6.

SASKATCHEWAN—SCM, Gordon C. Pearce, VE5HP—We are pleased to welcome VE5HZ, of Sagen-ill, as our new PAM, succeeding VE5PZ, who requested that he be relieved of the position because of heavy family and business commitments. Two-meter activity is increasing, with "repeater talk" in Saskatoon as well as in other centers. RTTY also is showing signs of becoming widespread. Those active in this mode are VE5s LG, DR, JO, FU, DO, GO and others. Ham theory classes were held at various centers, including Saskatoon, Regina, Prince Albert, Moose Jaw and Yorkton. Code classes also were held on the low end of the band several nights a week. The Saskatchewan Hamfest will be held in Regina July 3, 4, 5, 1970. Congrats to the Regina Club on winning the Field Day award. What about moon news for this column? Your contribution will be welcomed. The Saskatchewan Phone Net meets daily at 0100 GMT on 5785 kc.; the Saskatchewan Traffic Net (c.w.) daily at 0230 GMT on 3620 kc.; the Aurora Net twice daily at 0200 and 0300 GMT on 7188 and 7203 kc., respectively. Traffic: VE5BO 14, VE5SC 14, VE5VD 12, VE5CI 11, VE5FA 4, VE5JK 4, VE5XL 4, VE5SM 3, VE5EH 2, VE5CJ 2, VE5RE 2, VE5BD 1, VE5DN 1, VE5KI 1, VE5MX 1, VE5TH 1.



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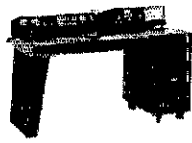
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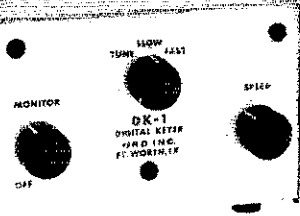
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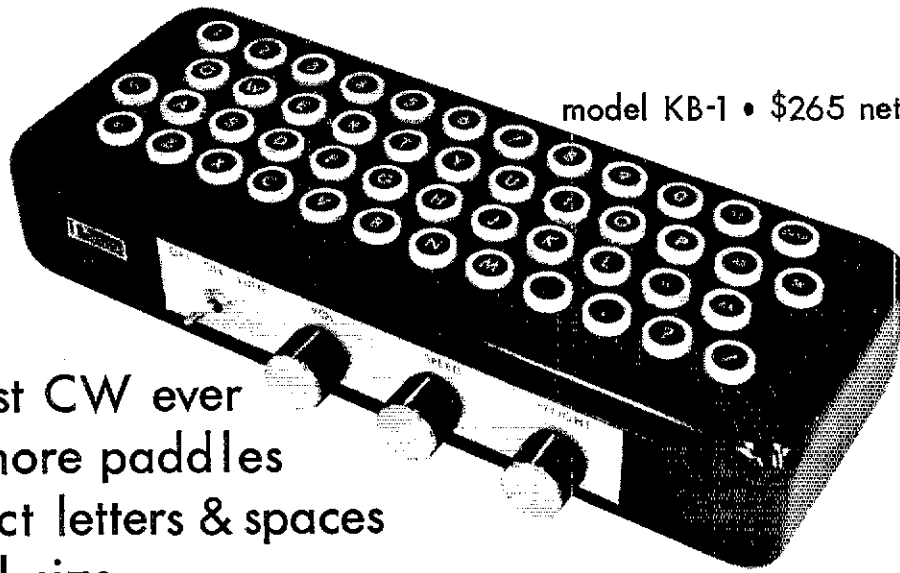


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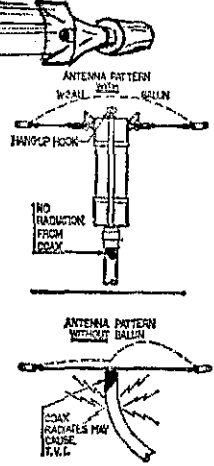
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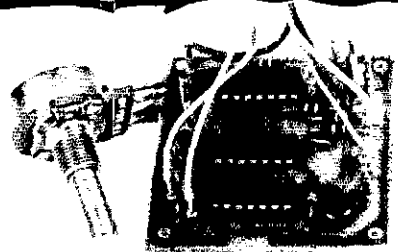
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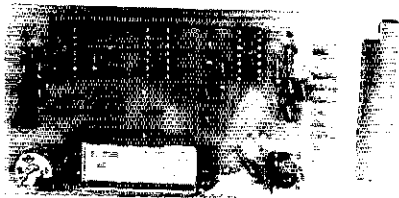
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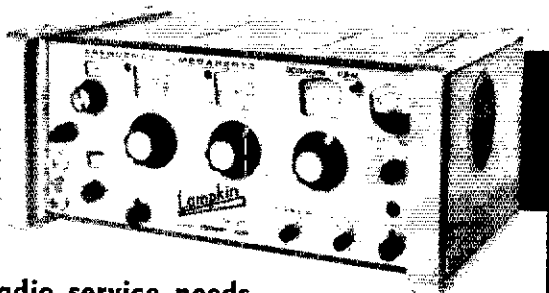
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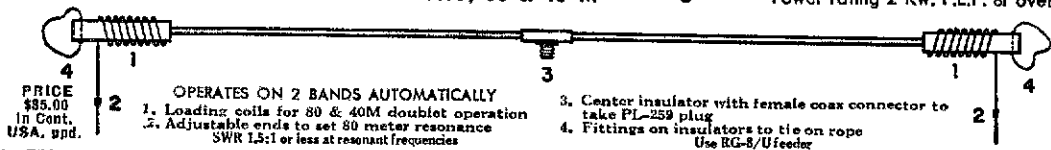
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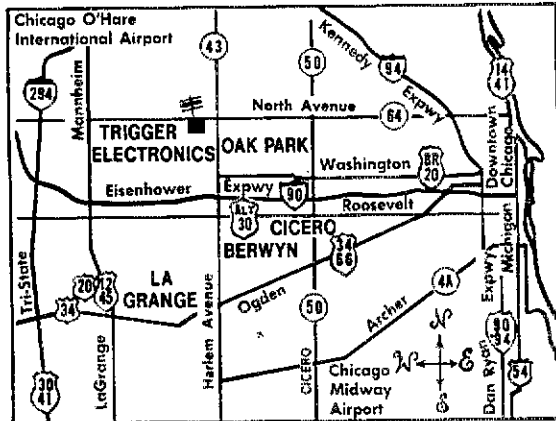
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DRAKE 1K5..... 559	5K66..... 39	HALO LINEAR..... 189
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HAM-ADS

(1) Advertising shall pertain to products and services which are related to amateur radio.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others. No Box Reply Service can be maintained in these columns nor may commercial type copy be signed solely with amateur call letters. Ham-ads signed only with a post office box or telephone number without identifying signature cannot be accepted.

