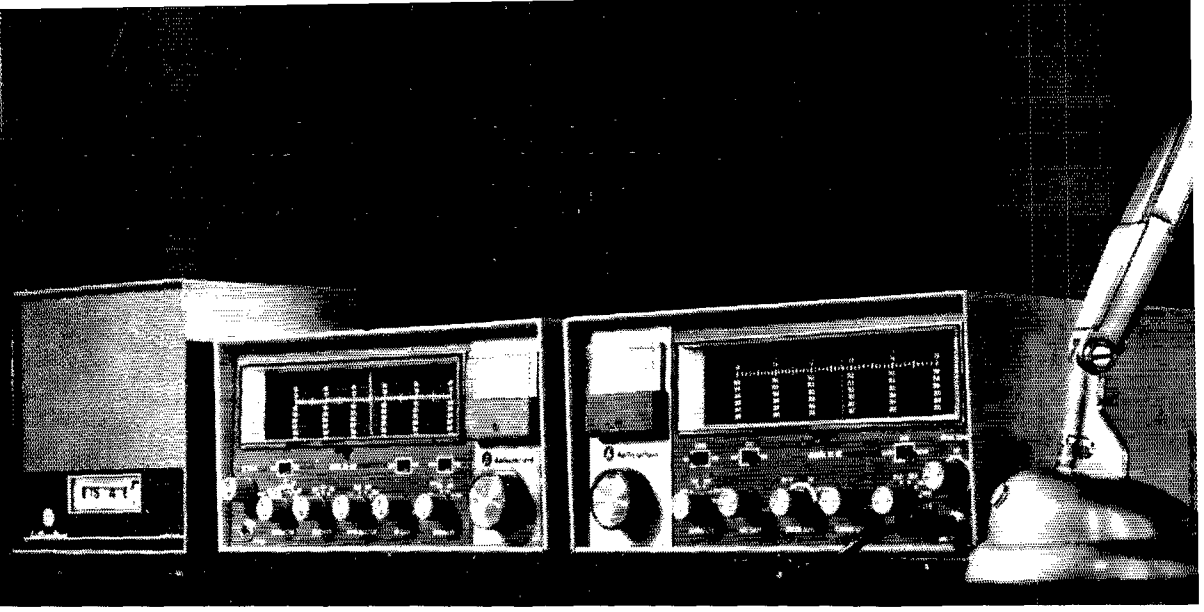
May 1968
75 Cents

QST

devoted entirely to

amateur radio



SX-146 Receiver

This is an amateur band receiver of advanced design employing a single conversion signal path and pre-mixed oscillator chain to assure high order frequency stability and freedom from adjacent channel cross-modulation products. The SX-146 employs a high frequency quartz crystal filter and has provision for installation of two more crystal filters. The receiver may also be used from 2 to 30 mc, with the exception of a narrow gap at 9.0 mc, with the connection of auxiliary oscillators. The highly stable conversion oscillator chain may be used for transceiver operation of the matching HT-46 transmitter.

FREQUENCY BANDS: 3.5-4.0; 7.0-7.5; 14.0-14.5; 21.0-21.5; 28.0-28.5; 28.5-29.0; 29.0-29.5; 29.5-30.0 mc (28.0 to 28.5, 29.0 to 30.0 requires extra crystals at users option).

SENSITIVITY: Better than 1 μv for 20 db S/N.

TUBES AND FUNCTIONS: 6JD6 RF amplifier; 12AT7 Signal mixer and cathode follower; (2) 6AU6A 9 mc IF amplifier; 12AT7 AM detector—AVC rectifier—product detector; 12AT7 USB—LSB crystal oscillators; 6GW8 Audio amplifier and audio output; 6BA6 Variable frequency oscillator; 6EA8 Crystal heterodyne oscillator and pre-mixer; Plus diode power supply rectifier, ANL diode and AVC gates diode; *6AU6A—100 kc crystal calibrator oscillator; *Harmonic generator diode.

PHYSICAL DATA: Size: 5⅞" x 13⅛" x 11". Shipping wt., 20 lbs.

FRONT PANEL CONTROLS: Frequency: Power off CW-upper-lower and AM: Audio gain; Band selector—3.5, 7.0, 14, 21.0, 28.0, 28.5, 29.0, 29.5; Selectivity—0.5, 2.1, 5.0 kc (0.5 and 5.0 kc filters optional extra); Pre-selector; RF gain; AVC on-off; Cal. on-off; ANL on-off; Phone set jack; S-meter.

REAR CHASSIS: S-meter zero adjust; Internal-External oscillator switch; Slave oscillator output; External oscillator input; Antenna socket; Speaker, ground and mute terminals; Grounding stud; AC power cord.

POWER REQ.: 105/125 volt—50/60 cycle AC—55 watts.

I-F SELECTIVITY: Uses a 6-pole crystal filter to obtain a nose-to-skirt ratio better than 1 to 1.8.

Amateur net, $295.00

Model HA-19 plug-in, 100-kc quartz calibrator available as accessory. **Amateur net, $19.95**

Part of HA-19 calibrator.

HT-46 5-band transmitter

All new from the ground up! Here's the "new breed" transmitter that matches your SX-146 . . . works independently or may be interconnected for transceiver operation.

FEATURES: 180 watts PEP input on SSB; 140 watts on CW; Frequency control independent or slaved to SX-146 receiver; Upper or lower sideband via 9 mc quartz filter; Built-in power supply; Press-to-talk or optional plug-in VOX; grid block for keying for CW.

FREQUENCY COVERAGE: 3.5-4.0, 7.0-7.5, 14.0-14.5, 21.0-21.5 mc and 28-30 mc in four 500-kc steps. Crystal supplied for 28.5-29.0 mc coverage. Other plug-in crystals at user's option.

TUBES: 6BA6 VFO; 6EA8 Heterodyne crystal oscillator and mixer; 12AT7 Carrier oscillator-third audio; 12AT7 Mic amplifier; 6EA8 9 mc I-F amplifier and AALC; 6AH6 Mixer; 12BY7 Driver; 6HF5 Power amplifier; 0A2 Reg.

FRONT PANEL CONTROLS: Frequency Tuning; Operation-Off, Standby, USB, LSB, CW-Tune, Standby LSB USB; Microphone gain; Driver tune; Carrier level; Band selector; Final tune; VFO selector—Transmitter-Receiver; Dial cal.; Calibrate Off-On; Meter MA-RFO.

REAR APRON FUNCTIONS: AC Cord; Ground lug; Fuse; Key jack; VOX accessory socket; Antenna jack; Receiver input (for transceiver); 11 pin control socket; bias adjust.

PHYSICAL DATA: Size: 5⅞" x 13⅛" x 11". Shipping wt., 26½ lbs.

HA-16 Vox Adapter, **$44.95**

Amateur net, $395.00

R-51 Speaker.

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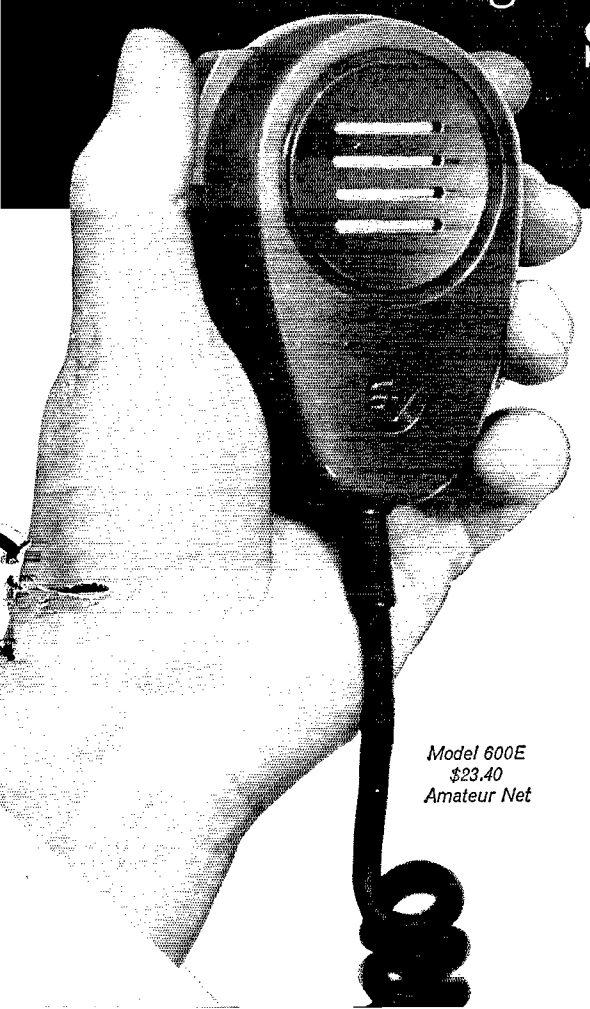
MOBILE SERVICE is the most demanding form of voice communications you use. Power and size limitations are extreme, putting an unusual premium on efficiency. The environment is tough, putting an accent on reliability. In the final analysis you will benefit fully from your mobile equipment only by paying strict attention to every detail of installation and operation.

Mobile service performance starts with the microphone—the first active element in the system—and there's no better way to start than with the new E-V Model 600E dynamic microphone. It is a little more costly than many microphones you can buy that "just work", and rightly so. For the E-V 600E is a lifetime investment in top-notch performance.

Look closely. The dynamic element of the 600E is the direct descendant of a long line of military microphones built to perform faithfully under battle conditions. This element was chosen for high intelligibility and its ability to withstand any environmental conditions. The proved ruggedness of the E-V Acoustalloy® diaphragm easily withstands ear-shattering sound pressures with no change in characteristics. But there is more to the 600E than ruggedness. Its sound quality has no equal. Here's why.

The frequency response of the 600E is ideally suited to SSB and critical AM transmission. You get highest intelligibility with any ALC circuit or frequency-shaping network in common use. That's been proved with on-the-air tests with every commercial SSB mobile transmitter and transceiver on the market today. Further, the high output level of the 600E will fully modulate even the "Scotch" input circuits sometimes found in mobile rigs. The 600E is available in 150-ohm or Hi-Z models.

Now pick up the 600E. It is shaped for comfort, with an easy-acting switch that gives you positive control, even when you are wearing heavy gloves. The case is molded of Cycolac®, a space-age plastic that absorbs a fantastic amount of abuse. The 600E never feels hot or cold to the touch, regardless of the climate. The shielded coiled cord has passed flexing tests that far exceed normal life, while the switch has test-cycled on and off over a half-million times without a sign of failure. Even so, both cord and switch are designed for easy field service, if necessary.



Model 600E
$23.40
Amateur Net

The E-V 600E is built to outlast every other piece of mobile equipment you may use, while outperforming every other microphone on the market. It will probably be transferred from rig to rig as the one most useful communications tool you own. Actually, the 600E, like all E-V microphones, is guaranteed forever against defects in workmanship or materials. It must perform as stated, or your money back.

The one best way to find out what the E-V 600E can contribute to your mobile installation is to try it. We guarantee you have nothing to lose. Ask your Electro-Voice distributor to help you put the new E-V 600E dynamic microphone to work in your rig, today!

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QST

MAY 1968

VOLUME LII NUMBER 5

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

OFFICES

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

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

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

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

OUR COVER

Our colorful cover this month is by F. T. Prado. Details on the Convention begin on page 72; see you there!

—CONTENTS—

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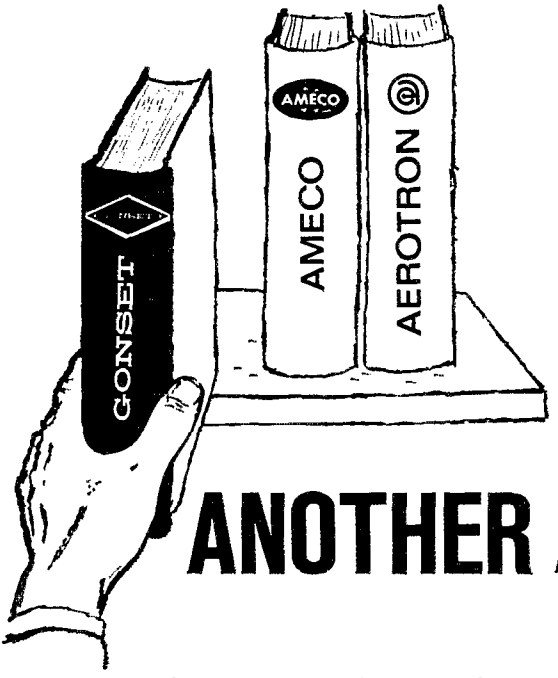

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AEROTRON is proud to announce the acquisition of the famous Gonset line of quality amateur radio equipment. This acquisition appreciably broadens the line of equipment and components which we have to offer to the amateur and related markets. We are now shipping directly from our award-winning plant in Raleigh, the Gonset Communicators, Single Sideband VHF transceivers, HF and VHF linear amplifiers and other items bearing the Gonset name. In the coming months we will have even more.

AEROTRON, with more than twenty years in the two-way radio manufacturing business, has also acquired the AMECO Equipment Corporation during the past year. Ameco, formerly of Mineola, New York has been completely moved to our Raleigh plant and we are constantly adding to this popular line of economically priced equipment which is sold by more than a thousand radio supply outlets throughout the country.

The **GONSET** name has been a familiar and respected one by hams the world over for many years. It is with a great deal of pride that we now have it as a division of Aerotron, Inc.

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CU at the A·R·R·L New England Division Convention in Swampscott, Mass., June 1 & 2

Stuart F. Meyer, W2GHK/4.

Section Communications Managers of the ARRL Communications Department

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

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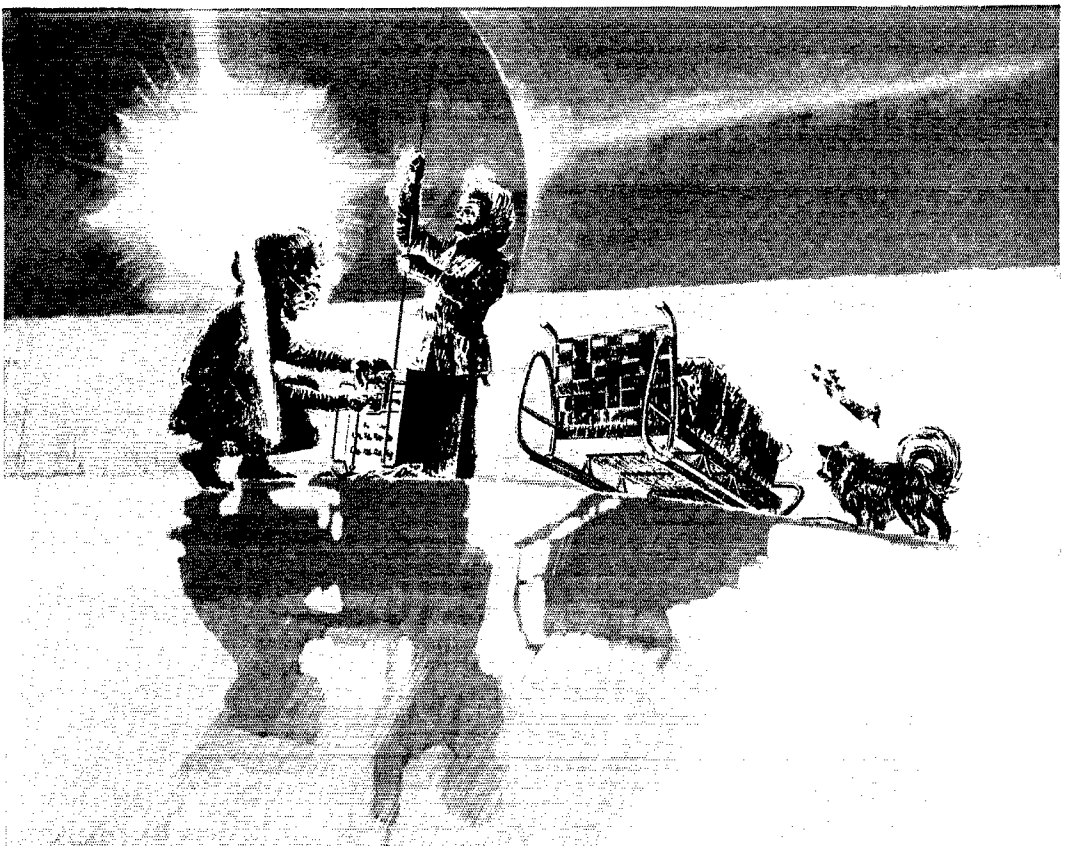

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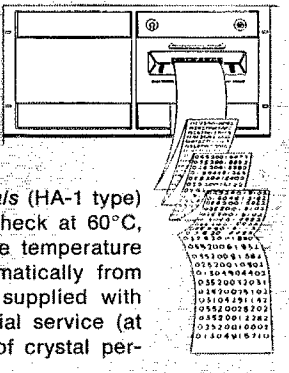

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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors.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

"Of, by and for the amateur," it numbers within its ranks practically every worth-while amateur in the nation and has a history of glorious achievement as the standard-bearer in amateur affairs.

Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisite, although full voting membership is granted only to licensed amateurs.

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Vice-Director: Ray K. Bryan W5UYQ
2117 S.W. 61st Terrace, Oklahoma City, Okla. 73159

"It Seems to Us..."

Fourth of a Series:

COMMUNICATIONS ESCALATION

One of the most intriguing things about amateur radio to the uninitiated is its "people-to-people" aspect. To the non-ham the idea that the amateur next door — and hundreds like him across the country — can and does carry on direct, personal conversations day in and day out with other hams around the world, on both sides of the Iron Curtain, is a very exciting one. Yet we amateurs have been doing this for nearly fifty years and most of us think nothing of it — at least after we have been at it for a while.

Our world seems to shrink daily; yet tensions sometimes seem to be increasing almost as rapidly. The people-to-people contact through amateur radio, where distance, geographic, political and language barriers dissolve, constitutes an unparalleled international exchange. For Canada and the U.S. at the least, it is a priceless national service.

Is it just possible that, now at this point of time in history, amateur radio has an opportunity to add a new dimension to the traditional concept of public service? Can we somehow organize and expand our international on-the-air contacts into an even more effective people-to-people exchange?

Can we as amateurs come up with a new way to convey to the peoples of other nations what we — whether Americans or Canadians, Gambians or Zedders, Muscovites or Japanese, Venezuelans or Danes — are really like? Not through political discussions or propagandizing, of course — but simply through expanded personal communication?

When we come right down to it, our actual on-the-air communications, as distinct from just contacts, are limited by several things. For one, our conversations lean heavily on technical discussions and "shop talk" about amateur radio — quite naturally because that is one interest we all have in common. For another, DX activity is all too often a matter of just making an authentic but minimum contact, or trying to get through an avalanche of competing signals. As a consequence, we do not very often really get to know much about the ham at the other end — his other interests, his opinions, his work, his activities. Nor does he get to know us.

Of course, many of the more gregarious among us have indeed established solid international friendships. But perhaps too many of the rest of us limit our own potentialities by too intense interest only in a high DX contest score, or a coveted QSL.

So how can we "escalate" our communications? This is a question that has been discussed from time to time at conventions, here at headquarters, and even in Washington (97.1e — "continuation and extension of the amateur's unique ability to enhance international good will"). But no one has yet come up with the real key to a broad program.

What do *you* think? How can we do it? QST

In these days of billions and trillions, a figure of 4,000,000 doesn't sound like much. This isn't government dollars, however, but the total distribution of The Radio Amateur's Handbook, which makes it 16th on the all-time list of best-sellers (in the non-fiction class -- we can't compete with Peyton Place!). ARRL members can take pride in the knowledge it is the top technical book on the entire list. The four millionth copy was presented to FCC Chairman Hyde (see p. 80).

Not a best-seller, tho it should be, is the ARRL Annual Report, a bound 100-page summary of activities during 1967 by extensive reports of officers and directors. Complimentary copies go to affiliated clubs who have requested them, and are also available to individual members at the cost of production and mailing -- $1. For those not wanting the full report but having an interest in the financial statement, this extract of the report is furnished without charge to members sending a stamped self-addressed envelope.

Studies on revision of the Loran service in 1800-2000 kHz. have been completed, and a new plan drafted for amateur sharing. Until finalization and formal announcement by FCC, see page 85 for an interim report.

On the DX phone bands we encounter lots of confusion about "third-party" traffic. It's like this: When I work you, you're the first party and I'm the second (or vice versa). Anyone else is a "third-party." Message traffic we handle for the general public is obviously third-party traffic. But informal communications can also be. When you ask me to "say hello to Joe," Joe is a third party whether he's sitting in the shack, at the end of a telephone line, or the eventual recipient of a postcard I'll mail him. A person without the proper amateur license using my mike is also a third party. Third-party communications are okay within Canada and the U.S. and between our two countries and a few others, listed nearly every month in the IARU News section (e.g., see page 86 this issue). But don't handle 'em with other countries, not even if the fellow on the other end is a Canadian or a Yank.

It's good news to learn that the amateur section of the Electronic Industries Association has formed an engineering committee (W2GHK, chairman) to work on developing definitions, performance standards and methods of measurement in the manufacture of amateur radio equipment. The latter in particular has long been needed -- e.g., an agreed standard of measuring antenna gain -- so that we'll all be talking the same language.

Recruiting . . . the League is sometimes accused of being too "soft-sell" in seeking new members. Point is, of course, the League needs every ham, and every ham needs the League -- to support amateur radio, to get the most out of his hobby, and because membership is his best bargain. Best way to grow? Each of us knows at least one ham who "just hasn't gotten around to joining." Let's sign him up and we'll really GROW.

Vacation-planning time is here. Does your schedule include one or more of the hamfests or conventions this Spring and Summer, especially the National in San Antonio?

Quads and Yagis

Comparisons, Patterns and Working Dimensions

BY J. E. LINDSAY, JR.,* WØHTH

Here's a fresh look at the Yagi vs. quad question. The discussion is based on both theory and extensive experimental measurements, and includes data on successful antennas of the quad and Yagi types. "Must" reading for the antenna-minded.

On the amateur bands antennas come and go. They appear in wondrous forms, their inventors claiming impossibly high gain, magical means of reducing beam widths and angle of radiation, and the like. However, the natural selection process of the test of time leaves only those antennas that are the true performers. The material in the following sections will present a discussion of two of these time-tested antenna arrays.

In this class of arrays the Yagi (more properly the Yagi-Uda) antenna is the grandfather of them all. There are very few antennas which can compete with the electrical operation and simplicity of construction of this array. However, in the early 1940's C. C. Moore, of radio station HCJB, brought into being a parasitic array of loop elements with properties very comparable to those of the Yagi-Uda array. Since its conception this array has become very popular in amateur radio circles. It has come to be known as the "cubical quad" or "quad" antenna because of the common use of square loops and box-like construction.[1]

The material to follow will attempt to present an unbiased comparison of these two arrays based upon the experimental and theoretical results of many workers. This material is prefaced by a short section of introductory antenna concepts and definitions so that certain terms and notation will have more meaning when the comparisons between the quad and Yagi antennas are made. Finally, in the last section, some of the experimental patterns of modeled quad and Yagi arrays are presented. A compilation of some of the working dimensions for both types of arrays are also given. This latter material should be of interest to the builder and experimenter.

* Route 2, Box 7, Castle Rock, Colo. 80104.

[1] For a colorful description of C.C. Moore's invention of the cubical quad antenna see the introduction of W.I. Orr's *Quad Antennas*, Radio Publications, Inc.

— INTRODUCTORY ANTENNA THEORY AND DEFINITIONS

Polarization

Inspection of the radiation field of an antenna will show it to have plane-wave character and to be made up of electric and magnetic field lines which are perpendicular to each other. Polarization of an electromagnetic wave is defined as that direction in which the electric field lines are oriented. If the electric field vector is fixed (in direction) in a plane it is said to be linearly polarized. For example, the polarization of a dipole is linear. If the plane in which this dipole lies is horizontal or parallel to some reference plane (e.g., the surface of the earth) it is called a horizontally-polarized antenna. Vertical polarization would result if the dipole were placed perpendicular to the reference plane. It should be noted that if the electric vector does not stay fixed in position but rotates (its tip tracing out an ellipse) then the wave is said to be elliptically polarized. Circular polarization is a special case of elliptical polarization. Elliptical polarization will have a right- or left-hand sense, depending upon the direction of rotation of the electric vector.

Directivity and gain of an antenna

The degree to which a particular antenna can concentrate the antenna pattern into a beam is known as "directivity." Mathematically it is the ratio of the power density (in watts per square unit of measure) that would be available at an observation point to the power density one would have if the total radiated power were radiated *equally* well in *all* directions.[2] Directivity is a function of the antenna pattern alone and does not take into account antenna efficiency or losses.

The gain of an antenna can be defined in terms of directivity when antenna efficiency is taken into consideration. If K is the antenna efficiency, a number between zero and one, then antenna gain is given by

$$G = KD$$

where

G = antenna gain
K = antenna efficiency
D = directivity

The gain in decibels is then given by

$$\text{db. gain} = 10 \log_{10} G.$$

[2] An antenna which radiates equally well in all directions is called an isotropic radiator or isotropic antenna.

Please note that the above definition has been such that it is a function of the observation point. In amateur circles gain is usually measured at that observation point where the maximum power density is observed. Further, when considering practical Yagi and quad arrays for the h.f. range, K is normally taken as 1. Gain measured in the above manner is normally called gain with respect to an isotropic antenna. It is interesting to note that since a half-wave dipole concentrates its pattern into certain directions, it will have some gain with respect to an isotropic antenna. This gain with respect to isotropic is found to be

$$G = 1.64$$

or, in db.,

$$G_{db.} = 2.15 \text{ db.}$$

If the vertical and horizontal half-power beam widths are known for a given antenna the following formula will give (somewhat on the generous side) the gain of the antenna with respect to an isotropic antenna

$$G = \frac{40{,}000}{\theta_H \theta_V}$$

where

θ_H = horizontal half-power beam width in degrees.

θ_V = vertical half-power beam width in degrees.

This formula assumes low-side and back-lobe levels for the antenna pattern. If the gain with respect to isotropic is known then the gain with respect to a half-wave dipole is obtained by subtracting 2.15 db.

Antenna aperture or area

This concept is of most use when discussing a receiving antenna. It is a measure of the antenna's ability to gather in available radiated power at some receiving position. Antenna area and gain are *directly* related:

$$G = 4\pi \frac{A}{\lambda^2}$$

G = antenna gain

λ = operating wavelength

A = area (based upon square units of length measurement, with the length measurement the same as that assumed for λ). It should be noted that one *cannot* have two antennas with the same gain and different areas. One hears this concept misused (in the sense of the above sentence) quite often on the amateur bands. That is to say, if you feel that one antenna has more capture area than another, then it must also have more gain.

Antenna patterns

The pattern of an antenna may be plotted by recording the received electric field strength or power density as a function of viewing (observation) angle. The properties of most antennas used by radio amateurs (below 30 Mc.) can be described by two basic patterns. Consider a pattern due to a radiating half-wave dipole, this pattern to be obtained by moving a sampling or test antenna about the dipole in the horizontal plane which contains the dipole. This pattern is called the horizontal-plane or *E*-plane pattern (the pattern was taken in a plane containing the electric *E*-lines, hence the name *E*-plane pattern). If the sampling antenna is placed directly in front of the horizontal dipole (and in the horizontal plane) and moved up over the top of the dipole (in a plane perpendicular to the horizontal plane) and on around until it returns to the starting position the result is the vertical-plane or *H*-plane pattern (since the test antenna moved in a plane parallel to the magnetic *H*-lines it is called an *H*-plane pattern).

For Yagi and quad arrays these two patterns will give enough essential information to determine their expected radiating properties.

II — COMPARISON OF QUAD AND YAGI ARRAYS

The cubical quad antenna was first introduced to the radio world in 1942 by Clarence C. Moore at HCJB to alleviate a serious corona problem occurring on a large commercial short-wave Yagi array. It is a parasitic array formed with loop elements which are approximately one wavelength in circumference.

Important to proper operation of a quad antenna are considerations of proper element sizes,

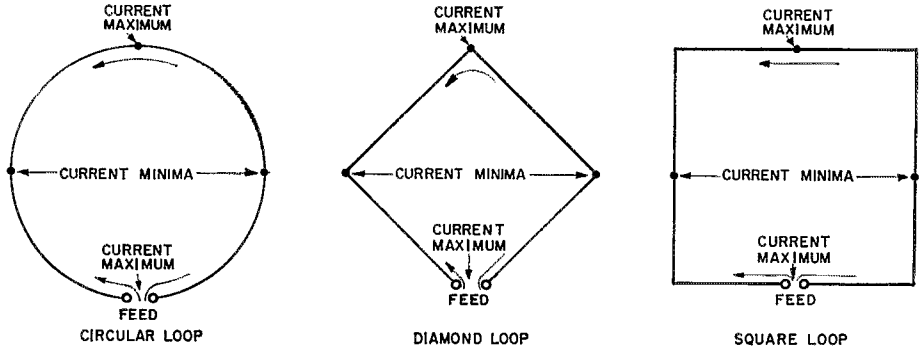


Fig. II-1—Current distribution on circular, diamond and square loops 1 wavelength in circumference.

spacing between elements, boom length, feed impedance and so forth. The following material presents a discussion of these considerations and a comparison of the quad and Yagi arrays.

Polarization of a quad antenna

The polarization of a quad antenna can be determined by considering the current distribution on the driven element. To stress the point that square, diamond, or circular loop all produce essentially the same polarization, consider the current distribution shown in Fig. II-1. A little thought reveals the fact that the vertical components of current produce radiated fields that cancel each other, and the horizontal components of current produce a radiated field (broadside to the loop) with all components adding. The polarization of any of these loops is then linear and parallel to an imaginary horizontal line drawn through the current minima. Hence, if a quad loop is fed at the bottom it produces horizontal polarization, and if fed on the side it will have vertical polarization. The geometrical form of the loop, square, diamond or circular, does not mean that the (broadside) radiation has a possible combination of both horizontal and vertical polarization or circular polarization. This seems to be a common misconception in amateur circles. The linear polarization properties introduced above can be verified easily experimentally. It should be further noted that there are no noticeable differences in the radiating properties or impedance of a loop 1 wavelength in circumference whether it be of the circle, diamond, or square configuration.

Angle of radiation for a horizontally-polarized quad antenna

Placement of an antenna above a conducting ground will alter its free-space radiation pattern, positioning the maximum of its main lobe at possibly a new angle with respect to a horizontal reference line. The angular position of this main lobe is called the angle of radiation. The angle of radiation of an antenna is a function of its height above the conducting ground and its polarization. Given the height and the polarization, the angle of radiation can be determined by using the concept of the antenna's virtual image or ray theory and reflection of the wave by the ground.

The following conclusions can now be drawn:

The angle of radiation of a *horizontally*-polarized quad antenna, at a given boom height,

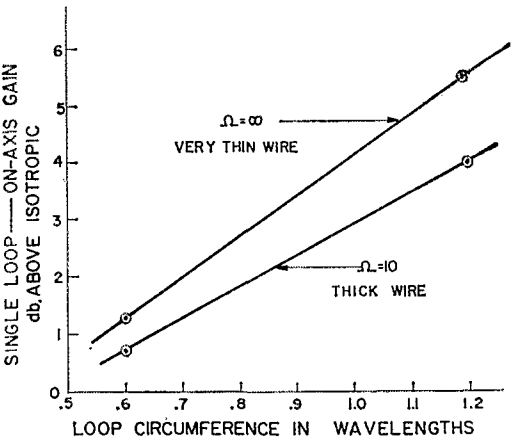


Fig. II-3—On-axis gain of a single loop as a function of loop circumference. (From "Studies of Large Circular Loop Antennas" by S. Adachi and Y. Mushiake *Sci. Rep. Ritu*, B-(Elect. Comm.) Vol. 9, No. 2, Tohoku Univ., Sendai, Japan, 1957.)

is essentially the *same* as that of a *horizontally*-polarized Yagi at the same boom height.

This must be so because the boundary conditions imposed upon the electromagnetic wave at the surface of ground are completely insensitive to the fact that the wave is produced by a quad antenna as opposed to the wave produced by a Yagi antenna.

Typical patterns of a quad *or* Yagi antenna placed at a height of ½λ or 1λ above a perfect ground are shown in Fig. II-2 at A and B.

Gain comparisons of the quad antenna with the Yagi antenna

The gain of a quad array (of given boom length) seems to be somewhat higher than that of a Yagi array of the same boom length. This gain difference can be explained by considering the theoretical work of Adachi and Mushiake of Tohoku University in Japan. In 1952 and 1957 they published two papers which discussed the current distribution, impedance, and radiating properties of loops of large circumference.[3]

[3] S. Adachi and Y. Mushiake, "Theoretical formulation for large circular loop antennas by integral equation method," *Repts. of the Research Institute of Elec. Commun.*, Tohoku University, Sendai, Japan, Sci. Rept. Ritu, B(Elec. Commun.), vol. 9, no. 1, 1957.

——, "Studies of large circular loop antennas," *Repts. of the Research Institute of Elec. Commun.*, Tohoku University, Sci. Rept. Ritu, B(Elec. Commun.), vol. 9, September 1952.

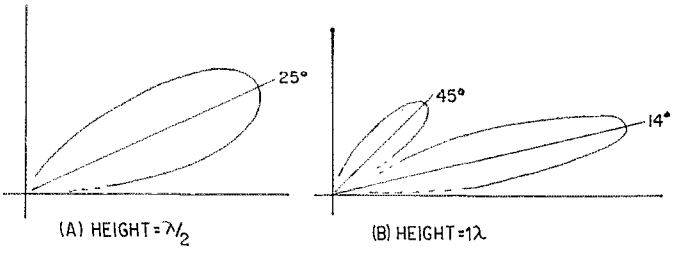


Fig. II-2—Vertical-plane radiation patterns for a horizontally polarized quad or Yagi array above perfectly-conducting ground.

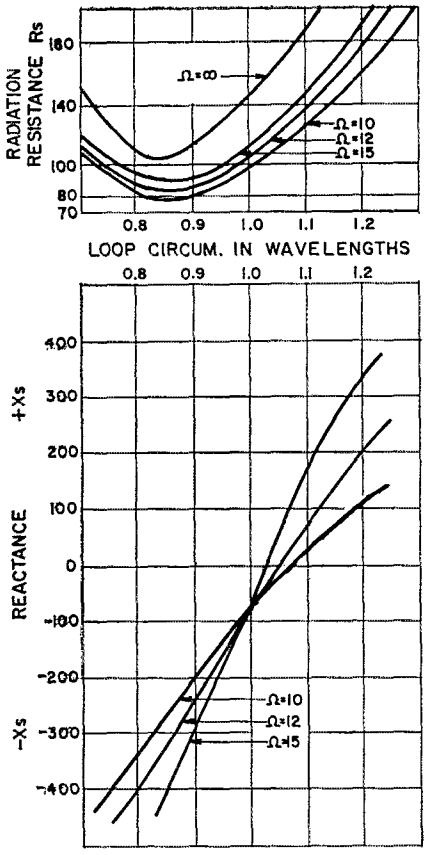


Fig. II-4—Reactance and radiation resistance of a single loop versus circumference. Note: Ω is a measure of the ratio of loop circumference to wire diameter. $\Omega = 2ln\frac{8a}{\rho}$ where a = loop radius and ρ = wire radius.

Fig. II-3 shows the gain of a single loop as a function of wavelength and wire diameter. Fig. II-4 shows the variation of reactance and radiation resistance for a single loop. Please note the dependence upon the circumference-to-wire-diameter ratio in these two figures. They showed that the broadside gain of a single loop 1λ in circumference was approximately 2 db. above that of a half-wave dipole. This result implies that a parasitic array of loop elements should have the same gain advantage when compared to a Yagi array of comparable boom length.

This gain differential for the quad array does appear and can be verified experimentally. Fig. II-5 demonstrates this comparison. The points on the figure were obtained as follows: For the antenna under consideration *E* and *H* plane patterns were made. The gain was then calculated using the *E* and *H*-plane half-power beam widths of these radiation patterns and the formula discussed above in section 1. This gain and the boom length of the antenna were then used to determine a point on the graph given in Fig. II-5, where gain and boom length represent the parameters under consideration. The data points for many, many antennas, both quad and Yagi, were then placed on the graph and a smooth curve representing an average for each type of antenna was then drawn.

The expected gain difference of 2 db. does indeed appear in favor of the quad antenna. This gain differential is essentially that predicted by the results of the Japanese workers cited above.

The measurements used to obtain the above gain comparisons were performed at 440 MHz. A measuring frequency of 440 MHz. was chosen so that 1 cm. (at this frequency) is equivalent to 1 foot of measurement at 14 MHz. Hence, to relate these results directly to the 20-meter amateur band, boom length in cm. from the curve can be read as boom length in feet. For example, the gain of a quad on a 40-foot boom should be slightly more than 1 db. above a quad on a 25 foot boom. Comparison of the signals from these two antennas at a receiving station will not reveal much difference; however, in the DX "pile-ups" the longer antenna should have a slight advantage. Another interesting interpretation of these results is to note that a quad on a 30-foot boom is equivalent to a Yagi on a 55-foot boom. Hence the boom of a Yagi antenna must be about 1.8 times longer than the boom of a quad in order for the two gains to be comparable.

Impedance properties and matching

The driving-point impedance of a quad antenna depends upon the element spacing and number of elements. For two-element quad antennas the results of Bill Orr in his *Quad Antenna* handbook can be used to determine the driving-point impedance. For multielement quads (3 or more elements)[4] the impedance will range from 40 to

[4] Element spacing of 0.14λ to 0.2λ being considered.

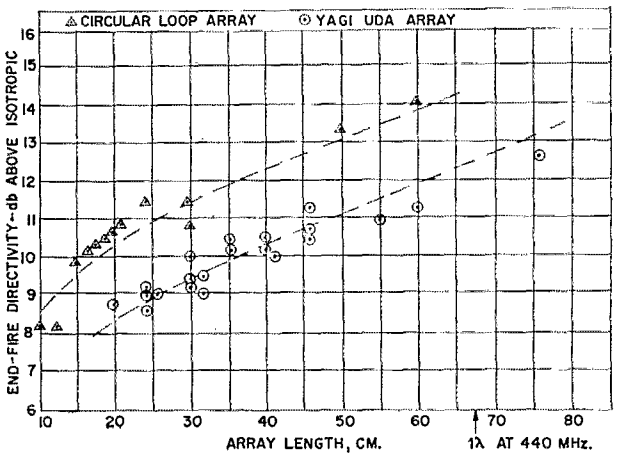


Fig. II-5—Quad and Yagi array gain as a function of boom length.

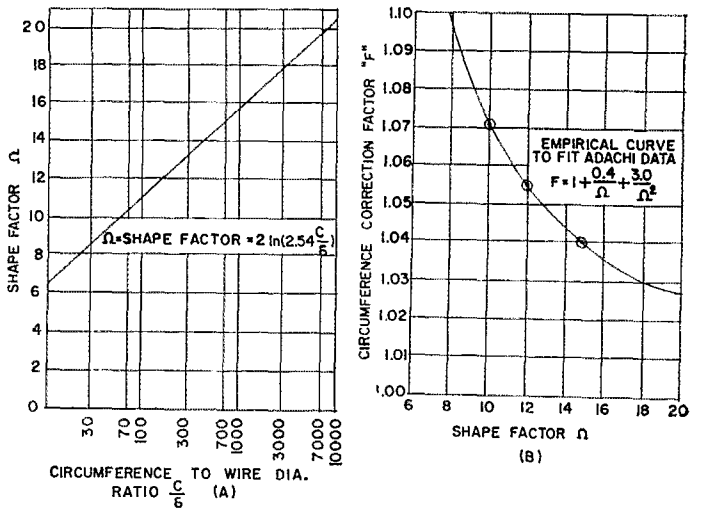


Fig. II-6 A: Shape factor as a function of the loop circumference-to-wire diameter ratio. B: Loop "resonant length correction factor" versus shape factor. (Circled values obtained from S. Adachi, and Y. Mushiake, "Studies of Large Circular Loop Antennas" *Sci. Rep. Ritu*, B-(Elect. Comm.) Vol. 9, No. 2, Tohoku Univ., Sept. 57.)