(3) The Ham-Ad rate is 35¢ per word, except as noted in paragraph (6) below.

(4) Remittance in full must accompany copy, since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham-Ads is the 20th of the second month preceding publication date.

(6) A special rate of 10¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 10¢ rate. Address and signatures are charged for, except there is no charge for zipcode, which is essential you furnish. An attempt to deal in apparatus in quantity for profit, even if for an individual, is commercial and all advertising so classified takes the 35¢ rate. Provisions of paragraphs (1), (2) and (5), apply to all advertising in this column regardless of which rate may apply.

(7) Because error is more easily avoided, it is requested copy, signature and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signatures in commercial and all authorized inventions. No checking-copies can be supplied.

(8) No advertiser may use more than 100 words in any one advertisement, nor more than one ad in one issue.

(9) Due to the tightness of production schedules, cancellation of a Ham-Ad already accepted cannot be guaranteed beyond the deadline noted in paragraph (5) above.

Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

HAM Auction, February 1, 15th Annual by Toledo Mobile Radio Assn., at the Lucas County Recreation Center, 2001 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.

AUCTION Time, The N.Y. Radio Club cordially invites all hams and SWLs to its 15th annual auction Sunday afternoon, Mar. 15th 2 P.M. Free parking. Bring items to sell and money to spend. Families are welcome. The George Washington Hotel at 23rd St. and Lexington Ave. NYC. G. Kiener, Pres. NYRC.

LIKE Washington, we can't tell a lie. You'll have a ball at the ARRL Hudson Division Convention, October 17-18, Hilton Motor Inn, Tarrytown, N.Y. Exhibits, Lectures, Contests, Giveaways, New York Sightseeing, Fun, Honest! Hudson Amateur Radio Council, Box 58, Central Islip, NY 11722 has all the dope.

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, WRRP, 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 XLS. For information, watch ads or write to Dayton Hamvention, Dept. Q, Box 44, Dayton, OH 45401.

FIFTH Annual Ham Auction and Flea Market sponsored by Penn Wireless Radio Club will be held on March 8, 1970, at Fairless Hills Community Center, Fairless Hills, Penna. Open sales from 10 AM till 5 PM. Auction from 2 PM till 5 PM. Table space, \$1.00. A 2-meter FM repeater demonstration will be held. Talk in tree, on 39.20 Mc., 50.4 Mc., 146.34 FM. Held indoors, rain or shine. For further information, write WA3HBT, Bob Almeida, Box 111, Cornwells Heights, PA 19020.

RAGS Hamfest, Syracuse, New York April 12, 1970 at Song Mountain, WA2AWK, P.O. Box 88, Liverpool, New York 13088.

FREE Sample copy Long Island DX Association Bulletin. Latest DX news, Business rate \$ASE to K2AFY, Box 74, Massapequa Park, N.Y., L.I. 11762.

CHICAGO Suburban Radio Association Annual Hamoree on March 22nd at East Avenue and 55th St., Countryside, (La Grange), Ill. Flea market and prizes. For further information contact Wilson Thomas, W9KWA, 4017 Vernon Ave., Brookfield, Ill. 60513. Tel. c/a. (312) HC15-0451.

AUCTIONFEST, Broward A.R.L. Saturday, March 14, Chaminda High School, 500 North 51st Ave., Hollywood, Florida. Doors open 8 a.m. Fred Schmidt, W4NYF, Chairman, P.O. Box 8873, Ft. Lauderdale, FLA 33310.

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QSLs—100, \$1.40 and up postpaid. Samples, dime. Holland, R.I. Box 649, Duluth, Minn. 55803.

QSLs "Brownie" W3CJL, 3111 Lehigh, Allentown, Penna. 18103, Samples 10¢. Catalog 25¢.

QSLs. With all this competition, you've gotta have something different. Try us. Samples 10¢. Alkanprint, Box 8494, Minneapolis, Minn. 55408.

QSLs stamp and call brings samples. Eddie Scott, W3CSX, Fairplay, Md. 21733.

QSLs Free samples, attractive designs. Fast return. W7HIZ, Press. Box 2387, Eugene, Oregon 97402.

QSLs—SWLS. Samples 25 cents. Malgo Press, Box 375, M.O., Toledo, Ohio 43601.

DELUXE QSLs Potts, W2HAZ, P. O. Box 5237, Trenton, N.J. 08648. Samples 10¢.

10¢ brings free samples, Harry R. Sims, 3227 Missouri Ave., St. Louis, Mo. 63118.

RUBBER Stamps \$1.25 includes tax and postage. Clint's Radio, W2UDQ, 32 Cumberland Ave., Verona, N.J. 07044.

3-D QSLs—The modern concept that makes all others old-fashioned. Samples 25¢ (refundable), 3-D QSL, Co., Monson 2, Mass. 01057.

QSLs, samples 10¢. Fred Leyden, W1NZJ, 454 Proctor Ave., Revere, Massachusetts 02151.

QSLs by K1FF. \$2.00 for 100. Others at reasonable prices. Samples 25¢ (deductible). K1FF QSLs, Box 33, Melrose, Mass. 02177.

QSL, SWL, cards that are different. Quality Card Stock Samples, 10¢. Home Print, 2416 Flmo Ave., Hamilton, Ohio 45015.

CREATIVE QSL Cards. Personal attention. Imaginative new designs. Send 25¢. Receive catalog samples, and 50¢ refund coupon. Wilkins Printing, Box 787-1, Atascadero, Calif. 93422.

QSLs, SWLS, KYL-QMS. Sample assortment, 25¢. All the fabulous designs of the late Warren Rogers, K0AAB. Patterning Printing Co., 961 Arcade St., St. Paul, Minnesota 55106.

QSLs, 300 for \$4.50, samples 10¢. W9SKR, George Vesely Ret. #1, 2100 Wilson Road, Inglewood, Ill. 60041.

QSL cards finest quality. Economical prices. Fast service. Free samples. Little Print Shop, Drawer 9848, Austin, Texas 78757.

LOW Priced QSLs! Free samples! K.L.L. Press, Box 258, Martinsville, N.J. 08836.

QSLs-100 3-color glossy \$3.50; silver globe on front; report form on back. Free samples. Rusprint, Box 2575, Kansas City, Mo. 64116.

QSLs, Gorgeous rainbows, cartoons, etc. Top quality! Low prices! Samples 10¢ refundable. Joe Harms, W4BLO, P. O. Box 158, Edgewater, Fla. 32032.