60 ohms. Matching of these multielement quads is most easily done by direct feed with a 50-ohm coaxial line. A 1:1 balun can be used but experimental results show that it does not give performance any better than that obtained with direct feed. A gamma match can be used to obtain an exact match to any chosen coaxial line. For details of using a gamma match on a quad antenna see Bill Orr's *Quad Antenna* handbook.

If a single boom is used to construct a multiband quad antenna, then it is recommended that a separate feed line to each driven element be used.

Approximate formulas for quad antenna element lengths

The multielement quad antenna gained its first real popularity following the work of Lee Bergren, WØAIW, in the early 1960's. He published the results of his work in *QST* in 1963.[5] Many experimentalists have used his dimensions for antennas in the 20-meter amateur band and have scaled them to other bands. Based upon Bergren's work and others the following empirical formulas can be used to determine the element lengths of a quad antenna.

$$\text{Circumference of driven element} = \frac{1005}{f_{\text{MHz}}} \text{ feet}$$

$$\text{Circumference of reflector element} = \frac{1030}{f_{\text{MHz}}} \text{ feet}$$

$$\text{Circumference of director elements} = \frac{975}{f_{\text{MHz}}} \text{ feet}$$

These results *should only* be used for quad antennas operating below 30 MHz. It is interesting to note that for quad antennas the reflector and directors are only 2½ to 3 percent different in length from the driven element. This is a smaller change than that normally encountered in Yagi arrays.

[5] Bergren, "Multielement Quads," *QST*, May 1963.

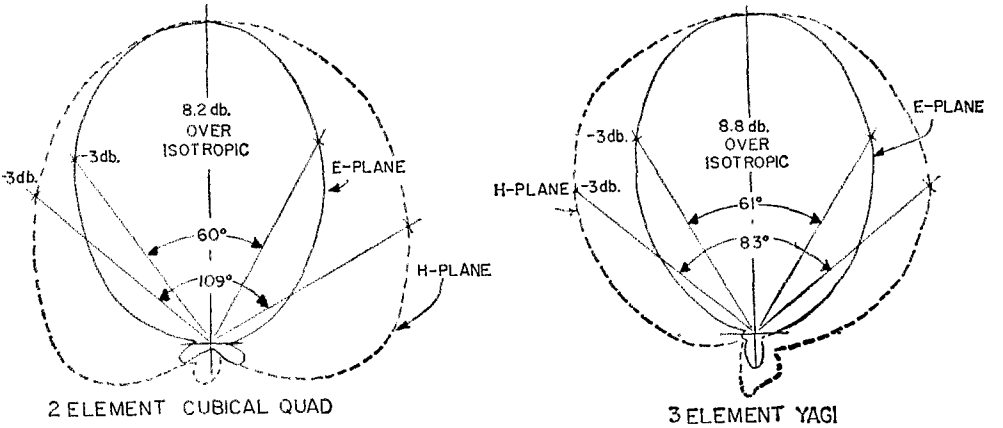
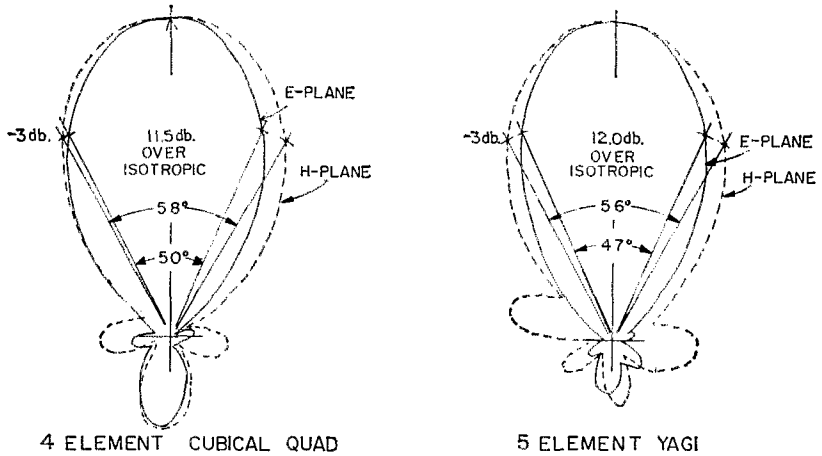


Fig. III-1—E and H plane radiation patterns for (A) 2-element quad antenna and (B) 2-element Yagi antenna.



4 ELEMENT CUBICAL QUAD
30 CM. BOOM
445 MHz.
(A)

5 ELEMENT YAGI
55 CM. BOOM
445 MHz.
(B)

Fig. III-2—*E* and *H* plane radiation patterns for (A) 4-element quad antenna and (B) 5-element Yagi antenna.

The above figures should not be used for v.h.f. or u.h.f. quad antennas. At these higher frequencies the circumference-to-wire-diameter ratio becomes small enough that its effect upon the resonant properties of the loop must be considered. Here again, the results of Adachi and Mushiake are useful and the effects of wire size on the resonant length of the loop can be taken into account. These results are given in graphical form in Fig. II-6 where, based upon the circumference-to-wire-diameter ratio, a circumference correction factor can be obtained. Once the correct size of the driven element is determined (using the results of Fig. II-6) a quad antenna can be designed by making the reflector approximately 3% longer and the directors 3% shorter.

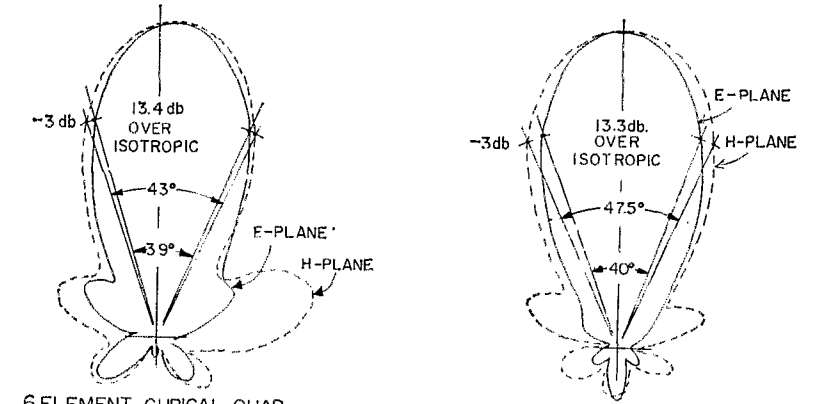
The above results can be used to obtain workable dimensions but, just as with approximate formulas for Yagi antenna element lengths, the "best" dimensions would have to be determined experimentally by tuning the array.

III — A COLLECTION OF QUAD AND YAGI PATTERNS AND DIMENSIONS

E and H plane patterns for quad and Yagi arrays

The previous section referred to a group of experimental tests, where a series of model antennas were constructed and the *E* and *H* plane patterns obtained.

It should be noted that these patterns have direct interpretation in light of the 20-meter



6 ELEMENT CUBICAL QUAD
60 CM. BOOM
440 MHz
(A)

7 ELEMENT YAGI
80 CM. BOOM
440 MHz
(B)

Fig. III-3—*E* and *H* plane radiation patterns for (A) 6-element quad antenna and (B) 7-element Yagi antenna.

Table III-1

Quad dimensions

2 element Quad (WØHTH)
Spacing (given below)
Boom length (given below)

Band	*40 M.*	*20 M.*	*15 M.*	*10 M.*
Reflector	144′ 11½″	72′ 4″	48′ 8″	35′ 7″
Driven Element	140′ 11½″	70′ 2″	47′ 4″	34′ 7″
Spacing	30′	13′	10′	6′ 6″
Boom length	30′	13′	10′	6′ 6″
Feed method	Directly with 23′ of RG11, then any length of RG8 coax.	Directly with 11′ 7″ RG11, then any length RG8 coax.	Directly with 7′ 8½″ RG11, then any length RG8 coax.	Directly with 5′ 8″ RG11, then any length RG8 coax.

(Note that a spider or boomless quad arrangement could be used for the 10/15/20 meter parts of the above dimensions yielding a triband antenna)

4 element Quad* (WØAIW (20 M.) /WØHTH** /KØKKU/KØEZH/W6FXB)
Spacing: equal; 10 ft.
Boom length: 30 ft.

Band	*20 M.*		*15 M.*	*10 M.*
	Phone	CW		
Reflector	72′ 1½″	72′ 5″	48′ 8″	35′ 8½″
Driven Element	70′ 1½″	70′ 5″	47′ 4″	34′ 8½″
Director 1	69′ 1″	69′ 1″	46′ 4″	33′ 7¼″
Director 2	69′ 1″	69′ 1″	46′ 4″	33′ 7¼″
Feed Method	Directly with 50-ohm coax.		Directly with 50-ohm coax.	Directly with 5′ 9″ RG11, then any length RG8 coax.

* Common boom used to form a triband array.
** The 2-element 40-meter quad given above is added to form a four-band quad array.

4 element Quad (WØHTH/K8DYZ*/K8YIB*/W7EPA*)
Spacing: equal; 13′ 4″.
Boom length: 40 ft.

Band	*20 M.*	*15 M.*	*10 M.*
Reflector	72′ 5″	48′ 4″	35′ 8½″
Driven Element	70′ 5″	47′ 0″	34′ 8½″*
Director 1	69′ 1″	46′ 1″	(Directors 1-3 all
Director 2	69′ 1″	46′ 1″	33′ 7″)*
Feed method	Directly with 50-ohm coax.	Directly with 7′ 9″ RG11, then any length 50-ohm coax.	Directly with 50-ohm coax.

* For the 10-meter band the driven element is placed between the 20/15 reflector and 20/15 driven element. The 10-meter reflector is placed on the same frame as the 20/15-meter reflectors and the remaining 10-meter directors are placed on the remaining 20/15-meter frames The 10-meter portion is then a 5-element quad.

6 element Quad (WØYDM, W7UMJ)
Spacing: equal; 12 ft.
Boom length: 60 ft.

Band: 20 M.

Reflector	72′ 1½″
Driven Element	70′ 1½″
Directors 1, 2 and 3	69′ 1″
Director 4	69′ 4″
Feed Method	Directly with 50-ohm coax.

band. Recall that the experiments were performed at 440 MHz., where dimensions for boom length, element size, and spacing in cm. are directly equivalent to dimensions in feet for the 20-meter band. For example, the patterns for a 440-MHz. 5-element Yagi on a 55-cm. boom can also be taken as the pattern for a 14-MHz. 5-element Yagi on a 55-foot boom.

Perusal of these patterns will give a visual means of comparing the quad and Yagi arrays. It is interesting to note the dependence of gain and pattern beam width upon array boom length.

Table III-2

Yagi dimensions

3-element Yagi (W6SAF)
Boom length: 24 ft.
Band: 20 M.

	Element length	*Spacing*
Reflector	34′ 10¾″	R—DE: 13′ 9½″
Driven Element	33′ 2½″	DE—D: 10′ 4½″
Director	31′ 9½″	

3-element Yagi (WØOKC)
Boom length: 26 ft.
Band: 20 M.

	Element length	*Spacing*
Reflector	35′ 6″	R—DE: 14′
Driven Element	33′ 4″	DE—D: 12′
Director	31′ 7″	

3-element Yagi (WØCM, formerly WØJYW)
Boom length: 30 ft.
Band: 20 M.

	Element length	*Spacing*
Reflector	35′ 4½″	R—DE: 13′
Driven Element	32′ 2½″	DE—D: 17′
Director	31′ 10″	
Feed Method	Folded dipole	

4-element Yagi (KØKKU)
Boom length: 30 ft.
Band: 20 M.

	Element length	*Spacing*
Reflector	35′ 6″	(all elements
Driven Element	33′ 4″	equally spaced)
Director 1	31′ 9½″	
Director 2	31′ 2″	

4-element Yagi (W4PLL)
Boom length: 30 ft.
Band: 20 M.

	Element length	*Spacing*
Reflector	35′ 4½″	(all elements
Driven Element	33′ 4½″	equally spaced)
Director 1	31′ 9½″	
Director 2	31′ 9½″	

4-element Yagi (K6VIZ)
Boom length: 32 ft.
Band: 20 M.

	Element length	*Spacing*
Reflector	35′ 6″	R—DE: 10′
Driven Element	32′ 8″	DE—D1: 10′
Director 1	31′ 8″	D1—D2: 12′
Director 2	31′ 1″	

4-element Yagi (WØOKC)
Boom length: 36 ft.
Band: 20 M.

	Element length	*Spacing*
Reflector	35′ 6″	R—DE: 14′
Driven Element	33″ 4″	DE—D1: 10′ 8′
Director 1	31′ 8½″	D1—D2: 11′ 4″
Director 2	31′ 1″	

4-element Yagi
Boom length: 40 ft.
Band: 20 M.

	Element length	*Spacing*
Reflector	35′ 6″	R—DE: 14′
Driven Element	33′ 4″	DE—D1: 12′
Director 1	31′ 7″	D1—D2: 14′
Director 2	31′ 0″	

5-element Yagi (WA6ZZK)
Boom length: 40 ft.
Band: 20 M.

	Element length	*Spacing*
Reflector	34′ 10″	R—DE: 10′
Driven Element	33′ 4″	DE—D1: 9′
Director 1	32′ 6″	D1 —D2: 10′ 6″
Director 2	32′ 2″	D2 —D3: 10′ 6″
Director 3	31′ 10″	

5-element Yagi
Boom length: 46 ft.
Band: 20 M.

	Element length	*Spacing*
Reflector	35′ 7¾″	
Driven Element	34′ 5⅜″	(All elements
Director 1	33′ 2″	equally spaced
Director 2	31′ 9½″	at 11′ 6″)
Director 3	30′ 4½″	

Without further comment, typical patterns for both types of antennas are given in Figs. III-1 through III-3.

A tabulation of dimensions of working arrays

Presented in tabular form are a few representative dimensions for both quad and Yagi antennas. These are dimensions presently in use by a number of amateurs. Most of the Yagi dimensions are due to amateurs across the country who sent their dimensions to Mr. Hal Wolff or the author to be modeled on the antenna range at the University of Denver. The quad dimensions also are those now in use by a number of amateurs in this country and abroad. It should be noted that most of these dimensions, and the resulting model antennas, provided the necessary data used in the previous section to compare the quad and Yagi. Where known, either the user(s) or the originator of a set of dimensions is indicated. The first set of dimensions is for quad antennas, the second set for Yagi antennas.

Summary

A comparison between the quad and Yagi antennas, on the basis of gain, has been given, this comparison being based upon both theo-

5-element Yagi (K6EVR)
Boom length: 46 ft.
Band: 20 M.

	Element length	*Spacing*
Reflector	35′ 4″	R—DE: 12′
Driven Element	33′ 5″	DE—D1: 10′
Director 1	31′ 8″	D1 —D1: 12′
Director 2	31′ 8″	D2 —D3: 12′
Director 3	31′ 8″	

5-element Yagi (W8PWH)
Boom length: 52 ft.
Band: 20 M.

	Element length	*Spacing*
Reflector	35′ 11″	R—DE: 13′ 10″
Driven Element	33′ 4½″	DE—D1: 10′ 5″
Director 1	32′ 10″	D1 —D2: 13′ 10″
Director 2	31′ 2″	D2 —D3: 13′ 10″
Director 3	30′ 9″	

5-element Yagi (W4EX, formerly W4DQH)
Boom length: 54 ft.
Band 20 M.

	Element length	*Spacing*
Reflector	35′ 0″	R—DE: 13′ 6″
Driven Element	33′ 4″	DE—D1: 11′ 6″
Director 1	32′ 3″	D1 —D2: 13′
Director 2	32′ 1″	D2 —D3: 16′
Director 3	31′ 11″	

5-element Yagi (W6RR, formerly W6ITA)
Boom length: 55 ft.
Band: 20 M.

	Element length	*Spacing*
Reflector	34′ 9″	R—DE: 16′ 9″
Driven Element	33′ 7″	
Director 1	31′ 11″	(All elements
Director 2	31′ 9½″	equally spaced)
Director 3	31′ 8″	

6-element Yagi
Boom length: 46 ft.
Band: 20 M.

	Element length	*Spacing*
Reflector	35′ 5″	
Driven Element	34′ 5½″	(All elements
Director 1	32′ 7″	equally spaced
Director 2	32′ 3″	at 9′ 2⅜″)
Director 3	31′ 4½″	
Director 4	31′ ½″	

6-element Yagi (WØOKC)
Boom length: 46 ft.
Band: 20 M.

	Element length	*Spacing*
Reflector	35′ 4″	R—DE: 10′
Driven Element	33′ 4″	DE—D1: 8′
Director 1	31′ 11″	D1 —D2: 9′
Director 2	31′ 3½″	D2 —D3: 9′ 6″
Director 3	31′ ½″	D3 —D4: 9′ 6″
Director 4	30′ 11″	

6-element Yagi (WØOKC)
Boom length: 74 ft.
Band: 20 M.

	Element length	*Spacing*
Reflector	35′ 5″	R—DE: 16′ 6″
Driven Element	33′ 4″	DE—D1: 9′ 9″
Director 1	31′ 9½″	D1 —D2: 14′
Director 2	31′ 2½″	D2 —D3: 17′ 6″
Director 3	30′ 11″	D3 —D4: 21′
Director 4	30′ 8″	

7-element Yagi (W6HAW)
Boom length: 80 ft.
Band: 20 M.

	Element length	*Spacing*
Reflector	35′ 5″	R—DE: 14′
Driven Element	33′ 4″	DE—D1: 11′
Director 1	31′ 8″	D1 —D2: 12′
Director 2	31′ 4″	D2 —D3: 13′
Director 3	30′ 8″	D3 —D4: 14′
Director 4	30′ 8″	D4 —D5: 16′
Director 5	30′ 8″	

8-element Yagi (WA6EKD?)
Boom length: 100 ft.
Band: 20 M.

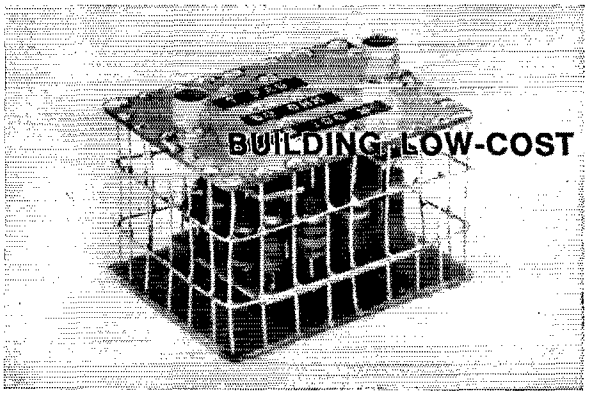
	Element length	*Spacing*
Reflector	34′ 9″	(All elements
Driven Element	33′ 5″	equally spaced
Director 1	32′ 2″	at 14′ 4″)
Director 2	31′ 11¾″	
Director 3	31′ 9⅞″	
Director 4	31′ 8″	
Director 5	31′ 2″	
Director 6	30′ 11¾″	

retical and experimental results. The results indicate that if both antennas have the same boom length the gain of the quad array will be about 2 db. higher than that of the Yagi. For either antenna, gain is a function of boom length and will increase approximately 2.5 db. each time the boom length is doubled. Hence, a 2-db. gain advantage is equivalent to a boom-length advantage of 1.8. In other words, for the quad and Yagi arrays to have comparable gain, the boom length of the Yagi antenna must be 1.8 times longer than that of the quad.

The size of the wire used for the loop element (relative to the loop circumference) will have an influence upon the resonance and radiating properties of the loop. The influence of this shape factor — i.e., the ratio of loop circumference to wire diameter — can be accounted for by using the referenced results of Adache and Mushiake. These results are given in graphical form in section II.

In conclusion, it might be stated that one type of antenna (quad or Yagi) is not necessarily better than the other. The choice between a quad or Yagi array will depend critically upon many factors. For example, if single-band operation is of main importance and the geographical

(Continued on page 150)



BUILDING LOW-COST R.F. ATTENUATORS

INTENTIONALLY absorbing transmitter power would have seemed ridiculous to most of us until recently, but if you've tried using an h.f. sideband rig as a driver for a heterodyne unit that will give output on the v.h.f. bands, you've probably encountered the need for devices like those shown here. While simply dissipating the excess exciter power in a resistive attenuator may seem wasteful, it is often the most convenient way of doing the job. Modification of the exciter to reduce its power output may be undesirable in several ways, and just turning down the gain on a sideband rig will very likely affect the carrier suppression and hum level adversely. A similar need often arises in using a linear amplifier on the v.h.f. bands.

The attenuators pictured were built by Carl Ebhardt, W4HJZ, and described by him in a talk given at the Roanoke Division V.h.f. Convention recently in Spartanburg, S. C. They combine simple construction and moderate cost, and they can be designed for any attenuation and power capability you're likely to need. The T-pad configuration shown in Fig. 1 is used in the smaller of the two attenuators shown, a 1-db. job having a power rating of 100 watts. The larger is a 10-db. attenuator having a power capability of 33 watts. It is of π section design, but embodies similar principles.

Construction

The attenuators are assembled between plates of copper-clad circuit board stock. Copper or brass sheets may be used, but the copper laminate is easy to work and connections can be soldered with a small iron. Dimensions can be adjusted to suit various designs, the principal consideration in the resistor arrangement being that there be adequate spacing for good air circulation. About a half inch between centers is the minimum. This open design is very superior to laying resistors against one another, or putting them inside a closed box, as is done occasionally. The wire cage effect, accomplished with No. 16 or 18 wire after the resistors have all been mounted, provides a degree of shielding, and some mechanical rigidity.

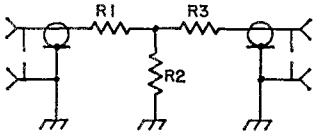


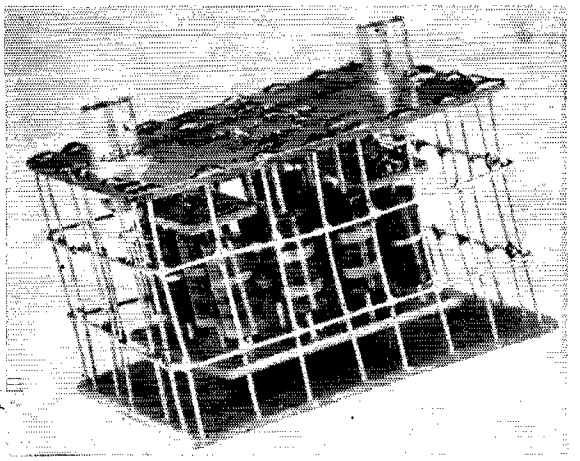
Fig. 1—Circuit of the T-pad r.f. attenuator, for which values are given in Table I. R_1 and R_3 have the same resistance, but lower wattage ratings may be used for R_3, if the attenuator is always connected the same way in the circuit.

The cutaway sketch, Fig. 2, may show more clearly than the photographs how the resistors are mounted in a T-pad attenuator. The dimensions of the various plates of copper laminate can be determined after the number and physical arrangement of the resistors have been worked

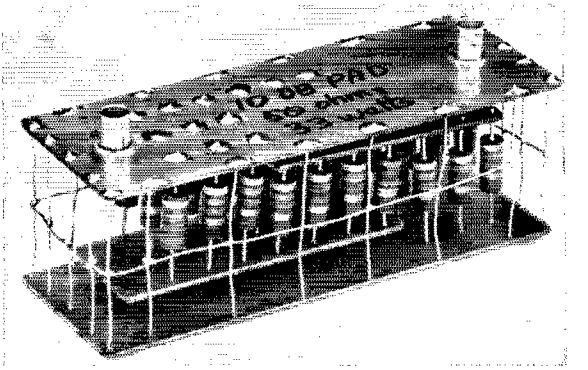
Table I

Ohmic values and wattage ratings for resistors in a T-pad attenuator for use in a 50-ohm line carrying up to 100 watts of r.f. power. For other power ratings, scale wattage of all resistors.

Insertion Loss (db.)	*Power Out (Watts)*	R_1 *(Ohms)*	*(Watts)*	R_2 *(Ohms)*	*(Watts)*	R_3 *(Ohms)*	*(Watts)*
1	79	3	6	430	10	3	5
3	50	9	17	142	24	9	9
6	25	16.6	33	67	33	16.6	9
10	10	26	52	35	33	26	5
20	1	41	82	10	16	41	1



A 100-watt 1-db. r.f. attenuator of the T-pad type.



A 10-db. attenuator capable of handling 33 watts input, in a 50-ohm line. This model, by W4HJZ, uses a π configuration, rather than the T shown in Fig. 1, but the principles are similar. Plates are copper-clad circuit board material. Wires provide some shielding and mechanical rigidity.

out. Placement is not particularly important, though the objective should be a reasonable degree of mechanical and electrical symmetry.

Selecting Resistor Values

Except for very low-power applications it is necessary to parallel many resistors in order to get the proper value in ohms, with adequate power rating. The ohmic value, for a given attenuation, is the same for any T-pad for use in a 50-ohm line. The wattage required rises with the attenuation desired, and with the power level at which the attenuator is to operate.

Table I shows ohmic and wattage values needed in 100-watt attenuators to be used in 50-ohm lines, for various insertion losses from 1 to 20 db. Wattage can be scaled for other power levels. For a 10-watt rating, divide the wattage values given by 10. The ohmic values remain the same, for a given attenuation.

Suppose we have an exciter putting out 100 watts, and an amplifier or mixer that can take a maximum of 25 watts drive. We'll have to burn up 75 watts, an insertion loss of 6 db. From the third line of Table I we find that we need the following: R_1 — 16.6 ohms, 33 watts; R_2 — 67 ohms, 33 watts; R_3 — 15.6 ohms, 9 watts. We will parallel 2-watt carbon resistors to achieve these values, as this is the highest wattage that is readily available in noninductive resistors.

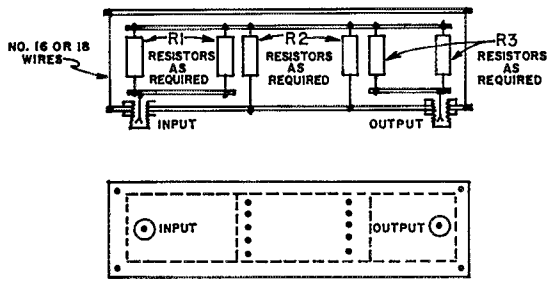


Fig. 2—Structural details of the T-pad attenuator.

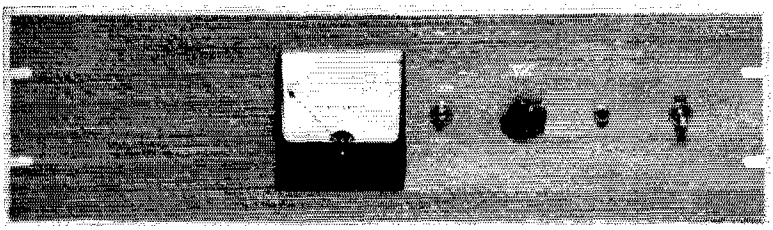
As both R_1 and R_2 must dissipate 33 watts, we'll need at least 16 resistors in each position. For R_1 we can try 16 270-ohm (nearest standard value) resistors, which should give 16.9 ohms. This is close to the desired 16.6 ohms, but we can do better. Using 18 300-ohm resistors will give 16.67 ohms, which is very close. For the 67 ohms needed at R_2, we can use 16 110-ohm or 18 120-ohm 2-watt resistors in parallel. As before, the 18-resistor combination is preferable.

The wattage requirement for R_3 is lower, though the ohmic value is the same as for R_1. Six 100-ohm 2-watt resistors will do this job nicely. It is important to note that economizing on the wattage rating for R_3 makes the attenuator a one-way device. To avoid this, use the same combination for R_3 as for R_1. It's cheaper to mark the attenuator as to input and output ends!

Performance

The 1-db. and 10-db. attenuators pictured were kindly loaned to us by W4HJZ for photographing and testing. They were operated in 50-ohm lines connected to a nonreactive load, at 21 and 145 Mc. At the lower frequency neither introduced any discernible impedance bump, and the attenuations measured right on the nose. It can be assumed that this construction will work extremely well in the application for which the attenuators will be needed most often: knocking down the output of a sideband exciter on 14, 21 or 28 Mc.

Both attenuators introduced some mismatch at 145 Mc., about 2:1 for the 10-db. model and 1.5:1 for the smaller. The attenuations were not precisely as marked, at this frequency also. Ordinarily this will not be a matter of importance, for the main use is to knock down power without upsetting the operation of the equipment. Thus the attenuators will do handily, at frequencies up through the 2-meter band. — *W1HDQ*



The RTTY terminal unit is mounted on a relay-rack panel, but occupies only part of the total space available. Controls are the loop-lamp switch, input-level potentiometer, and the power-supply on-off switch.

An RTTY Terminal Unit of Wide Dynamic Range —

BY CLIFFORD BUTTSCHARDT*, W6HDO, AND HENRY OLSON**, W6GXN

THERE is certainly no lack of articles on transistorized RTTY terminals in the amateur literature[1]. Previously published TU's certainly *do* work, and have provided hams with literally roomfuls of printed pleasure. However, all of the TU's that the authors have had any association with were quite sensitive to input level. This input level sensitivity was in spite of the fact that a form of input limiting was used.

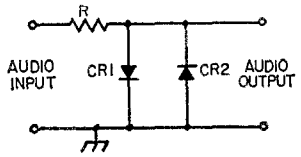


Fig. 1—Back-to-back diode limiter. CR_1 and CR_2 are silicon diodes. Resistor *R* ensures that the audio voltage applied to the diodes will be poorly regulated, thus making certain that the input waveshape will be clipped.

The transistorized TU's that the authors have tried all used a pair of back-to-back silicon diodes as a. f. limiters, as shown in Fig. 1. This sort of limiting, though very simple and commonly applied, is usually inadequate. One problem with back-to-back diode limiting is in the nature of the forward-biased silicon diode; a typical curve is shown in Fig. 2. Notice in Fig. 2 that there is no "knee," or point at which the curve breaks abruptly.

It is possible to make a better, symmetrical, limiter by use of the circuit in Fig. 3. This circuit must, of course, have higher signal levels in order to make the Zeners break down, but sine-to-square-wave conversion of this limiter is more nearly perfect than that of Fig. 1. However, even good Zener diodes do not have perfectly sharp knees, and this circuit leaves something to be desired as a bandpass limiter (see Appendix).

An alternative to limiting is automatic gain control (a.g.c.). A.g.c. is normally accomplished by means of a negative voltage applied to a vacuum-tube control grid, or the equivalent process in solid-state circuitry. However, tubes, bipolar transistors (either forward or reverse a.g.c.), and diodes (either in forward conductance or backward capacitance modes) all have serious signal nonlinearities that limit their effective a.g.c. range. Certainly the newer FET's, especially the dual-gate MOS types, are more promising for a.g.c. purposes but they are so far unavailable to most amateurs.

The ideal a.g.c. element would be resistive, isolated electrically from its control source or "control port," capable of having its resistance varied many decades, and have a time constant much shorter than the rate at which a.g.c. action is required to be controlled. Such a resistive element could then be made part of any standard L, T, or π attenuator and placed in the audio signal path.

An inexpensive cadmium sulphide (CdS) cell coupled to a small incandescent lamp comes fairly close to fulfilling all the requirements

This unusual method of obtaining automatic gain control makes use of the resistance variation in a photoconductive cell under the influence of varying light intensity. The transistorized RTTY terminal unit includes a two-tone audio generator for a.f.s.k. on the v.h.f. bands.

* 275 Chiquita Ave., Mountain View, Calif. 94040.
** P.O. Box 339, Menlo Park, Calif. 94025.

[1] Conners, "Autostart Teletype Encoder and Decoder", *73*, January, 1967.
Kokjer, "The Semi-RTTY System", *73*, August, 1967.
Kretzman, *The New RTTY Handbook*, Cowan Publishing Co., Port Washington, N. Y.
Stoner, "RT-1 Frequency Shift Terminal Unit", *RTTY Magazine*, November, 1965.
Weitbrecht, "The Mark Five Radioteleprinter Terminal Unit", *RTTY Magazine*, September, 1965.

proposed. CdS photoconductive cells are widely used for everything from street-lamp turn-on devices to light meters for photo buffs, and are thus inexpensive. Fig. 4 shows the typical cell resistance versus lamp current curve of a particular CdS cell and lamp combination. The control port for the CdS cell alone is *light*, so the incandescent lamp provides well-isolated control. (In fact, the CdS cell could be operated at an extremely high voltage above the lamp input voltage by use of a long dielectric "light pipe" of lucite or fiber optics.)

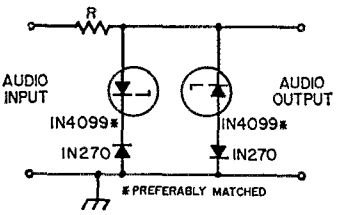


Fig. 3—Improved limiter circuit using sharp-break Zener diodes.

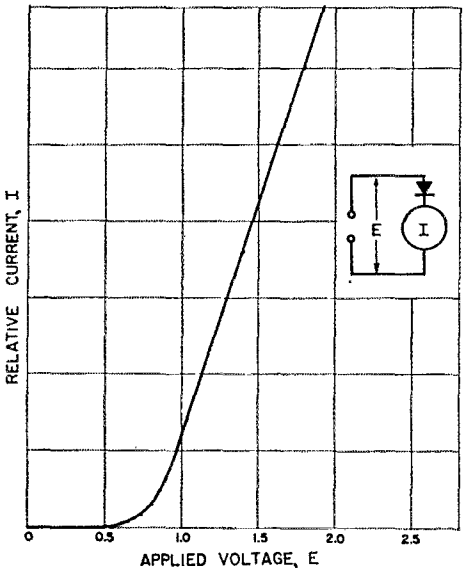


Fig. 2—General shape of silicon diode current-vs.-voltage characteristic.

CdS cell a.g.c. control is used in the RTTY terminal unit presented here. Aside from the replacement of the back-to-back diode limiter with an a.g.c. system, the remaining circuitry is similar to that in use by many amateur RTTY stations.

Circuit Description.

The receiving section of the TU is shown in Fig. 5A. Following Q_1, an amplifier whose input level is controlled by the CdS cell, are two tuned amplifiers, Q_2 and Q_3. The Q_2 amplifier is tuned to 2975 Hz. (space) and the Q_3 amplifier is tuned to 2125 Hz. (mark). These amplifiers each drive diode detectors; the space detector produces a positive output, and the mark detector produces a negative output. The mark detector output and space detector output are combined at the base of Q_4 so that a "signal" consisting of white noise will produce nearly equal and simultaneous detector outputs which cancel. This feature gives the system noise immunity. Q_4, Q_5, and Q_6 are simply amplifiers to drive the selector magnet.

A.g.c. control voltage is derived through R_4 from the (negative) mark detector output. This negative voltage tends to cut off Q_{10}, an n-channel FET, which then decreases the lamp (I_1) current and increases the CdS cell's resistance. Q_7, Q_8, and Q_9 comprise an amplifier to turn on a relay, K_1. This "autostart" section is included to start the printer motor automatically after about 7 seconds of mark tone is received. This circuit also turns the printer off when no marks have been received for about eight seconds. The autostart-equipped RTTY station is then able to receive (and print out for later reading) messages completely unattended.

The power supply is of unregulated and simple design, as shown in Fig. 5C. However, a thyrite varistor has been shunted across the power transformer secondary to protect the rectifiers. This thyrite was obtained for less than a dollar from a surplus electronics store.[2] A General Electric 63D-10000, as listed in the Allied Radio catalog, could also be used.

[2] Red Johnson Electronics, 3311 Park Blvd., Palo Alto, Calif.

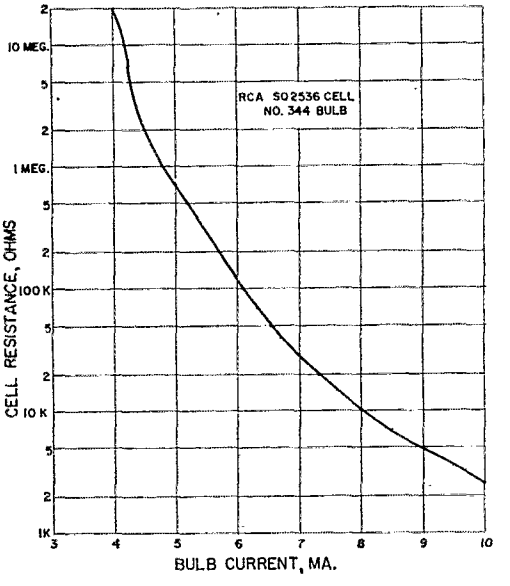


Fig. 4—Change in resistance with lamp current (relative illumination) for an RCA SQ2536 cadmium sulphide photocell and No. 344 lamp bulb arranged as shown in Fig. 5B.

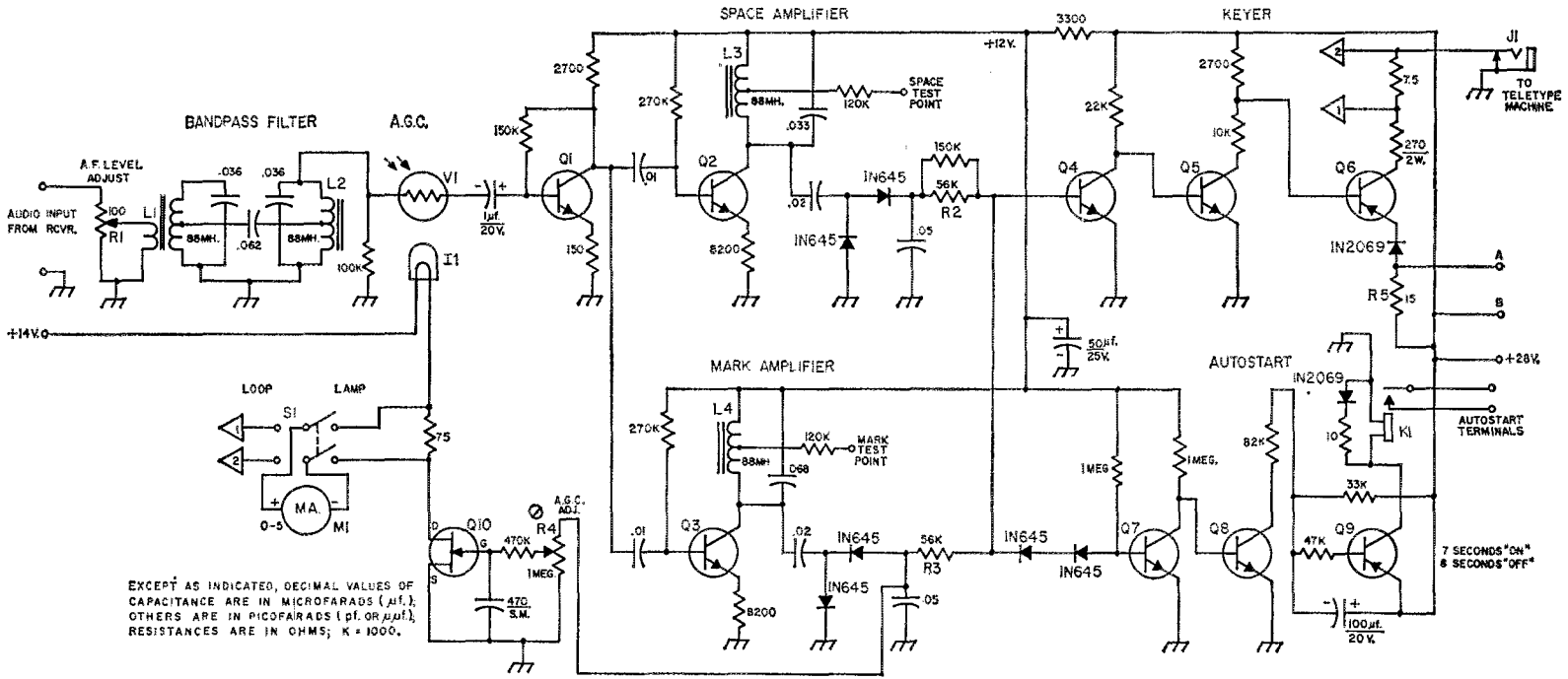


Fig. 5A—Circuit of the RTTY receiving converter using photosensitive cell for automatic gain control. Fixed resistors are ½-watt composition, 5% tolerance, except as indicated. Capacitors are mylar or ceramic except those marked S.M. (silver mica) or with polarity marked; the latter are electrolytic (tantalum).

I_1—No. 344 pilot lamp, 10 volts, 14 ma.
J_1—Closed-circuit phone jack.
K_1—Single-pole relay, 24-volt coil, 560 ohms d.c. resistance; pull-in voltage 15 volts d.c.
L_1—88-mh. toroid with additional winding (primary) having 22 turns of No. 28 enameled wire.
L_2, L_3, L_4—88-mh. toroid. Taps taken off a junction point of the two windings on the core (also on L_1).
M_1—0-5 d.c. milliammeter, 150 ohms d.c. resistance (Emico No. 13).
Q_1, Q_2, Q_3, Q_4, Q_7—2N697 or 2N720A.
Q_5, Q_8—2N699 or 2N720A.
Q_6, Q_9—2N4037.
Q_{10}—TIS34 (Texas Instruments).
R_1, R_4—Linear controls.
R_2, R_3—For text reference.
S_1—D.p.d.t. toggle.
V_1—Cadmium sulphide cell (RCA SQ2536 or Sylvania 8100).

The semiconductors in the unit are all inexpensive types and are available from Allied Radio (Catalog 680). The TIS34 (an n-channel junction FET) is picked for high I_{DSS}; one with I_{DSS} of 8 to 14 ma. gives best performance. Since TIS34's are only $1.07, you probably should buy a half dozen anyway, using the lower I_{DSS} units in your next v.h.f. converter.

The receiving TU circuitry is built on a 5 by 9 inch Vectorbord 64AA18, using Alden 651T terminals. All the components except the 88-mh. toroids are supported by their soldered leads. The torroids are screwed to the board using 4-40 screws and small 1⅛-inch diameter disks of plastic or fiberglass. The power supply is built separately; its components are conventionally wired (point-to-point) in the chassis-cabinet.

Adjustment and Operation of Receiving Section of T.U.

An audio generator, v.t.v.m., and audio v.t.v.m. are required to adjust the TU for best operation, although it will probably work "as built" on strong a.f.s.k. signals.

There are four toroidal inductors in the circuit: L_1, L_2, L_3, and L_4. These are all parts of tuned circuits which need adjustment. L_1 has a primary winding on it, so should probably be called a transformer (except that the secondary inductance of this transformer is our main concern here). By adjusting the size of the two 0.036-μf. capacitors associated with L_1 and L_2, a curve resembling Fig. 6 should be obtained, using the audio generator on the input and the audio v.t.v.m. across the 100K resistor just ahead of the CdS cell. A target value of 1 per cent accuracy of the 2125- and 2975-Hz peaks was the authors' aim, but perhaps this is "overcalibrating."

Moving the audio generator to the junction of the CdS cell and the 1-μf. coupling capacitor, to avoid a.g.c. action during adjustment, we can now adjust the capacitors associated with L_3 and L_4. The .03-μf. capacitor and 88-mh. toroid are tuned to 2975 Hz. (space), and the .068-μf. capacitor and 88-mh. toroid are tuned to 2125 Hz. (mark). In each case, the v.t.v.m. (d.c.) is put at the junction of the 56K (R_2 or R_3) resistor and the .05-μf. capacitor. The output of the space detector should be positive, and that of the mark detector should be negative.

Next, return the audio generator to the audio input terminals and set it for 100-mv. (r.m.s.) input. Then set the input-level control, R_1, for 4 volts r.m.s. at 2125 Hz. as measured by the audio v.t.v.m. across the 100K resistor previously mentioned in the adjustment procedure.

Finally, with the input set as above the a.g.c. pot, R_4, should be adjusted for a reading of 4 ma. on the TU meter, M_1, with the meter switch in the "lamp" position. (This reading corresponds to 12 ma. in the lamp.)

The TU can now be connected to the speaker of one's receiver, and the printer and a.f.s.k. will cause the printer to print out RTTY. If the circuit is to be used on f.s.k. signals (with a b.f.o. and product detector) it is necessary that the b.f.o. be tuned to the correct side of the signal, since this circuit has no "invert" switch.

The authors' experience has been almost entirely using the TU on the a.f. output of a two-meter f.m. repeater (WA6YCZ) to copy technical

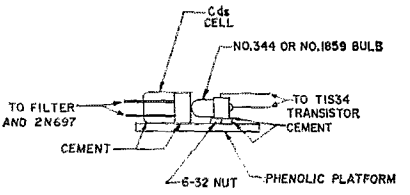


Fig. 5B—Construction of the light-sensitive resistor. The entire unit should be enclosed in a light-tight enclosure or wrapped with two layers of No. 33 Scotch Tape. A drop of clear salad oil between the face of the bulb and the Cds cell will improve the optical coupling.

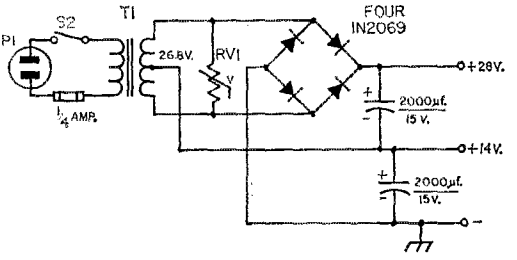


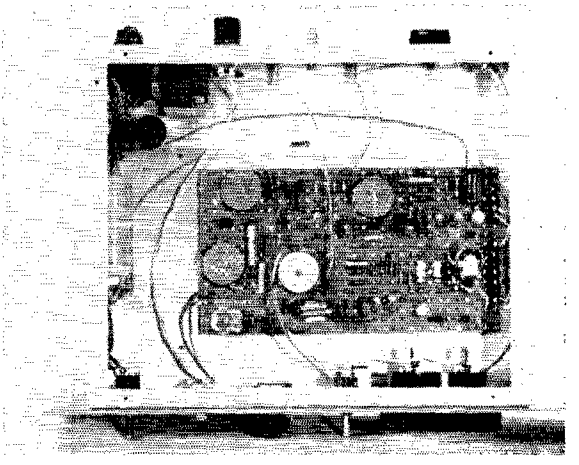
Fig. 5C—Power-supply circuit. Capacitors are electrolytic. A package bridge rectifier such as the International type 10DB2A (200 p.r.v., 1.8 amp.) can be substituted for the four individual diodes shown.

P_1—115-volt plug, male.

RV_1—Voltage-sensitive resistor (Thyrite; see text).

S_2—S.p.s.t. toggle.

T_1—Filament transformer, 26.8 volts c.t., 1 amp. (Triad F-40X).



The converter circuitry is assembled on a Vectorbord inside the main chassis. The 88-mh. telephone-type toroids are mounted on the wiring board using disks of insulating material. Power-supply components are in the upper left corner in this view.

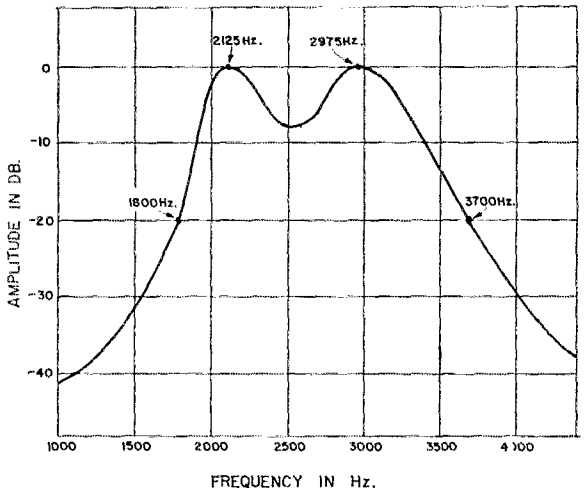


Fig. 6—Selectivity curve of the bandpass circuit preceding the cadmium-sulphide cell.

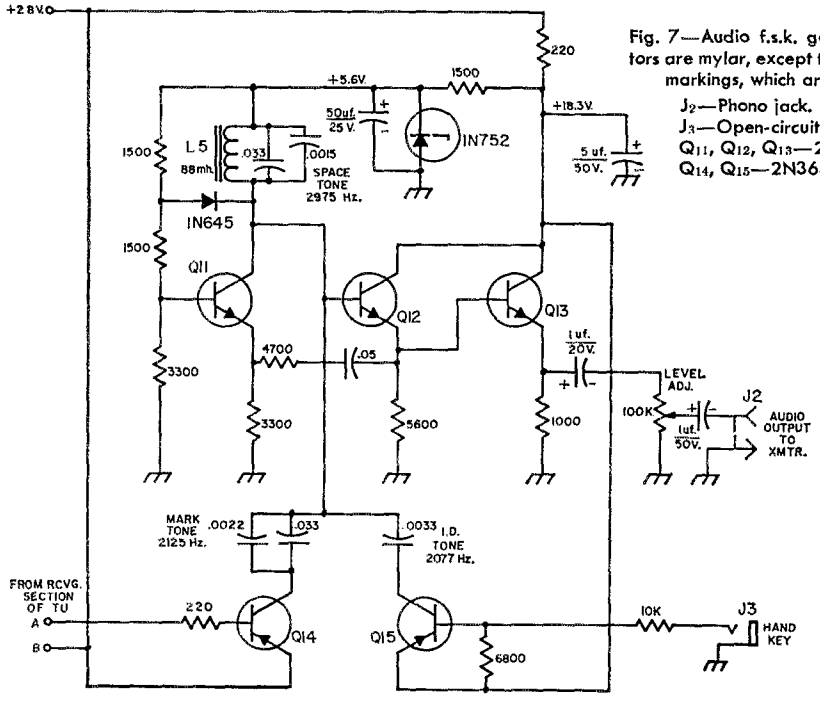


Fig. 7—Audio f.s.k. generator. Capacitors are mylar, except those with polarity markings, which are electrolytic.
J_2—Phono jack.
J_3—Open-circuit phone jack.
Q_{11}, Q_{12}, Q_{13}—2N697.
Q_{14}, Q_{15}—2N3644 or 2N4037.

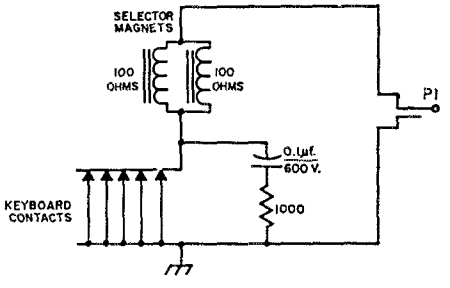
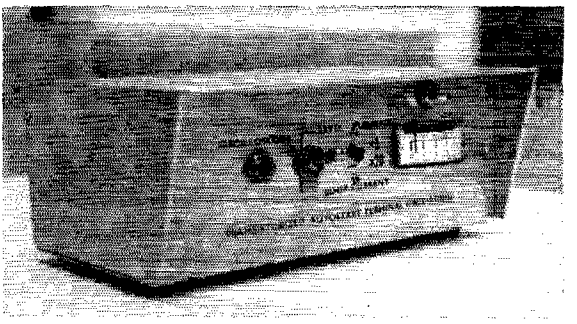


Fig. 8—Teletype machine wiring. P_1 is a phone plug mating with J_1, Fig. 5A.



Another version of the TU—reduced to almost pocket size. The cabinet dimensions are only 3 inches high by 8 wide by 5 deep. Since layout is not critical, the design readily lends itself to miniaturization.

bulletins. In such service it has been found that a.f.s.k. signals 12 db. below voice transmissions can be copied solid simultaneously, thus allowing the possibility of greatly increasing the usage of repeater operation. At this reduced a.f.s.k. tone amplitude, background interference is negligible to the voice operator while maintaining errorless TTY copy.

A.F.S.K. Generator

So far, only the receiving section of an RTTY terminal unit has been discussed, since it represents the major departure from conventional TU designs. In order to complete the TU, the a.f.s.k. section shown in Fig. 7 is included. Q_{11} and Q_{12} are used in an audio oscillator, which is basically tuned to 2975 Hz. (space). This frequency is determined by a parallel-resonant circuit consisting of an 88-mh toroid, L_5, and 0.033-μf. and .0015-μf. capacitors. When Q_{14} is turned "on", an additional 0.0352 μf. is shunted across the resonant circuit, lowering the oscillator frequency to 2125 Hz. (mark). If Q_{15} is also turned on, an *additional* 0.0033 μf. is shunted across the tuned circuit and the oscillator is shifted to 2077 Hz. for identification. Q_{15} is keyed on by a hand key, which by grounding the base through a 10K resistor makes this base more negative than the emitter, and Q_{15} saturates. In a similar way Q_{14} is on when current is flowing in R_5 of Fig. 5A. Thus the a.f.s.k. oscillator is controlled by *either* the incoming received signal (as a regenerator) or by the keyboard.

Note that the keyboard is not sensed as a voltage switch in this unit. Voltage transients in such a hookup were found to be difficult to deal with, and so the current-sensing method (using R_5) was used. Also note, in Fig. 8, the series resistance and capacitance across the keyboard for waveshaping and general transient reduction.

Appendix

The "bandpass limiter," in its perfect form, is a squaring amplifier followed by a bandpass filter. A sine-wave input to this device will be first amplified by a very large factor (theoretically infinity) and clipped at a fixed level. The output of the amplifier-clipper is then a square wave of the same frequency as the (single) sine-wave input. This square wave contains all the odd harmonics of the original sine wave, and these are removed by the bandpass filter. The result is then a sine-wave output of constant amplitude, of the same frequency as the input sine wave.

The difficulty with bandpass limiters is that they are "captured" by the strongest of an ensemble of sine-wave signals. That is, the largest signal overdrives the amplifier to a point above the clipping level, and the smaller signals then have no effect.

It can also be demonstrated that the output signal-to-noise (power) ratio is dependent on the input signal-to-noise ratio. In an ideal bandpass limiter the output signal-to-noise ratio is 2 times the input signal-to-noise ratio if the input signal-to-noise ratio is much larger than 1. That is, the bandpass limiter *improves S/N.*

If the input signal-to-noise ratio is much less than 1, however, then the output signal-to-noise ratio will be $\frac{\pi}{4}$ times the input signal-to-noise ratio, a *degradation!*

These effects are simply due to the signal capturing the bandpass limiter in the first case, and the noise capturing the bandpass limiter in the second case. QST

Strays

Feedback

This is a feedback on a feedback! The feedback on page 35 of March 1968 mentioned W3MOO's article in January 1968 *QST*. It should say W3MOO's article in February 1968 *QST*.

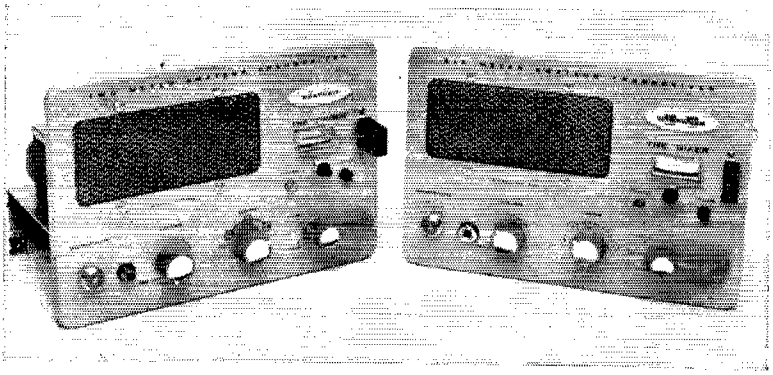
—•••—

Near the end of Rom Hildreth's article on his VOX system for s.s.b., (page 148 of the March issue), V_4 is identified as the second mixer. This is incorrect. V_4 is the *first* mixer.

—•••—

In the article "Amateur Radio and Distress Information," *QST*, January 1968, Table II contained the telephone numbers for Coast Guard Rescue Coordination Centers. Telephone numbers for several of the Centers have been changed and the table below shows the up-to-date numbers.

Rescue Coordination Center (*District*)	Telephone (*number*)
First	223-3644
Third	264-4870
Eighth	527-6225
Twelfth	556-5500
Fourteenth	Honolulu 588841
Seventeenth	586-7353



The TWOER (left) and the SIXER. The tune-up meter is visible at the upper right in both units, next to crystal panel-mount addition.

Some Useful Modifications for the Sixer and Twoer

Adding A2 for Code Work, and Other Changes

BY LEWIS G. McCOY,* W1ICP

ONE of the changes the FCC has made in the amateur regulations is the elimination of phone privileges for the Novice, effective November of this year. Formerly, the Novice could use phone on 2 meters. While this band will still be available to him, it will be on a code basis only.

Of all the Novice bands, 2 meters offers the most frequency space (145 to 147 Mc.) and the least interference. Also, antenna construction is simple. On the other hand, construction techniques for transmitters or receivers are considerably different — and more difficult — than on the low-frequency bands. However, there is one fairly simple approach — the kit route. One such kit is the Heathkit Model HW-30, called the "Twoer," designed specifically for the band. As supplied, it is designed for phone operation exclusively, but with the fairly simple modification described in detail in this article it is possible to add A2 emission. A2 is amplitude tone-modulated code transmission, and Novices are permitted to use it between 145 and 147 Mc. Tone-modulated telegraphy is also permitted on the 6-meter band, so for the benefit of Technician Class license holders who would like to add A2 to the Heathkit Sixer, that information is also included in this article.

Adding A2 to the Twoer and Sixer

Both of these transceivers use superregenerative receivers, and it is practically impossible to copy normal c.w. (A1) with this type of receiver. However, a superregen will receive A2 with no difficulty at all. Modification of either transceiver consists simply of adding a tone modulator, circuits for which are shown at A and B in Fig. 1.

The A2 modulator is a transistor audio oscillator, capable of generating a sine-wave audio tone of approximately 1000 cycles.[1] By connecting the output of the oscillator to the arm of the volume control the keyed tone will modulate the transmitter, and when the transceiver is switched to the receive position the oscillator can be used for code practice. Also, in the transmit position a slight amount of the audio tone is fed to the speaker, permitting the operator to monitor his own "fist."

Making the Tone Oscillator

The tone oscillator is mounted on a 2 × 2¼-inch piece of perforated unclad circuit board. This type of board is available from all mail-order radio-parts distributors and in most radio stores that have an experimenter section. The board is 1/16-inch thick and is perforated with

The popular "Benton Harbor Lunch Boxes" can be made even more useful with the simple modifications described here. Recommended to radio clubs conducting Novice classes for on-the-air code practice.

* Novice Editor

[1] Cheek, "A Simple Two-Tone Test Generator," *QST*, August, 1966.

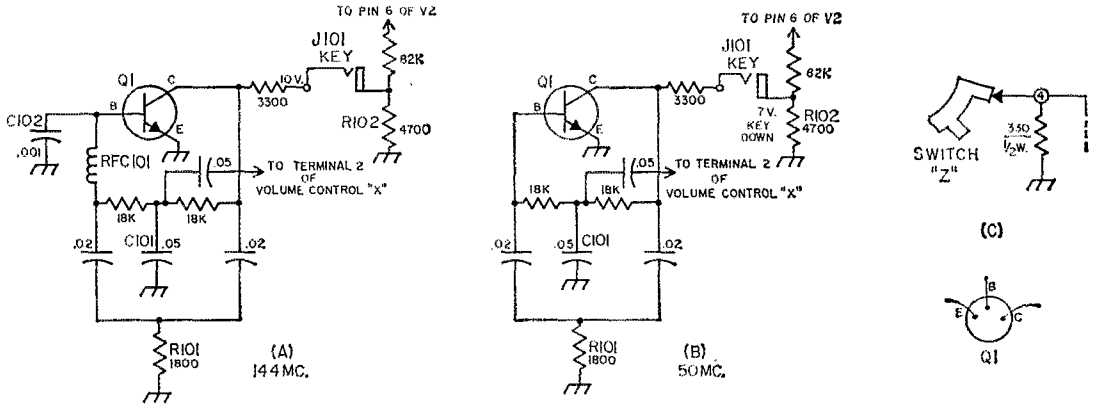


Fig. 1—Circuit diagram of the code oscillator. A is the 144-Mc. unit and B is for 50 Mc. Fixed resistors are ½ watt; resistances are in ohms (K = 1000) and capacitances are in μf. Capacitors are paper or Mylar, 25 volts working voltage or more. Component numbers under 100 refer to the original Heath circuit; those over 100 are the added components. C is the circuit for the monitor addition.

C_{101}—0.05 μf., disk ceramic, paper, or Mylar.
C_{102}—0.001 μf., disk ceramic.
J_{101}—Single-circuit phone jack or phono jack.
Q_1—N-p-n, RCA type 40314 or similar (see text).
R_{101}—1800 ohms, ½ watt.
RFC_{101}—2.7 μh. (Millen 34300-2.7 or similar).

1/16-inch diameter holes spaced approximately ¼ inch apart. Flea clips are available for making connections, but in the units shown the connections were made by soldering the component leads together.

There is nothing critical about the construction of the oscillator. The emitter of Q_1, and one side each of C_{101}, R_{101}, and R_{102} (and C_{102} in the 2-meter unit) are connected together and a lead run from this connection to the chassis of the transceiver. This provides a common ground for the oscillator. The key jack, J_{101}, must be insulated from the panel, and either insulating washers or electricians' plastic tape can be used for this purpose. The jack is mounted on the panel between the microphone connector and the volume control. The oscillator circuit is supported by its own leads. When installing the board, be careful that none of the connections on the bottom touch any leads in the transceiver.

In order to monitor your own sending, a 330-ohm, ½-watt resistor should be connected between terminal 4 of the transmit-receive switch and the chassis. This feeds a very small amount of audio from the transmitter to the speaker. When transmitting A2 turn the volume control full on; otherwise, the audio oscillator output will be short-circuited to ground. For receiving or using the oscillator for code practice, the volume control should be set at a comfortable listening level. A switching circuit could be used so that the volume control setting wouldn't have to be changed, but this would have complicated the conversion and didn't seem worth the expense or crowding of components.

Metering the Output

One drawback to the Twoer and Sixer is that an external meter is required for tune-up and there is no constant metering of the output. As an additional modification, a low-cost milliammeter connected as a relative output indicator was installed in each unit. This provides constant monitoring of the power going to the antenna.

Fig. 2 shows the circuit. The meter is an edgewise miniature S meter. There is adequate space on the panel for both the meter and control R_{103} just below the nameplate. The ungrounded end of R_{103} is connected to the meter-jack side of R_{18} (a 3300-ohm, ½-watt resistor) by an insulated wire fed under the chassis through a grommet below the meter.

Amplifier Tank Circuit Modification

Another simple improvement can be made by changing the output tank circuit from capacitive to inductive coupling to the antenna. This reduces the possibility that undesired signals generated in the multiplier stages will reach the antenna.

The first step in this modification is to remove the coupling capacitor that goes from the tank

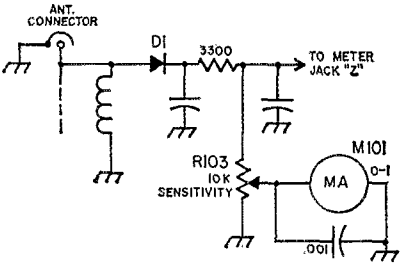
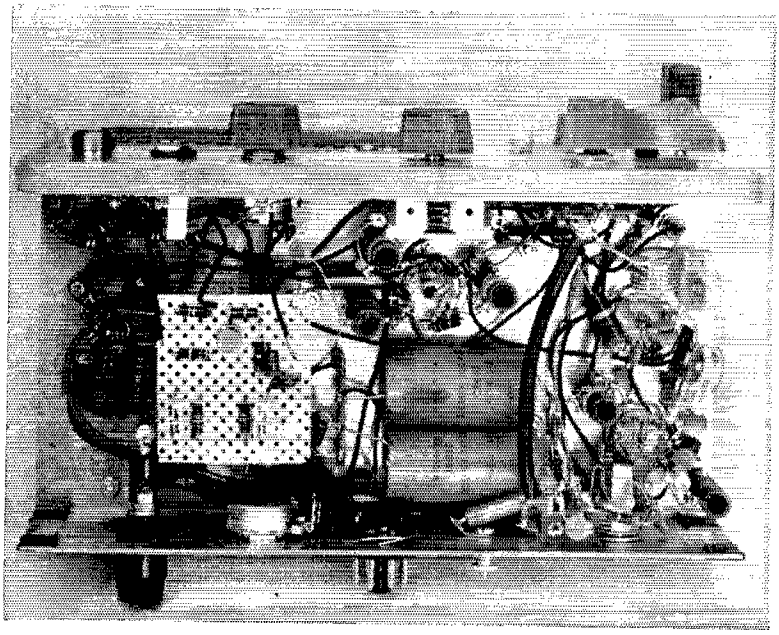


Fig. 2—Addition of the metering circuit modifications.
M_{101}—0—1 milliammeter (Radio Shack 22-004, World Radio Labs 99M194).
R_{103}—10,000-ohms, ¼-watt control.



The tone oscillator is shown mounted just to the rear of the volume control. Note the addition of the coaxial lead between the band-switch and the output jack, at the right-hand side in this view.

coil (L_3 in the Sixer and L_4 in the Twoer) to terminal 11 of the transmit-receive switch. In the 2-meter unit, one side of a 3–30 compression trimmer capacitor is mounted under the nut that holds the tube socket for V_4 at the chassis-edge side. The new coupling loop, L_{101} in Fig. 3, is made of insulated No. 14 or 16 solid wire. The loop for the Twoer consists of one turn the same diameter as the tank coil, and is inserted between the first and second turns of the tank coil at the feedthrough capacitor end. One end of the loop is connected to terminal 11 of the transmit-receive switch and the other end to the ungrounded side of the 3–30 compression trimmer. Keep these lead lengths as short as possible.

Using the lamp dummy load that comes with the kit, tune the tank capacitor and the compression trimmer for maximum lamp brilliance. You'll also note that the output meter will read maximum when the lamp is the brightest. It may be necessary to reduce the sensitivity by means of R_{103} to keep the meter pointer from going off scale.

Try moving the loop in relation to the tank coil, shooting for maximum brilliance of the lamp load. Be sure to turn off the power to the transceiver when making this adjustment because the B-plus voltage is present on the tank coil and you could get a nasty or dangerous shock.

The 6-meter installation is slightly different. The trimmer capacitor is mounted on a 3-lug terminal strip with the center terminal grounded. The strip is mounted between the crystal socket and the socket for V_4, using the unused coil mounting hole as the mounting point. A 2-turn link, with the turns just slightly smaller in diameter than the tank coil, is made from insulated No. 16 or 18 solid wire. The link is positioned just inside the tank coil at the feedthrough capacitor end. The adjustment procedure is the same as with the 2-meter unit.

The last change in the tank circuit requires removing the bus-bar wire from terminal 12 of the transmit-receive switch and the antenna output terminal. A length of RG-58/U is substituted for this lead, grounding the outer shield at both ends.

Crystal Socket

A last modification consists of mounting a crystal socket on the front panel. This makes crystal changing much easier. The crystal goes on the front panel alongside the meter, and a short length of either 300- or 70-ohm Twin-Lead, fitted with a crystal socket plug (Millen type 37412), is used to connect it to the chassis-mounted crystal socket. If you have a defunct crystal, the crystal can be removed and the Twin-Lead soldered to the holder pins. The crystal holder is then used as a plug.

(Continued on page 148)

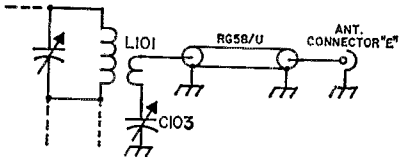


Fig. 3—Circuit diagram of the tank-circuit modification.
C_{103}—For 144 Mc., 3-30-pf. compression trimmer; for 50 Mc., 8-50-pf. trimmer (Centralab type 822-AN or similar).
L_{101}—See text.

Subscribers to the monthly ionospheric prediction service of ESSA know that the predictions now include numerical data in a form suitable for electronic computer use. When K2ETM recently volunteered to put a computer to work on a sample path of interest to DX men we suggested Los Angeles-Athens — in the hope that you fellows in the LA region would take it from there and see how well the electric brain did its job. The period covered is the month of May, 1968.

Los Angeles Handicap

BY LEWIS B. GILMER,* K2ETM

WE were figuring the odds on something when this letter came. It said the Athenians wanted to contact Los Angeles and environs in May, and what were the odds?

*Communication Engineering, 17 Adams St., Garden City, N. Y. 11530

TABLE I

Los Angeles-Athens Circuit Performance

Distance: 7206 miles
SSN: 105

Bearing at Los Angeles 20.1°
Bearing at Athens 338.8°

Percentage of Days C.W. Signals from Los Angeles Expected to be Copiable at Athens

		3.52 MHz.				7.02 MHz.				14.05 MHz.				21.05 MHz.				28.05 MHz.				
GMT	MUF	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	GMT
00	18.4	—	—	—	—	—	—	—	—	01	30	71	89	12	19	21	21	—	—	—	—	00
02	18.3	—	—	—	—	—	—	—	03	17	64	85	88	01	11	18	19	—	—	—	—	02
04	21.0	—	—	—	—	—	—	—	01	08	56	85	91	36	48	49	49	—	—	—	—	04
06	17.9	—	—	—	—	—	—	—	—	—	20	66	83	—	03	11	15	—	—	—	—	06
08	15.4	—	—	—	—	—	—	—	—	—	03	37	58	—	—	—	—	—	—	—	—	08
10	13.8	—	—	—	—	—	—	—	—	—	—	13	26	—	—	—	—	—	—	—	—	10
12	14.7	—	—	—	—	—	—	—	—	—	—	14	22	—	—	—	—	—	—	—	—	12
14	17.9	—	—	—	—	—	—	—	—	—	—	08	12	—	—	03	08	—	—	—	—	14
16	20.6	—	—	—	—	—	—	—	—	—	—	02	04	06	30	42	44	—	—	—	—	16
18	21.2	—	—	—	—	—	—	—	—	—	—	02	06	10	38	50	52	—	—	—	—	18
20	22.2	—	—	—	—	—	—	—	—	—	—	05	18	15	46	60	63	—	03	05	05	20
22	20.0	—	—	—	—	—	—	—	—	—	01	37	72	17	32	37	38	—	—	—	—	22

Percentage of Days C.W. Signals from Athens Expected to be Copiable at Los Angeles

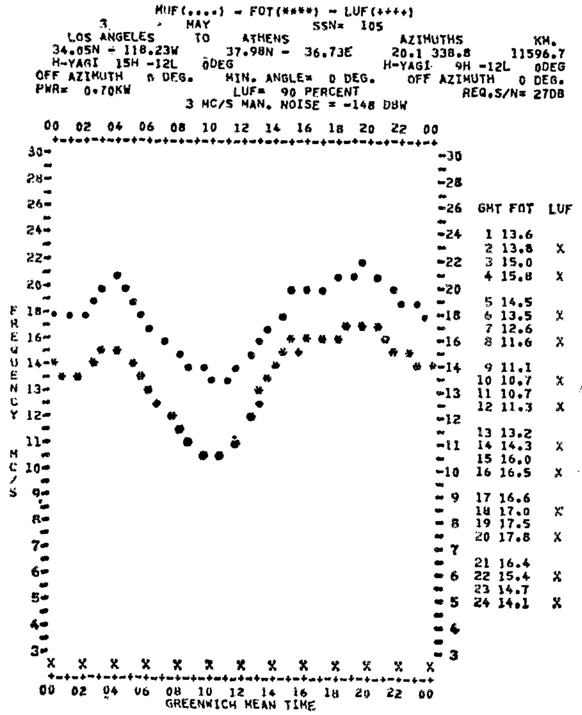
		3.52 MHz.				7.02 MHz.				14.05 MHz.				21.05 MHz.				28.05 MHz.				
GMT	MUF	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	GMT
00	18.4	—	—	—	—	—	—	—	—	—	04	44	53	04	14	19	21	—	—	—	—	00
02	18.3	—	—	—	—	—	—	—	—	01	25	64	68	—	02	12	17	—	—	—	—	02
04	21.0	—	—	—	—	—	—	—	—	—	13	57	69	12	36	47	49	—	—	—	—	04
06	17.9	—	—	—	—	—	—	—	—	—	02	33	55	—	—	04	10	—	—	—	—	06
08	15.4	—	—	—	—	—	—	—	—	—	—	07	31	—	—	—	—	—	—	—	—	08
10	13.8	—	—	—	—	—	—	—	—	—	—	01	13	—	—	—	—	—	—	—	—	10
12	14.7	—	—	—	—	—	—	—	—	—	—	01	16	—	—	—	—	—	—	—	—	12
14	17.9	—	—	—	—	—	—	—	—	—	—	—	11	—	—	—	02	—	—	—	—	14
16	20.6	—	—	—	—	—	—	—	—	—	—	—	03	—	10	32	43	—	—	—	—	16
18	21.2	—	—	—	—	—	—	—	—	—	—	—	01	—	13	38	50	—	—	—	—	18
20	22.2	—	—	—	—	—	—	—	—	—	—	—	01	01	23	49	61	—	01	04	05	20
22	20.0	—	—	—	—	—	—	—	—	—	—	05	16	02	20	32	38	—	—	—	—	22

(1) *Industrial* (2) *Residential* (3) *Rural* — *Man-made Radio Noise*

(4) *Galactic*

```
    3             MAY                 SSN=  105
 LOS ANGELES      TO    ATHENS                    AZIMUTHS          KM.
34.05N - 118.23W      37.98N -  36.73E     20.1 338.8       11596.7
H-YAGI  15H -12L   0DEG                    H-YAGI   9H -12L   0DEG
OFF AZIMUTH   0 DEG.    MIN. ANGLE=  0 DEG.    OFF AZIMUTH   0 DEG.
PWR=  0.70KW       3 MC/S MAN. NOISE = -148 DBW         REQ.S/N= 27DB
                       OPERATING FREQUENCIES
GMT  MUF     3    7   14   21   28   99   99   99   99   99   99   99   99
14  17.9
       3F   6E   6E   3F   3F    -    -    -    -    -    -    -    -   MODE
        1    1    1    2    1    -    -    -    -    -    -    -    -   ANGLE
      402  391  392  403  402    -    -    -    -    -    -    -    -   DELAY
      .50  .99  .99  .92  .11    -    -    -    -    -    -    -    -   F.DAYS
       36 -410 -159   18   24    -    -    -    -    -    -    -    -   S/N..DB
      .41  .00  .00  .08  .03    -    -    -    -    -    -    -    -   REL.

16  20.6
       3F   6E   6E   3F   3F    -    -    -    -    -    -    -    -   MODE
        1    1    1    0    1    -    -    -    -    -    -    -    -   ANGLE
      402  391  392  400  402    -    -    -    -    -    -    -    -   DELAY
      .50  .99  .99  .98  .44    -    -    -    -    -    -    -    -   F.DAYS
       42 -418 -162   14   44    -    -    -    -    -    -    -    -   S/N..DB
      .47  .00  .00  .02  .42    -    -    -    -    -    -    -    -   REL.

18  21.2
       3F   5F   4F   4X   3F    -    -    -    -    -    -    -    -   MODE
        1    8    3    4    1    -    -    -    -    -    -    -    -   ANGLE
      402  405  399  401  402    -    -    -    -    -    -    -    -   DELAY
      .50  .99  .99  .97  .52    -    -    -    -    -    -    -    -   F.DAYS
       45 -262  -89   14   45    -    -    -    -    -    -    -    -   S/N..DB
      .48  .00  .00  .02  .50    -    -    -    -    -    -    -    -   REL.

20  22.2
       3F   4F   4F   4X   3F   3F    -    -    -    -    -    -    -   MODE
        2    5    3    4    2    2    -    -    -    -    -    -    -   ANGLE
      403  405  400  402  403  403    -    -    -    -    -    -    -   DELAY
      .50  .99  .99  .98  .63  .05    -    -    -    -    -    -    -   F.DAYS
       48 -227  -83   16   46   42    -    -    -    -    -    -    -   S/N..DB
      .49  .00  .00  .05  .60  .05    -    -    -    -    -    -    -   REL.

22  20.0
       3F   4F   4F   3F   3F    -    -    -    -    -    -    -    -   MODE
        2    6    4    0    2    -    -    -    -    -    -    -    -   ANGLE
      404  406  401  400  404    -    -    -    -    -    -    -    -   DELAY
      .50  .99  .99  .95  .38    -    -    -    -    -    -    -    -   F.DAYS
       47 -173  -57   25   50    -    -    -    -    -    -    -    -   S/N..DB
      .48  .00  .00  .37  .37    -    -    -    -    -    -    -    -   REL.

24  18.4
       3F   4F   4F   3F   3F    -    -    -    -    -    -    -    -   MODE
        2    6    4    1    2    -    -    -    -    -    -    -    -   ANGLE
      404  406  402  401  404    -    -    -    -    -    -    -    -   DELAY
      .50  .99  .99  .91  .21    -    -    -    -    -    -    -    -   F.DAYS
       49  -98  -21   36   54    -    -    -    -    -    -    -    -   S/N..DB
      .49  .00  .00  .71  .21    -    -    -    -    -    -    -    -   REL.
```

This is what a page from the computer looks like. It took 50 of these to work up the data summarized in Tables I and II—and this is only one out of thousands of paths of possible interest to DX'ers.



The computer even draws graphs of the maximum and optimum frequencies vs. time of day, when you ask it to.

The writer was very good. Said that out there in California there were some nice high beams — as high as fifty feet, and that there would be a good chance that at least 700 watts would get into them. The Athenians, he said, seldom put more than 100 watts into their beams, which he estimated might be 30 feet up.

For c.w., we were told to make the receiver bandwidth 500 Hz, and for phone, 2.1 kHz. The writer thought that for c.w. DX contacts, the minimum acceptable *S/N* ratio would be 0 db., and for phone, 6 db. Up to this point, everything was hunky-dory.

When it came to the man-made noise levels, he said it probably would not be as low in Athens as in some points in California because you could find most any kind of a noise level out there, if you knew where to look.

When you start telling your problems to any machine that uses Al Barghausen's ITSA program, you have to be specific. If you want a specific answer, you have to ask a specific question. You don't get iffy with a computer. Those machines work on the basis of past experience — you could get a headache just thinking about how much past experience. George Haydon is largely responsible for that, we think. Kind of an historian of the ionosphere, among other things too numerous to mention. Always helping someone, too.

Now you can see what kind of a problem this fellow tossed out. He passed the buck to us, so we have to pass it along to you. After all, *you* ought to know how much racket you get from automobiles, factories, and fancy electrical gadgets. So we give you Tables, and let it go at that.

You can get a pretty good idea about man-made noise levels from the use to which people put the area surrounding the receiving site. You might classify it as "Industrial," or "Residential," or "Rural," or as "Remote and Unpopulous," to use ITSA terminology. The computer will take into account the variations in the noise level with time so long as you give it the mid-scale level.

The Tables cover each of these four grades of noise. They show the percentage of time you can expect a signal at Athens and at Los Angeles, at two-hour intervals, on five frequencies, using c.w., and phone.

As you can see, the fellows who wrote the program knew what it means to have a quiet receiving location. Important, isn't it?