QSLs, SWLS, WPE. Samples 15¢ in adv. Nicholas & Son Printery, P.O. Box 11184, Phoenix, Ariz. 85017.

RUBBER Stamps, 3-line address: \$1.50. J. P. Maguire Company, 448 Proctor Avenue, Revere, Massachusetts 02151.

QSLs, finest YLR's. OM's samples 10¢. W2DJH Press, Warrensburg, N.Y. 12885.

QSLs, Neat, Quick, 10¢. Filmcrafters, Box 304, Martin's Ferry, Ohio 43935.

QSLs-SWLS. Hundred, \$2.00. Samples dime. Willow Press, 223 N. Udriks Dr., Battle Creek, Michigan 49017.

EMBOSS'D QSLs, Free Samples, with cat catalog 25 cents. Ace Printing Service, 6901 Clark Ave., Cleveland, Ohio 44102.

QSL, Second to none. Sameday service. Samples airmailed, 25¢. Ray, K7HR, Box 331, Clearfield, UT 84015.

ORIGINAL FX-In double holders display 20 cards each in plastic, 3 for \$1.00 or 10 for \$3.00 prepaid and guaranteed. Free samples to Dealers or Clubs. Tebacco, John K&MT, Box 198T, Gallatin, Tenn. 37066.

QSLs 3-color glossy 100, \$4.50. Rutters Vari-Typing Service. Free samples. Thomas St., Riegel Ridge, Millford, N.J. 08848.

PICTURE QSL cards of your shack, etc. from your photo-gram 50, \$12.00, 1000, \$15.25. Also unusual non-picture designs. Generous sample pack, 25¢. Half pound of samples 50¢. Baum's, 4154 Fifth St., Philadelphia, Penna. 19140.

NEW! OSL's professionally designed. Every yard original. Free samples. Printing follows through by WFLX OSL Design, 20 Britton St., Pittsfield, Massachusetts 01201.

3-LINE Unwaxed badges, any color, \$1.25. Special rates to clubs. Fattell's Engravings, 121 N. C. St., Hamilton OH 45013.

CANADIANS: National NCX-5 Mark II with calibrator a.c. supply, in mint condx; \$695; d.c. supply, \$35.00. VE2AS 307 Davinson Road, Dollard Desormeaux, Quebec Q1A 1E1. Tel: 684-6646 evenings.

QSTs, 1932-1968. All in good condx. 95% and list. \$200.00. Express collect. No offers. NY1183, Erich Holden, 2 Cherry Hill Rd., St. Johns, New Brunswick, Canada.

WANTED: Collins 75S1 with rejection tuning (Waters Q-multiplier) 12N1. No p.s. required. RITy conversion accepted. Fritz Helfmuth, VE4XD, 128 Lally Bay, Winnipeg 5, Manitoba P., Canada.

INVITATION to attend West Allis Radio Amateur Club meetings on the second and fourth Tuesdays of every month. McKinley Fieldhouse, 1000 So. 72nd St., at 8 PM. West Allis, Wisconsin. Lynn Tamplin, WA9KRF.

NEW Jersey's largest ham auction! Friday April 3rd 1970, by the Key Clickers of Stirling, Central School, Stirling, New Jersey. Refreshments, talk-in stations, bring your gear. Two auctioneers all evening. Easy to reach from Penna. and New York. Make Plans to Attend Now!! L. Vant Slot, See 2 Treas. W2DL1.

JUNE 7, 1970—Save this date for the Starved Rock Radio Club Hamfest. Same place as last year. Details on request after April 1, 1970. Write: SRRC, W3MKS, G. F. Keith, Sixty-Treas., RD#1, Box 171, Oglesby, IL 61348.

CHRISTIAN Ham Fellowship now organized for Christian hams who wish to fellowship with other Christian hams. Requests free information how to witness to other hams, Christian Ham Callbook for \$1 donation. For free details, write Christian Ham Fellowship, 5857 Lakeshore Dr., Holland, MI 49423.

CHECK your first 2 year radio contract. If it was 40 or more years ago, you are eligible for membership in the most exclusive club in all of Amateur Radio, The Old Time Hammers Club. Write for membership application and details. Bert E. Gamble, W5ZC, Executive Secretary, 402 Beck Building, Shreveport, La. 71101.

WANTED: Military and commercial laboratory test equipment. Electronicart, Box 13, Binghamton, N.Y. 13902.

SOUTHERN California Amateur Network. Scan 14.325 MHz Monday through Friday 0400 GMT. Join us. K6YCM.

WELCOME to Maritime. Mobile service net, 14313 KHz, daily 2100Z. Amateur Radio's service to the Fleet. Vic Barry RDC USS Corry, DD817 FPO N.Y., N.Y. 10950.

TOROIDs, 88 mh uncased, \$3.25. Postpaid. Humphrey, WA0FKN, Box 54, Dixon, Calif.

SAVE. On all makes of new and used equipment. Write or call Bob Grimes, 89 Aspen Road, Swampscott, Massachusetts. 617-598-2540 for the gear you want at the prices you want to pay.

WANTED: All types of tubes. Top prices paid for Variac and Elmac. Jaro Electronics Corp., 150 Chambers St., New York, N.Y. 10007.

NOVICES: Need help for General Ticket? Complete recorded audio-visual theory instruction. Fast, no electronic background necessary. Write for free information. Amateur License, Box 6015, Norfolk, Virginia 23508.

WERT: Trying to complete our collection for Callbooks at Headquarters. Anyone have extra copies of Government Callbooks 1922-1925 and Radio Amateur Callbooks 1928-1934 ARRL, 275 Main St., Newton, Conn. 06411.

TELETYPE Wanted: Models 28, 32, 33, 35. Receivers R-390A, R-388. Cash, or trade for amateur equipment. Alltronic-Howard Co., Box 19, Boston, Mass. 02101. Tel: a.c. 617-742-0048.

SPIDERS For doomless quads. Hellarc welded aluminum. AP's Antenna Accessories, 1339 South Washington St., Kennebec, Washington 9346.

R89, R390, R390A, 5114, 75A4, 75K3A, NC101X, HR808T1, HR060T1, SP600, KWM-1, KWM-2, 62SL, 512B5, HA-2, and others. List for NASE, W2ADD.

SELL, trade or buy Call Books, Handbooks, magazines, and old radio sets and parts. Irv Rasmussen, 164 Lowell, Redwood City, California 4062.

WANTED: An opportunity to quote your ham needs, 30 years a ham gear dealer. Collins, Sinal Oke, Drake, Swan and all others. List \$25,000.00 inventory used gear. Request list. Chuck, W8UCG, Electronic Distributors, 1960 Peck, Muskegon, Mich. 49441.