TABLE II

Los Angeles-Athens Circuit Performance

Distance: 7206 miles
SSN: 105

Bearing at Los Angeles 20.1 °
Bearing at Athens 338.8 °

Percentage of Days Phone Signals from Los Angeles Expected to be Copiable at Athens

		3.99 MHz.				*7.29 MHz.*				*14.34 MHz.*				*21.44 MHz.*				*28.51 MHz.*				
GMT	*MUF*	*1*	*2*	*3*	*4*	*1*	*2*	*3*	*4*	*1*	*2*	*3*	*4*	*1*	*2*	*3*	*4*	*1*	*2*	*3*	*4*	*GMT*
00	18.4	—	—	—	—	—	—	—	—	—	02	41	76	—	01	10	15	—	—	—	—	00
02	18.3	—	—	—	—	—	—	—	—	—	18	64	85	—	01	09	15	—	—	—	—	02
04	21.0	—	—	—	—	—	—	—	—	—	12	60	84	09	33	43	45	—	—	—	—	04
06	17.9	—	—	—	—	—	—	—	—	—	—	25	63	—	—	02	08	—	—	—	—	06
08	15.4	—	—	—	—	—	—	—	—	—	—	05	29	—	—	—	—	—	—	—	—	08
10	13.8	—	—	—	—	—	—	—	—	—	—	—	03	—	—	—	—	—	—	—	—	10
12	14.7	—	—	—	—	—	—	—	—	—	—	—	02	—	—	—	—	—	—	—	—	12
14	17.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	14
16	20.6	—	—	—	—	—	—	—	—	—	—	—	—	—	06	27	37	—	—	—	—	16
18	21.2	—	—	—	—	—	—	—	—	—	—	—	—	—	11	36	47	—	—	—	—	18
20	22.2	—	—	—	—	—	—	—	—	—	—	—	—	—	17	45	57	—	—	—	—	20
22	20.0	—	—	—	—	—	—	—	—	—	—	04	34	01	16	29	34	—	—	—	—	22

Percentage of Days Phone Signals from Athens Expected to be Copiable at Los Angeles

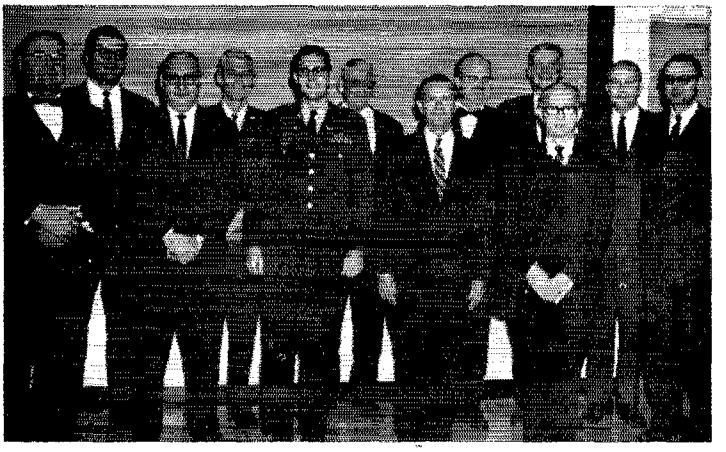
		3.99 MHz.				*7.29 MHz.*				*14.34 MHz.*				*21.44 MHz.*				*28.51 MHz.*				
GMT	*MUF*	*1*	*2*	*3*	*4*	*1*	*2*	*3*	*4*	*1*	*2*	*3*	*4*	*1*	*2*	*3*	*4*	*1*	*2*	*3*	*4*	*GMT*
00	18.4	—	—	—	—	—	—	—	—	—	—	05	13	—	—	02	10	—	—	—	—	00
02	18.3	—	—	—	—	—	—	—	—	—	01	29	38	—	—	02	09	—	—	—	—	02
04	21.0	—	—	—	—	—	—	—	—	—	—	17	33	—	11	33	43	—	—	—	—	04
06	17.9	—	—	—	—	—	—	—	—	—	—	03	14	—	—	—	—	—	—	—	—	06
08	15.4	—	—	—	—	—	—	—	—	—	—	—	03	—	—	—	—	—	—	—	—	08
10	13.8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	10
12	14.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12
14	17.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	14
16	20.6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	11	27	—	—	—	—	16
18	21.2	—	—	—	—	—	—	—	—	—	—	—	—	—	01	14	33	—	—	—	—	18
20	22.2	—	—	—	—	—	—	—	—	—	—	—	—	—	01	23	43	—	—	—	—	20
22	20.0	—	—	—	—	—	—	—	—	—	—	—	—	—	02	19	29	—	—	—	—	22

(1) Industrial (2 Residential (3) Rural — Man-made Radio Noise

(4) Galactic

Strays

These dozen Defense Communications Agency (DCA) employees have a combined total of 279 years as radio amateurs in private life. In DCA they are professional communicators assigned to the Defense Communications Engineering Office (DECEO), headquartered in the building that once housed the famous Radio Arlington, the first Navy wireless station to be called a "radio" station. Shown are (front row) W4RHC, W3GRF, WB4HNV, W4OS, W4EXF, W4RUJ, W2BWZ, WB4BZU, WA4ZMI, W4NND, WØYWL, and W4HEK. Absent are WA4QYD, W4JUY, and W4LXC.



A Tuned Input Circuit for Grounded-Grid Amplifiers

THE grounded-grid type linear amplifier has been received by the amateur fraternity with considerable enthusiasm over the last several years. One of the reasons for this popularity is that the drive requirements for this type of amplifier are well suited to the power output that is available from most transceivers on the market.

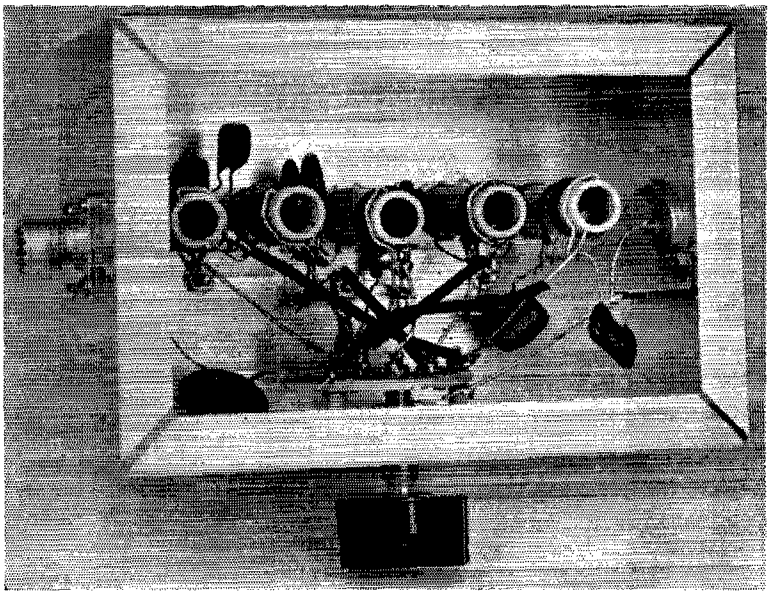
In many designs of cathode-driven amplifiers a tuned input circuit was eliminated because the designer probably felt that a 100-watt-output exciter would provide more than adequate drive, and that the addition of a tuned input circuit unnecessarily complicated the circuit. However, as Orr and Sayer[1] pointed out recently in *QST*, a tuned input circuit is required in order to reduce intermodulation distortion. Also, as many amplifier builders have found out after building an amplifier and attaching the exciter, their driving power may be on the scant side. A tuned circuit to match the input of the amplifier to the exciter will help take care of both problems.

[1] Orr and Sayer, "Semi- and Super-Cathode-Driven Amplifiers," *QST*, July, 1967.

Fig. 1 shows the circuit of a band-switched impedance-matching unit that covers the 80- through 10-meter bands and can be used without making any changes in the amplifier. It connects between the amplifier (at the regular exciter connection point) and the output terminal of the exciter.

The circuit consists of a pi network with a high C to L ratio to match the low input impedance of the grounded-grid configuration in the amplifier. A double-pole, five-position wafer switch is used to switch the appropriate circuit into use. If the amplifier construction lends itself to it, the switch could be ganged to the amplifier band switch. If not, the input circuit must be switched separately whenever the amplifier plate circuit is switched. (We found that when changing bands it took us a couple of times to remember to switch the input circuit. If you don't remember, you *will* have scant drive!)

The unit shown was built into a 3 × 4 × 6-inch aluminum chassis, the coils L_1 through L_5 being mounted in a straight line across the chassis, as visible in the photograph. J_2 can be a standard coax chassis fitting, with the con-



This view shows the coil and switch arrangement.

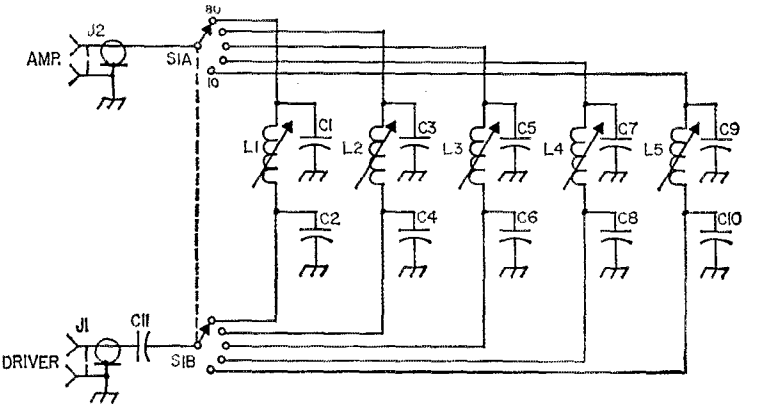


Fig. 1—Circuit diagram of the tuned-input circuit for grounded-grid linear amplifiers.

C_1, C_2—1800-pf. 500-volt mica, for 80 meters.
C_3, C_4—1000-pf. 500-volt mica, for 40 meters.
C_5, C_6—470 pf. 500-volt mica, for 20 meters.
C_7, C_8—330 pf. 500-volt mica, for 15 meters.
C_9, C_{10}—220 pf. 500-volt mica, for 10 meters.
C_{11}—0.01-μf. disk ceramic.
J_1, J_2—Coax chassis receptacle, SO-239.
L_1—80 meters, 15 turns close-spaced.
L_2—40 meters, 8 turns, close-spaced.
L_3—20 meters, 6 turns, close-wound.
L_4—15 meters, 4 turns, close-wound.
L_5—10 meters, 4 turns, spaced over 1 inch.
All coils wound on Millen 69046 ½-inch diameter slug-tuned forms.
S_1—Two-pole, five-position steatite wafer switch.

nection made to the amplifier via a short coax cable. Alternatively, a short length of RG-58/U with a PL259 plug on the free end can be connected directly to the output of the tuned circuit. We used about four inches of cable, including the plug.

Coil information is given in Fig. 1. All coils are wound with No. 18 enameled wire. In building the unit, we found that it was easier to mount one coil and its associated capacitors before installing the next coil.

For adjustment, merely attach the unit to the amplifier and feed the driver output into J_1. Switch S_1 to the appropriate band and then apply drive to the amplifier. Peak the slug in the unit's coil while looking for maximum drive. You may have to reduce the output from the exciter and also retune the exciter as you make the adjustment. In any event, tune the coil slug for maximum and that particular band will be adjusted. Proceed to the next band and make the same adjustments, doing the same with the remaining bands.

The circuit will transform amplifier input impedances ranging from 50 to 100 ohms into 50 ohms for the exciter, in the 75-meter phone band (3800–4000 kc.), and will cover a somewhat greater impedance range on the higher bands. The unit has been tested with 100 watts running through it continuously; the coils will get slightly warm at this power level but operation is stable. The limitation on matching range is set by the inductance variation it is possible to get in the slug-tuned coils. — *W1ICP*

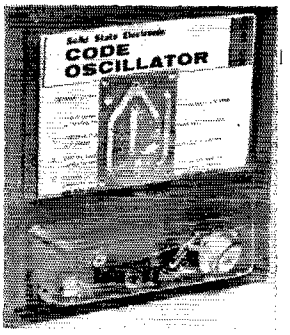
• New Apparatus

Eico Code Oscillator Kit

ELECTRONIC Instruments Co., Inc., 283 Malta Street, Brooklyn, N. Y. 11207, has recently introduced a line of solid-state electronic kits called "EICOCRAFT TruKits." The items available include a siren, a burglar alarm, a fire alarm, an intercom, an audio power amplifier, a metronome, and an a.c. power supply; however, the kit that should interest most hams is the code oscillator, EC-1000, shown in the photograph.

The oscillator is actually a two-stage transistor amplifier, with positive feedback provided by a 0.01-μf. capacitor between the collector of the second stage and the base of the first. Although there are no controls for varying the tone of the oscillator, the pitch can be changed by using a different value of feedback capacitance.

Included in the kit are one resistor, one capacitor, two transistors, one printed-circuit board, hookup wire, hardware, and assembly instructions. The directions are quite clear, and the most inexperienced beginner should need little time to put the oscillator together. However, the kit it not complete in itself; additional items — a 6-volt battery, an on-off switch, a telegraph key, and a speaker — must be obtained before code can be sent.



The unit built in the ARRL laboratory worked well and provided ample volume. Cost of the EC-1000 is $2.50. — *W1YDS*

Auroral Notes

BY DON LUND,* WAØIQN

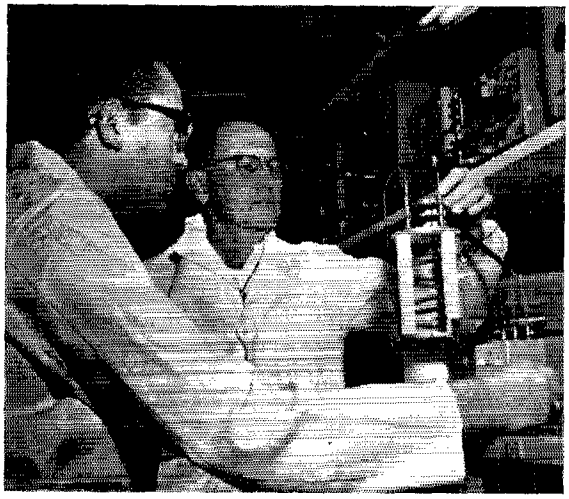


Fig. 1—ESSA rocket instrumentation package, designed for launch from Fort Churchill during the summer of 1968. Intended to measure electron densities in the auroral ionosphere, the instrument was designed by Tommy Thompson, WØIVJ (left) and built by Tommy and Bob Brown, WØYHI (right).

SINCE about 500 B.C., experts have debated the nature and cause of the aurora. Like most other ways of extending v.h.f. propagation beyond ground-wave range, auroral propagation was first noticed by hams. In 1937, one year after the sunspot peak of 1936, the first connection between the visual aurora and garbled signals from the north was observed. The experts are still debating the cause of the aurora some years later, but among v.h.f. addicts there is no such debate, since during an auroral session all present are too busy working new states! Between appearances of those chopped-up, long-range signals from the north, the Hot Stove League gathers on 3815 kc., and from those nightly discussions, as well as from current professional literature, these notes have evolved. They are intended to summarize the new knowledge that has been gained since WØGYS and K6DSJ wrote a pair of excellent articles about v.h.f. auroral propagation.[1,2] If you haven't read these, you might want to dig them out, since the material they presented is as good now as when it was written.

The Earth, The Sun and Some Jabberwockian Names

The sun, in some way that is not fully understood, produces the energy, and probably the particles, that cause the aurora. The outer atmosphere of the sun is very hot, with the result that there is always an expansion of gas away from the sun. Since the sun is rotating, the gas follows a curved trajectory much like water squirted from a rotating garden sprinkler. The earth therefore has a continual ionized "wind" blowing against it in constantly changing degrees. Following a solar flare, a small section of the *solar wind* in the flare region blows harder for some time.

When the solar wind arrives at the earth, it can't blow directly on the surface of the earth because the earth's magnetic field pushes the wind out of its way. What happens is much like the pictures of flow in a wind tunnel; where flow occurs around a blunt body, a shock wave is set up that pushes the flowing gas off to the sides, and provides a buffer zone between the shock wave and the surface of the earth. The region inside the shock front is called the *magnetosphere*. The motion of particles in this region is controlled by the earth's magnetic field, rather than by the pressure of the solar wind, as is the case outside this protected region. The shape of the magnetosphere is somewhat like a teardrop or comet (see Figure 2A) with the tail away from the sun. The head of the teardrop is about 40,000 miles from the earth and pointed toward the sun. Some experiments indicate that the tail of the magnetosphere may be more than 400,000 miles long, and may be closed like a teardrop or open like a comet, but no one knows for certain.

The earth's magnetic field may be illustrated as a bar magnet, except that the field is "squashed" on the day side and "extended" on the night side, due to the solar wind. In Figure 2B, which is an enlargement of the center of Figure 2A, only a few field lines are shown, although the whole magnetosphere is threaded with field lines. Protons and electrons within the magnetosphere tend to move along the field lines, rather than across them. For this reason, and because the particles are always in motion, there are two regions within the magnetosphere where the population of electrons and protons is

* P.O. Box 1664, Boulder, Colorado 80302.

[1] Moore, R. K., "Aurora and Magnetic Storms," June, 1951, *QST*, p. 14.

[2] Dyce, R., "More About VHF Auroral Propagation," January, 1955, *QST*, p. 11.

very high. Called the Van Allen belts, they circle the earth in the equatorial plane. Electrons and protons in the Van Allen belts are in motion along field lines, shuttling back and forth between the northern and southern hemispheres. As they near the earth's surface, the increasing strength of the magnetic field along the field line causes them to reverse and move to the opposite hemisphere. Again they dip down toward the earth's surface and are turned around, spending their lives commuting between turning points. For most of them, their turning points are well above the ionosphere. These particles are said to be trapped. However, a few of them have their turning points near ionospheric heights. For these "precipitated" particles, the magnetic field loses its control on their motion, and they simply become a part of the ionosphere. In addition to the bounce motion, the particles also drift slowly in longitude.

Most of the ionosphere is the result of solar radiation photoionizing the neutral atmosphere. At higher latitudes, solar radiation is weak, but the influx of precipitated particles maintains an ionosphere. As an illustration, during the polar night the aurora generates *most* of the ionization at high latitudes. The aurora is caused by the precipitation of protons and electrons into the ionosphere along field lines that just graze the top of the outer Van Allen belt. These particles do not proceed directly from the sun to the ionosphere via the solar wind, because the solar wind cannot move particles directly across the boundary of the magnetosphere. It is possible for the particles to enter the magnetosphere indirectly through the tail region, and this may well be the source of auroral particles, although this explanation has not been proven experimentally. We know that auroral particles do not come *directly* from the Van Allen belts, for the number of electrons in the Van Allen belts that have the range of energies typical of auroral electrons is known. (From here on, reference will be made only to electrons, since they alone produce auroral reflection at v.h.f.) During a typical aurora, many more particles in this energy range are dumped into the ionosphere than are present in the Van Allen belts. So if the auroral particles come from there, they must be taken from the more numerous low-energy electrons and accelerated in some unknown fashion.

In summary, it seems that the electrons that cause the aurora originate at the sun. They move from sun to earth via the solar wind, and enter the magnetosphere through the tail region. Once inside the magnetosphere, they either are trapped in the Van Allen belts, eventually accelerated and then precipitated as auroral particles, or they proceed directly from the tail into the polar regions.

Prescription for an Aurora

You can see that the aurora is the result of a complicated set of interactions between particles and the earth's magnetic field. Visual aurora results from precipitated electrons giving energy to the gases of the earth's normal atmosphere. When an electron passes close to an oxygen molecule, it gives the molecule some energy, usually by electrostatic attraction, which, in turn, the molecule releases by radiating some light. In contrast, the radio aurora is the result

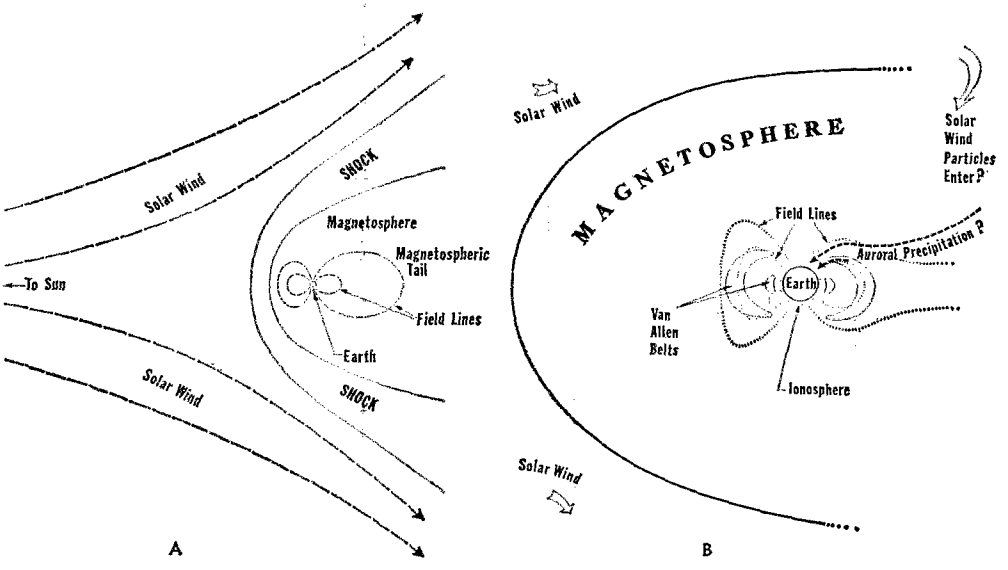


Fig. 1—A distant view of the earth and its magnetic field, slightly distorted by the solar wind, is shown at A. B is a closer view, showing the magnetic field more distorted by solar wind. Note location of the Van Allen belts and the ionosphere. Possible paths of auroral particles are indicated.

of the stopping of the precipitated electrons. Where they stop, the concentration of electrons builds up, and the ionosphere becomes a better reflector. *To generate an aurora thus requires both particles and fields.* The location of the visual aurora may be different from the location of the radio aurora, since the electrons may be deflected between the time they excite the visual radiations and the time they are stopped.

During the IGY it was found there was always auroral activity somewhere around the auroral zone. Recent data from satellites such as Explorer XX, and from rockets as shown in Fig. 1, indicate that conditions for precipitation are always satisfied along a particular bundle of field lines. The place where these field lines intersect the surface of the earth is shown as the dashed line in Figure 3. This is called the "auroral oval" or "auroral belt," as distinct from the "auroral zone." In this region, packets of soft electrons are continually precipitating, sometimes with sufficient energy to splash electrons *back up* the field lines. Since this region is where the field lines that touch the earth extend into the tail, this region does not rotate with the earth. To an observer fixed in space, the sun and the auroral oval would be stationary, and the earth would spin on its axis underneath the oval. To an observer on the surface of the earth, the auroral oval would appear to rotate. The southernmost tip of the auroral oval is where visual aurora is most likely. The line traced out by the tip of the oval as the earth rotates under it is the region where visual aurora is most probable. This line, the dotted circular band in Fig. 3, is the conventional auroral zone. Since the southernmost tip of the auroral oval points *away* from the sun, aurora is most likely near midnight. Figure 3 shows the orientation of the auroral oval and auroral zone, when it is midnight in Chicago. Six hours later, the earth would have rotated under this pattern, and the southernmost tip of the auroral oval would be pointing toward Fairbanks.

This is a sketch of what is thought to be the case when the earth's magnetic field is unperturbed. Aside from operations like KG1FN's[3], this aurora is too far north to affect v.h.f. propagation at latitudes where most of us live. However, during a magnetic storm, the aurora moves southward. Magnetic storms may occur in two ways: either as a result of solar flares or as a result of the earth experiencing a "recurrent magnetic storm." Magnetic storms have two effects, both of which are attributable to the increased strength of the solar wind. The first is that the earth's magnetic field is weakened. The increased flow of solar wind around the magnetosphere interacts with the magnetic field so as to change the magnitude and direction of the earth's field, and also may cause some of the Van Allen belt particles to precipitate. Later in the storm the second effect appears: particles

[3] Mellen, R. H., F. J. Williams and C. T. Milner, "Hams On Ice," January, 1960, *QST*, p. 11.

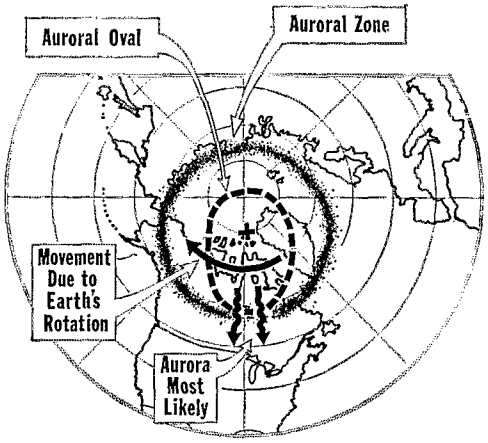


Fig. 3—Polar projection of the earth's surface, showing locations of the auroral oval and auroral zone at midnight, Central Standard Time.

entering through the tail region probably replenish the Van Allen belts.

Solar flares can cause magnetic storms directly, but it appears that they may also be the cause of the recurrent magnetic storms. The recurrent storms may result from an earlier flare which ejected solar material into the solar wind. As the sun rotates, with its 27-day period, a region of strong solar wind may again be swept across the front of the magnetosphere, producing a recurrent magnetic storm, just as a rotating water sprinkler can squirt a bystander once every rotational period.

Geometry: The Difference Between H.F. and V.H.F. Aurora

Up to this point we've attempted to answer questions like, "what is the aurora, why is it where it has been observed to be, and why is it so sporadic where I live?" All fine for the physicist, you say, but what about the man whose only interest is in swapping v.h.f. QSL cards? Why is the aurora so different from one session to the next? Answers to questions like these are much more clear-cut: most are found in the geometric relations between transmitted, beamed, radio-frequency energy and the orientation of the reflecting surface.[4,5]

The first important idea is that the aurora is aligned with the earth's magnetic field. That is, the reflecting surface is in the form of a column or sheet which is inclined to the surface of the earth at the same angle as the lines of force of the earth's magnetic field (typically 60 to 75° in the United States). As an application, visualize lying on your back and shining a searchlight at

[4] Lange-Hesse, G. and W. Dieminger, "Polarlicht als Ruckstrahler ultrakurzer Wellen," *DL-QTC*, June, 303–322 (1967).

[5] Lange-Hesse, G., Radio Aurora, in *Aurora and Airglow*, B. M. McCormac edit., 519–562 (Reinhold, New York, 1967).

an overhead mirror that is almost vertical: the reflected ray doesn't come back down. Similarly, for North America and Europe, an overhead aurora doesn't lead to useful propagation, for the signals merely go off into space. Fig. 10 of Dyce's *QST* article[2] illustrates this. Fortunately, even when the visual auroral is overhead, there is often enough precipitation off to the north to make propagation possible.

Another important idea is that signals bounce off the aurora with the angular relations shown in Fig. 4, and strongest reflections result when the angle of incidence (θ_t) equals the angle of reflection (θ_r). For the higher frequencies, such as 432 Mc., the requirement is much more stringent than for the lower frequencies, such as 50 Mc. There are occasions when the aurora will swing off to the east or west, but in general the old advice of "aim north" is good. At 432 Mc., one would almost always want to point north, while at 50 Mc., aurora will often be found somewhere other than in the north. The trick of finding where the aurora is on

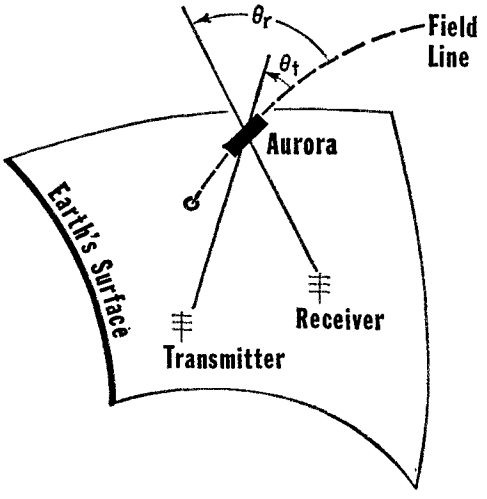


Fig. 4—Geometry of aurorally-propagated v.h.f. signals.

a lower band, and then using this heading for 432 Mc., may fool one in this respect.

Another important idea is that the auroral ionization is almost always the most intense at a fixed height of around 62 miles. The reason for this is that the precipitating electrons induce the most ionization close to where they stop, since the density of the atmosphere increases as they get closer to the earth's surface. The electrons are almost all stopped near this level, so this is where they increase the ionization the most, and this is the level where most auroral reflection of radio waves occurs.

Fig. 5—Auroral coverage from KØMQS. Only for ionization within the hatched area is the reflection condition satisfied. It will provide propagation to the area within the solid line.

It has been assumed all along that propagation from the transmitter to the receiver is along the line of sight. This is largely true for v.h.f., but not for h.f., and for this reason, many types of auroral reflection are possible at h.f. that are not seen at v.h.f. For example, h.f. signals may bounce off the *F* region, and come down perpendicular to a field line *toward the south*, and thus be aurorally propagated. This can't happen at frequencies much above 50 Mc. Auroral propagation at h.f. is also affected by absorption much more than v.h.f. propagation is. Thus, auroral signals at h.f. are much different from those at v.h.f., as has been pointed out in a recent *QST* article.[6]

Using these ideas, we can calculate where the aurora has to be to permit propagation between two given stations. More generally, for a given station one may calculate what coverage is available such that the reflection condition (above) is satisfied.[7,8,9] Fig. 5, which is an adaptation from Reference 9, shows the results of such a calculation for the QTH of KØMQS. For auroral precipitation within the hatched region, propagation is possible to the region within the solid line.

A word of caution is necessary here. The above assumes mirror-like reflection. As has been pointed out, at the lower v.h.f. frequencies the reflection condition may be relaxed to the tune of four or five degrees, and lead to much larger coverage than is shown in Fig. 5. Also the existence of combination modes of propagation, such as tropospheric ducting plus auroral reflection, may lead to extended coverage in unexpected directions. Don't treat the above theory as gospel!

Characteristics of Auroral Signals

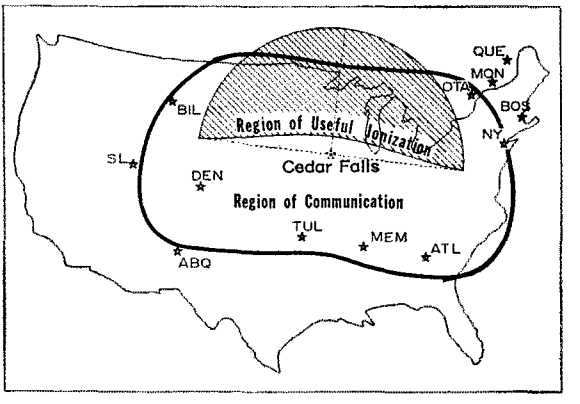
Anyone who has worked a new state via the aurora hardly needs to be told what an auroral

[6] Hunsucker, R. D., "HF Propagation Effects at High Latitudes," February, 1967, *QST*, p. 16.

[7] Millman, G. H., "The Geometry of the Earth's Magnetic Field at Ionospheric Heights," *J. Geophys. Res., 64*, 717–726 (1959).

[8] Egeland, A., "Studies of Auroral Reflections in the VHF Band" *Arkiv for Geofysik, 4*, 171–209 (1963).

[9] Leadabrand, R. L. and L. Yabroff, "The Geometry of Auroral Communications," *IRE Trans. on Ant. and Propagat.*, AP-6, 80–87 (1958).



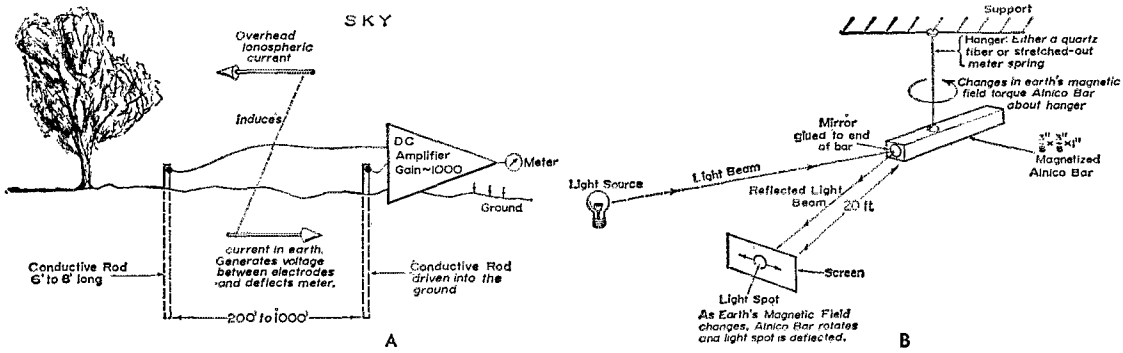


Fig. 6—Two simple aurora detection schemes. At A is the earth current measurement system used by WØMOX. A magnetic storm disturbs earth's magnetic fields, producing earth currents indicated on the meter. B is a magnetometer devised by W5UGO from a junked meter A magnetic disturbance rotates the bar magnet, deflecting light spot.

signal sounds like. Few of us, however, have heard the full variety of which the aurora is capable. Most typically, the signal strength shows large fluctuations, ranging all the way from tens of fades per second (sounds like flutter) through hundreds of fades per second (sounds like a growl) to thousands of fades per second (makes the signal sound like a soft hiss). A possible explanation is that there are several columns of ionization simultaneously reflecting signals. As one fades away and is replaced by a new one, both constructive and destructive interference lead to the rapid fading rates. The system of columns is likely to be moving, thus superposing a Doppler shift on the transmitted frequency. This Doppler shift is often several hundred cycles at two meters, but since it may be three times that amount at 432 Mc., some tuning may be required.

A small but growing number of contacts have been reported at 432 Mc. Since some researchers have reported auroral echoes (monostatic) at frequencies as high as 3000 Mc.,[10,11] it is interesting to think about auroral contacts at 432 or even 1296 Mc. Theory indicates that the strength of the auroral signal should be about 23 db. less at 432 than at 144 Mc., and another 31 db. less at 1296 than at 432 Mc. While the experimental results are somewhat confusing (Reference 10 measured just about the theoretical value, while Reference 11 showed much less loss), it appears that one should not have to pay a penalty of more than 4 S-units in going from 144 to 432 Mc. Since antennas at 432 are sharper, the penalty should be even less. So why aren't there more auroral contacts on 432? Is the answer activity, or isn't our gear working as well as we think it should?

Another question is whether antennas should be circularly polarized for auroral work. Some experimental measurements have been made.[12,13] Only at 50 Mc. does depolarization seem to be a problem. At higher frequencies, transmitting vertically-polarized radiation and looking for horizontally-polarized returns gave negative results.[13] Further, no difference in the reflective properties of the aurora is known between horizontal and vertical linear polarizations. Above 144 Mc. there should be no problem if both stations have the same polarization.

Prediction of Aurora

Predicting that aurora may occur, at latitudes where most of us live, is harder than predicting the weather. We have discussed the essential ingredients of an aurora, and have given an idea of conditions that are favorable for producing one. Most often, some kind of solar disturbance is required. For this reason, passing flare information on the nightly informal 3815-kc. net is often helpful, since many flares occur that do not produce an aurora. Some eject particles in directions such that the particles do not go in the direction of the earth and its magnetosphere. Other flares just do not seem to produce particles.

For prediction we need to know that there has been a flare, that the flare produced particles, and that the flare orientation was correct for the particles to reach the magnetosphere. But all this information tells one is whether an aurora is likely at high latitudes. More information is required to judge whether aurora is likely at low latitudes: one must know what the earth's magnetic field is doing.

This is what one needs to know for prediction of auroras that result *directly* from a solar flare, but other auroras occur from recurrent magnetic storms. These usually occur 27 to 32 days after

(Continued on page 152)

[10] Hodges, J. and R. L. Leadabrand, "Auroral Radar Echo Wavelength Dependence," *J. Geophys. Res.*, *71*, 4545–4549 (1966).

[11] Leadabrand, R. L., A. G. Larson, and J. C. Hodges, "Preliminary Results on the Wavelength Dependence and Aspect Sensitivity of Radar Auroral Echoes between 50 and 3000 MHz," *J. Geophys. Res.*, *72*, 3877–3887 (1967).

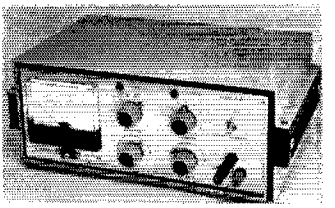
[12] McNamara, A. G. and B. W. Currie, "Polarization of Radio Echoes from Aurorae," *Nature*, *174*, 1153–1154 (1954).

[13] Presnell, R. I., Leadabrand, R. L., Peterson, A. M., Dyce, R. B., Schlobohm, J. C. and M. R. Berg, "VHF and UHF Observations of the Aurora at College, Alaska," *J. Geophys. Res.*, *64*, 1179–1190 (1959).

Recent Equipment

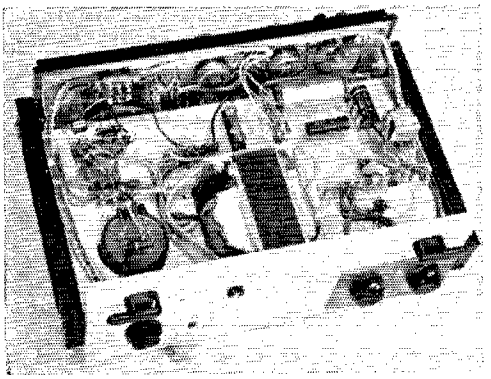
To acquaint you with the technical features of current amateur gear.

Heathkit IP-27
Low-Voltage Power Supply



ADJUSTABLE-output power supplies that provide low-voltage regulated d.c. have been commercially available in a variety of sizes and shapes for quite some time. Of far greater importance than size and shape, however, is the matter of unit cost, especially if the power supply is to receive infrequent use. Most radio amateurs who experiment with transistor circuits require some type of regulated, voltage-variable, well-filtered low-voltage d.c. supply. Certainly, no truly modern ham radio workshop is complete without such a convenience. Heretofore, laboratory-type power supplies that met the foregoing requirements were somewhat beyond the financial reach of the cost-conscious experimenter. Now, with the Heath IP-27 being offered for less than $80 in kit form, a laboratory-class test supply is available to anyone who feels he must operate on a modest budget.

Load currents up to 1.5 amperes, over a voltage range of 0.5 to 50 volts, are specified by the manufacturer. Ripple and noise in the output of the power supply is rated at 250 microvolts, or less. Load regulation over the entire voltage range is reported to be ± 15 millivolts from no load to full load. The specified line regulation calls for less than 0.005-per cent change in output voltage when the primary is varied from 105 to 125 volts.



A panel meter permits monitoring of the voltage and current. Four meter ranges are used for current—50, 150, and 500 milliamperes, plus a 1.5-ampere position. Two voltage positions are provided — 15 and 50 volts, full scale.

Protection against overloads or short-circuiting of the power-supply output is effected by the current-limiting circuit of Q_1, Fig. 1, and relay K_1. Q_1 will handle small amounts of overload, or overload situations that occur at low-voltage settings of the supply. Because extreme overloads could destroy Q_1, K_1 is used as a protective relay. It is normally closed, but when a serious overload or short-circuit takes place, causing the power supply's output voltage to drop, the relay becomes energized and its contacts open. When the contacts aren't engaged there is no voltage supplied to the emitter of Q_1, the current limiter, and the balance of the circuit is without operating voltage. Once the overload is removed, or the reset switch on the front panel is thrown from the OPERATE to the RESET-STANDBY position, the field coil of K_1 is no longer energized. Normal operation of the power supply can be resumed once this condition is met.

Voltage regulation of the supply is made possible by a complex group of sensing and control circuits which are represented according to their functions in the block diagram of Fig. 1. Voltage reference for the series-regulator circuit is supplied by a Zener-diode-stabilized negative bus. The main portion of the regulator circuit is shown schematically in Fig. 2. The unregulated d.c. input to the circuit is supplied by a bridge-rectifier which connects to the tapped secondary winding of the power transformer through an

An under-chassis view of the IP-27. The power transformer is installed in a chassis cut-out area, lower center, to provide a low-silhouette cabinet style. Overload relay K_1 is located at the far right. A preassembled wiring harness hugs the outer edges of the chassis and contributes to a neat-appearing finished product. Two L-shaped plastic posts on the rear wall of the cabinet (above the transistors) are used to store the a.c. line cord when the power supply is not being used.