TRANSFORMERS rewound. Jess W4CLL, 411 Gunby, Orlando, Fla. 32801.

GREENE—Center of dipole insulator with or without halon. 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 complete personal 50-year collection. Rex Bassett, W4QS, Box 4163, Fort Lauderdale, Florida.

TOROIDs, Uncased 88 or 44 ph. 5 for \$1.50 ppd. M. Weinschenker, Box 351, Irwin, Pa. 15642.

REPAIR and calibration service. Write before shipping. Pan Tronics, Inc., 8608 Edsall Road, Alexandria, Virginia 22312.

WANTED: Military, commercial, surplus, airborne, ground, transmitters, receivers, test sets, especially Collins Airborne. We pay cash and freight. Riteo Electronics, Box 156-0567, Annadale, Va. Phone: 703-560-5480 collect.

WANTED: 2 in 1 304T tubes, Callanan, W9AU, 625 West Jackson Blvd., Chicago, Ill. 60606.

HAM'S Spanish-English manual \$3.00 Pnd., Gabriel, K4BZY, 1329 N. E. 4th Ave., Fort Lauderdale, Florida 33304.

WANTED: For personal collection: How to Become a Radio Amateur, Edition 9. The Radio Amateur's License Manual, Edition 12, WICUT, 18 Mohawk Dr., Unionville, Conn. 06085.

QST's Wanted: December 1915 to December 1916, 1913. IRF readings. Any unreasonable price! Ted Dames, W2KUW, 308 Hickory Street, Arlington, New Jersey.

FOR Sale: 5B-101 and 5B-200. Wanted kits to wire. Heath preferred, 12% of cost, same in stock. Professionally wired. Ian Richter, K3SSUN, 131 Florence Drive, Harrisburg, Penna. 17112.

WE Buy all types of tubes for cash, especially Elmac, subject to our test. Maritime International Co., Box 516, Hempstead, N.Y. 11551.

CASH Paid for your unused Tubes and good Ham and Commercial equipment. Send list to Barry, W2MLN, Barry Electronics, 512 Broadway, N.Y. 10012. Tel: (212) 925-7000.

WANTED: Tubes and all aircraft and ground radio units like 17L, 51K, 61R1 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 07012.

INTERESTING Sample copy free. Write: "The Ham Trader," Sycamore, Illinois 60178.

RITy gear for sale. List issued monthly, 88 or 44 Mhz toroids five for \$2.50 postpaid. Flot Buchanan & Assoc. Inc. Buck, W6VPC, 167 Mandana Blvd., Oakland, Calif. 94601.

WORLD QSL Bureau. See ad page 127.

1000 PIV 90-1.5 amp. epoxy diodes. Includes Use bypass caps and bridging resistors. 10 for \$3.95. Postpaid USA. With diode purchase, \$25.00. Add 350 pF electrolytic capacitors. 50¢ each. Postpaid USA no limit. East Coast Electronics, 123 St. Boniface Rd., Cheektowake, N.Y. 14225.

COUNTER, 100kc, Herkley, epmt. model 7150BDK, excellent condition, \$200. Safety belts for climbing, new nylon body belt. \$15. John Link, 1081 Aton St., Cocoa, Fla. 32922.

TEST Equipment wanted: Any equipment made by Hewlett-Packard, Tektronix, General Radio, Stoddart, Measurements, Bontion. Also Military types with WRM-D, 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, 5/52.00. La Von Zachry, P. O. Box 845, Apple Valley, Calif. 92307.

NATIONAL HR060 A,B,C,D coils, spkr, stal calibr. Am original owner, \$2.25. NCX-A, NCX-D stal cal. All like new. 5135 K2EDU, 97 Miller Ave., Brooklyn, NY 11207.

GOVERNMENT Surplus Electronics Bargain Catalog, 96 pictured pages. Send 25¢. Meshina, Nahant, Mass. 01908.

NOVICE Crystals: 40-15M \$1.33, 80M \$1.83. Free flyer. Nat Stinnette, Electronics, Umatilla, Fla. 32784.

SELL swap and buy ancient radio sets and parts magazines. Lavery, 118 N. Wycombe, Lansdowne, Penna. 19050.

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. Resection Instruments, Inc. 215 Mill St., N.E., Vienna, Va. 22180. Tel: a.c. 703-281-4040.

WANTED: Electronics Instructor. General, Theory and workshop. Science and Shop. Like a Placid. New York. Write: Eppstein, Apt. 4B, 440 West End Ave., NYC 10024.

SALE: KWM-2 a.c. power supply, \$675.00; 40L-1, \$275.00; Classic 53, 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. 1914-SP9-5636.

DX Awards Log, 150-page book lists contacts for over 100 major world-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 9106.

SELL: HT-41 linear, \$170.00; HX-50 exciter, \$175.00; Johnson KW Matchbox, 230-30-5, \$100.00; \$3-400Z, Elmac tube, new, \$20.00; 117V, new filament transformer 5V secondary @ 30A, \$20.00. All in good condx. F.C.H. Roanoke, Va. You pay shipping charges. W4PRJ, 301 Carroll Ave., N.W., Roanoke, VA 24016.

NATIONAL NCX-500, \$350.00; A.C. supply, \$85.00, never used, brand new, factory sealed parts, warranted. "Check" Whitley, W4TRK, 3806 Cornwallis Drive, Greensboro, NC 27408. Call a.c. 919-292-1350.

SELL: 5B-101 C.W. filter, HR-170AC noise blanker, 1500 v. p.s. following equipment brand new: TR-44A and Mosley TA40KR, Ron Hornek, 65 Park Drive, Warwick, NY 10990.

HX-20 all-band stal filter 55B transmitter with Heath redoxine stal modification: Leved VOX break-in c.w., power supply, like-new, \$135; 3-400Z one kw all-band c.w./s.s.b. lineal, \$100. WAZL, Cascade 417A 2-meter converter, with spare tubes, \$25. W4OZMA, Griffiths, Quarters 4213A, USAF Academy, CO, 80840.

TELETYPE Parts. Fast service. Machines to M.35. Buy, too. S.a.c.c. Synchronos, Box 8873, Ft. Lauderdale, Fla. 33310.

WANT! Early issues of Pioneer Wireless Magazines for W4AA Historical Library. Wayne Nelson, Concord NC 28025.

WANTED: good electronic keyer and Vibroplex. XFINE, P.O. Box 2807, Mexico City J DF Mexico.

WIRELESS Shop. New and Reconditioned equipment. Write, call or stop for free estimates. 1305 Tennessee, Vallejo CA 94590. Tel: a.c. 707-264-7297.