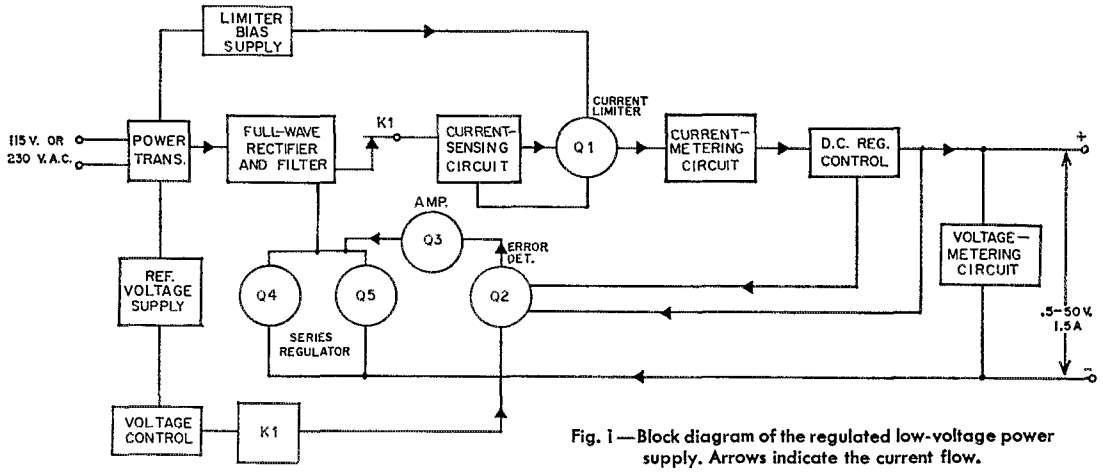
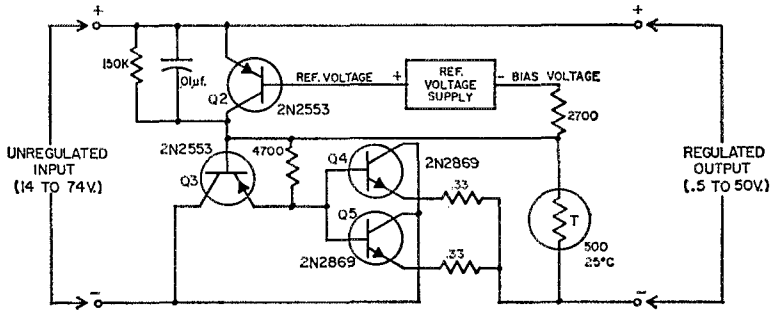


Fig. 1—Block diagram of the regulated low-voltage power supply. Arrows indicate the current flow.

11-position voltage-selector switch. Output from the regulator circuit is routed to plus and minus binding-post terminals on the front panel of the supply. A third binding post, the chassis-ground connector, is located directly above the plus and minus posts so that either of them can be made common to the case by placing a jumper between the appropriate pair.

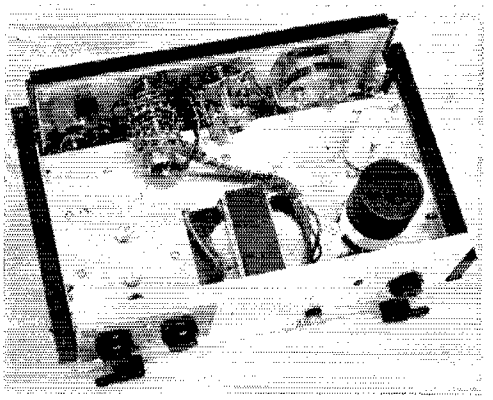
Assembly of the kit was without incident. That is to say, there were no problems in component identification or installation. It took approximately 12 hours to assemble and calibrate the kit. Assembly time was greatly speeded up by the manufacturer's inclusion of a complete wiring harness. There was very little point-to-point wiring required. Calibration and testing was straightforward and everything took place exactly as the instruction manual stated it would.

When testing the power supply, a 25-ohm resistance was connected across the output terminals. The voltage was set at 25 and the current reading was 1 ampere. Going from a no-load to 1-ampere-load condition, no change in output voltage could be detected on the panel meter. An oscilloscope was connected across the output terminals of the IP-27 and the test was repeated. The oscilloscope could not detect any "bump" in the base line when the load was removed and reattached. Output from the supply remained rock solid — 1-ampere load connected — when the line voltage was varied between 90 and 130 volts. In this writer's opinion, the power supply performs as well or better than the manufacturer states in the instruction manual. The overload-protection circuit responds exactly as the book says it should. It was tested for short-circuit



Q2—ERROR DET.
Q3—AMPLIFIER
Q4,Q5—SERIES REGULATOR

Fig. 2—Schematic diagram of the regulator section of the IP-27. Resistance is in ohms. K = 1000. The 500-ohm thermistor is coated with silicone grease and is inserted into the socket of one of the series-regulator transistors, Q_4 or Q_5.



Looking into the top of the power supply, two studmount transistors are visible at the left. The coarse-voltage-adjust switch extends out from the front panel and is ringed with multiplier resistors for the metering circuit. Three high-wattage transistors are mounted on the rear wall of the cabinet and insulated by means of plastic covers to prevent accidental short circuits. The power supply case serves as a heat sink for the large transistors

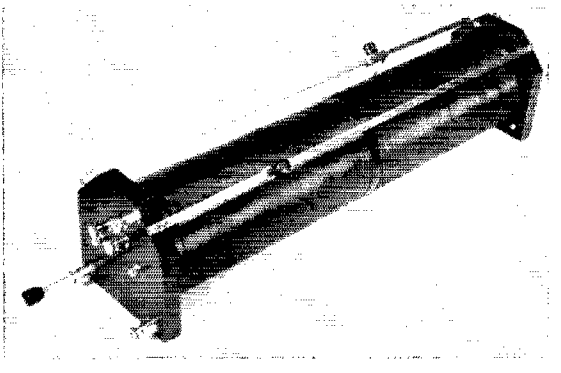
and for moderate overloads. In both instances the protective circuit responded rapidly, cutting off the output and protecting Q_1. Examination of the output voltage during the 1-ampere load condition showed the ripple to be markedly less than the 250-microvolts-maximum figure listed in the book. In fact, the output was so clean that it was not possible to get a meaningful reading of the ripple and noise with the available test equipment.

As far as the exterior properties of the IP-27 are concerned, the equipment has a professional appearance. It is housed in a rugged, tan wrinkle-finished aluminum cabinet. The front panel is framed by a sturdy aluminum casting which seems to add a quality look to the buff-colored glossy finish of the panel. Retractable vinyl-plastic handles are located on the right- and left-hand sides of the cabinet. — *W1CER*

Heathkit IP-27 Power Supply

Height: 5⅛ inches.
Width: 13¼ inches.
Depth: 9 inches.
Weight: 12 pounds.
Power requirements: 105–125 volts, or 210–250 volts 50–60 c.p.s., 135 watts max. at full load.
Price Class: $80.
Manufacturer: Heath Company, Benton Harbor, Michigan 49022

From the Museum of Amateur Radio



Here we have a real rarity. It is a Colby Tuner made by Colby's Telegraph School, Auburn, N. Y. expressly for R. B. Bourne in 1915. Both primary and secondary windings are on the same cardboard tube. A third coil, actuated by the rod, was originally connected in series with the secondary and the coupling between primary and secondary was thus varied, by sliding the coil in and out. This model was changed so that the third coil was used as a tickler for c.w. reception, using a DeForest RJ5 Audion detector box. Padding the coils with large capacity variable condensers filled with castor oil extended the tuning range well toward 15,000 meters. With this outfit, signals were consistently copied from Hawaii to Germany. The original tuners, patented in 1912, were much shorter and went from about 300 to 2000 meters when used with a large antenna. The writer had one of these made into a complete receiver using a cerusite crystal detector. The rig was smuggled aboard ship and hooked up when safely outside the three mile limit! It spectacularly outperformed the United Wireless Type D tuner, almost needlessly to say. — **W1ANA**

Remote Control for the NCX-5

Convenience in Mobile or Fixed-Station Operation

BY J. WAYNE WALLER,* W4TZB

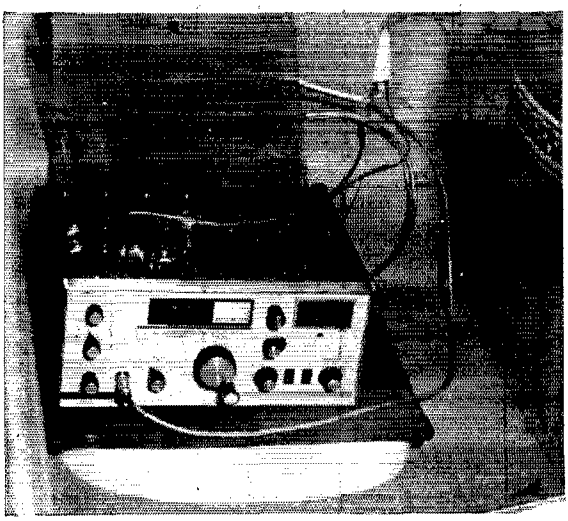
The simple adapter described permits remote control of both transmit and receive frequencies, audio level, and power switching of the NCX-5, while maintaining normal operation as well. No drilling or cutting is required, and the modification is easily installed and removed.

THIS article should be of interest to: (1) NXC-5 owners who use the rig mobile and worry about it being stolen, (2) those who are generally interested in going mobile, but who have no room for the rig under the dash, (3) those whose XYL or XYL2B complain about the appearance or inconvenience of a dash-mounted rig, and (4) bedridden hams who would like to have a small control box with the essential controls at hand.

After trading for a new car with the currently-popular bucket seats and console, mobile operation was tried for a while by setting the NCX-5 in the passenger bucket, facing toward the driver. This proved to have numerous disadvantages among which are: (1) it takes up the most important passenger space, (2) it offers a great temptation to any would-be thief passing by, since it is clearly in view, and (3) it offers no protection for the rig in case of a sudden stop. A trunk-mounted installation appeared to be the solution to all of these problems, but only one rig on the market is especially designed for remote operation, and the cost of a second fairly-expensive rig which would generally be used only one or two week ends a month could not be justified.

Since the NCX-5 already had receiver offset tuning, accomplished by the varying of the bias on a varactor in the v.f.o., it was decided to see if this circuit could be brought out to permit remote control of at least the receiver frequency. However, after looking at the circuit, it became apparent that it should be possible to control not only the receiver, but also the transmitter, within the range of the varactor which is approximately ±6 kc. about any center frequency. Since practically all of my mobile operation is on 3980 kc. (the Tennessee Net frequency), and since a 75-meter mobile whip is narrow in bandwidth anyway, this deviation range seemed acceptable.

*3610 Sevier Heights Road, Knoxville, Tenn. 37920.



NCX-5 mounted in trunk. The frequency-control cable plugs into an octal socket mounted at the left. The sponge-rubber seat cushion soaks up vibration. The power supply is behind the transceiver. *(Photos by W4CVG)*

The Circuit

The circuit modification was first breadboarded and found to work very satisfactorily. The modified frequency-control circuit and adapter connections are shown in Figs. 1A and 1C, respectively. While this is for the NCX-5, the same principle could be easily adapted to other transceivers which have offset tuning, or which use a varactor for calibrating. Rigs not having a varactor could be appropriately modified. The transceiver modification (Fig. 1A) involves only the cutting of three wires and the bringing of the six ends (plus a ground connection) to an outboarded octal socket. The yellow, purple, and orange wires indicated are all available above the chassis at the vernier-control potentiometer.

The adapter socket J_1 is mounted on a small ceramic standoff insulator, which is screwed onto the threaded stud protruding from the balanced-modulator box. For normal operation, an octal plug with appropriate jumpers (Fig. 1B) restores the original circuit.

For the mobile installation, an additional control for the audio level seemed desirable. The audio level on the receiver is set to the maximum required (or desired) for normal operation, and then a simple fader control (Fig. 1E) on the front-mounted speaker sets the level in the car. The r.f. gain control is left "wide open," and the a.g.c. takes care of normal signal variation. A headphone jack, J_2, permits private listening whenever passengers do not wish to listen.

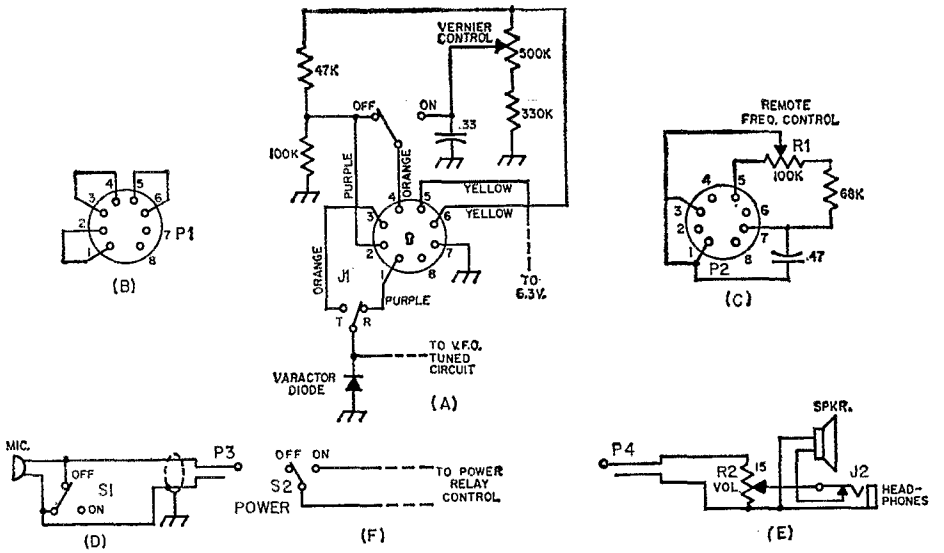


Fig. 1—A—NCX modification. The original color-coded wires indicated are cut, and J_1 inserted as shown. B—Dummy plug connections to restore original circuitry. C—Remote frequency-control plug connections. D—Microphone extension with microphone shorting switch. E—Speaker/headphone extension. F—Power-control extension. Capacitances are in microfarads, and resistances are in ohms (K = 1000).

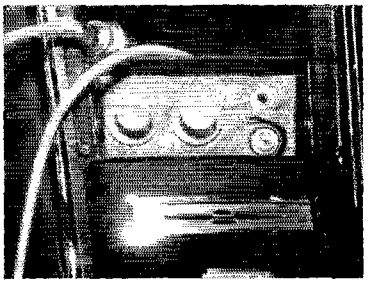
J_1—Octal socket (bottom view shown).
J_2—Closed-circuit jack.
P_1, P_2—Octal plug (bottom views shown).
P_3, P_4—Plug to suit transceiver.
R_1, R_2—Linear control.
S_1—S.p.s.t. switch at microphone.
S_2—S.p.s.t. toggle switch.

A remote power switch (Fig. 1F) was also included so that it would not be necessary to open the trunk for this function (very undesirable during a rainstorm). The function switch is left in the s.s.b. position.

The need for a p.t.t. circuit is eliminated by using VOX with an on-off switch at the microphone (Fig. 1D).

Installation

The resulting convenience and appearance of the trunk installation have been well worth the few hours and dollars invested. The remote-control panel is mounted under a flip door in the T-Bird console, as shown in one of the photographs. For the sake of appearance, the panel is covered with grained vinyl matching the interior, with the result that it appears as a FoMoCo accessory. A second section in the console is convenient for holding the microphone and log book. With the lid closed, the entire installation is concealed. To avoid hum, it was found necessary to keep the shielding of the microphone cable, and the ground wire of the other remote cables (which are not shielded), insulated, except at the transceiver ends, where they are grounded.



Remote-control unit mounted in front-seat console. The knobs are for frequency and audio-level control.

In the trunk, the NCX-5 is set on a foam cushion for shock mounting, and the transceiver lid is left open for better cooling (although heating, even on the hottest summer day, has been no problem). The d.c. supply is also in the trunk.

Adjustment and Tune-Up

What about tuning up in the trunk? It is not necessary! The antenna is adjusted for a flat 52 ohms at the desired center frequency (in my case, 3980 kc.); the transceiver is tuned up at the same frequency into a dummy load in the shack, and then placed in the trunk without moving the controls. Tests (by getting inside the trunk!) have indicated that no further tuning is necessary within the limited frequency range of the remote tuning. The fact that there is only about three feet of coax between the transceiver and antenna seems to help both the efficiency and the ease of matching.

Many other variations should be possible, such as having two frequency-control circuits with a switch to permit independent control of transmit and receive frequencies as well as transceive operation. A lighted calibrated dial should also be possible, but was not used here because of space limitations.

No room for a mobile rig? Think again! QST

A 500-Watt Power Inverter

12 or 24 Volts D.C. to 115 Volts 60-Cycle A.C.

BY RUSSELL DUNAJA,* W3BBF

INVERTERS that generate 115-volt 60-cycle a.c. with 12-volt d.c. input are useful devices for camping trips and emergencies. The one described below was designed primarily to handle my KWM-2, but it will also operate my 225-watt absorption-type gas-electric refrigerator, an exhaust fan, and several fluorescent lights. The nominal rating is 500 watts. When an a.c. line is available, the same unit may be used to charge a 12-volt battery.

Output Transformer

The circuit of the 500-watt inverter is shown in Fig. 1. The success of the unit depends to a great extent on the design of the output transformer, T_1. In experimenting over a long period with transformers wound on conventional rectangular cores, it was found to be almost impossible to avoid transient voltage spikes that would in time ruin the transistors. The problem was resolved eventually by using a toroid core. The one I used is from an old 20-ampere variable-voltage autotransformer (known by various trade names, such as Variac, Powerstat and Volt-Pac), but any such transformer having a rating of 5 amperes or more should be usable.

Secondary Winding

The original winding on the transformer is to be used as the 115-volt a.c. secondary. Most variable-voltage transformers have an "over-voltage" tap that provides a step up, in normal use, to somewhere between 120 and 140 volts. This tap can be used to give a choice of two a.c. output voltages.

After removing the sliding contact and mounting, the original winding should be inspected carefully, especially if it is a junk item, to make sure that there are no breaks in the winding, or shorted turns along the slider path. The turns on the winding should be counted, since the number of turns to be wound on the primary and feedback windings will depend on the number of turns on the secondary. If the original winding has been damaged, it should be rewound with the same number of turns of the same size of wire. If your core has no winding, the number of secondary turns can be approximated closely enough by:

$$Turns\ per\ volt = \frac{9.5}{A},$$

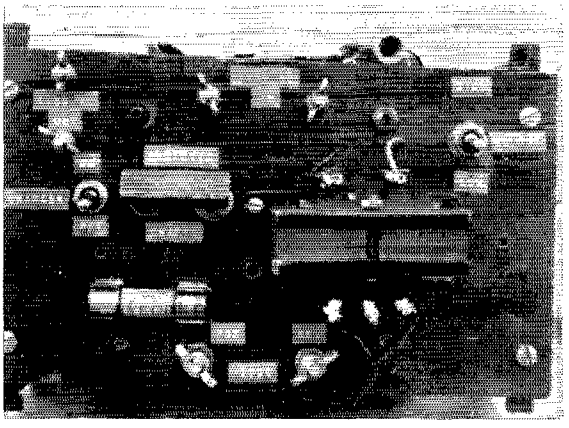
where A is the cross-sectional area of the core in square inches (the height of the core times the thickness of the core in inches). Thus, if the core is 3 inches high, and 1 inch thick, A is 3, and the number of turns per volt is 3.16. Therefore, a 115-volt winding would require 364 turns. The largest size of wire should be selected that will permit the winding to be made in one layer with the turns close-wound. Use wire with heavy Formvar insulation, and cover the core with a layer of tape before winding on the turns. Calculate the length of wire needed to make the required number of turns (be generous if you want to make sure that you won't run short) and make the winding by taping one end of the wire to the core and feeding the other end into the window.

Primaries

The original winding on my core has a total of 205 turns, tapped at 196 turns, the tap being the normal 115-volt point. This figures out to be 1.7 turns per volt. The 12-volt primary will therefore require about 20 turns (each side of center). To allow for some resistance loss, I made the step-up ratio a little higher by using 19 instead of 20 turns.

To avoid loss of power in equalizing resistors, each transistor is fed through a separate primary winding. Also, since smaller wire is more readily obtained and easier to handle than a single conductor of adequate size, the number of primary windings was doubled, the windings being connected in parallel in pairs. Thus, there is a total of 8 primaries, as indicated in Fig. 1.

*7524 Battle Grove Circle, Baltimore, Md. 21211.



Top view of the inverter, showing the feedback transformer and control switches. Two toggles to the left of the transformer are ganged by drilling holes in a length of square brass rod.

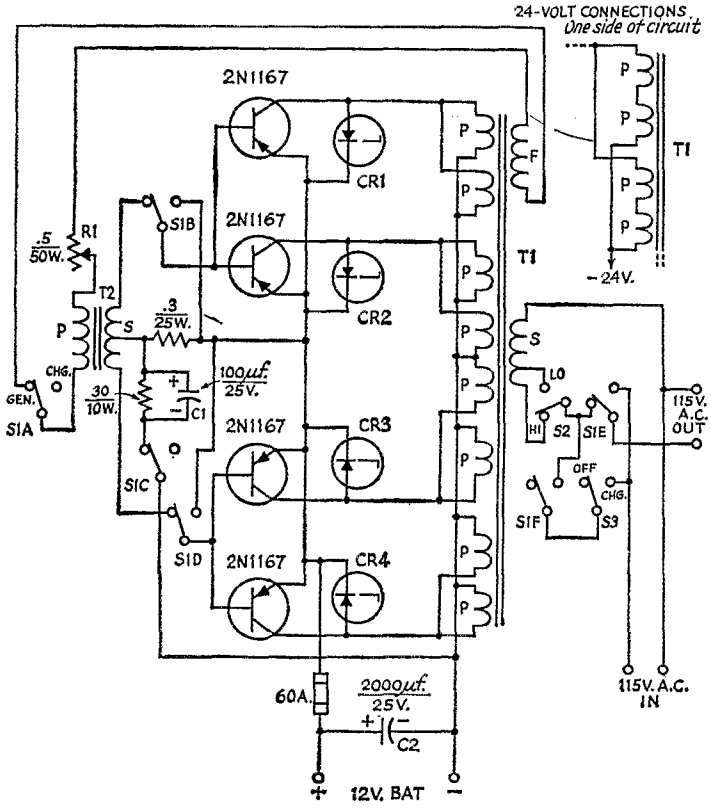


Fig. 1—Circuit of the 12-volt d.c. to 115-volt a.c. power inverter. Capacitors are electrolytic. P indicates primary windings (on generate), S indicates secondaries, and F is a feedback winding. R_1 is a rheostat (Ohmite type 0308). S_1 is a 15-ampere 6-pole double-throw switch. It can be made by mechanically ganging the controls of a combination of standard 1- 2- or 3-pole toggle switches. S_2 and S_3 are 15-ampere s.p.d.t. toggle switches. Transistors are 25-ampere 90-watt p-n-p germanium types (Motorola 2N1167). Zener diodes, CR_1–CR_4, (transient suppressors) are 35-volt 10-watt types (Motorola 1N2991). See text for construction of T_1 and T_2. Detail at upper right shows T_1 primary connections for 24-volt operation, as described in the text.

Before making the primary windings, the original winding should be covered with two layers of plastic electrical tape (Scotch glass tape is better if it is available). Then, the length of wire to make the required number of turns should be estimated, and eight strands of No. 14 wire with heavy Formvar insulation cut to this length. The strands should be laid parallel, and then wound simultaneously. The turns should be spread out evenly to occupy as much of the core circumference as possible. (Smaller cores may require more than one layer. Try to estimate the number of layers and divide the winding into layers of an equal number of turns, each layer spread out over the core.)

When the winding has been finished, the individual windings should be connected in parallel in pairs, connecting two starting ends together, and two finishing ends together. (Use an ohmmeter to pick out the individual windings.) It doesn't make any difference which two windings you choose to connect in parallel. However, the starting ends should be connected to the collectors of the two transistors on one side of the circuit, while the finishing ends should be connected to the collectors of the two transistors on the other side of the circuit. The opposite ends in each case will then be connected together, and eventually to the negative side of the battery.

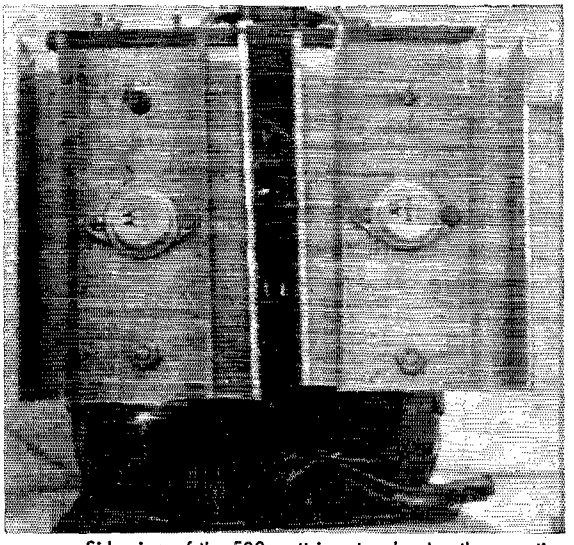
Feedback Winding

Experience has shown that a base driving voltage of 5 to 6 volts is adequate. I used 9 turns on the feedback winding, and provided the 0.5-ohm rheostat, R_1, for adjustment. This winding was made by winding two strands of No. 18 simultaneously, and connecting the strands in parallel when the winding was finished. The primary was covered with two layers of tape before adding the feedback winding. As with the primary, the turns of the feedback winding should be spread out over the core.

Feedback Transformer

The feedback transformer, T_2, was wound on the core from an old 15-watt audio output transformer. This core is of the "EI," or Figure 8 type, with the windings on a center leg. The cross section of this leg is about ¾ inch square.

The core was disassembled, and the original windings removed. A wood form the same size as the core leg was made, and three strands of No. 18 were wound simultaneously on the form to give 30 turns of each strand. The starting end of one strand should be connected to the finishing end of a second strand to form the secondary, the junction serving as the center tap. The third strand is used as the primary. Thus the transformer has a 1-to-1 ratio, primary to half second-



Side view of the 500-watt inverter showing the mounting of two of the four transistors on heat sinks. The other two transistors are similarly mounted on the other side of the unit.

ary. After winding, the new coil can be slipped off the form, taped, and the core reassembled. The output frequency of the inverter is determined principally by the number of turns on T_2, so some experimentation may be necessary to obtain 60-cycle output.

Heat Sinks

The form that the unit assembly may take is not critical. However, the transistors should be mounted on heat sinks with the transistors exposed to free air, as shown in the photographs. The heat sinks that I used are homemade of 1/16-inch aluminum sheet. Each sink (one for each transistor) consists of two channels, assembled one within the other. The outer channel is made from a piece measuring 5 by 6 inches, by bending up 1-inch lips along each 5-inch side. Each inner channel is made similarly from a piece measuring 5 by 3½ inches, bending up ¾-inch lips along each 5-inch side. The two U-shaped pieces are then nested, and bolted together, and the transistor mounted centrally. No insulating washers are necessary for the 2N1167s.

Charging

The inverter is used ordinarily with a charger connected across the battery. The charger is capable of handling most, if not all, of the required power. (I use a 55-ampere Motorola alternator/rectifier driven by my 60-h.p. Jeep Diesel.) However, on occasion, I have successfully operated the KWM directly from a pair of 6-volt 130-ampere-hour batteries for periods of up to 3 or 4 hours without operating the generator.

Whenever an a.c. line is available, the battery may be charged from the inverter by switching to the CHARGE position, making it unnecessary to crank up the generator. The charging rate depends on the condition of the battery, and the turns ratio of T_1. With the ratio I used, the charging rate varies from 6 to 12 amperes. The charging rate will be higher with a smaller turns ratio (more turns on the primaries), but the output voltage when the unit is used as an inverter will be lower.

CAUTION: Do not operate the unit on "charge" with the battery disconnected, as the transistors may be damaged.

I have had no trouble with this inverter in the time that it has been in service. The voltage regulation is reasonably good. The no-load voltage output is 130 volts at the low-voltage tap, and 135 at the high-voltage tap. With the KWM-2 connected and fully loaded (475 to 500 watts input), these voltages drop to 110 and 112, respectively.

24-Volt Operation

Although I have not actually tried it, it should be possible to use the unit with a 24-volt battery, at the same power level, by using a single 2N1167 on each side of the circuit. The primary pairs of T_1 should be connected in series, instead of in parallel, and then the two series pairs connected in parallel, on each side of the circuit, as shown at the upper right in Fig. 1. Two 63-volt Zeners should be used, one on each side of the circuit. The 0.3- and 30-ohm biasing resistors should be changed to 1 ohm, 20 watts, and 100 ohms, 10 watts, respectively, and a 0.2-ohm 5-watt resistor should be inserted in series with the base of each transistor. The 60-ampere fuse should be replaced by a 30-ampere unit.

QST

(EDITOR'S NOTE: Readers who do not have access to the type of core used by the author can obtain suitable cores from Arnold Engineering Co., 610 East Palisade Ave., Englewood, N. J. Their type 6234L-12 core is about right for the job, and sells for $5.00 or less. It measures 3½ inches inside diameter, 5½ inches outside diameter, and the cross section is 1 inch square. Using this core, the 115-volt secondary should have about 550 turns (No. 14 should be adequate), but it would be advisable to use about 600 turns, and provide taps every 25 turns down to 400 turns to permit adjustment of both the output voltage, and the charging rate. (The 2N1167s should be capable of handling charging currents up to 50 amperes if the case temperatures are held to 25 degrees C.) The secondary winding will require about four layers, and tape should be used between layers. The primaries (8) should each have 55 turns of No. 14, wound as described by the author. This winding will also have to be wound in layers. The feedback winding should have about 28 turns of double-strand No. 18, but may require some experimental adjustment to obtain the desired feedback voltage.)

Technical Correspondence

THE "ARMY LOOP"

Technical Editor, *QST*:

Having just read the article "The Army Loop in Ham Communication" in March 1968 *QST*, I would like, speaking as the designer of the "Army Loop," to offer a few comments.

First, I note with regret that the loop tested was not a reasonably accurate electrical duplicate of the Army version. Consequently, the "Tests in Comparison with Other Antenna Types" are of questionable validity. To substantiate this statement I submit the following:

1) At the test frequency, 3980 kHz., the value of C_2 was probably in the order of 450 pf. under matched conditions. This is based upon the fact that a maximum of the capacitor is 500 pf., and good engineering practice would allow a minimum range of about 10 percent above and below the optimum value.

2) Not being absolutely certain in my memory regarding details of work performed three years ago, I have just checked one of our Army antennas, one which has been out in the weather for the past nine months. (I freely concede that in our portable models we have had a problem due to deterioration of contact conduction as a result of exposure to the elements. Consequently, this antenna is not likely to be truly representative of a new one. Nevertheless, it is the only one we presently have left here in Aberdeen so I measured what we have.) My measurement verified what I had suspected. When operating at 3980 kHz. our antenna matches to a 50-ohm line with a value for C_2 of about 2300 pf. This is a very significant differential. Let us look a little closer and see what this does to the performance of the two antennas.

3) Since both of the two loop conductors are of the same size, shape and material they probably have essentially identical inductance values. Consequently, to provide resonance at the same frequency, the two capacitive matching networks must provide very nearly the same total capacitance across the loop terminals. Since in the Army model C_2 is about five times as great as the equivalent in the ARRL version, C_1 (the effective value of C_{1A} and C_{1B} in series) in the Army network is approximately 0.8 times the value of C_1 in the ARRL equivalent. The relationship for the capacitative matching networks

$$\textit{Impedance offered to input} = Z\left(\frac{C_1}{C_1 + C_2}\right)^2$$

where Z is the parallel impedance of the antenna. If we plug into this equation a reasonably realistic value of 200 pf. for C_1 in the ARRL network (giving about 160 pf. for the Army equivalent) we can — since each antenna is matched to a 50-ohm line — readily calculate the impedance of each antenna. This gives about 527 ohms for the ARRL loop and about 13,700 ohms for the Army antenna. Very significantly, the Army antenna has an impedance which is greater than that of the ARRL version by a factor of 26!

4) From the fundamental relationship between the impedance, Q and loss characteristics of parallel-resonant tank circuits (as represented by our loops), we can readily conclude that the Army antenna is less lossy than the ARRL counterpart by the same factor, 26.

5) If we further assume, quite realistically, that both antennas have (at the test frequency) a radiation resistance of 0.1 ohm and, further, that the efficiency of the Army antenna is about 50 percent, we can compute the ARRL antenna to have an efficiency of about 3.7 percent. We may then conclude that the difference between the ARRL loop antenna and the original Army version is (within the limits imposed by the assumptions which have been made) from 11 to 12 db. in favor of the Army version. I am certain that you can visualize the difference which would have been made in the results of your tests if an additional 11 db. of signal had been radiated by the loop.

6) I regret I cannot offer positive suggestions regarding the exact nature and location of the losses in your loop. A good general rule is that *any* mechanical joint in the entire loop is a prime suspect. This includes not only the corners of the octagon but also the connections to the adapting brackets and the feedthrough insulators. Basically, the *sum* of *all* looses must be (and can be) low compared to the radiation resistance, 0.1 ohm.

I also wish to clarify a misunderstanding regarding the mica capacitors used in the Army loop. Contrary to the impression I have erroneously conveyed in the past, these mica capacitors, though certainly of high quality, are not special military components but are ordinary commercial (current rated) components. Incidentally, with the exception of your experience, I am not aware of any overheating in these components.

The final comment I wish to submit is in regard to a statement made in the conclusions. It is stated that the dipole will do as good a job or better, is much cheaper and can be used on all bands. Regarding the first claim, whether the loop or the dipole does the better job depends greatly upon the loop. My experience (45 years) is that if the loop is average in its performance the dipole (60 feet high) will usually outperform the loop. But if the loop is a good one (such as the Army version) this is no longer true. The second part of the statement ("the dipole is much cheaper") is also, I believe, open to question. Just which of the two antennas is cheaper will depend upon the individual user's circumstances. In costing a dipole 60 feet high, such as was used in your tests, I feel that the expense of acquiring at least two poles, each close to 70 feet long, plus rigger's fees must be, for most of us, included in the cost of the dipole. As for being used on "all" bands, I agree. Certainly I do not recommend a single individual loop for use over more than a 2-to-1 frequency range. On the other hand, neither would I advise the use of a single, individual dipole on more than one band. In fact, the very concept and definition of a true dipole limits its use to a single band. However, I recognize, of course, that with appropriate modifications single physical-dipole-type antennas can be made to perform over several bands.

I wish to emphasize that none of the foregoing comments are intended to be critical of the ARRL. The ability of its members to effectively improvise is legend the world over. I only regret that in my previous efforts on loop antennas I have failed to place sufficient emphasis on the absolute necessity of reducing *all* losses, whether they are due to skin resistance or to joint and contact resistances, to an

extremely low value. This is the basic concept of the Army's loop antennas. The sum of all losses must be, can be and *is* well below 0.1 ohm.

Since I am confident that the ARRL and *QST* have a keen desire to present the true facts in a straightforward and impartial manner, I am looking forward to a future loop article reporting on a loop which is truly comparable to the Army version. — *Kenneth H. Patterson, Department of the Army, U.S. Army Limited War Laboratory, Aberdeen Proving Ground, Maryland 21105.*

[EDITOR'S NOTE: A new loop using copper pipe, with soldered joints, is under construction for the purpose of making further tests along the lines suggested by Mr. Patterson. Results will be reported in *QST* as soon as possible.]

Technical Editor, *QST:*

Recently, a single-turn loop transmitting antenna developed at the Army's Limited War Laboratory was described by Kenneth Patterson (*Electronics*, Aug. 21, 1967).[1] This antenna was developed for use in Southeast Asia to boost m.f. and h.f. signals out of narrow valleys and heavy forests. Inasmuch as this also describes most recreational camping spots, the antenna should be of interest to hams who like to combine hamming and camping. It is relatively small and can be placed directly on the ground, but requires no ground plane nor ground connection.

To check out the possibilities, an experimental version was whipped up and tested on 80 meters.

The large-diameter conductor required presented a problem until I remembered the ever-handy roll of aluminum foil available at all grocery stores. The foil was crumpled loosely together as it was drawn from the roll to form a rope-like conductor 2 or 3 inches in diameter and about 30 feet long. The resulting conductor when strung up has surprisingly good wind resistance.

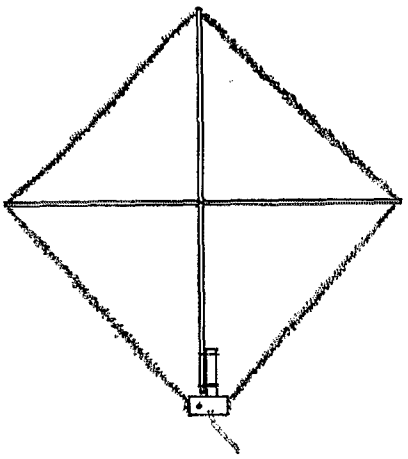


Fig. 1

Two 10-foot pieces of bamboo rod were lashed together to form a cross as shown in Fig. 1. The middle of the aluminum "rope" was secured to the top of the bamboo cross with a loosely-tied loop of twine. The halves were tied out to the ends of the crosspiece. The whole assembly was then raised to a vertical position and the bottom of the upright member lashed to a convenient post in the back yard.

The tuner, mounted in an aluminum box, was set on the ground at the base of the cross. The two loose ends of the conductor were drawn in and clipped to the tuner as shown in Fig. 2. The diamond-shaped loop thus formed is roughly 7 feet on a side. The tuner was fed with 300-ohm TV lead laid on the ground and into the shack.

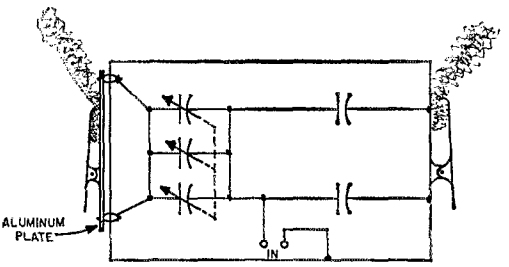


Fig. 2

The loop resonating capacitor is a three-gang receiving type with paralleled sections totalling about 1100 pf. It was found by trial that 0.003 μf. is about the right value for the matching capacitor on 80 meters. To reduce resistance it was made up of two 0.0015-μf. transmitting micas, the kind with heavy lug terminals, that were in the junk box. Ideally, the matching capacitor should be a series of switch-selected units to permit closer matching of the feed line as in the Army version, but a low-resistance, high-current switch was not at hand.

Internal connections were made with lengths of copper braid. The loop connectors were made of wide spring clips taken from dime-store note boards. The ends of the aluminum conductor were simply slipped under the clips, which then held them in tight contact with the end of the box on one end and to the insulated aluminum contact plate on the other end. Excess conductor length was simply torn off and discarded.

The experimental loop and tuner were driven by a transmitter having an input of 12 watts. Tune-up was done by adjusting the pi-net output capacitor until some loading was indicated, then tuning the loop to resonance as indicated by a neon bulb held on the insulated end plate, after which the pi network was adjusted for normal plate current.

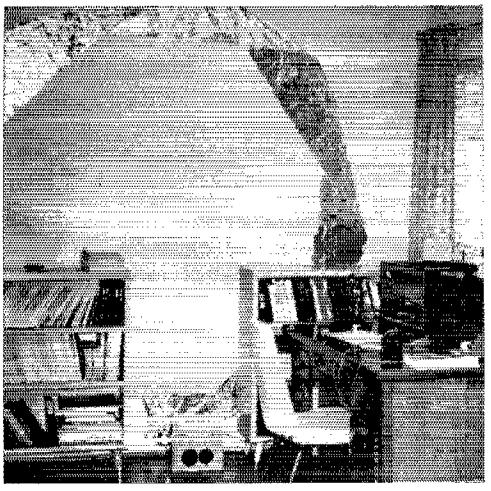
In a week of intermittent operation, during midday hours only to avoid QRM, several contacts up to a maximum of 90 miles were made. All reports were R5, S7-9. As an experiment, the loop was shortened to 3 feet on a side during the 90-mile contact. The report dropped to R5, S3. For comparison, a random wire about 40 feet long and 8 to 10 feet high could not be heard.

Results were good enough to indicate this may be a quick and convenient antenna for many temporary operating locations. Ingenuity and a roll of fishing line will suggest many other ways of stringing up the aluminum foil. Inasmuch as the only high-voltage point is at the insulated connection plate, you don't have to be too careful about insulating the loop support points. When you are done, the aluminum foil can be discarded (in a proper refuse container, of course). — *S. A. Sullivan, W6WXU, 20565 Fifth St. East, Sonoma, California 95476.*

[1] See March 1968 *QST* for a report on this antenna.