WORLD Radio has used gear with trial-guarantee terms: w/scr. \$79.98; 912A, \$179.98; SR150, \$299.95; HW-10, \$129.94; HW-32, \$89.95; Swan, 400/420, \$299.95; Swan 250, \$229.95; DuoBandier 84, \$109.95; 753, \$129.95; NC-200, \$249.95; SB-31, \$199.95; Galaxy VMK2, \$279.95; Ramnet II, \$149.95; 200V, \$399.95. Free Blue Book list for more. Write World Radio, 3415 West Broadway, Council Bluffs, IA 51501.

PHONE Patch, with 2.5 kc filter, for Telco coupler or direct if not required, no tricky adjustments. Kit \$6.95; wired, aud 54, Ham Kits, Box 175, Cranford NJ 07016.

WANTED: HP-524A freq. converter and any plug-in accessory for HP-524B or NorthEastern Engrg. Inc. 14-20C converters. Need 10-18 amp and assembly for 14-20C counter, prefer working one and manual for 14-20C. Pepos S. Dounson, 914 W. Mistletree Ave., San Antonio TX 78201. Tel: a.c. (512)-735-5554.

KWM-2, No. 10006 with 516F2 power supply with speaker and Jones Micro-Match mounted in power supply unit, \$75.00, Cash. W3CJP, H. A. Stoudt, Tuckerton Road, Reading, PA 19603.

3V3 wanted, State price and condition. R. McCloud, Esopus, NY 12429.

FOR Sale: Heath SSB, HX-29 transmitter, HR-20 receiver and HP-20 power supply, \$150.00; Gomet 2-meter Communicator GC105, 117VAC/12VDC, \$125.00; Regency FM Monitor receiver MR-10B, 152-174 MHz, \$50.00. All F.o.b. El Voyles, 5103 Marshburn Ave., Arcadia, CA 91006.

FOR Sale: Part of collection of antique radios. S.a.s.e. for list, pls. Joe Horvath, W6GPB, 523-3rd, St. San Rafael, CA 94901.

SELL: Working HO-170 with clock and speaker. Best offer over \$160.00. Have new R4B. Certified check. Night phone 3541, Box 696, W5PO, Novis Ousley, Rule, TX 79547.

HAMMARLUND HO-170 receiver. Triple conversion, 160 to 6 meters, c.w. a.m., s.a.b. in v.v. grid condx. \$150.00. Eric Linden, WB1BD, 35-35 75th St., Jackson Heights, L.I. NY 11372.

SHURE Microphones in stock. Order from us and we ship postpaid. Randall Communications, 7035 N 39th, Milwaukee, WI 53209.

SP600 1X revr, 160-6 meters with product detector. In excpt condx. \$195.00. W81VM, 541 Evanswood Pl., Cincy, OH 45220.

DRAKE R-4A, T-4X and A-3. In perf. condx. All for \$400. FCB, 111 Tweller, Han-M, All for \$150.00. Stanton Towne, 678 Trackeray, Highland Park, IL 60035. Tel: a.c. (312)-433-4472.

SALE: HT-37, \$135.00; new R13 tubes, \$15.00 each. HT-37 shipped from Maleside, Turn, WB4COT/KP4, P.O. Box 219, APO, NY 09845.

TOUCHSTONE Dial equivalent for Kenrad, Ten Button, convertible to all twelve in a minute with data included. Beige, except Green and White while they last. 12VDC required for oscillator operation, \$15.00 postpaid. JNA, W6-GDO, O'Brien, 6006-5th St., Rio Linda, CA 95673.

NEW Year Specials: KWM-2, \$695 and \$750; 516F-2, \$95.00; 755-1, \$295 and \$325.00; 32S-1, \$395 and \$425.00; HA-6 with a.c. \$179.00; B&W LPA with 1.1PS1, \$275.00; GSR100, \$179.00; HW-12, \$79.00 and \$89.00; HT-37, \$175.00; Drake 2A, \$169.00; E-W Ranger, \$99.00; Hic-10, \$39.00; Howard Radio, \$145.00; YR-4, \$19.00 and SBE-34, \$399.00. Tel: a.c. (915)-677-1335.

HEATH HA-10 Warrior kilowatt linear amplifier, \$145.00. Srv. no shipping, but will meet part way. K2KIR, tel: a.c. (315) 458-0940.

SWAN 250 with a.c. supply, Mint condx. Shure 444 mike, \$250.00 F.o.b. Arlington, Va. McDonnack, K3LOV/4, 5008 Carlin Springs, Arlington, Va. 22203.

SELL: Hammarlund HQ-170A with clock and \$-200 speaker in v.v. grid condx, original packing cartons and manual, \$700.00. Johnson Viking Challenger transmitter 80-6 meters, built-in key-clock filter, grid condx, with manual, \$45.00. Howard Radio, 615 North First St., Abilene, TX 79601. Hush D. Barton, Rte. 3, Canadian, TX 79014.

FICO 720, mint condx, no modifications, \$55.00. Dave Walters, Rte 2, Box 520-6, Jacksonville, ARK 72076.

SELL: Collins mechanical filter, 300 cycle for 75S 3B, \$10.00; Collins SM-1 dynamic microphone, \$20.00. Vibroplex Key "Original," \$10.00. Bob Check, W8HBI, 3318 Ralph Ave., Cleveland, OH 44109. Tel: 681-0258.

SELL: SX-101 MC III, \$110.00; WRL G-300 DC mobile power supply, \$40.00; 3-4002 6M linear amp, \$50.00; 25 amp Variac, \$25.00. P. J. Willemsse, WARZTA, 7240 Wilmington Pike, Dayton, OH 45459.

FOR Sale: Collins 75S3B, Serial No. 17757, inc. 500 cycle filter, in mint condx, \$475. Parkway Electric Co., 1390 West 85th St., Cleveland, OH 44102.

HRO-500, LE-10 wanted. Hans Horn, 527 N. Massachusetts Ave., Atlantic City, NJ 08401.

WIRE Recordings, Want mine transferred to tape. G. Black, 563 Center Rd., Essexville, MI 48732.

KW Matchbox, including SWR meter, \$95, no shipping, sry. WRDK, 18975 Van Aken, Snaker Heights, OH 44122. Tel: 283-2531.

50 Ft. tower, 1H 4 beam, Ham-M rotator, \$240.00. KWM1 mobile mount, \$25.00. WA9KBL. Tel: a.c. (312)-439-6884.

SBE-34, little use, \$250.00. KOKME, 7427 Woodson, Overland Park, KS 66204.

VALIANT I, in excpt condx, just professionally checked out \$130.00. Delivery in NYC area. WA2YVR/K5SRR, 123 Hilltop Trail, Sparta, NJ 07871. Tel: a.c. (201)-729-3660.

RTTY Pictures for sale, Vol. 1, \$1.00, Vol. 2, \$2.00. Audio and perforated tapes available. W9DGV, 2210-30th St., Rock Island, HI 61201.

SELLING Out: Valiant II, Ranger II, both F/W and mint condx. Gomet G-76 transceiver, with a.c. and d.c. supplies. Tri-Band Hornet beam, tower and rotator; 6M Signal. Complete file of QSTs since 1945. Complete file of CQ since January, 1945, except 1945 issues. Antiques, S.a.s.e. for list. C. W. Robertson, W3MBP, Box 218, Terrell, TX 75160.

SELL: Hallicrafters SX-146 receiver w/05 kcs. filter and vial calibrator HT46 amp. Mod. per factory specs. 1 1/2 years. New and speaker, \$550.00. Firm price. Am moving out to Collins S/line, R. C. MacDonald, Jr., 75 Ladue Estates, St. Louis, MO 63141. Tel: a.c. (314)-432-2752.

COLLECTION of electronic parts (resistors, capacitors, coils, tubes, semiconductors, etc.), in cabinet, worth over \$1000. Test equipment and receivers worth over \$700. Telescopes worth over \$700. Will sell in pieces or all together as int. Call a.c. (812)-446-4526, or write Larry K. Pittman, RR #1, Hope, IN 47246.

SELL: Swan 500C, 117XC, a.c. supply, Swan VOX, Swan phone patch, all new warranty. Nov. 1, 1969. Never used, \$560.00. GSR-20 MK2, 11 linear like new condx. 6 mos. old, \$310.00. SB-620 Heath Scanalyzer, new, \$85.00; Collins 32S-3, 516F-2 supply, ser. No. 11,697, recently updated and checked by Collins; \$550.00. HT-40 transmitter, perfect, \$35.00. Can ship all in original boxes, you pay postage. Money orders or cashier's checks only. Joe Perry, tel: 1-(315)-RA4-8374, 117 Paris Road, New Hartford, NY 14413.

WILL Trade my Rek-O-Kut record cutting equipment, models T-R43-H cutter and R-8-B amplifier for a good 5-band s.a.b. transceiver. Write for details to T. W. Kirkpatrick, KOWXA, 728 Rhode Island No., Mpls, MN 55427.

SELL: Model 19 teletype set, \$25.00. You pick up. W2AH, 151 Rock Creek Lane, Scarsdale, NY 10583.

HW-12A, HP-23, Turner mike, \$100; Eico 753 3-band s.a.b. revr with a.c. supply, \$90.00. Both in mint condx. with manuals, two ARC transmitters and two receivers, new, 40 mtrs, \$8.00 each. Want: four of five-band revr under \$250.00. Also, cubical quad, Ship USA, you pay shipping, K2RDM/4, 11046 N. W. 6th Lane, Miami, FLA 33126.

SELL: Heath Apache xmtf, \$80.00; HQ-140X revr, \$80.00; complete station including D-104 mike, T-R switch and coax relay, \$185.00. C. L. Archer, K4ZCM, 3109 N. E. 9th St., Ocala, FLA 32670.

POLY-COMM-2 transceiver (2 meters). All cables for a.c. and 12V operation; mike, manuals. Will ship in original carton. Mint condx. First \$150.00 takes. Bert Kavanagh, W2MZY, 84 Parkway Ave., Newburgh, NY 12550. Tel: a.c. (914)-101-8338.

FOR Sale: Hallicrafters HT-46 xmtf, \$225.00; HO-170 revr, \$150.00. Both in excpt condx. B. Fiduk, 813 Somonauk St., Avoca, IL 60178.

NEED R127 ceramic tubes, one of two, new or used, Bill Clearfield, WA0IMY, 2594 So. Colo. Blvd., Denver, CO 80222.

HW-42, latest factory modification; mike, mounting bracket, Hustler, 20M coil section, \$90.00. HP-23, \$40.00. G-E transistorized mobile supply for FM revr. Real buy at \$40. Budd Meyer, 10510 65th Ave., Forest Hills, L.I. NY 11375.

WANTED: Automatic keyer, key; H010, QST binders, Tom Dornback, K9MKX, 19 W. 167 21st Place, Congress Knolls, Lombard, IL 60148.

WANTED: B&W T-R switch, model 381-B; 4:1 tuning knob for 75-44, P&H VFO-model model 80-10, Jennings vac. var. UC5-500 7 K.V. WB2MEE, Jim Joyce, 286 Ridgewood Blvd. No., Westwood, NJ 07675.

QSTs: January 1942 to December 1952, in reg. QST Binders. W7KOL, 4474, East Bunell, Tucson, AZ 85716.

FOR Sale of trade: Nikon "F" of (1.4 50 mm lens), flash, case; Bell & Howell 200-FF if 1.9 200 mm lens; 16 mm movie camera. Want: Collins, Drake, Henry, James Craig, 29 Sherburne Ave., Portsmouth NH 03801.

GALAXY GT-550, a.c. power supply, speaker, VOX, call. used only 40 hours, \$255.00. Greg Siefert, 4295 Wayburn Rd., Columbus, OH 43221. Tel: a.c. (614)-451-1345.

FOR Sale: QSTs, 1952-1969 complete run, in gud condx. Bob Thompso, 19 W. Walnut St., Alexandria, VA 22301.

FOR Sale: Drake R-4A and MS-4 with 160 and 11 meter xtal, \$300. We ship. Also, Crown professional tape-recorder, first best bid. Paul Wittosch, WA9JMN, Box 266, Rensselaer, IN 47978.

HOT Carrier diodes: new HP-2800, 12/5/10 package. Integrated circuits: new Fairchild micrologic, epoxy 14-15 package. 9V0 filter, 914 rate, 600 each, 923 1/2 flip-flop, 800 each. Guaranteed. Add 15¢ postage. HAL Devices, Box 305A, Urbana, IL 61801.

GIVEAWAY: Sparkling mint condx Drake 2-C receiver with 2-CB, speaker, multi, \$250; Hx-44in 14A VO and other extras available. Larry Moss, 138-05 Cronston Ave., Rockaway, NY 11694, (NYC area). Tel: a.c. (212)-GR4-6155.

SELL: Heath RX-1 (Mohawk) revr, 160 m/10m a.c./c.w./s.a.b.; Viking Challenger xmtf 80m/6m, a.m./c.w.; Heath VE-1 ACO thrown in any reasonable offer accepted, you to pay shipping. All replies will be answered, WA6OXX, 2675 Fayette, 207 Mt. View, CA 94040.