Technical Editor, *QST*:

I was quite interested in Lew McCoy's article on the vertical loop antenna. An indoor version of this antenna has been used at my QTH for several months. Being an apartment dweller I am unable to put up an outside antenna, and have found this version of the vertical loop to give excellent results.



W3TOB's wall-mounted loop solved his apartment-antenna problem — and probably dazzles visitors when light strikes the bright side of the aluminum foil!

The antenna is made from ordinary 12-inch wide aluminum foil attached to an outside wall of the apartment with Scotch tape. A sketch of the layout and dimensions are shown in Fig. 3. Note that the dimensions are made by folding the continuous strip of foil. The original capacitive tuning arrangement shown in Fig. 3 is used. Pilot lamps shunting three to four inches of the feed line are used to tune up. Care must be taken not to tear the foil when putting up the antenna. It is estimated that C_1 and C_3 must go to about 800 pf. to tune to 80 meters, and C_2 to several thousand pf. Receiving-type mica capacitors have been used successfully for C_2, but fry in the other positions.

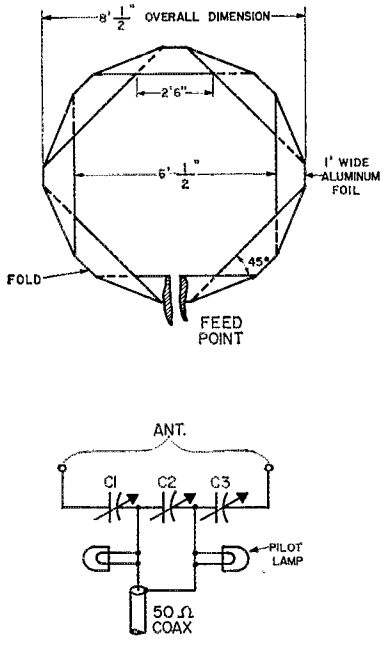


Fig. 3—Dimensions of the aluminum-foil loop used by W3TOB. The circuit for matching into the transmission line also is shown.

Although this antenna may not be as effective as a good outside antenna, it does very well for its size and convenience. The first night on 80 meters three stations were worked — K1DGE, WA6WNH, and VE3COO — with 150 watts input to an Apache. A month before trying it on 80, it was used on 40 with 50 watts to an HX-20, where several Europeans were worked. Operation has been confined primarily to low-frequency c.w.; however, contacts have been made on 15 and 10 meters. On the latter bands the antenna is loaded directly from the pi network of the Apache. The antenna is self-resonant at about 30 Mc. as indicated with a grid dipper. It works to ten meters, but don't expect it to work like a beam. — *R. B. Short, W3TOB, 12207 Academy Way, Apt. 16, Rockville, Md. 20852.*

M.U.F. VALUES

Technical Editor, *QST*:

In "Interpreting 50-Mc. M.U.F. Tendencies in the Current Sunspot Cycle," March *QST*, Mr. Cooper, in referring to "Ionospheric Predictions," prepared by ITSA, writes that the m.u.f. values given therein "purport to show the highest frequency that the *F* layer will reflect back to earth for that point above the globe, for that time of day." This is an inaccurate statement.

Median values of m.u.f. are used in the "Predictions" (and are so labeled). The frequencies shown are those for which there is a 50-percent probability of ionospheric support for a signal return.

Had ITSA chosen to do so, the prediction charts might have been prepared for any other percentage of the time during the month — for example, for 3 percent of the time for long-shot amateurs, or for 97 percent of the time for those who require a high order of reliability.

We would expect that Mr. Cooper would be interested in reviewing the "Predictions" on a long-shot basis, using the median m.u.f. (zero) F_2 data. If the contacts he reported at 50 MHz. were actually made as the result of an F_2 path, he may find that he might have deduced from the "Predictions" that such an opportunity was possible. He could not, however, have said on what day of the month the occurrence would take place. So far as we know, no one has the ability to do that at any frequency in the h.f. and v.h.f. ranges. We cannot say what will happen a week from next Tuesday.

V.h.f. amateurs have used active stations in other services as "indicators" of possible extended range communication for at least 20 years. It is the only system we know of that applies to current conditions in a v.h.f. band in which the amateur activity is not intensive over wide areas. — *Lewis B. Gilmer, K2ETM, 17 Adams St., Garden City, N. Y. 11530.*

Hints and Kinks For the Experimenter

SIMPLE METHOD OF MOUNTING A ROTARY BEAM ON A UTILITY POLE

In some areas of the country used utility poles are available to amateurs at little or no cost. However, it's a problem to mount a large antenna on a pole, and little information is available from antenna or rotator manufacturers, except on mounting beams on towers.

The antenna system shown in Fig. 1 has been in service for one year, and it has withstood the test of the elements, including a severe sleet storm and several summer storms, one with winds gusting to 90 m.p.h. No problems have yet been encountered with the antenna, a 50-pound Mosley TA3340, or the rotator, a Ham-M. Overall height of the system is 40 feet.

After consulting with several metal firms, I located a 15-foot length of 2-inch o.d., $\frac{3}{8}$-inch wall aluminum tubing for the mast. Aluminum was picked because of its light weight (the mast weighs only 20 pounds), and durability. A thrust-

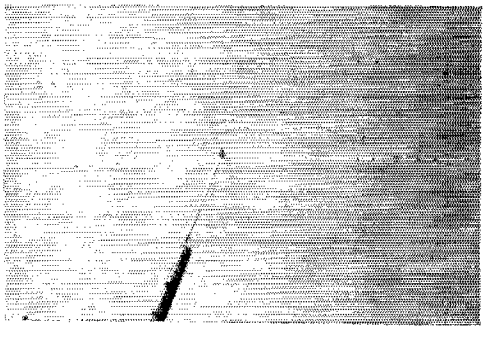


Fig. 1—KØCOU's 50-pound beam mounted atop a utility pole.

bearing type of mounting was chosen to avoid excessive sideways strain on the rotator by the lever action of the antenna and mast. A 3-foot, $2\frac{1}{8}$-inch i.d. aluminum tube was used for the bearing.

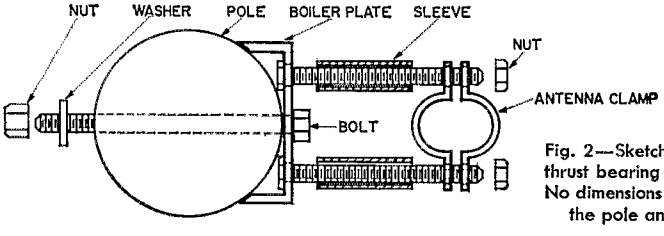


Fig. 2—Sketch showing the hardware used to attach the thrust bearing and rotator pipe to a wooden utility pole. No dimensions are given as they will vary with the size of the pole and the materials available to the builder.

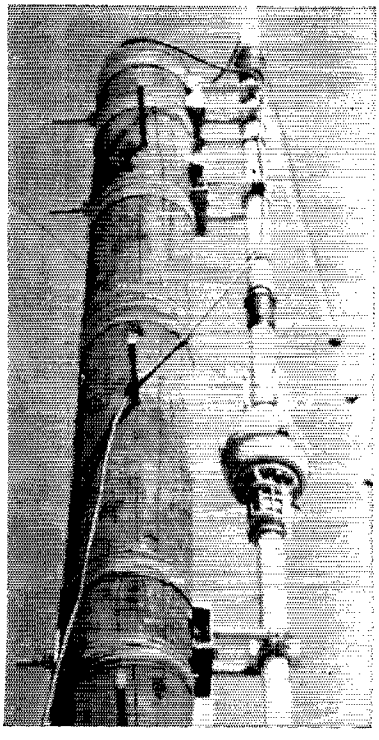


Fig. 3—A closeup of the installed rotator and mast.

After the hardware (Fig. 2) and thrust bearing were mounted on the pole as shown in Fig. 3, the 15-foot section of aluminum tubing was pushed through the 3-foot thrust bearing, and the antenna was attached to the top of the mast. Then a 3-foot section of pipe was attached to the base of the rotator. Next the mast was pushed up to the position shown in the photographs, the rotator clamped to the mast, and the pipe at the base of the rotator secured. Lightning protection was provided for the installation by running a ground wire directly from the base of the rotator to a ground rod buried at the foot of the pole. — *William N. Kendall, KØCOU*

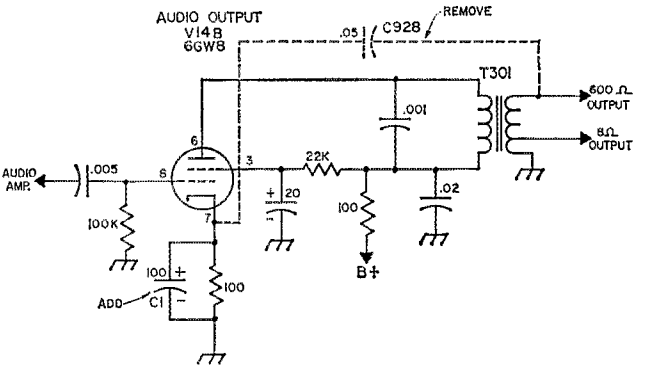


Fig. 4—Schematic of the audio output stage in the SB-100, showing modifications for increased gain. C_{928} should be removed and C_1, a 100-μf., 25-volt electrolytic, connected from pin 7 of V_{14B} to ground. The other parts shown are original SB-100 components. Resistances are in ohms; K = 1000. Capacitance values are in microfarads (μf.)

SB-100 IMPROVEMENTS

THE Heath SB-100 transceiver can be modified to obtain greater gain, slightly increased sensitivity and considerably more audio output. The first seven changes listed below convert the SB-100 to an SB-101, except that no filter switch is added. They are official Heath modifications that were found by directly comparing the SB-100 and SB-101 schematic diagrams and parts lists. The other changes are our own.

1) Change R_{221} from 470 ohms to 100 ohms.
2) Change R_{927} from 220 ohms to 100 ohms.
3) Change R_{928} from 150 ohms to 56 ohms.
4) Change R_{104} from 47 ohms to 56 ohms.
5) Change R_{105} from 47 ohms to 56 ohms.
6) Insert a 4700-ohm, 1-watt resistor between ground and the ground end of the 10,000-ohm BIAS ADJUST potentiometer.
7) Connect a 0.005-μf. disc ceramic capacitor from the B+ connection of the LMO to ground.

Considerably more output from the transceiver is obtained by removing C_{928}, a 0.05-μf. negative feedback capacitor between pin 7 of V_{14B} and T_{301}, and adding a 100-μf., 25-volt electrolytic, C_1, from pin 7 of V_{14B} to ground (see Fig. 4). The increase in distortion appears to be negligible, and the audio output is greatly increased.

Overall gain of the receiver is quite dependent upon the low-voltage supply used with the transceiver. Rather than the nominal +300 volts specified, the authors recommend a slightly higher voltage (up to 10 percent).

Prior to these changes, the authors were somewhat disappointed with the performance of the receiver section of the SB-100. The audio output was quite low, especially on 10 meters, and the S meter indicated a low signal level. The changes given here corrected both of these conditions and also improved the transmitter audio and driver levels. — *Charles B. Andes, WB2VXR and Emil E. Hrivnak, W2CCL*

JEWELERS' LOUPE HELPS TO RELIEVE EYE STRAIN

AN eye loupe affixed to a pair of glasses is very helpful for examining soldered connections in tight, crowded areas. A jewellers' loupe can be purchased for a reasonable sum at any optical center or supply house. — *David Basskin, VE3FPM*

DENTAL INSTRUMENTS FOR THE AMATEUR

DISCARDED and broken explorers and scalers are very handy tools for the ham shack. Dentists break the fine points of these instruments, making the tools useless for the purpose for which they were designed. However, such tools are more than adequate for opening up solder-filled holes in sockets and tie-points. Solder won't adhere to the instruments because most modern dental hardware is made of stainless steel. The next time you visit your dentist, ask him for these used or broken items: in most cases, he will be glad to give them to you. — *Dr. Roy R. Campbell, W4DFR*

DIODE PROTECTION FOR THE HEATH R.F. PROBE

I HAVE been building an s.s.b. rig for 6 meters. In the process of testing the transmitter, I have burned out three or four 1N34 diodes in my Heath 309-C r.f. probe by exceeding the 30-volt r.m.s. rating of the unit.

I solved the problem by connecting a NE-51 neon bulb across the diode as shown in Fig. 5. Before the p.i.v. rating of the diode is exceeded, the NE-51 conducts and acts as a protective short across the diode. The particular diode now in use has not been damaged, even though it has been subjected to the same voltage levels that burned out the other diodes, and the accuracy of the probe doesn't seem to have been impaired by the addition of the NE-51. — *C. A. Danforth, K3OKG*

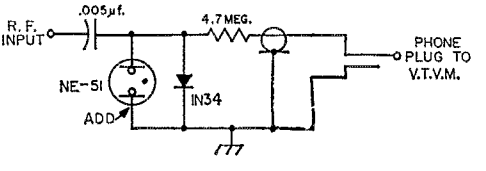
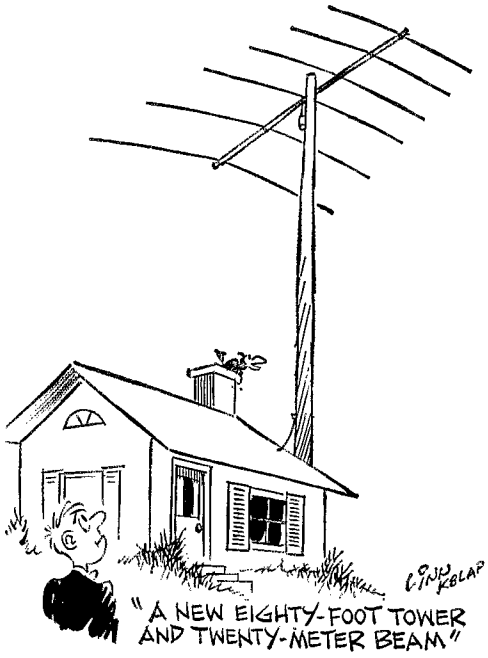


Fig. 5—The addition of a NE-51 neon bulb to the Heath r.f. probe protects the unit from overload. Resistor is ½-watt composition.

QRP VERSUS QRO

A Short Story

BY ROBERT BRINE,* WB6RYQ



I closed the door of the den, sat down at my massive, Italian provincial desk, which doubles as a work bench for small home-brew projects, and dumped a handful of electronic components out of a brown paper bag.

All the parts were there; resistors, transistors, capacitors, crystal and mounting board. There was even an extra 330-ohm resistor. I only needed one 330-ohm resistor, but they were selling at two for 25¢, and by purchasing two, I had saved ½¢ on each resistor.

I glanced up at my new QRP membership certificate hanging on the wall. It was neatly set off by the dark mahogany paneling of the den. Soon, I hoped, I would be able to hang up the 1000-Mile-Per-Watt certificate next to it. All I had to do was solder together the little components into a 1 milliwatt, 20-meter transmitter and work the East Coast.

The door of the den banged open and jarred me from my thoughts.

"Hi, Pop!" It was my fourteen-year-old son, Ted.

"What's up, son?" I asked.

"Well," he began, "I was just wondering about something. I've been on 20 meters ever since I got my General Class ticket, but I've only worked forty countries with that seventy-five watt, Novice rig. I'm really going to have to use more power if I'm ever going to earn my DXCC Certificate."

"OK," I said. "You can have my 200-watter. I've gone QRP now, anyway."

"Thanks, Dad, but I was thinking more like a kilowatt. I mean, why not go first class, if you're going at all?"

Well, I figured ham radio was just the thing to keep the kid off the streets, and so the next day I drove down to Market Street, in San Francisco, and picked up a Hurricane SR-2000 transceiver for $995.00 and a power supply for $395.00. Ted was delighted, and I was able to get back to work on my QRP rig.

The next week I was at my desk wiring in the final resistor of the little rig when Ted walked into the den.

"How's DX," I asked.

"OK," he said without any enthusiasm.

"You look a little sad," I observed. "Want to tell your old dad about it?"

"Now that you mention it," the kid replied, "things aren't going too well. It's like, all that power, you know — all of it — just going into a dipole antenna. You dig?"

"I dig!"

The next day, I dug down into my pocket and pulled up a one-thousand-dollar bill for a new eighty-foot tower and a twenty-meter beam antenna. Then I went back to home-brewing my one-milliwatt peanut whistle.

When the little rig was completed, I connected it to the dipole, turned on the receiver with the gain at a minimum, and keyed the new rig. Nothing! I turned up the gain. Still nothing! Then I fed the output of the rig directly to the receiver. More nothing!

Several weeks later I was still analyzing the schematics to find a wiring error, when Ted barged into the den.

"How's the DX champ?" I asked.

"Well," he hesitated. "Only 280 countries worked so far. Of course, I did receive my DXCC Certificate."

"Fine, son, fine!" I praised.

"Well, Dad," the kid said, "I just don't know how I'm going to get the rare ones. It's like Hicksville here on the coast! I mean, what with all those Sierra Nevada Mountains just a hundred miles to the east, a guy just doesn't have a chance to work the rare DX in Africa. Dig? It's like, man! The *location* is the thing that counts for DX. How can I get to the top of the DXCC honor roll from here?"

I saw Ted's problem and began to work out a solution in my mind.

The next day I drove up into the Sierras to locate an ideal transmitter site. Near Emigrant Gap, which is at the 8000-foot level just south of Lake Tahoe, I found the dream location. It was

*6128 Welty Way, Sacramento, Cal. 95824.

a small estate consisting of four acres, free from trees, and boasting a private ski lodge of some ten rooms. The view from the lodge was nearly overwhelming; one could see in all directions for nearly one hundred miles.

The owner accepted my draft on the First Security Bank of San Francisco for $40,000 and even helped Ted to install the radio equipment and erect a new tower.

It was a ham's dream come to reality — almost. The only fly in the ointment, or a.c. on the note, was that winter would bring heavy snows to this area and the roads would be closed during some of the prime DX months! Moreover, Ted would have to be at school in San Francisco by eight o'clock every morning.

With a stroke of genius, not to mention of the pen, I wrote out another draft on the bank for $120,000, and with it, I purchased a helicopter. Ted would now be able to operate the station in the winter and get to school on time.

Assured that the kid would now be able to move up on the DXCC honor roll with little difficulty, I went back to San Francisco and to my QRP rig.

I carefully traced the wiring once more and discovered, at last, why no signal would come from that clump of components which I fancied to call a transmitter. The emitter and collector leads of the transistor were reversed and the extra resistor had somehow gotten soldered into the circuit with the other components.

After a few hours, I succeeded in un-clumping the mess and re-soldering the parts into a transmitter which did have an output. With the help of a few ham friends, I got the one milliwatter on the air and worked several friends around the San Francisco Bay area.

During the next few months, I spent all my time trying to work the East Coast with the rig, but unfortunately, I worked only the few locals who would listen for me on schedule. It was beginning to look as though my QRP membership certificate would remain alone on the den wall.

In a spell of depression over the failure of the rig, I moped about the house and did little except eat and sleep. Such was my depression, that I scarcely took note that the DXCC honor roll now listed Ted at the top, with all countries worked! I even refused to work anyone on the land line whenever I could avoid it. When the president of the First Security Bank of San Francisco took to bothering me at all hours with questions about my checking account, I had the phone removed.

After a few weeks, my melancholia suddenly disappeared; it was Ted who inspired me to greater projects and greater hopes. He finally flew home one evening and I casually congratulated him on being at the top of the honor roll.

"Nothing to get excited about, Pop," was his reply. "I mean, like there's five other guys right on top with me, and each of us has worked all countries. So the game's over. Can't get ahead of the others if there's no more countries to work!"

Well, a father just can't stand by and not help — not when his son is suffering the trauma of a DX champ. So I began to puzzle over his new problem.

"Son," I asked, "what can we do about this?"

"Gosh, Dad, I dunno. Could you find a new country for me somewhere?"

I could see that this problem would be tough, so I consulted my attorneys. They advised me of the legal complexities involved and helped me organize my thoughts toward a solution.

I walked home from the lawyers' office; the cool sea breeze blowing against my face helped me to meditate clearly on the project at hand, and also, I saved 20¢ carfare.

The following day I outlined my plans to Ted, who was ecstatic when he heard them.

"Gee, Pop," he beamed. "You're a regular guy!"

His praise inspired me to my best efforts and with his help I packed my clothes and personal belongings, together with the 200-watt transceiver. I also tossed the QRP rig into one of the trunks just in case I would have a chance to try again for the 1000-Mile-Per-Watt Certificate.

Good boy that he is, Ted flew me and my baggage down to Pier 14, at the wharf, on his way back to the lodge.

At the wharf, I wandered about for a few hours, casually inspecting the ships currently in port. At last I found the object of my search. It was a small Japanese freighter scheduled to depart in an hour with a load of dry-mix concrete — the kind to which you add a little water when you need concrete for those small jobs around the house. The freighter's name was *Ginza Maru,* and her captain was standing on the pier making final arrangements for departure.

After a brief discussion with the captain of the *Ginza Maru,* I bought the entire ship, captain, crew and cargo for two million dollars, which I paid, on the spot, with a check drawn on the First Security Bank of San Francisco.

By the time the late afternoon fog began pouring in under the Golden Gate Bridge, we were in the middle of the bay, running outbound at a speed of nearly twenty knots. When I retired that evening, the *Ginza Maru* was a hundred miles out from the coast and nearly sixty miles south of San Francisco, with a heading of due south.

For the next two days, I busied myself with the installation of my ham gear on the bridge of the ship. The job completed, I worked several hams along the coast with the 200-watter and even tried out the QRP rig. However, I was unable to get a QSO with the little transmitter. Some of the boys did say later that they could hear the one milliwatt signal in there, but they just didn't have time to strain their ears working such a weak signal. I was forced to content

myself with the knowledge that at least I could radiate a signal with the rig.

On the morning of the third day the captain woke me at the first glimmer of sunrise. We had arrived at our destination; the famous sand bars of Baja California, which are located in international waters, about sixty miles from the Mexican coast.

First, we dropped anchor over the largest sand shelf, which the ship cleared by roughly six feet, and then we set off several small dynamite charges along the water line of the ship. These charges ripped open the ship and allowed water to pour into the cement-laden cargo holds. Within minutes the *Ginza Maru* began to settle, lower and lower, until she finally touched bottom. At this point, the *Ginza Maru* became a small, but genuine, Pacific island.

Immediately, I hauled down the Japanese flag and raised a new ensign which the ship's tailor had prepared for this occasion. It had a white background upon which was printed the picture of a blue telegraph key.

"I hereby declare this to be an independent country with the name of 'Republic of Hiram Maxim,' and I declare myself to be the President of this new republic," I announced over the public address system of the ship.

As my first official act, I issued an extra ration of *Sake* to all the crew. For my second presidential act, I issued, to myself, the Republic's first amateur radio license, ØB2YRK.

That same evening, on schedule, I had a long QSO with Ted. He was so excited over working one more country that he could hardly operate his transceiver. He did manage to elicit from me a promise not to work any other ham and another promise to send a QSL.

When he had finally calmed down, and we could talk of other things, I asked him to give a listen for my QRP rig so that I might qualify for the 1000-Mile-Per-Watt club.

"OK, Dad," he said. "I'll do just that, but first hang on a minute. I hear a ZD8 in there that I'd like to work."

"I'll stand-by, Ted," I answered, with obvious disappointment.

I did stand by — all night long, while Ted worked first one, and then another DX station. At last he came back to me.

"Gosh, Pop, I think the band's just about gone out. We'd better wait until tomorrow to try out your QRP rig. See you on sked." He was gone.

For the next four nights I tried to contact Ted on schedule. No Ted. I did hear him in there working DX, but when I tried to break in with the 200 watter, all I got was, "QR Zed, QR Zed the ØB2 calling this frequency." Then he'd go back to the DX stations.

On the fifth night I heard the ship's radioman receive a message on the marine radio. It was addressed to the captain and simply requested that I be detained by him until morning. It seemed that the U. S. Coast Guard would be

"PAUSING LONG ENOUGH TO THROW OUT THE QSL"

out with a cutter to take me back to San Francisco for questioning — something about money, I gathered.

I could, of course, have argued that I was on sovereign territory and that I could not be forced to leave. Nonetheless, I was pretty fed up with the whole business. I packed my things, threw the QRP rig overboard, lowered a life boat and began rowing.

Through the night, I rowed, pausing only long enough to throw out the QSL card I had intended to send to Ted. It was nearly noon when I reached the Mexican Coast. Fortunately, I landed at the little Mexican village of Tecpan, just north of Acapulco.

I have now become a permanent resident of Tecpan, and I manage to earn a living by selling souvenirs to tourists and working part-time as a disc jockey for a local a.m. station. Most of my time, however, I spend down on the beach, sunning, swimming, boating, fishing and doing my darndest to forget ham radio. Someday, I may make a new try to win a 1000-Mile-Per-Watt Certificate — that is — if I can find that old checkbook. QST

Strays

I would like to get in touch with . . .

. . . hams who are also mayors and newspaper publishers. WØHGQ.

. . . law enforcement officers who are radio amateurs and interested in joining an international amateur radio net. K2BIG.

. . . whoever operated X7XOT in 1929. W3KW.

. . . other students or teachers of Russian or Hungarian. W3AXR.

Feedback

In W6DMK's article on his 7-Mc. c.w. transceiver, April *QST* page 12, Q_1 should have been specified as a 2N697 or equivalent. The 2N3905 is a p-n-p type, while the circuit calls for an n-p-n.

V.H.F. QSO Party Announcement *June 8-10*

LIKE June itself, v.h.f. enthusiasts throughout our ARRL field organization will be bustin' out all over during the second weekend of that balmy (we hope) month — in other words, the V.H.F. QSO Party rides again! As mentioned in the September Party writeup (December *QST*, p. 62), we've come up with a new, simplified way to figure Party starting and ending times: just operate any continuous 28-hour period beginning no earlier than 1900 GMT (starting on the hour), June 8, and ending no later than 0600 GMT Monday, June 10. GMT? Once you get used to it you'll wonder how you ever got along without it!

Unlike the Sweepstakes, you may take section-multiplier credit separately for each band you operate, so it's worth your while to band-hop as much as you're able. Contact a station, tell him your section and get his, and that's it. To tabulate your final score, count one point for each complete (two-way) exchange made on 50 or 144 Mc., two points for each on 220 or 420 Mc., and three points for each on 1215 Mc. or higher bands; multiply total points by total section multipliers. Your contest log must show your call and section, band(s) used, times (in GMT), and call and section of each station worked. Elsewhere on this page is a sample log and summary sheet to guide you in filling out your own. **Entries must be postmarked no later than July 1, 1968.**

STARTING TIME	ENDING TIME
1900 GMT, June 8	0600 GMT, June 10
Operates any consecutive 28-hour period	

Rules

1) The June 1968 V.H.F. QSO Party begins at 1900 GMT, Saturday, June 8, and ends at 0600 GMT, Monday, June 10. Entrants may operate any continuous 28-hour period beginning no earlier than 1900 GMT Saturday (starting on the hour) and ending no later than 0600 Monday. All claimed contacts must be within the chosen 28-hour period and must be made on amateur frequencies above 50 Mc., using authorized modes of operation.

2) Name-of-section exchanges must be acknowledged by both operators before either may claim contact point(s). A one-way exchange, confirmed, does not count; there is no fractional breakdown of the 1-, 2-, or 3-point units.

3) Fixed-, portable- or mobile-station operation *under one call*, from one location only, is permitted. A transmitter used to contact one or more stations may not be used subsequently under any other call during the contest period (with the exception of family stations where more than one call is assigned to one location by FCC/DOT).

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

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

3) Scoring: *1 point* for completed two-way exchanges on 50 or 144 Mc.; *2 points* for such exchanges on 220 or 420 Mc.; *3 points* for such exchanges on the higher v.h.f. bands. The sum of these points will be multiplied by the number of *different* ARRL sections worked per band; i.e., those with which at least one point has been earned. Reworking sections on additional bands for extra section credits is permitted. Cross-band work does not count. Aircraft mobile stations cannot be counted for section multipliers.

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

5) A contact *per band* may be counted for each station worked. Ex.: W2EIF (S.N.J.) works K1YON (Conn.) on 50, 144 and 220 Mc. for complete exchanges. This gives W2EIF 4 points (1 — 1 — 2) and also 3 section-multiplier credits. (If W2EIF contacts other Conn. stations on these bands, they do not add to his section multiplier but they do pay off in additional contact points.)

6) Each section multiplier requires a complete exchange with *at least one* station. The same section can provide another multiplier point only when contacted on a new v.h.f. band.

7) Awards: A certificate will be awarded to the high-scoring single-operator station in each ARRL section. In addition, the high-scoring multi-operator station will receive a certificate in each section from which three or more valid multiple-operator entries are received. Certificates will also be given to the top Novice in each section where three or more such licensees submit logs and to Novices in sections of less than 3 entries, who in the opinion of the Awards Committee, displayed exceptional effort. Awards committee decisions will be final. QST

SUMMARY OF CONTACTS, V.H.F. QSO PARTY

STATION...W1AW.....ARRL SECTION.....CONN.....

Freq. Band (Mc.)	(GMT) Date Time	Station Worked	Section	Record of new Sections for each band: 50	144	220	420	other 1215	Contact Points
50	1901	W4GJO	E FLA	1					1
	1905	K8MMM	OHIO	2					1
	1915	W0PEP	IOWA	3					1
	1920	K8UQA	OHIO						1
144	2001	W2ZKI	ENY		1				1
	2009	K6MYC	S.C.V.		2				1
420	2210	W1QWJ	W MASS			1			2
220	2217	WA2WEB/2	WNY			1			2
1215	2300	K2UYH	NNJ					1	3
144	2310	K2UYH	NNJ		3				1

(Enter below on last sheet used)

Band	Contacts		Points	Mult.
50 Mc.	4	x1=	4	3
144 Mc.	3	x1=	3	3
220 Mc.	1	x2=	2	1
420 Mc.	1	x2=	2	1
Other 1215 Mc.	1	x3=	3	1
TOTALS	10		14	9

Check one: ◯ Single operator (X) Multiple operator

Calls of operators having a share in above work: W1's...DIS...WPR NPG

Power input.....

Transmitter.....

Receiver.....

Antenna.....

CLAIMED SCORE: ...14... (Points) x ...9... (Mult.) = ...126..... FINAL SCORE

I hereby state that I have abided by the rules specified for this contest and that, to the best of my knowledge, the points and score as set forth in the above summary are correct and true.

..... Signature ..... Call ..... Address

NEW RULES For The 1968 ARRL Field Day

Annual Test for Emergency-Powered Stations, June 22-23

BREATHES there a ham with soul so dead he doth not plan to go out on Field Day this year? Sometimes FD is Fabulously Delightful; sometimes it's only a series of Frustrating Disasters — it's still the League's most popular contest! Be sure to read the 1968 rules carefully: several significant changes have been made, although the basic purposes of FD remain the same — to combine emergency preparedness with an enjoyable and unique type of contest activity in which there is something for everybody. The following changes in the rules are significant:

1. Classes D and E (home stations) are combined into one class (D) and compete with each other using same scoring as all other classes (Rule 4). This will provide better opportunity for participation by home stations and give incentive for home stations to operate on emergency power.

2. **Limit FD set-up time.** Setting up time is included in the total FD period. That is, the 27-hour period from 1900 GMT Saturday to 2200 GMT Sunday must include *all* setting up for FD purposes. The group that can set up in less than three hours therefore gets that much more time to operate (Rule 5).

3. In the interest of eliminating "manufactured" contacts, a new rule (9a) will prohibit contact with participants of your own group operating from any other station.

4. To eliminate another common abuse of FD intent, another new rule (9b) will prohibit repeat contacts with the same station using different calls.

5. Power multipliers have been rearranged and a *new* low-power multiplier added. Power multipliers are now available breaking at 10 watts (×4), 50 watts (×3), and 200 watts (×2). Anything over 200 watts takes a multiplier of 1 (Rule 10a).

6. The bonus of 200 points for 100% emergency power remains, but is now multiplied by the number of transmitter classification. Thus, a Class 2A entry would get 400 points, 3A would get 600 points, etc. This is on the basis that the more transmitters in operation, the more difficulty involved in being 100% emergency powered.

7. Message handling credit (other than the origination for 200 bonus points) is doubled, is now 10 points per message handling. This should make FD stations less reluctant to handle traffic. Not more than 200 total points can be claimed for this, however.

8. The 1.5 multiplier for battery-operated rigs in Class B and C now also applies to 10-watt stations in Class A.

Portable stations are reminded to be sure they comply with regulations in signing portable.

To keep on good terms with ARRL and FCC, logs must be kept in GMT for cross-checking purposes, portables must be logged as such in your entry, do *not* send your original FCC/DOT log as your entry and last (though not least), odds are in favor of Murphy striking, so plan ahead!

ARRL Field Day forms are now available from the Communications Department, ARRL, 225 Main Street, Newington, Connecticut 06111.

All entries must be postmarked no later than July 22 for *QST* listing. Try to submit your FD photos along with your entry. *GL!*

Rules

1. Eligibility: The Field Day is open competitively to all amateurs in the ARRL Field Organization (plus Yukon and N.W.T.). Foreign stations may be contacted for credit but are not eligible to compete.

2. Object: For portable and mobile stations, to work as many stations as possible. For home stations, to work as many portable and mobile stations as possible.

do not write above this line

ARRL Field Day

FIELD DAY CALL USED (indicate portable). W1CW/1... F.D. LOCATION. Edsel's Elevation, Connecticut

REPORT CLASS (check only one)

(✓) A. Club or non-club group portable — Club or group name. Murphy's Marauders...

( ) B. Non-club portable (1-2 opns.) — NUMBER OF TRANSMITTERS IN SIMULTANEOUS OPERATION [4]

( ) C. Mobile — If Class B, calls of operator(s).....

( ) D. Home station

The number of people participating at this station...17....

POWER SOURCE: [✓] Generator [✓] Commercial Mains [✓] Battery [ ] Other

Description of power source (generator type, etc.). Mite-X-Lite, Mark III.....

Band	Nr. QSOs	Independence of Mains multiplier	D.C. input multiplier	Score	Transmitter	D.C. input
80 c.w.	108	x 3	x 2	= 648	32V3	150
80 ph.	267	x 3	x 2	= 1602	SB-101	90
40 c.w.	415	x 3	x 1	= 1245	6146-813	400
40 ph.	93	x 3	x 3	= 837	SB-34	50
20 c.w.	205	x 3	x 2	= 1230	Ranger	75
20 ph.	87	x 1	x 1	= 87	Swan 500	250
10 ph.	70	x 3	x 3	420	SB-34	50
2 mtrs	32	x 3 x 1.5	x 4	576	HW-30	5
TOTALS	1277	TOTAL QSOs		6645	CLAIMED SCORE	

Check and attach proof(s) of claimed bonus points, to be added to score at ARRL Hq.

[ ] 100% Emergency Power (200 points per transmitter class) [✓] Publicity (200 pts.) [✓] Message Orig. (200 points) [✓] Messages (10 pts/bdlg., maximum 200)

This certifies that the station whose call appears above was operated in accordance with the current Field Day rules (see May QST) and that, to the best of my knowledge, the points and score as set forth in the above summary are correct and true.

6/29/68...date ...signature/call club president

Be sure to attach logs, proof(s) necessary for bonus points, soapbox, photos and send promptly to ARRL Headquarters, 225 Main Street, Newington, Connecticut, U.S.A. 06111.

(R368) Printed in U.S.A.

Entries must be accompanied by this summary sheet. You may obtain the summary shown here plus log forms free on request from ARRL, or prepare a facsimile. Attach logs of all Field Day contacts and copies of all messages received and relayed. Furnish publicity proof if applying for Spirit of Field Day bonus as well as a copy of your message origination.

SCORING EXAMPLES

A home station (Class D) uses a generator to power his transceiver. The station runs 120 watts d.c. input and 150 QSOs are made.

150 × 2 (50-200 watts) × 3 (Independent power)	= 900

A one-man portable (Class B) makes 50 QSOs using a battery-powered 5-watt rig. He originates a FD message to his SCM.

50 × 4 (under 10 watts) × 1.5 (battery multiplier) × 3 (independent power)	= 900
Bonus for 100% independence from commercial power (200 × 1)	200
Bonus for message origination	200
	1300

A small club mans one transmitter in the field, runs 40 watts d.c. input and uses commercial power exclusively. 400 stations are worked.

400 × 3 (10–50 watts)	= 1200

A club mans two transmitters simultaneously. One runs 8 watts d.c. input, powered by batteries and makes 70 QSOs. The other station runs at 180 watts input, generator powered, makes 300 QSOs. No commercial power on site. No FD traffic, no publicity.

70 × 4 (under 10 watts) × 1.5 (battery multiplier) × 3 (independent power)	= 1260
300 × 2 (50-200 watts) × 3 (independent power)	1800
Bonus for 100% emergency power (200 × 2)	400
	3460

A home station (D) using commercial power and running 30 watts d.c. input works 200 FD portables.

200 × 3 (10-50 watts)	= 600

A mobile (Class C) makes 60 contacts running 30 watts input. He originates a FD message, receives two and relays two.

60 × 3 (10-50 watts) × 1.5 (battery multiplier) × 3 (independent power)	= 810
Bonus for 100% independence from commercial power (200 × 1)	200
Origination bonus	200
Receive/relay bonus	40
	1250

A large group in the field mans 6 transmitters simultaneously (Class 6A). Three setups run 30 watts input and make 350 QSOs, three run 150 watts input and make 600 QSOs. No commercial power on site, publicity supplied, a message originated, 4 received and 2 relayed by ham radio.

350 × 3 (10-50 watts) × 3 (Independent power)	= 3150
600 × 2 (50-200 watts) × 3 (Independent power)	3600
Bonus for 100% independence from commercial power (200 × 6)	1200
Publicity bonus	200
Origination bonus	200
6 rcd./rel. @ 10/points	60
	8410

3. Conditions of Entry: Each entrant agrees to be bound by the intent as well as the provisions of these rules, the regulations of his licensing authority and the decisions of the ARRL Contest and Awards Committee.

4. Entry Classifications: Entries will be classified according to the number of transmitted signals simultaneously on the air at any one time, followed by designation of the nature of the individual or group participation, as follows:

a. *Class A.* Club or non-club group (3 or more licensed amateurs) portable stations set up specifically for operation in the Field Day. Such stations must be located in places which are *not* regular permanent or licensed amateur station locations, operated under one call and under the control of a single licensee or trustee for each entry. All control locations for equipment operated under a single call must lie within a circle whose diameter does not exceed 1000 feet.

b. *Class B.* Non-club portable stations operated by not more than two licensed amateurs. Other provisions same as for Class A.

c. *Class C.* Stations located in vehicles capable of operation while in motion and normally operated in this manner, *including* antenna. Class C stations may operate stationary, but *no* stationary equipment or facilities may be used. A Class C station may *not* be used as a Class A station.

d. *Class D.* Stations operating from permanent or licensed station locations, not portable or mobile.

5. Field Day Period: Field Day operation starts at 1900 GMT the fourth Saturday of June and lasts until 2200 GMT the following Sunday, a period of 27 hours. All activity at the Field Day site exclusive of dismantling must be conducted in this period. **Any activity at the chosen FD site except inspection for planning purposes prior to 1900 GMT Saturday is prohibited.** It is within the intent of this rule to prohibit use of any structures installed previously at the FC site specifically for FD purposes.

6. Bands: Each phone segment and each c.w. segment is considered as a separate "band." All forms of voice contact will be considered *phone* band contacts, in the voice segments in which they are allowed. C.w. and RTTY will be considered "c.w. band" contacts. The same station may be worked on each band. Cross-band contacts are not allowed. The use of more than one transmitter at the same time in a single band is prohibited.

7. Exchanges: Stations making contact, in order to count their contact as valid, must exchange ARRL Section (see p. 6, *QST*) or specific location.

8. Valid Contacts: A valid contact is defined as a two-way *exchange* (see Rule 7, above) between stations. Class A, B and C stations may contact *any* other amateur station. Class D stations may contact any Class A, B or C station. Stations may be worked only once in each "band." (see definition, Rule 6).