HENRY 2-K in excpt condx, \$475.00; Hy-Gain 12 AVO vertical, \$15.00; New-Tronics 20-meter mobile whip and base, \$12.00; 10-0 mike, \$15.00; Electro-Voice 729 ceramic mike, \$10.00. P. Betts, K1NEF, 232 Park St., New Canaan CT 06840. Tel: a.c. (203)-966-8047.

HAVE back numbers of QST: April, May and June 1929 (covers missing). Most of 1940, 1940s and through July 1957. All in gud condx. Mrs. J. C. Phipps, 25 Woodport Road, Sparta, NJ 07871.

ANTENNA Bearings computed for your QTH. Send QTH, latitude, longitude with \$1.50. If latitude and longitude are unknown, add 25¢. K4VEC, Betts, 4305 Murphy Road, Nashville, TN 37209.

CLEARANCE: Mint condx NCK-5; unwired DX-100; unused 10 mobile rig, unused kilowatt d.c. supply components; much much more. No homebrev. List 10¢. No stamps, pls. Ex-WB2KVK, P.O. Box 4552, Wilmington, CA 90744.

COLLINS 41S-1, ser. no. 1013, \$1225. (orig. \$1946). Hammarlund SP-600, ser. No. 11965, \$125.00 (orig. \$1450). Both in v.v. grid condx; instruction manual is included. Rev. H. John Tel: a.c. (305)-865-2534, P.O. Box 4215, Miami Beach, FLA 33141.

SR-200, mint condx \$195.00. TA-33, perfect, Factory cartn. \$75.00, A. B. Watson, 3606 Skyview, Huntsville AL 35809. Tel: a.c. (205)-536-9776.

DISCOUNTS! Up to 15% on new equipment. Full warranty, factory-sealed cartons. We service what we sell. Ecent s.a.s.e. for a deal from "the best in the West." L. A. Amateur Radio Sales, 2414 Crenshaw, Torrance, Calif. 90503.

HAM Receiver: Hallcrafters SX-117. Aluminum chassis, cabinet, etc. 14 tubes, VY and cond. Modern style, \$170. Dave Owens, 1552 San Andreas, San Jose, CA 95118.

SELL Collins 511-R-388, 3400; HC-221 with power supply, \$50; General Radio 11RF Signal Generator, \$25; Jackson 80X color bar generator, \$25, 5 1/2 in. Diameter scope; SB-10, 18X WB-10, both \$125.00. Other equipment and tubes. All F.o.b. WBNLY, F. R. Francis, 4276 Helena Dr., Springfield, OH 45503.

WRITE: Phone or visit us for the best deal on new or reconditioned Collins, Drake, Swan, Galaxy, Hallcrafters, Hammarlund, Hy-Gain, Mosley, Waters, Henry Linear, B11 linear, towers, rotators, other equipment. We meet any advertised cash price on most equipment. We try to give you the best service, best price, best terms, best trade-in. Write for price lists. Your inquiries invited. Henry Radio, Butler, MO 64730.

HEATH HW-16 c.w. transceiver and HG-10 matching VFO, \$90.00. Also Mosley X15 2-element beam, \$15.00. Dave Lambert, WA1JSD, RFD #3, Derry, NH 03038.

HEATH DX-100 with VFO troubles—otherwise OK, \$30. Hoffman, WB2TJW, 115 Highland Ave., Jersey City, NJ 07306. Tel: a.c. (201)-334-0708.

FOR Sale: SX-117 receiver and HT-44 s.s.b./c.w. transmitter Hustler, Sun tach, Motorola mic, Vespa scooter (trade), E. P. Rolke, 1166 Kidde Road East, Rochester NY 14621.

FOR Sale: SX-117 receiver and HT-44 s.s.b./c.w. transmitter with power supply. Will operate separate or transceive. Exclnt cond., \$475 complete. Contact Vince Szroi, K1JHX, 648 East St., New Britain, CT 06051.

FOR Sale: Complete station: SR-500 transceiver with a.c. speaker, two-way radio, PS 500AC, Mike. All for \$300. Ralph Paxton, W6HRI.

SALE: Cleaning out shack. Test gear, parts, smtrs, revts, power supplies, send s.a.s.e. for list. Arnold Mireau, Box 34762, Dallas, TX 75234.

WANTED: Heath HA-14 SSB amplifier for 160 conversion, OK if partially disassembled, inoperative, W2BP, 101 Collins, Pleasantville, NY 08232.

HAM-M Rotor, new, Mosley TA-33, Like new, \$200. R. Richards, P.O. Box 132, Windham, NY 12496.

QSTs: In Binders 1915 thru 1965: \$1500. Extra copies 1935 thru 1964, three copies, \$1.00. Also CQ, WOPR, 1022 North Rockhill, St. Louis, MO 63119.

HALLCRAFTERS Station HI-17, (\$80.00): SX-101A, \$185.00 with manuals and original cartons, in excnt condx. Will ship anywhere freight collect. Edward D. Meeker, WA4QEO, 5444 Sanders Road, Jacksonville, FLA 32211. Tel: a.c. (904)-737-7413.

SFL: HT-32B, SX-115, HI-33A, MK III, with new in the box spare PL-829S, and HA-6 six meter transceiver. Was Hallcrafters KCP, own station like new, with original cartons \$1000. Complete or will sell separately. Will ship. J. D. Cieslala, K8UHX, 4212 Fulton Parkway, Cleveland OH 44144.

We buy electron tubes, diodes, transistors, integrated circuits, semiconductors and resistors. Astral Electronics, 150 Mille St., Elizabeth, NJ 07207. Tel: a.c. (201)-354-3141.

FOR Sale: TR-4-AC-4, MS-4. Hardly used, in perf. condx: \$450.00. Firm, K2AK, 1115 Willis Ave., Albertson, NY 11507. Tel: a.c. (516)-MA1-8181

FOR Sale: QSTs 1943 to date; CQ's 1957 to date, 15¢ each. E. Wagner, 6307 East Gate, Monona, WI 53716.

WANTED: Davco DR-30. Send info to J. W. Richardson, 753 Oregon Ave., Palo Alto, CA 94303.

SELL: Good DX-100 xmr, \$50; mint condx TX-1 Apache xmr, \$80; mint RX-1 Motlak revt, \$110. All manuals. Will deliver within 100 miles radius. Ken Taylor, W6NIB, 3390 Greer Road, Palo Alto, CA 94303. Tel: a.c. (415)-327-3351.

SFL: Valant II conv. Johnson SS adapter, scope—FSK shifter, Collins speaker with clock, \$375.00. Kenneth Schwartz, K2BKU. Tel: a.c. (914)-668-4534; (914)-668-3677 night.

WANTED: KVM-2, MP-1, 351D-2 mint condx. K9VQC. Tel: a.c. (312)-767-8734.