9. Miscellaneous Rules:

a. Operators participating in the FD may not, from any other station, contact the FD portable station of a group with which they participated. This is intented to outlaw any kind of "manufactured" contact.

b. A station used to contact one or more FD stations may not subsequently be used under *any other call* during the FD period. This rule is intended to outlaw multiple contacts on the same band with the same station using different calls.

10. Scoring: Scoring is based on the number of valid contacts times the power multiplier times the independence-of-mains multiplier, times the battery multiplier, *plus* bonus points. The following are multipliers and bonuses:

a. *Power.* For each contact made using output stage plate (collector) d.c. input power of 10 watts or less, multiply by 4. Over 10 watts up to 50 watts, multiply by 3. Over 50 watts up to 200 watts, multiply by 2. Over 200 watts up to 1000 watts, multiply by 1. Over 1000 watts, multiply by *zero*! Power on s.s.b. phone is considered to be half the peak envelope power: that is, 100 watts p.e.p. would take the 50-watt multiplier. Where various powers are used, each contact must take only the multiplier for that particular contact.

b. *Independence from Mains.*

(1) Contacts made with both transmitter and receiver operating from power source independent of commercial mains take an additional multiplier of 3.

(2) Contacts in Classes B, C, and in 10-watt Class A (see Rule 4), made with battery power, take an additional multiplier of 1.5.

(3) Charging batteries from commercial mains while using them to operate equipment is *not* considered "independence from mains" or battery operation. However, batteries may be charged from an independent source while being used, or they may be charged from commercial mains while *not* being used.

c. *Bonuses.* The following points may be added to the score *after* all multipliers have been applied:

(1) *100% emergency power.* If *all* equipment and facilities at the Field Day site were operated during the entire FD period by emergency power independent of commercial mains, add 200 points per transmitter classification (See Rule 4). (Example: Class 1A would get 200 points, Class 2A would get 400, Class 3A would get 600, etc.). This includes *everything:* keyers, refrigerators, lights, monitoring receivers, cooking, battery charging, etc. If commercial mains are at hand, *pull the main switch* from 1900 Saturday until 2200 Sunday. Even if your generator goes *pfft* you lose the bonus if you turn on the commercial power.

(2) *Publicity.* Evidence of publicity must be attached to the FD log and report to get additional 200-point bonus. This can be in the form of a newspaper or magazine clipping, or a letter or memo from a BC or TV station stating that publicity was given.

(3) *Message origination.* An additional 200 points may be added if a message is originated by your club president or activities manager or other FD leader addressed to the SCM or SEC, stating the club name (or non-club group), number of operators, field location and number of AREC members participating. The message must be transmitted during the FD period and a fully-serviced copy of it in standard ARRL form must be included with the FD log and report.

(4) *Message handling.* Add 10 points for each message received and each message relayed during the FD period, up to a maximum of 200 points. Copies of each message, properly serviced, must be included with the log.

SAMPLE SCORE: Assume a station in Class 3A with independent power running three 50-watt rigs. If 127 valid contacts are made, all power at FD site independent of commercial mains, publicity obtained and a message originated, the score would be computed as follows:

127 × 3 (Power 50 watts or less) × 3 (Independent power)	= 1143
Bonus for 100% independence from commercial power (200 × 3)	600
Bonus for publicity	200
Bonus for message origination	200
Message handling points (7 handled at 10 points each)	70
	2213

d. *Club Aggregate Mobile Scores.* Entries under Class C may be combined to form an aggregate score for the club, having no connection with the club's portable entry, if any. Individual reports must include the club name, and the club secretary or other designated club official must submit a claimed aggregate score. Only bona fide members of the club residing in the club territory may contribute to this aggregate mobile score.

11. Reporting: Mail reports or entries on or before July 22. Reports must show starting and ending time of FD operating period, bands used, dates and contact times in GMT, calls of stations worked, and ARRL sections or locations of stations worked. Reports must also show power inputs and sources of power, number of transmitters in simultaneous operation, location of station, number of persons participating, class of entry, and score computations. QST

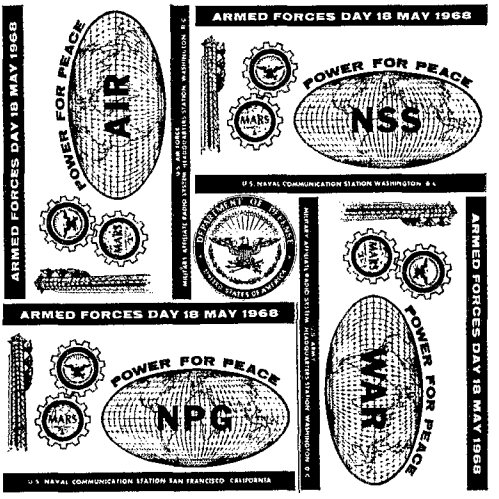
Mountaintop Contest Rules by Mr. Murphy[1]

1) The 110-volt 60-cycle a.c. power isn't.
2) Accessible mountains aren't.
3) With a spare tube for every rig, two will be needed.
4) A carefully erected tower will be missing the coax.
5) A carefully re-erected tower will be missing the rotor lead. (Murphy can usually be struck out on the 3rd pitch.)
6) At least one piece of gear will have odd-ball fittings for which the connecting cable has been left behind.
7) Six-meter 10-element beams will become 6 meter 9½-element beams on the way up the mountain.
8) All pre-cut coax will become spliced coax on site.
9) Any generator will wait until the most critical part of the most critical contact to burp.
10) Any visitor to the site will run over at least three important items before he finds a parking spot.

(*Continued on page 154*)

[1] From the Southern California Radio Club's *The VHF Reporter*, March 1968.

1968 Armed Forces Day Communication Tests



On Saturday May 18, 1968 the Department of Defense will sponsor the observance of Armed Forces Day. In order to foster the continually growing rapport between the civilian and military communities, the Departments of the Army, Navy and Air Force will conduct communication tests between U. S. Amateur radio operators and selected military communications stations.

The Department of Defense, recognizing the abilities of the amateur radio operator, makes available the facilities of major military communication stations on Armed Forces Day to adequately demonstrate to the civilian community the desire to witness further expansion of the technical contributions and international goodwill rendered as a general public service by the joint effort of military and amateur communicators.

The military stations participating in the military-to-amateur crossband operation and receiving contests for both (c.w.) and (RTTY) modes of operation are:

NSS — Washington, D. C.
NPG — San Francisco, California
WAR — Washington, D. C.
AIR — Washington, D. C.

Those amateurs establishing two-way contact with participating military stations will receive a specially designed QSL card confirming crossband communications. For those demonstrating operating proficiency by receiving a perfect copy of the Secretary of Defense originated c.w. and/or RTTY message(s) transmitted during the receiving contest portion of the communications tests, a special Department of Defense certificate will be awarded. Although shortwave listeners will not qualify for a QSL confirmation card of crossband communications, anyone who has equipment capable may copy the Secretary of Defense messages and receive credit.

Military to Amateur Crossband Test

Military radio stations WAR, NSS, NPG and AIR will be on the air from 181400 GMT to 190245 GMT. During this test of crossband operations, the military stations will transmit on specified military frequencies while amateur stations will transmit in the indicated portions of the amateur bands. Contacts will consist of a brief exchange of locations and signal reports. No traffic handling will be permitted.

Station	*Military Frequency KHZ. unless otherwise noted*	*Emission*	*Appropriate Amateur Band (MHZ.*
WAR (Army Radio Wash., D.C.)	4001.5	c.w.	3.5–3.65
	4020	c.w.	3.65–3.8
	6992.5	c.w.	7.0–7.1
	7325	c.w.	7.1–7.2
	14405	c.w.	14.0–14.2
NSS (Navy Radio Wash., D.C.)	3357	c.w.	3.5–3.65
	4012.5	RTTY	3.60–3.65
	4015	c.w.	3.65–3.8
	4040	s.s.b.	3.8–4.0
	7301	c.w.	7.1–7.2
	7365	s.s.b.	7.2–7.3
	7380	RTTY	7.0–7.05 7.1–7.15 and 14.05–14.10
	14386.5	s.s.b.(u.s.b.)	14.02–14.35
	14480	c.w.	14.0–14.2
	*143820	a.f.s.k. RTTY/a.m.	144.0–145.5

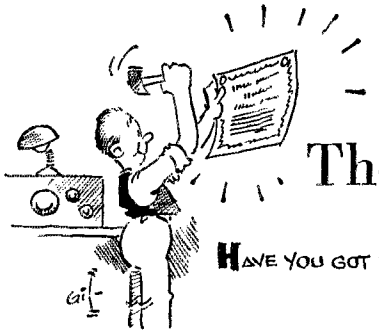
* Provided it is consistent with operational and training commitments, this frequency will be keyed from a U. S. Navy aircraft flying between Washington, D. C. and Boston, Massachusetts during the major portion of the time allotted for military to amateur crossband contacts. The flight path will be over Baltimore, Philadelphia, New York City and Hartford, Connecticut. The call sign NSSAM will be utilized from the aircraft.

NPG (Navy Radio San Francisco)	4001.5	RTTY	3.65–3.8
	4005	c.w.	3.5–3.65
	4013.5	s.s.b.	3.8–4.0
	4016.5	c.w.	3.65–3.8
	7301.5	s.s.b.	7.2–7.3
	7332	RTTY	7.0–7.2
	7375	c.w.	7.1–7.2
	13975.5	c.w.	14.0–14.2
	14383.5	s.s.b. (l.s.b.)	14.2–14.35
	20954.5	s.s.b.	21.0–21.45
	♯49.692 (MHz.)	a.m.	50–54
	**143.700	a.m.	144–148
	♯148.410	a.m./f.m./a.f.s.k.	144–148

♯ To be operated from Mt. Diablo

** Provided it is consistent with operational and training commitments, this frequency will be keyed from a U. S. Navy aircraft flying between Los Angeles and Seattle during the major portion of the time allotted for military to amateur crossband contacts. The call sign NPGAM will be utilized from the aircraft.

(Continued on page 156)



Those Higher-Class License Examinations

In Six Parts — Part III

Transmitting — General

THE group of questions in this section of the higher-class examination series covers things which are more-or-less common to all modes of transmission, including interference to other services. If you've studied the first two parts you've already gone over some of the ground. For example, you've looked into crystal oscillators, r.f. amplifier tank circuits, filters, and frequency measurement. A review of the material recommended in Part II should be sufficient for these.

In the FCC sample questions which follow, there is considerable emphasis on spurious radiations and how to suppress them, and on proper methods of adjusting amplifier tank circuits. Harmonic suppression, both for ordinary high frequencies and the television bands, is an important topic.

The necessary material on TVI is to be found on pages 576-592 of the 1968 *Handbook* and on pages 566-583 of the 1967 edition. Harmonic reduction for the lower frequencies as a part of tank-circuit design is covered in pages 150-154 (1968) or 154-158 (1967).

Amplifier neutralization and methods for avoiding parasitic oscillations are treated in pages 161-164 (1968) and 165-168 (1967). Proper methods of amplifier adjustment are covered, for amplifiers generally, in pages 168-169 (1968) and 172-173 (1967); for s.s.b. linears, pages 262-264 (1968) and 321-325 (1967). Information on linear amplifiers in general, including the definition of peak-envelope power, is in 257-260 (1968) and 279-282 (1967). For a more detailed discussion of power in s.s.b. transmitters see pages 249-250 in the 1965 edition of *Single Sideband for the Radio Amateur.*

RTTY practices are outlined in Chapter 10 in both editions. It is also a good idea to go over ordinary keying methods as described in pages 207-209 (1968) and 232-234 (1967).

As before, (A) and (E) alongside the FCC sample questions indicate that the questions come from the Advanced and Extra Class examinations, respectively. We conclude with a few questions of our own, based on the material in this section, in multiple-choice form.

FCC Sample Questions

(A) What are harmonics? How can the generation of excessive harmonics be avoided?

(E) Give some proven methods of harmonic reduction in transmitters.

(E) What are some causes of the excessive production of harmonics in r.f. amplifiers? How can these causes be remedied?

A harmonic of a fundamental frequency is a frequency which is an integral multiple (2, 3, etc., times) of the fundamental frequency, the fundamental being considered the first harmonic. A frequency twice the fundamental frequency is the second harmonic, one three times the fundamental frequency is the third harmonic, etc. For instance, the third harmonic of 4000 kc. is $3 \times 4000 = 12{,}000$ kc.

The principal factors responsible for harmonic generation and radiation are (1) improper operating conditions in the final amplifier, such as excessive grid bias and excessive drive, causing the tube or tubes to develop unnecessarily large harmonic output; (2) poor selectivity in interstage tank circuits, resulting in excessive harmonic content in the excitation voltage applied to the final stage; (3) inadequate selectivity in the final tank circuit because of too-low operating Q; and (4) insufficient selectivity in the coupling circuit between the final-amplifier tank circuit and the antenna, or omission of such a coupling circuit.

These defects can be corrected by (1) reducing grid bias and drive to the minimum necessary for reasonably efficient operation of the final tube or tubes: (2) using higher-Q interstage circuits, usually by increasing the ratio of capacitance to inductance or by decreasing the coupling to lighten the loading on the circuit; (3) adjusting the final tank inductance so that the tuning capacitor will be set for higher capacitance at the

operating frequency; and (4) installing a tuned antenna-coupling or matching circuit between the transmitter and the transmission line or antenna.

Proven methods of reducing v.h.f. harmonics that are the frequent cause of interference with television reception (TVI) include the use of shielded wiring for all d.c. leads and for filament leads, the use of filters in d.c. and a.c. leads leaving the enclosure, adequate shielding of the entire transmitter, proper choice of drive power and grid bias, use of high-Q tuned circuits, proper physical layout to avoid harmonic resonances, and the use of low-pass filters in the feed line to the antenna.

The presence of harmonics in the output of a transmitter can be detected by the use of an absorption wavemeter, having a sensitive indicator, coupled to the final tank circuit or to the antenna coupling circuit, and successively tuned through the harmonics of the operating frequency. Alternatively, tests can be conducted with a nearby amateur station, with the cooperating amateur listening on the various harmonic frequencies while the transmitter is in operation. The receiving station should not be so close that the fundamental-frequency signal strength will be such as to overload the receiver and thus cause spurious harmonic responses in the receiver itself. Harmonics in the TV range can be detected by observing the television screen, with the receiver tuned to TV channels that are harmonically related to the transmitting frequency.

(E) How do filters attenuate harmonic emissions?

The simplest type of filter, an LC circuit resonant at the operating frequency, attenuates harmonics by virtue of its selectivity, all frequencies other than that to which it is tuned being attenuated. The selectivity — i.e., the rejection of off-resonance frequencies — increases with increasing circuit Q. Another common form of circuit used for suppressing harmonic emissions is the low-pass filter, which is designed so that all frequencies below its "cutoff" frequency are passed with little or no attenuation, but all frequencies above the cutoff frequency are suppressed. Such a filter basically consists of capacitors shunted across the transmission path and inductors in series with it. The capacitors tend to short-circuit all frequencies above the cutoff frequency, and the inductors operate as high reactances to prevent such frequencies from passing through the filter. The cutoff frequency of a low-pass filter should be below the lowest-frequency harmonic to be suppressed, but must be above the highest frequency to be transmitted.

Among other forms of filters that might be used, particularly for attenuation of a single harmonic frequency, are parallel- and series-tuned traps.

(E) How can unwanted v.h.f. resonances in a transmitter amplifier be moved from TV channel frequencies?

Such resonances are caused by lengths of leads (both internal and external) associated with stray as well as intended capacitances, and with parasitic v.h.f. self-resonances in tank coils and r.f. chokes. A tank-coil resonance usually can be moved sufficiently by a small change in the overall coil size (e.g., by removing or adding a turn or two). Others can be moved by changing the types of bypass capacitors, by changing the bypass capacitor lead lengths, by varying the lead lengths to capacitors in the tuned circuits, and by changing the values of r.f. chokes or using ones of different physical construction. The particular components and leads responsible for the unwanted resonance should first be found with the aid of a v.h.f. grid-dip meter; the location usually will give a clue to the means by which the resonance can be moved.

(E) How does amateur TVI usually affect television reception?

The effect depends on the relative strength of the amateur and TV signals, type of emission, and whether the interference is caused by harmonic radiation or is the result of overloading the TV receiver's front end by the amateur transmitter's fundamental frequency. In the case of harmonic radiation falling inside a TV channel, an unmodulated carrier (key-down c.w. or a.m. during pauses in modulation) of strength comparable to the TV signal strength will produce a "cross-hatching" pattern on the screen. Depending on the relationship between the TV picture carrier frequency and the harmonic frequency, the cross-hatching may range from very coarse to very fine, the latter often being detectable merely as a "graying over" of the picture. With amplitude modulation, the presence of modulation will be indicated by alternate dark and light horizontal bars ("sound bars") in the picture, in addition to the cross-hatching. If the harmonic strength exceeds the TV signal strength the picture may turn "negative"; that is, the normally white parts become black and vice versa. Still greater harmonic strength may turn the screen completely dark.

As no carrier is transmitted with single-sideband, TVI from s.s.b. occurs only with modulation. The interference pattern is a combination of cross-hatching and sound bars, appearing intermittently and varying in intensity as the transmitter is modulated. The TVI is most intense on voice peaks, but these occur only during a relatively small part of the time; low-level components of the modulation will have a comparably smaller effect.

TVI from harmonics radiated by the amateur transmitter affects only those TV channels that are harmonically related to the transmitting frequency. If TVI is the result of severe overloading in the TV receiver, all or many channels not harmonically related to the transmitting frequency may be affected. If the overloading is not severe, the interference patterns may be indistinguishable from those arising from harmonic radiation, since overloading causes har-

monics of the transmitter's fundamental frequency to be generated in the receiver's front end.

In some cases, depending on the relationship of the transmitting frequency to the TV channel sound frequency, voice interference may occur in the TV sound. Such sound interference also is prone to occur when the amateur transmitter is operating in the 144-Mc. band, as a result of rectification of the amateur signal in the TV receiver's sound section, the amateur signal being picked up directly by the receiver wiring.

(A) How can TVI caused by cross-modulation be remedied?

Cross modulation is the process by which the modulation on one signal is superimposed on another signal, and occurs when the limits of receiver linearity are exceeded by a strong undesired signal. Common usage also includes intermodulation in the general class of "cross modulation." Intermodulation occurs when two signals mix (heterodyne) in a nonlinear circuit and produce sum and difference frequencies as a result. E.g., an amateur 14-Mc. signal might be mixed in the front end of a TV receiver with an f.m. broadcast signal at 98 Mc.; the difference frequency, 84 Mc., falls in a TV channel and would be reproduced by the receiver when tuned to that channel. The remedy for either cross modulation or intermodulation is to prevent at least one of the undesired signals (if more than one are involved) from reaching the part of the receiver where the nonlinear action is taking place. This may be done by the use of a trap, connected in the receiver antenna lead, tuned to reject one of the undesired signals; or, if one of the signals is from an amateur station, by using a high-pass filter on the TV receiver to reject signals below the filter's cutoff frequency, which is usually between 30 and 40 Mc.

As any rectifying element will generate cross modulation, and rectification can take place when any two conductors are in poor contact, cross modulation and intermodulation frequently occur in wiring, piping, metalwork, etc., external to the receiver. The cause must be discovered before the remedy (bonding of the conductors) can be applied. Traps and filters at the receiver are not effective in cases of this type.

(A) How do parasitic oscillations affect circuits? What can be done to prevent or eliminate parasitics?

(E) How can parasitic oscillations be prevented?

Parasitic oscillations can be prevented by proper physical layout of components, by proper choice of bypass capacitors and r.f. chokes, and by the use of parasitic chokes or suppressors in the plate leads.

In addition to production of undesired signals, parasitic oscillations rob the circuit of power on the intended frequency of operation; in some instances they may cause overloading and destruction of components. Neutralization of amplifier circuits, or appropriate screening of input and output circuits, help prevent low-frequency parasitics. V.h.f. parasitics can be prevented by the use of appropriate coil/resistor combinations in the plate lead to the amplifier tube.

(A) Why is neutralization important in amplifiers? What points in an amplifier circuit should be coupled to provide good neutralization?

Neutralization is important in amplifiers to prevent self-oscillation on an undesired frequency (usually close to the desired operating frequency) with resultant interference potential. Good neutralization is obtained by coupling the appropriate amount of power from the grid to the plate circuit of a vacuum-tube amplifier, out of phase, to offset the tendency for self-oscillation due to grid-plate internal capacitance.

(E) How can a transmitter be tested for self-oscillation? What precautions should be observed during testing?

In general, testing should begin with the final amplifier and work back toward the oscillator. Since the presence of self-generated oscillations in an amplifier usually can be detected only when the stage is not being driven by normal excitation, the transmitter's oscillator must be shut off. However, before this is done it is necessary to make sure that the d.c. input to every stage following the oscillator will be within the safe dissipation ratings of the amplifier tubes. This can be determined by measuring the plate voltage and plate current (and screen-grid voltage and current, if a screen-grid tube); if the power input is too high the grid bias should be increased as necessary. Alternatively, tubes in which the dissipation would be excessive may be removed temporarily, except in the stage being tested.

Essentially, the test consists of adjusting the grid bias and (screen voltage) so that the d.c. plate power input is about equal to the rated plate dissipation of the amplifier without excitation, and then checking for signs of self-oscillation. Oscillation will be indicated by the presence of grid current, in the usual case. All possible combinations of settings of the input and output tuning capacitors should be tried; if the amplifier is stable there will be no grid current under any tuning conditions likewise, the plate current will remain constant with tuning.

If there is evidence of self-oscillation it is necessary to determine the frequency at which the oscillation is occurring before the necessary remedial measures can be taken. An indicating-type absorption wavemeter can be used. Oscillations near the operating frequency can be measured by coupling the wavemeter to the plate tank circuit of the amplifier; higher-frequency parasitic oscillations may require coupling to the plate lead close to the tube rather than to the tank. Appropriate means should be taken to stabilize the amplifier before going on to test the next preceding stage.

As self-oscillation sometimes is accompanied by abnormally high plate current which would cause the safe dissipating rating of the tube to be exceeded, it is advisable to make provisions for shutting off the plate power immediately if the place current should rise suddenly. And *in every case*, proper safety precautions against electrical shock should be taken when working around transmitter circuits.

(A) What is backwave radiation? How can it be eliminated?

If the transmitter's output power is not reduced to zero when the key is open, an undesired signal called a "backwave" is transmitted. For example, if the final amplifier stage is keyed some energy from the oscillator and intermediate stages may be fed through to the antenna and be radiated even though the key is open. This type of backwave may be eliminated by proper neutralization of the amplifier, by providing adequate shielding between the output circuit and the exciter circuits, or by changing the method of keying so that no power is present at the input side of the amplifier with the key open (e.g., by keying an early stage in the transmitter).

Another type of backwave may occur when there are amplifier stages following the keyed stage and these subsequent stages (or a single stage) are not stable enough to prevent parasitic oscillations from being generated. The parasitic signal, which usually will be on a somewhat different frequency from that intended, will be radiated even though the key is up. The remedy is proper neutralization of the amplifier stage or stages in which the parasitic oscillation is generated.

(E) How may an amateur check his transmitter for spurious sidebands?

A selective receiver can be used for checking one's own transmitter for spurious sidebands outside the normal communication channel. With r.f. input to the receiver kept at a low value — e.g., by disconnecting the antenna from the receiver — and with the sharpest selectivity available in use, turn on the b.f.o. and tune through a band of frequencies each side of the carrier while another person talks into the microphone. Spurious sidebands will be observed as intermittent beat notes coinciding with voice peaks, or as clicks or crackles well away from the carrier frequency.

(A) What factors affect the peak envelope power of a transmitter?

In an amplitude-modulated transmitter the factors that affect peak-envelope power are the grid bias, excitation voltage and power, and plate loading of the modulated stage, together with the distortionless power capability of the modulator and proper impedance matching between the modulator and modulated amplifier. For 100 percent modulation the modulated tube or tubes must be inherently capable of delivering four times the carrier power on modulation peaks; i.e., the voltage rating and cathode emission must be adequate for this.

In an s.s.b. transmitter the peak envelope power of the output linear amplifier is determined by the maximum power output that can be obtained at the plate voltage used, consistent with an acceptably low value of intermodulation distortion. The limiting factor is usually distortion rather than actual power capacity. The linearity of the amplifier is affected principally by the plate loading and value of grid bias used; heavy loading and a relatively low value of grid bias ("resting" plate current such that the quiescent d.c. plate power input approaches the rated plate dissipation) improve the linearity but reduce the peak-envelope output. In addition at least a moderate value of tank Q should be used, and the amplifier must be free from regeneration — i.e., it may require careful neutralization even though a screen-grid tube is used. If grid current flows in the amplifier tube during part of the modulation cycle a constant fixed load ("swamping resistance") should be shunted across the grid circuit to provide an essentially constant load for the driver and thus avoid the distortion that would result from poor regulation of the driver output because of the varying grid load.

In any case, the tube or tubes should be operated within safe plate dissipation limits during modulation. This may set a limit to the peak-envelope power even though it may be possible to satisfy the above requirements at a higher power level.

(E) How is the output circuit of a transmitter adjusted to increase or decrease its coupling to the antenna system?

The adjustment procedure to use depends on the form of the final amplifier tank circuit. If the circuit is a pi network the coupling to the antenna or load circuit will be increased by decreasing the capacitance of the network's output capacitor. Increasing the output capacitance will decrease the coupling to the load. In either case, the network must be maintained in resonance at the operating frequency by readjustment of the pi network input capacitor, to compensate for the detuning caused by changes in output capacitance. Coupling also may be varied by adjustment of the pi-network inductance in combination with the output capacitance, but for mechanical reasons adjustment of the inductance in the necessarily small steps is seldom provided for in transmitter circuit design.

If the transmitter has an output circuit consisting of a parallel-resonant circuit inductively coupled to an output coil or link, coupling to the load may be varied by varying the mutual inductance between the tank coil and link coil. The mutual inductance can be varied by changing the spacing between the two coils or by varying the inductance of one or both of the coils. Coupling increases as the mutual inductance is made larger, and vice versa. Retuning the tank capacitor to maintain resonance will be necessary each time the coupling is varied.

(E) How can the safe power input to a crystal oscillator be determined?

The safe power input to the oscillator depends on how much r.f. power the crystal itself can safely dissipate. As the crystal dissipation cannot readily be measured, the best plan is to follow the crystal manufacturer's recommendations as to circuits and voltages. In the absence of such information, a check on the crystal heating (which is a function of the power dissipation) can be made by observing the drift in oscillator frequency with time. Pronounced drift in a period of 15 to 30 seconds can be assumed to indicate excessive dissipation, and the power input to the oscillator should be reduced.

(A) How close to the edges of a certain amateur band can you safely operate a v.f.o. c.w. transmitter if you are using a frequency meter having maximum possible error of 0.01 percent?

The minimum distance from the edge of the band can be computed by obtaining the product of the frequency in use times the percentage error of the measuring instrument, and adding the keying bandwidth. E.g., at 3500 kc. the potential measurement error is 3500 × .0001, or 350 cycles (0.35 kc.). To this must be added half the keying bandwidth, which is dependent on keying speed and the shape of the keyed waveform. With proper shaping, the necessary keying bandwidth is equal to 4 times the speed in words per minute for International Morse Code; e.g., at 25 words per minute, the bandwidth is approximately 100 cycles. If the shaping does not confine the emission to this bandwidth, half the *actual* keying bandwidth must be added to the measurement-error tolerance to determine the frequency to which the v.f.o. can be set.

(Note: The above method of computing possible error in cycles per second in frequency setting is not strictly accurate, since the computation should be based on the frequency-meter reading rather than on the band-edge frequency. However, the difference is negligible, amounting to less than 1 c.p.s. in the example above. If the frequency-meter error had been specified to be 0.1 percent the difference between the accurate and approximate answers would still be less than 4 c.p.s. — again negligible, in view of the uncertainty respecting the keying or modulation bandwidth.)

(E) What precaution(s) should be taken when measuring the rectified grid voltage in an oscillator with a d.c. voltmeter?

The voltmeter used should disturb the operating conditions as little as possible; i.e., it should have high resistance (at least 10 or more times the resistance of the grid leak across which the measurement is made) and should be isolated for r.f. by means of an r.f. choke at the probe. A satisfactory type of instrument is the d.c. vacuum-tube voltmeter, which conventionally has an input resistance of 11 megohms, 1 megohm of which is in the probe tip and will isolate the voltmeter from the r.f. circuit.

(E) What would happen if the grid-bias supply of a Class C modulated amplifier was suddenly short-circuited?

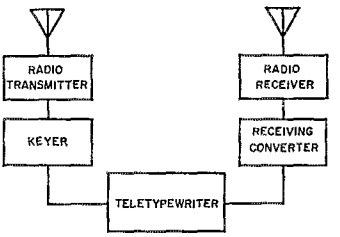
If the bias is obtained entirely from a d.c. power supply and the tube or tubes are types having a medium μ (amplification factor) so that a fairly large value of d.c. bias is required for Class C operation, the amplifier's plate current would rise to a high value, possibly resulting in damage to the tubes. The output would be greatly reduced or lost entirely, and the modulation, if any, would be nonlinear. If part of the operating bias is obtained from a grid leak, the amplifier would continue operating, but possibly at reduced efficiency and output and poor modulation linearity.

If the tubes are "zero-bias" types, which take relatively little plate current with no grid bias and no drive, the stage would continue operating, but at somewhat increased input and reduced efficiency.

(E) Draw a block diagram of an RTTY system showing the function of each stage. What is the proper way of identifying an RTTY transmission?

The essentials of an RTTY system are shown in block form below.

A radioteletype transmission must be identified by transmitting the call sign of the station being called and the call sign of the station calling by means of radioteletype, and additionally the call sign of the station calling by means of c.w.



(E) What is meant by frequency-shift keying and how is it accomplished?

In frequency-shift keying, the radiated power is constant, the code characters being formed by transmitting the "mark" on one frequency and the "space" on another. The two frequencies usually differ by less than 1000 cycles per second. Frequency-shift keying may be accomplished by any means, such as keying a small capacitance across a self-excited oscillator tank circuit or across a crystal, that permits changing the frequency between the two chosen values at a rate sufficient for the desired keying speed.

(E) Why are synchronizing pulses transmitted with television signals?

Synchronizing pulses are transmitted to ensure that trace lines across the face of the picture tube in the receiver are synchronized or locked in step with the scanning lines in the television camera.

Q1. Can parasitic oscillations occur in a transmitter stage which has been properly neutralized at the operating frequency? If so, why? If not, why not?

A — No, because neutralization eliminates feedback.
B — Yes, because parasitic oscillations depend on the antenna coupling.
C — No, because a properly-neutralized stage is automatically biased to prevent parasitic oscillations.
D — Yes, because neutralization at the operating frequency does not prevent feedback at frequencies much lower or much higher.
E — No, because a neutralized stage is perfectly balanced.

Q2. Name some effects that may occur when the acceptable peak-envelope power input rating of a single-sideband transmitter is exceeded.

A — The power output is increased.
B — The output power is spread over a wider frequency spectrum than it occupies when operation is below the p.e.p. level.
C — The amplifier tube operates at higher efficiency.
D — The modulation envelope is distorted.
E — All of the above.

Q3. What is the purpose of the converter in a receiving system for RTTY?

A — It prevents signals in ordinary Morse code from operating the Teletype machine.
B — It is needed because the receiver does not have enough power output to operate the Teletype machine directly.
C — It converts the incoming signal frequency to the receiver's intermediate frequency.
D — It converts Morse code into the Teletype code.
E — It converts frequency-shift keying into d.c. pulses for operating the Teletype machine.

Q4. Television Channels 2, 4 and 5 are commonly received in your area. If you are operating on 21 Mc. and are causing interference in a nearby receiver, what is the probable cause?

A — The transmitter is radiating harmonics in these TV channels.
B — Harmonics are being generated by rectification in conductors in the vicinity.
C — The receiver is being overloaded by the transmitter's fundamental frequency.
D — The transmitter is being overmodulated, causing spurious emissions.
E — There is a v.h.f. parasitic oscillation in the transmitter.

Q5. In testing a tetrode r.f. power amplifier for parasitics and self-oscillation, how should the d.c. voltages on the tube elements be adjusted?

A — Normal plate voltage and grid bias should be used, but the screen voltage should be zero.
B — Normal plate and screen voltages should be used, and the grid bias should be such as to cause plate-current cutoff.
C — The grid bias should be adjusted so that the plate input is at approximately the rated plate dissipation, using normal plate and screen voltages.
D — The plate and screen should be operated at the same voltage, using normal grid bias.
E — All voltages should be normal.

Q6. Draw a pi-network tank circuit for an r.f. power amplifier showing how a parasitic suppressor circuit would be added.

(*Answers on page 148*)

Strays

If you work on any band where beam antennas can be used you'll no doubt be giving careful study to the WØHTH article on quads and Yagis on page 11 in this issue. And if that leads to an intention to build a quad, you'll be further interested to know that the author has a limited supply of reject fiberglass pole-vaulting poles that can be used for making a very rigid and high-strength quad structure. The poles are approximately 1½ inches in diameter with a very slight taper, and are available in 14-, 15- and 16-foot lengths at $8.80 per pole, plus shipping. Write J. E. Lindsay, WØHTH, Route 2, Box 7, Castle Rock, Colorado 80104.

Feedback

The phone score of K8DCP/8, Michigan section, was omitted from the November SS writeup appearing in last month's *QST*.

K8DCP/8 (K8s DCP HLR, WA8GUF)
152, 496-708-72-24

Also, the section-leading c.w. score of KØJPJ (113,055) was erroneous credited to KØJPL, whose actual tally of 27,720 appears further on down the list. And, we inadvertently omitted the call of WA7EWC from the "Led Section Both Modes" box. Bruce topped Wyoming on phone and c.w.

In the *QST Extra* for March, 1968, page 20, there is a time error that might cause you to lose the desired WWV "Geoalert" transmissions. Author K6EDX noticed this himself, but the article was already on the presses. The second paragraph under the heading, *Check WWV — WWVH*, should have read as follows: The service is given over WWV at 18 minutes, 5 seconds, past each hour, and WWVH at 48 minutes, 5 seconds, past . . . Actually the Federal Register says ". . . during the first half of the 19th minute . . . and the 49th minute . . ." according to information supplied by WB4GTS. You'd just manage to miss it if you followed the article's instructions.

AMATEUR RADIO PUBLIC SERVICE CORPS

CONDUCTED BY GEORGE HART, *WINJM

Refusing Messages

Every once in a while we come across a net or a traffic-handler who takes pride in the fact that he, she or it "refuses to handle" certain types of traffic. Some say they won't handle "death messages," others exempt "fair traffic," military traffic, old traffic, traffic with incomplete preambles, traffic with long texts, traffic with incomplete address, traffic originating in foreign countries, "commercial" traffic, traffic which does not (the handler thinks) say anything important enough to occupy his valuable time, traffic asking for money, — and so on, down to traffic that is ungrammatical, misspelled or impolite.

Well, each of us has the right to decide for himself what traffic, if any, he shall or shall not handle. This is still a free country. And even if one of these nonconformists does get conned into accepting a message, there is no law says he has to deliver it. All the "rules" for message handling are a matter of convention, some written, some understood. Before we begin a discussion on this subject, we should all understand that any binding is moral or conventional, not legal. The moral binding is in responsibility to perform a public service, the conventional in certain rules that have been adopted and are generally observed in carrying it out.

Let's dispose of the moral matter first. It revolves principally around the concept of responsibility. When you have acquired a written message, never mind under what circumstances, you are morally responsible for seeing that the message is passed from you along to someone else who will give it further (proper) handling, or delivered. Forty-eight hours after filing or receipt is the generally-accepted rule among amateur traffic-handlers, but it is obvious that if every amateur who relayed the message held it that long it might be a long time reaching its destination. Traffic should be relayed or delivered as quickly as possible.

Now, in the matter of refusing traffic, any traffic, this strikes us, generally speaking, as bad business. In the first place, since whatever is wrong with the message that makes you want to refuse it is probably not the fault of the station or operator sending it to you, why slap *his* face? If you must refuse the message, for whatever the reason, good or bad, the most diplomatic, not to mention proper, thing to do is service the originating station telling him what's wrong with it and advising him that you are holding it pending correction of the discrepancy. Note, you do not cancel it. This is the originating station's prerogative. The most effective place to correct such difficulties is at the source.

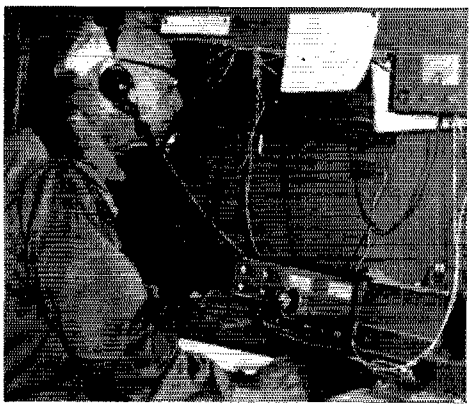
Secondly, let's not lose sight of the fact that amateur traffic is as much a training activity as a service activity; in the eyes of some important non-amateurs, more so. For training purposes, the message form is important, but the content not very. Even on commercial circuits the operators do not set themselves up as judges as to what is or is not worth sending. They send what they are given to send — or else! The only difference between that and amateur radio circuits is that there is no "or else."

Thirdly, the appearance of traffic inexpertly originated in increasing numbers is an indication of some newcomers in the traffic game — a good omen, not a bad one. We old timers ought to encourage them to do it right by setting them straight, not by refusing their traffic.

Fourthly — but why go on? We see more reasons why nets should *not* refuse traffic than why they *should*, and our recommendation is the adoption of as much tolerance as possible both as individual and net policy; this despite the fact that the writer hits the ceiling just as you do when someone gives him a message in one of the categories in the first paragraph above. Don't refuse traffic, fellers and gals. Put it into proper form if you can, service the originating station if you must, but don't kick the guy who hands it to you. — *WINJM*.

National Traffic System

We just consulted a little folder in our desk marked "NTS Column Source." Guess what? It was completely empty. This pretty much reflects the status of our brain at this point, after finishing a club bulletin, a CD Bulletin and an annual report in the past two or three weeks.



This is George Criteser, W7ZT, in action. George is a Radio Officer and MARS member from Carson City, Nevada.

* Communications Manager

But this emptiness does not necessarily mean that nothing is going on in NTS circles. Far from it. Out on the west coast a major hassle regarding basic rules on region-section net relations is going on. By the time you read this, the third meeting of the Eastern Area Staff of NTS will be history, and the subsequent fate of area staffs in general will possibly have been decided by the Board of Directors in Hartford.

Meanwhile the system, like Old Man River, just keeps rolling along. The year-end analysis for 1967 shows continued progress over the previous year, as that year showed over 1965, and so it goes. While traffic in general remains the same or declines slightly, NTS forges ahead. The net directory shows 199 nets now seeking recognition as NTS nets. Total reports were up 121 because of increased section net reporting (region and area nets can't improve much over 99.5%). Consequently, nearly all other data were also up — total net sessions almost 5,000, traffic handlings in the tens of thousands including substantial gains in both region/area and section traffic. Even TCC functions hit an all-time high, 263 over the previous year. It was a *good* year for NTS and we don't think we've yet hit the peak. There is still a long way to go.

Like most successful systems, however, NTS has its troubles. Petty bickering appears at various levels and threatens to develop into major proportions. In one part of the country it's a section net wanting to be recognized as an NTS net but the region net manager doesn't think it's merited. Elsewhere, area and region net managers take potshots at each other. In still another area a campaign is on to hang a region net manager, and the organization of area staffs is under question. Diversionary as such incidents may be, they nevertheless show that the system is alive and kicking and that its participants are concerned about its welfare and progress.

One point of debate that is of much interest seems to revolve about the question of who runs NTS, who calls the shots, who makes the decisions? There seems to be a desire on the part of some participants to pinpoint this question and get an answer and to settle a few things about it.