TRADE Or sale: local deal. Galaxy 3000 with PSA-300, \$185.00; HC-221AK, \$40.00. Want: HX-50 or similar. W2GOK, tel: a.c. (201)-463-0445.

WANTED: A few manuals of Hammarlund receiver Model SP-600-JX. Eberhard Schuessler, c/o Frankfurt/Main, Spohnstr., 55 West Germany.

FOR Sale: Collins 75S-3, 75S-3 and power supply, in und condx. Total price, \$875.00. K6GMST Keith P. Schmidt, Box 138, Eldridge, IA 52748. Tel: a.c. (319)-285-4149.

SB-34, in excnt condx. Going for Extra Class ticket. Need c.w. rig w/ VFO and Matchbox or will sell outright for \$250. KUCNC7, Ben Moses, 392 Central Park West, NY 10025. Tel: a.c. (212)-749-6852.

TR-4, A.c. supply, First Rest offer. Will hand deliver Ohio or adjacent states. WB8CKP.

MILITARY Test Set Directory, 4 volumes, 1500 pages. Covers both commercial, military units: \$5.00 plus 78¢ postage. White, 3716 N. King's Highway, Alexandria, VA 22303.

FM Walkie/Talkie, 2 channel G-E progress line. Transistorized receiver, 5 watt transmitter. Mean power supply. Operational with sale for 146.94. Receiver 146.36 and 146.94 transmitter 100.00. F.o.b. New Orleans. W5AWGO, 4911 Western, New Orleans, LA 70122.

WANTED: Hustler RB1V and loading coil; Mini model C-4. Penwood clock, Carsner, 935 Geary St., San Francisco, CA 94109.

QSTs 1943 to 1968, in excnt condx. First best offer over \$75. W2DHY, dl-58 71st St., Middle Village, LI, NY 11379.

COLLINS 50L-2, B11 linear, both like new condx. Dan Maselli, 327 Fairfield Ave., Hartford, CT 06114. Tel: a.c. (203)-525-7069 or a.c. (203)-278-6097.

FOR Sale: By the w/dow of Lawrence T. Phegan, W3FW Berwyn, Pa. Heath SR-400, MS-400, HM-15 and EV-423-A mic, all for \$430. Philly area pick-up. Call N1-4-0267 or write to Davis B. Stout, W3UX, 1026 West Lancaster Ave., Berwyn, PA 19312.

HY-GAIN TH3-MK III, balun, in beautiful condx. 30 ft. foam coax, no room to swing in city, \$90 shipped collect. Jan Williams, K2PLZ, 65 Anderson Pl., Buffalo, NY 14222. Tel: a.c. (716)-683-4562.

DRAKE TR-3, ACV, MS-3, and condx, \$385.00; all items except 48 states. Part 813s, sockets, filament alarm, \$42.00 pair. 4CX350s, sockets, chimneys, \$25.00. Heath HD-15 phone patch, \$21. Heath HM-15 SWR Bridge, \$13. 34-hour digital clock, buzzer, \$16.00. Turner, 454X mic, \$17. Jim Falin, W2T1 Rose St., Bellflower, CA 90706.

WANTED: 1 Kw. variable inductor by B. W. of Johnson. State price, model number and condx. W2CVY, 20 Beech Terrace, Wayne, NJ 07470.

SALE: Galaxy V, a.c. and d.c. supplies, speaker, \$250. Hammarlund HXL-1 linear, \$225.00. Both for \$450.00. K2GYY, 22 Fernway, Berkeley Heights, NJ 07922.

FOR Sale: Marauder 58B xmr, \$150. Marc Segan, 34 Oxbow Place, Wayne, NJ 07470, tel: a.c. (201)-279-2175.

MANUALS: R-390, R-390A, OS-8C (V), \$6.50 each. Many others. List for 20¢. S. Consalvo, 4905 Roanoke Dr., Washington, DC 20021.

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TRADE: 12 bolt-action rifle with loading clip and scope for Johnson Matchbox I. Hall, c/o Howard H. Hall, RFD #1, Port Acreary, PA 16743.

SFL: Star SR-700A ham-band receiver, in mint condx. Cost \$195 new. Will sell for \$125.00. Contact: George Hawrsky, W1B2GWU, 220 Highland Blvd., Apt. F-8, Brooklyn, NY 11207. Phone a.c. (212)-277-4001 between 5 and 9 P.M.

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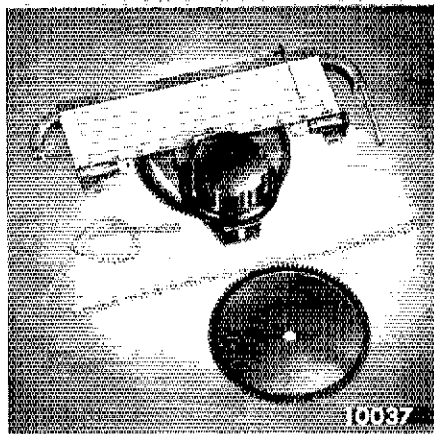
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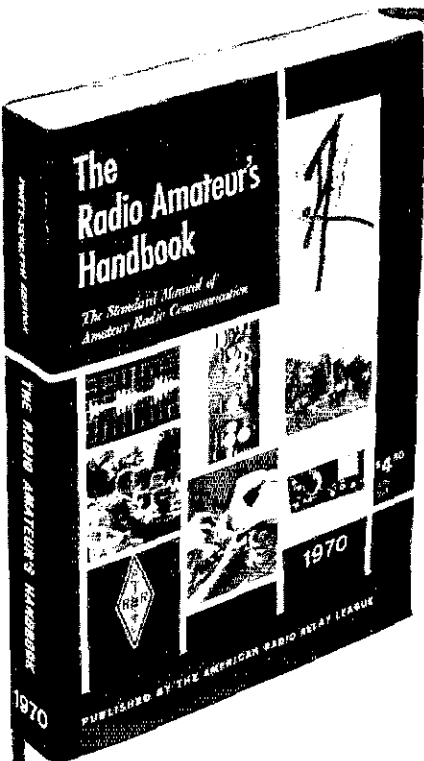
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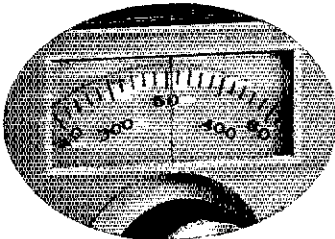
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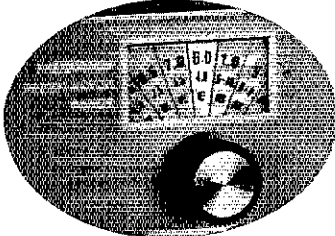
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