Let's start at the beginning. Briefly, NTS was "dreamed up" by three members of the headquarters staff as a result of dissatisfaction on the part of the traffic-handling members with the system of "trunk lines" then being used. A detailed plan was drawn up and submitted to the communications manager who agreed to have it circulated among prominent traffic men for comment. Most comment was favorable, so in October of 1949, after several months of organization, NTS went into operation on a trial basis. Some time in the fifties NTS became official and was first mentioned in the Rules and Regulations of the Communications Department. The "trunk line" concept, dear to the hearts of many old timers, gradually disappeared.

It is alleged by some that NTS is the work of one man and has been directed 100% by him since its inception. In a manner of speaking, this is quite true; but no man can lead without having followers and supporters, and we have had plenty of both — otherwise the system could never have reached its present stature. The implementation of NTS has been a completely delegated function under the responsibility of the communications manager. Appointments at region level and higher have been and are still at this writing made "under the direction of the communications manager." The system has functioned well — not perfectly, but well — under this setup for almost 20 years. The question now is, should that one person at headquarters continue to exercise supervisory functions and certain appointment prerogatives, or would the system be more efficiently run by committees elected by the members or appointed by elected officials? The issue is thus drawn and the participating members must decide. — *W1NJM.*

Carl Liachowitz, OPS and Chicago TNT net manager, (l.) and Jim Harden WA9RLA, RM and VHF PAM, operating from K9UAO, Red Cross Headquarters during SET.

February reports:

Net	Sessions	Traffic	Rate	Average	Representation %
1RN	58	678	.411	11.5	94.8
2RN[1]	71	1056	.585	14.9	91.9
3RN	58	739	.500	12.7	98.3
4RN	48	758	.586	15.8	77.8
RN5	58	918	.463	15.8	95.6
RN6	58	1496	.744	24.4	100
RN7	57	515	.354	9.0	44.6
8RN	59	575	.376	9.9	99.4
9RN[1]	82	1017	.514	12.4	96.6
TEN	58	744	.740	12.8	84.0
ECN	57	185	.225	3.2	74.7
TWN	53	349	.304	6.6	54.8
EAN	29	2157	1.481	74.4	96.0
CAN	29	1454	1.187	50.1	100
PAN	29	1613	1.131	55.6	100
Sections[2]	2255	17234		7.6	
TCC Eastern	116[3]	907			
TCC Central	87[3]	779			
TCC Pacific	116[3]	1064			
Summary	3059	34238	EAN	16.4	83.5
Record	2981	30248	1.368	12.5	—

[1] January SET information included.

[2] Section and Local nets reporting (77): AEND, H, M, O, P, R, AM (Ala.); OZK (Ark.); SCN (Cal.); HNN (Colo.); CPN (Conn.); FAST, FATT, FPTN, GN, QFN, TPTN, VEN, WFPN (Fla.); GSN (Ga.); QIN (Ind.); *ILN (Ill.);* Iowa 75; FCATN, KTN, KYN (Ky.); PTN, SGN (Me.); MDD, MDDS, MEPN, Termite (Md.-Del.); WMN (Mass.); M6TN, QMN (Mich.); MJN, MSN, MSPN (Minn.); MNN, MTTN (Mo.); NJEN, NJN, PVEN (N. J.); Roadrunner (N. Mex.); NYS (N. Y.); NCN, NCSB, THEN (N. C.); OSSB (Ohio); OLZ, SSZ (Okla.); EPA, EPEN, PFN, PTTN, VHFTN (Pa.); RISPN (R. I.); SCN (S. C.); ETPN, TN, TPN, TSSB (Tenn.); NTTN (Tex.); BUN (Utah); VTNH (Vt.-N. H.); VN, VSBN, VSN (Va.); WSN (Wash.); BEN, SWRN, WSBN (Wis.); APSN (Alta.); GBN, LN, RPQ, WQN (Ont.-Que.).

[3] TCC functions performed not counted as net sessions.

W2FR (ex-W2SEI), is officially the 2RN Manager and comments that W2KA (ex-W2WFL) is a big loss to 2RN particularly with the NLI rep. situation. K3MVO sez 100% was too good to last, but they did keep the traffic end up and passed out 3RN certificates to *W3s* ATQ CBG MPX, K3FSV, *WA3s* AKH CFK CKA CTP EXW. WB6BBO gripes about carelessness in relaying somewhere between the point of origin and RN6 — Example; the

omission of the number or date, following HXB and HXF in preambles. This is no longer an occasional omission; it is becoming commonplace. Bulk traffic using ARL 76 and ARL 77 should have an identifying location following the numbered texts. It may be coincidence, but there is a sudden rash of careless handling invariably following a drill like SET, or some major disaster operation. Let's re-read W1NJM's comments about Garbles on page 58 of March *QST*. W7BQ (ex-K7JHA) moved RN7 times to 0200Z and 0330Z. This gives a better spread for making liaison with section nets. W9QLW reports a pretty good month with traffic up slightly; KYN is to be congratulated for their two-net operation. Next goal is to urge other section nets to go for two sessions. WØLGG is glad to have both of the Dakotas on TEN again. K7NHL sez the second session is working out fine and has brought Wyo. to the fore. TWN certificates were issued to *Ks* 5MAT 7LKH 7UYW, WA7BME.

Section 97.87 of FCC reqs. does not mention nets, but we can now QNI without sending call of NCS. However, when checking out we should still send RN7 de . . . or the usual exchange of call signs.

Transcontinental Corps: W3EML reports 115 successful functions out of a possible 116, which is Eastern's best effort; too bad that conditions prevented K3MVO and W6EOT from passing traffic on Feb. 7; some day we may hit 100%. WØLCX also reports best percentage in over a year. W7DZX: "To say the least, I am real proud of this report for February, 1968. It is one of the best we have had for a long time. . . . Again thanks for the prompt and accurate reports, makes this job a pleasure, especially when the reports to ARRL are good ones like this one."

February TCC reports:

Area	*Functions*	*% Successful*	*Traffic*	*Out-of-Net Traffic*
Eastern	116	99.1	2581	907
Central	87	97.7	1910	779
Pacific	116	97.4	2140	1064
Summary	319	97.8	6581	2750

Feb. TCC roster: Eastern Area (W3EML, Dir.) *W1s* BJG EFW EMG EOB NJM, *W2s* FR GKZ, K2RYH, *WA2s* BLV UWA, *WB2s* OYE RKK UHZ, *W3s* EML NEM, K3MVO, *W4s* NLC/UQZM, K4KNP, *W8s* CHT RYP UM, K8KMQ, *WA8s* OCG ZGC. Central Area (WØLCX, Dir.) W4OGG, *K4s* BSS DZM, WA4WWT, WB4AIN, W5KRX, *W9s* CXY DYG JUK VAY, *WØs* INH LCX TDR, *KØs* AEM YBD, *WAØs* DOU MLE. Pacific Area (W7DZX, Dir.) *W6s* BGF EOT HC IPW TYM VNQ, *KØs* DYX LRN, *WA6s* BRG LFA ROF, *WB6s* HVA RSY RJX, *W7s* AAF/6 HMA/KZZB ZIW, WA7CLF.

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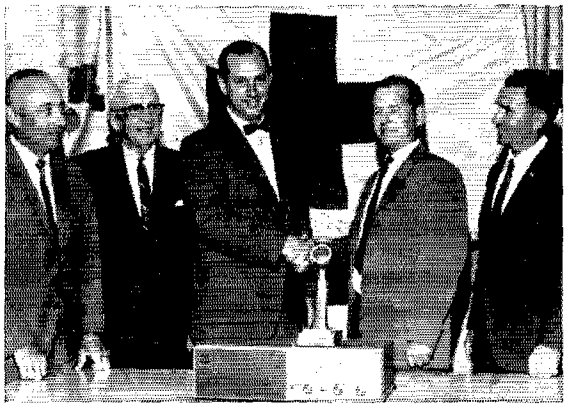

Dade County civil defense of Miami, Fla., was presented with some new f.m. equipment for the communications center. Shown left to right taking part in the ceremonies are: Red Cross Chairman Topmiller, disaster chairman Ebright, E Fla. SEC W4IYT, Communications officer W4YP, and coordinator Couch. (*Miami-Metro News Bureau photo*)

Other Net Reports:

Net	*Sessions*	*Check-ins*	*Traffic*
Mike Farad	54	478	466
Coast Guard	21	579	62
QTC	22	383	421
South Atlantic	25	122	83
Clearing House	21	146	399
New England Teenage	29	320	210
7290	42	1910	916
Eastern Area Traffic	29	256	233
HBN	29	406	850
75-Interstate	29	1102	535
20-Interstate	21	521	3501
North American	25	705	523

Diary of the AREC and RACES

On Oct. 14, Orange County (Calif.) AREC members furnished auxiliary communications for police during a parade. In addition to the normal traffic for this type event, police aid was called to prevent youths from throwing rocks and bottles from a store roof. Twelve amateurs participated in this event. — *WB6RVM Assistant EC Anaheim, Calif.*

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On Dec. 22, K4QZN/HK5 was requested by the leader of a Japanese colony in Cali, Colombia, to obtain information regarding an accident in Michigan. Commercial circuits had been unable to get through. Within 15 minutes he contacted W8ZGT in Ann Arbor, who read the account over the air, from the morning paper. W1BRE, K4CRU and W8CGZ also assisted in relaying communications. — *WA2RHE.*

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From Jan. 10 to Feb. 24, the following reported incidents used the Montreal repeaters on 2 meters: (1) On Jan. 10, VE2APT/mobile reported a traffic accident at Cote de Liesse via repeater VE2RM to VE2DGU, who called authorities. (2) On Jan. 17, VE2APT made a plea for blood donations for an urgent operation; VE2KT and VE2CK promptly answered through the repeaters and reported to the hospital to donate blood. (3) On Feb. 17, VE2AVP/mobile came upon an accident involving a semitrailer and 12 cars, about 20 miles from Montreal. He called via VE2RM, VE2ALE replied, accepted all information and relayed to police. The police said that a patrol car was already at the scene, but a further check with VE2AVP/mobile revealed that the patrol car was at another accident on the east bound lane, west of the accident reported by VE2AVP. VE2ALE then advised police and another patrol car was dispatched.

(4) On Feb. 17 & 18, VE2BU, assisted by VE2BYJ and VE2BGK, manned a portable base station at the headquarters of a car rally in Point Claire. VE2APT/mobile assisted by VE2DFD left Montreal for Buckingham. Later, VE2AVP/mobile went to Hawksbury, half way between Montreal and Ottawa. During the trip, VE2AVP approached a multi-car accident, which he reported to VE2ALE. This rally started with 31 cars, but only 17 completed the course; however there were no serious accidents. Driving conditions were very poor, with powdered snow and 50-m.p.h. winds some of the time. Murphy helped VE2APT/mobile with a burned dynamotor just after a check with NCS, and VE2ZA/mobile blew his FET preamp. VE2AVP/mobile then rendezvoused and by using workable parts of both mobile units, they were able to complete the remaining rally report. All units were back in Montreal on the 18th at about 1300Z, after the 24-hour coverage for the rally.

(5) On Feb. 19, VE2ALE/mobile was talking with VE2OJ while traveling to work. He came upon a 2-car collision on the Cecarie Blvd. expressway, with one car on the southbound lane and the other partially blocking the northbound lane. VE2OJ collected all information and then called police. (6) While mobiling from Montreal to Chateaugauy, Que., on Feb. 21, VE2AWY came upon an accident in which a pedestrian was pinned under the wreckage. He immediately requested VE2BHV, with whom he was in contact via repeater station VE2MT, to summon police while he rendered what assistance he could. Police arrived within 25 minutes. — *VE2ALE, SEC Que.*

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On Jan. 13, K3IXB/mobile summoned police and an ambulance for a traffic accident. There were no serious injuries and aid was available in a matter of minutes because contact was immediately established with W3ZQC on 10 meters. — *K3CHD, EC Westmoreland County, Pa.*

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On Jan. 20, Communications Director for Civil Protection VE2AGI declared an alert because of the rising St. Lawrence River. VE2CDT, operated by VE2BVV and VE2BJG, opened the net at 1700Z; twenty minutes later, VE2AJD and VE2DAH were operating at strategic points. The alert was called off at 0500Z but nets were reactivated again at 1720Z on Jan. 21. The alert was secured at 0500Z Jan. 28 and during 24 hours and 25 minutes, 150 messages were passed. There were five different operators that manned station VE2CDT and 4 other amateurs monitored the net frequency continuously during the alert. — *VE2AJD, EC Trois Rivieres, Quebec.*

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On Jan. 27, the East San Gabriel Valley AREC provided communications for a parade utilizing 2-meter f.m. equipment. Twenty-three amateurs participated in the event, linking police, ambulance services, first aid stations and local government vehicles. The AREC members even provided wire-line remote control of the police channel, allowing the police command post chief access to his radio from an AREC operating position. — *WA6JXG.*

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On Jan. 30, we received two reports of amateur radio activity in Michigan during the annual Mother's March of Dimes effort. In Plymouth, ten different amateurs operated for nearly 5 hours using 10 and 2 meters. This operation centered around the Student Rockafellow Amateur Radio Society station W8NJH which is permanently set up in the Plymouth City Hall. The RACES organization in Saginaw operated under the direction of W8CTY, who operated the base station at the health center. There were seven mobile units operating on 6-meter f.m. covering several sections of the city.

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On Feb. 1, a small tornado struck Groves, Texas, damaging 18 homes and some electrical poles. W5APX alerted the Emergency net on 2 and 6 meters. WA5DUG was on both bands and acted as NCS for the 2-hour alert. — *W5TFW, EC Jefferson County, Texas.*

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On Feb. 8, K3CHD/mobile was talking with K3ILC on 10 meters when he saw a traffic accident. He stopped his car, put out warning flares, checked for serious injuries and then asked K3ILC to call police. There were no houses in the area but because of amateur radio, police were at the scene in 5 minutes. No medical assistance was required. — *K3CHD, EC Westmoreland County, Pa.*

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From Feb. 2 to Mar. 3, six auto accidents, 4 stalled vehicles and 2 highway obstructions were reported to the West Coast Amateur Radio Service Net and authorities notified. On Feb. 25, K6VDL/portable used 7255 kc. to request a search for a 6-year-old boy in the remote rugged Pine Mountain area of Calif. WB6IZF called the Forestry Service and the search was started. W6YNX and K6LOV were contacted via the Mission Trail Net and furnished direct communications into county offices in Ventura. Later, all stations moved to the Astronet Frequency of 3885 kc., so net operation could be continued throughout the night. The Ventura stations later went mobile and joined the search. The child was found safe about 0930 PST the next day. — *WB6IZF.*

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On March 1, HK4BFE in Medellin, Colombia, called for medical assistance on behalf of a woman with failing kidneys. WA4TXE heard the call and telephoned WA4WTG, who immediately got on the air and obtained a description of the specially-made tubing required for the operation. Parts were obtained and given to the pilot of a flight to Bogota. The woman was doing fine after the operation. — *WA4WTG.*

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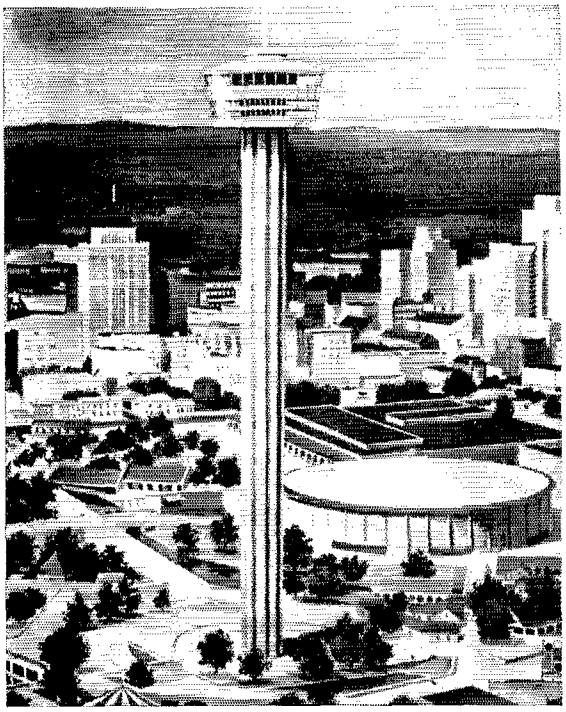
Forty SEC reports were received for the month of January, representing 13,904 AREC members. This is three fewer reports and about 4500 fewer members than reported a year ago. The following sections reported: Ala, Alta, Ark, Colo, Conn, EFla, Ill, Ind, Kans, Ky, La, Me, Mich, Mo, Mont, Nebr, Nev, NH, NC, NNJ, Okla, Org, Que, SDgo, SF, SCV, SDak, SNJ, STex, Tenn, Utah, Va, Wash, WVa, WFla. QST

Strays

Each year Iowa State University sponsors a student-run spring festival called VEISHEA. As part of the activities, the campus radio clubs WØYI, WAØKHF, and WAØTKK will be on all bands from 80- through 6-meters, s.s.b. and c.w., May 2, 3, and 4. Stations contacting any one of the VEISHEA stations may receive a commemorative certificate by sending a stamped self-addressed envelope to WØYI, Iowa State University, Ames, Iowa.



1968 ARRL National Convention

San Antonio, Texas June 7–9

BY DEAN DAVIS,* W5BGE

SEVERAL years of planning and hard work by members of the San Antonio Radio Club will come to a climax within weeks with the opening of the 1968 ARRL National Convention at the Municipal Auditorium in San Antonio on Friday, June 7. Three action-packed days in amateur radio are planned by SARC.

San Antonio, the unique city of contrasts, whose historic buildings blend a Spanish frontier heritage with the threshold of the space age, extends to you a Texas size welcome. Here is the setting, not only of the '68 ARRL National Convention, but also of HemisFair '68®, April 6 to October 6, the first world's fair ever scheduled in the southwestern United States. Celebrating the 250th anniversary of San Antonio's founding, the fair has as its theme: "The Confluence of Civilization in the Americas."

HemisFair, just two hundred yards from the Alamo, is an exposition that is conducting a centuries deep probe into the diversified cultures of Pan-America. It is featuring exhibits from this state, the United States government, foreign nations, other states and major industries from the United States and abroad.

HemisFair's featured performers for this weekend are Jack Benny and the Baja Marimba Band. For your convenience all meeting places and events of the convention are in the downtown section near the Alamo and HemisFair.

"With the theme: 'The World of Communication', convention activities have been designed to help you get the most out of amateur radio in the years ahead," said Roland U. Belk, W5LLS, general chairman for the convention.

George Munsch, W5VPQ, program chairman of the convention and president of the San Antonio Radio Club, announces the following highlights of the overall program:

"Padre" Gene La Fleur, W5WZR, of Lafayette, Louisiana, will be master of ceremonies, a colorful contributor to any convention.

Ambassador Armin H. Meyer, EP3AM, American Ambassador to Iran, will be the principal speaker at the banquet if his official affairs will permit.

Doctor R. O. Best, W5QKF, West Gulf Division Director, will moderate the ARRL open forum Sunday morning; George Hart, W1NJM, ARRL communications manager will talk on "Emergency Communications"; Lewis G. McCoy, W1ICP, Beginner and Novice Editor of *QST*, will speak on antennas.

Edward P. Tilton, W1HDQ, VHF Editor, and Robert L. White, W1CW, Assistant Communications Manager for Awards, are also speakers.

Notice has been received from Washington that the FCC will be represented on the program.

Technical subjects to be presented, but not necessarily in order as listed will be:

George Hanchett, W2YM, Department of Electronic Components and Devices of RCA, will describe "A Novel Hetrodyne Exciter Using Field Effect Transistors."

Paul Wilson, W4HHK, talks on v.h.f. and u.h.f. propagation equipment.

Ted Hart, W5QJR, will discuss the design and application of the Omega-T Noise Bridge.

Ralph Schleicher, Sr. Res. Engr., Southwest Research Institute, will describe a low-drain, animal-tracking transmitter, with emphasis on design criteria for long battery life in portable equipment.

Ray Wangler, W5EDZ, SwRI, will speak on "The State of the Art of Electronic Instrumentation Technology and its Impact on Design of Future Amateur Radio Equipment".

Pike Castles, W5CIW, research engineer at SwRI, will discuss some of the R.F. circuits developed for direction finding studies, and also

*1518 Santa Anna, San Antonio, Texas 78201

present information on propagation anomalies discovered during the development of state-of-the-art D. F. equipment.

Also a panel discussion, "New Life For a Coast-to-Coast Relay System VHF-FM," will be conducted.

The chiefs of the Military Affiliate Radio Systems will present a joint program Friday afternoon immediately following the formal opening of the three-day event. Arrangements have been made for group meetings to be held Friday for those interested in MARS, RACES/CD, f.m. v.h.f., DX, Old-Old Timers, QCWA, etc. Special interest luncheons on these and other topics may be arranged for Saturday.

At midnight Saturday night, a mystic initiation into the Royal Order of the Wouff Hong will take place under the supervision of C. B. Parks, W5UNE. If you've never been initiated, this is a ceremony you will never forget!

In addition to the ARRL staff presenting programs during the general assembly, League President Robert W. Denniston, W0NWX; First Vice President Wayland M. Groves, W5NW; General Manager John Huntoon, W1LVQ, and General Counsel Robert M. Booth, Jr., W3PS will take part in the ARRL Forum and will be available to answer questions concerning League and other amateur activities during the entire convention.

The ladies have not been forgotten. Those not wishing to take part in the technical sessions will be entertained by the Alamo YLs. Among the activities planned will be entertainment at the convention site, a Grey-Line tour of the historic sections of ole San Antonio, and HemisFair. There will also be a morning coffee on Saturday, later in the day a luncheon, and then, the SWOOP initiation (a secret sorority for the wives of amateurs). Sunday morning there will be a breakfast for all licensed YLs.

Featured speaker at the National Convention Banquet (his official duties permitting) will be the U.S. Ambassador to Iran Armin H. Meyer, W3ACE/EP3AM.

Governor John Connally of Texas signs an official memorandum designating June 3–9, 1968 as "Amateur Radio Week" in Texas. Looking on are, from left to right, W5QKF, ARRL West Gulf Division director; W5VPQ, San Antonio Radio Club president; W5USA/W5LLS, Fourth Army MARS director; and, W5TQN, Texas Civil Defense communications officer. (Texas Department of Public Safety photo.)

The general assembly will convene at 1300 hours on Friday, June 7 in the Municipal Auditorium. Registration booths will open in the lobby of the Auditorium at 0900 hours the same day.

An important part of the convention will be the three-day exhibit, in which many of the leading manufacturers and distributors of amateur radio equipment and related activities will present their latest lines. A special display from the National Aeronautical and Space Administration will be featured.

Registration price for all attending the general assembly sessions, group meetings, and exhibits of the convention will be $4.

Credit for all social functions of the convention must go to our co-chairman, M. D. Harris, K5PKX, who has arranged quite an array of entertainment beginning with the pre-convention party Friday night ($4), an informal gathering to renew old acquaintances and make new ones while enjoying a tasty buffet of ham, shrimp, and roast beef, with background music by a strolling Marachi band.

The Saturday night dance ($5) will have two bands to provide popular and country-and-western music along with other entertainment. Both the pre-convention party and the dance will be at the Villita Assembly Building, only a few blocks from the Municipal Auditorium.

The Texas style barbecue/banquet ($4) will be Sunday at 12:30 P.M. C.S.T. at the new Convention Center next door to the HemisFair.

Housing accommodations will be at a premium due to HemisFair, so make your reservations early. The convention committee has reserved blocks of room at several nearby hotels, for the

Among the hard-working local amateurs who have labored to make our convention a success are (from left): W5EJT, K5OPT, W5VPQ, WA5ONR, K5HZR, W5TSE, W5BGE, WA5JPT and W5BDN

convention dates only, that range in price from $17.50 to $32 for double occupancy. Please state the type of accommodations desired. Based on information received, accompanied by a separate check of $15 for room deposit, your reservation will be handled for you by the Registration-Reservation Chairman, Gene Jank, W5EJT, 100 N. Winston Lane, San Antonio, Texas, 78213. Give him the "handle," call and QTH of each registrant just as you want them to appear on the convention badge. Be sure to list the total number of registrations and the number of tickets for each individual event. Please make all reservation and registration checks payable to San Antonio Radio Club, W5SC.

Concurrent with the ARRL Convention the Texas VHF-FM Society will hold its semi-annual meeting. FMers are cordially invited to sit in on the meetings which will be held during a break of the general assembly.

On April 6 the San Antonio Radio Club began operating its club station, W5SC, from the HemisFair site. It is manned by amateurs of the San Antonio area for the duration of the fair. You are invited to contact and/or visit the station. W5SC is operating on all bands, meeting many of the traffic nets, especially 7290 kc. daytime and 3961 kc. night time. Also 52.525 and 146.94 Mc. f.m. are monitored almost continuously. Aubrey Armstrong, K5MOF, is in charge of the station at the fair.

During the convention there will be additional talk-in frequencies on 3900 and 7250 kc. Flying in? Contact Gen-Areo on the unicom channel at San Antonio International, 123.0 Mc.

Make your plans now for a double treat — HemisFair '68® and the 1968 ARRL National Convention. QST

Hamfest Calendar

Alabama — The Birminghamfest will be held on Saturday and Sunday, May 4 and 5. Further details can be obtained from the Birmingham ARC, P.O. Box 603, Birmingham, Ala. 35201.

Alabama — The Annual Hamfest sponsored by the Mobile ARC will be held on May 25 and 26 at Mobile, Alabama. For entertainment, swap table, eye-ball QSOs, and fun for the whole family, plan to attend. For further information and reservations contact Ham Wentworth, W4IAX, P.O. Box 7232, Mobile, Ala., Tel: 473-8561.

California — The Lockheed ARC (W6LS) will hold a convention May 18 and 19 at 2814 Empire Ave., Burbank. The displays, demonstrations, and talks will be of interest to all hams, as well as to those who plan to become hams. In addition, top speakers will provide an excellent program for both days. For more information write W6DDB or call 848-9340.

California — The 26th Annual Fresno Hamfest will be held on May 3, 4, and 5 at the Tropicana Lodge in Fresno California. There will be a Novice clinic, transmitter hunts, mobile judging, ladies' luncheon and fashion show and banquet. The registration fee is $8.00 and includes the banquet. For further details write the Fresno ARC, P.O. Box 783, Fresno, Cal. 93721.

California — The annual West Coast V.H.F. Conference is scheduled for May 25-26 at the Tropicana Lodge, 4061 North Blackstone, Fresno, Cal. K6MYC says formal invitations to this conference are no longer necessary and that it is open to anyone interested in v.h.f./u.h.f. The now well-known antenna measuring contest is scheduled for the 26th, and there are other seminars on solid state and moon-bounce techniques, f.m. repeaters, propagation, surplus equipment modifications, and so forth. Further information is available from Ken Hollaway, K6HCP, 7733 Rainbow Drive, San Jose, Cal., or K6MYC.

Florida — The St. Petersburg ARC, Inc. will hold their annual Hamfest at Lake Maggiore Park, entrance gate at 9th St. and 38th Ave. S., St. Petersburg, Sunday May 19. Plenty of parking space. No charge for entering Park. All hams and guests cordially invited. This is an old fashioned Hamfest, picnic lunch, and swap table.

Illinois — The Western Illinois RC is sponsoring a hamfest at Eagles Alps in Quincy, Ill. on Sunday May 26.

Illinois — The Starved Rock RC will hold their annual SRRC Hamfest at the La Salle County 4-H Home and Picnic Area Southwest of Ottawa, Ill. on June 2. Advance registration, until May 25, $1.50 or $2.00 at the gate. Free coffee and doughnuts from 10 to 10:30 A.M. Food available and ample parking provided for. For a big day of activities follow the big yellow "HAMFEST" signs on Route 71 from the South end of the Illinois River bridge at Ottawa. For further details, including data on available motels and camp facilities, write W9MKS/W9QLZ, RFD 1, Box 171, Oglesby, Ill. 61348.

Illinois — The Kishwaukee RC will hold its annual swapfest on Sunday May 5 at the Hopkins Park Shelter House in Dekalb, Ill. No charge for buying, selling, or swapping, but a $1.00 donation will be expected. Come one, come all and meet your ham friends.

Illinois — The Tri-City ARC of Granite City, Ill. will hold its Sixth Annual Hamfest on May 19, at the Fire Hall on Pontoon Road.

Kansas — The Jayhawk Hamfest, sponsored by the Jayhawk AR Society, Inc., will be held Sunday, May 26 at the George J. Meyn Community Building, Wyandotte County Park, 126th & State Ave., Bonner Springs, Kansas. Activities and meetings for everyone, free hot dogs and soft drinks.

Kansas — The Hi-Plains ARC will hold its annual Hamfest, May 19 at Plains, Kansas. No pre-registration. Featuring basket dinner, swap table and eye-ball QSOs.

Kansas — The Kaw Valley RC will hold its annual Ham Picnic at Garfield Park Shelter House, Topeka, Kan. on Sunday, May 19 from 9:00 A.M. to 5:00 P.M. No registration fee. The club will furnish the drinks, bring a covered dish and your family and enjoy amateur fellowship. For further information write WAØQKY, Charles Deitrick, Jr., 645 Vesper St., Topeka, Kansas 66606.

Michigan — The Hazel Park ARC will hold a hamfest on May 19 at the Hazel Park High School from 10:00 until 5:00 P.M.

Nebraska — The Pine Ridge ARC will hold their annual Hamfest on June 2 at Chadron State Park, ten miles South of Chadron, Nebraska. Each family bring a covered dish and own utensils. The club will furnish coffee and soda pop. Registration starts at 9:00 A.M. There will be hidden transmitter hunts, swap tables, and a code contest. Dinner at twelve.

New Jersey — An unusual opportunity to expose amateur radio to the general public will be exploited by the Garden State Amateur Radio Clubs, Inc., May 2-4, 1968

at the Garden State Plaza, one of the world's largest shopping centers, Rts. 4 & 17, Paramus, New Jersey. The Garden State Amateur Radio Exposition (see pg. 69, March *QST*) will feature over 7,000 sq. ft. of exhibit area covering all facets of amateur radio. An allied program of talks and symposiums and the International V.h.f. Conference will top off the event. Exhibit hours will be 1:00 to 9:00 P.M. Thursday and Friday, and 9:00 A.M. to 5:00 P.M. Saturday. Admittance is free; groups are invited to arrange visits in advance. Write: Garden State Amateur Radio Clubs, Inc., Box 73, Paramus, New Jersey 07652.

New York — Western N. Y. Hamfest and V.H.F. Conference, Vince's 50 Acres, Rte. 15 South of Rochester, Saturday, May 11. Full day of continuous dual programming with outstanding speakers covering a wide range of technical subjects. Special meetings for Navy MARS, QCWA, and Post Office Nets plus N.Y. Code Receiving Championship. Lunch served on grounds. Annual Banquet now at 5:45 P.M. Largest Flea market in the East. Entrance to grounds and registration is $2.50; banquet $3.75. Advance registration and banquet only $5.00. Send check to Western N. Y. Hamfest, P.O. Box 1388, Rochester, N. Y. 14603.

North Dakota — Don't forget the Hamfest at Fargo on May 5 and the one in Kindred on June 30.

Ontario — The Northshore RC, Oshawa, Ont. announces its annual banquet to be held at the Annandale Country Club, Church St., Pickering, at 5:30 P.M., May 11. Roast beef dinner, entertainment and dancing. Plan to be there with your wife or girlfriend. Tickets $3.75 each from Peter Solly, VE3DFD, 118 Allan St., Whitby, Ont.

Pennsylvania — The 23rd Annual Banquet of the Lancaster Radio Transmitting Society, Inc. will be held on Saturday May 18 at Media Heights Country Club located on U.S. Route 222 one half mile south of Lancaster. Dinner will be served at 6:30 P.M. Tickets are $4.00 and may be purchased from Harry Eberly, K3OEN, RD 1, Reading Rd., Ephrata, Pa. 17522, Tel: 717-733-6441.

Pennsylvania — On June 9, the South Community YMCA ARC will sponsor its annual Swap & Shop Hamfest. Lots of good food and the YMCA facilities available for you and your family. The YMCA grounds are 8 miles south of Pittsburgh near route 51, in Pleasant Hills. The directions will be well posted to the north from Large on Rt. 51 and south to the Liberty Tubes. For more information write K3HUO.

Pennsylvania — It's spring again! Time for the Breezeshooters 14th Annual Hamfest, Sunday May 19. Noon to 6:00 P.M. at White Swan Park. Inquiries contact George Petshot, K3EED, 5787 Clark Ave., Bethel Park, Pa. 15102.

South Carolina — The Greenville Hamfest will be held Sunday May 5 at Cleveland Park, Greenville, S. C. The Blue Ridge Radio Society invites you to attend. Swap shop, FCC exams, ladies' bingo, catered lunch, displays and an interesting program. Prices: adults $3.25, children $1.50. Talk in on 3915 kc. and 52.52 Mc. f.m. (W4NYK/4). More information from Don Robertson, WA4KLT, 202 Charing Cross Rd., Taylors, S. C. 29687.

South Carolina — The Palmetto ARC invites you to the first annual Columbia Hamfest to be held at the State Fair Grounds, Sunday May 26. Admission is $2.50. Lunch will be served at the location on the grounds (average cost of $1.25 per plate). Free coffee will be served, transmitter building contest, home brew contest, display of antique radio equipment, women's and children's activities, and complete indoor facilities. Talk in Frequencies: 3.915 (l.s.b.,a.m.), 52.525 (f.m.) and 146.94 (f.m.) Mc.

Tennessee — Don't forget the Hamfest at Humboldt on May 25, and in Memphis June 1 and 2.

Virginia — The Roanoke Valley ARC holds its annual Hamfest May 25-26 at the Vinton War Memorial in Vinton, Va. An open house Saturday at 7:00 P.M. will be followed by a dance 'til Midnight. Contests, and net meetings Sunday, and a chicken buffet at noon. Space available for swap or shop — no charge. Advance registration is $1.00, at the door $1.50 or four for $5.00. Buffet ticket $1.25. Write Roanoke Valley ARC, Box 2002, Roanoke, Va.

Washington — The AR Assn. of Bremerton, Inc., will hold its annual Hamfest on May 18 at the Westside Improvement Club. Tickets are $4.00 per reservation or $4.50 at the door and $2.00 for each child. Registration begins at 1:00 P.M. with various activities during the afternoon and dinner at 6:00 P.M. Dancing will conclude the day's festivities. Reservations and further information may be obtained by contacting either the ticket chairman, Doug White, WN7GXL, Box 12, Belfair, Wash. or Harry Hill, W7CQI, 3230 Herren, Bremerton, Wash. QST

ARRL NEW ENGLAND DIVISION CONVENTION

Swampscott, Mass. **June 1 & 2**

The 9th annual ARRL N.E. convention sponsored by the Federation of Eastern Mass. Amateur Radio Associations will be held June 1 & 2 at Swampscott, Massachusetts. The New Ocean House hotel features an Olympic-size swimming pool and private beach and attendees cry: "Come on in . . . the water's fine!" Saturday's features include programs on DX, s.s.b., RTTY, antennas, transceivers and the legal aspects of ham radio. The Saturday night banquet will be followed by dancing and a floor show featuring Jean Shepherd, K2ORS, of WOR-TV, New York. The Royal Order of the Wouff Hong will be bestowed at midnight on those daring to attend. Sunday's program features amateur TV, DX, v.h.f., MARS, the ARRL forum plus a talk by the inventor of the strobe flashgun, Dr. Harold Edgerton of MIT, on underwater photography, and a discussion by Fr. Dan Linehan, W1HWK, on oceanography. In addition there will be a variety of exhibits both days by leading manufacturers of the latest in ham gear, an antique wireless exhibit, net meetings, W1 QSL bureau, the ARRL booth manned by League headquarters staff. Sunday only, 10 to noon, FCC exams will be given for General, Advanced and Extra Class licenses. A special YL program will be in force both days featuring a scenic boat trip along the picturesque north shore on Sunday, 2 to 5 P.M. Reservations for the boat trip should be made well in advance with Ruth Barber, K1IIF complete with payment of the $2.50 fee. Listen for W1EED/1 on s.s.b. 3.950, 7.220, 14.320, 28.650 and a.m. 50.5 Mc. Convention registration is $3 per person before May 18 or $4 at the door. Banquet and floor show tickets are $7 each and are available by vance with Ruth Barber, K1IIF, complete with MAIL ONLY. Send check and s.a.s.e. to John McCormick, W1KCO, Berkeley St., Taunton, Mass. 02780 before May 18. Hotel reservations should be made at least 20 days in advance and sent directly to the New Ocean House Hotel, Swampscott, Mass. 01907. Single $12, double $17, triple $20 per night. QST

COMING A.R.R.L. CONVENTIONS

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

Amateur Radio—Present and Future

Our President Addresses the QCWA Washington Chapter

BY ROBERT W. DENNISTON,* WØNWX

MR. Chairman, distinguished guests, my fellow amateurs and friends.

Some weeks ago I was asked to say a few words at this QCWA dinner. I am very happy to have been invited. Since then we have all been shocked and deeply saddened at the passing into Silent Keys of Earl Thomas, W2MM, your distinguished president for many years.

On a brighter note, we're delighted to see Robbie, W3RE, up and around again, and in the thick of things as usual.

I am deeply honored by the opportunity to occupy this rostrum at what has become one of amateur radio's most prestigious annual events. One reason is that there are few if any groups who have contributed so much to amateur radio's past, or who are so vitally concerned with its future. It is to this concern that I'd like to address myself this evening — to explore with you some of the signs we in the League see as pointing toward the shape of things to come in amateur radio — its challenge and its opportunities.

But first, a bit of pertinent background.

In 1949 some rather drastic changes in the amateur rules were proposed and discussions concerning them occupied a period of several years. The League, although unsuccessfully, strenuously opposed much of the new concept — particularly when it suddenly developed into a lowering of standards for certain amateur operating privileges. Our growth in subsequent years was substantial in pure numbers, but not correspondingly so in technical levels of knowledge and achievement.

This trend became a matter of increasing concern to the Board of Directors of the American Radio Relay League, as well as to many able, knowledgeable amateurs seriously concerned over the future. It prompted the filing, several years ago, of a number of petitions to the Commission seeking one method or another of returning to the former standards.

The Commission's decision last August has, in my opinion, marked the start of a new era in amateur radio. It has restored the challenge, and the feelings of accomplishment and pride, which unfortunately the 1950 actions subdued. I want especially to thank Chairman Hyde and the FCC staff for their judicious and capable handling of the docket. (*Applause*). I am happy to say the new rules have in most cases been enthusiastically accepted by the amateur fraternity. Letters to our headquarters and directors repeatedly tell of determination to upgrade current licenses. And they are from doctors and plumbers and housewives, too — not the professional "egg-heads" who were claimed by detractors of incentive licensing to be the only ones who could reach the higher grades. Clubs throughout the country are starting special code and theory classes aimed at the new tickets. The whole tenor of amateur radio has changed the past few months, with more of the enthusiasm that has so long been an essential part of our avocation.

I find all this most encouraging, for it is precisely

the effect the League was seeking in its original action. It is reassuring, as well, for it shows that we have not underestimated the determination of the great majority of amateurs to accomplish the purposes of our service in the public interest.

But enough of incentive licensing, except to point out that it is just one step in the League's program to enhance the Amateur Radio Service. It is, of course, based on our domestic performance and image. So far as I know, while others are continually seeking relaxation of rules, we are the only service to have come to the Commission proposing a substantial tightening and raising of license requirements. We are indeed proud to be in that position.

Well, what are the other steps?

Most of you know that amateur frequency bands are born and can die at international allocations conferences. The world's nations agree, through the International Telecommunications Union organization, on the basic amateur band structure. FCC assignments to amateurs must fit this pattern. Thus the position and stature of amateur radio around the world is equally of concern to us.

Sooner or later, the spectrum will again be up for full evaluation at a general allocations conference. We intend to be prepared.

The basic mechanism for such preparation exists in the International Amateur Radio Union. IARU, created in 1925 by leaders such as Hiram Percy Maxim, is an affiliation of the world's amateur radio organizations. It has now grown to a membership of 77 national societies. The League was chosen as the Hq. society, and its officers are automatically officers of IARU. Increasing the strength and effectiveness of IARU has long been an objective of mine, and I am determined that this growth shall continue.

Just as the International Telecommunications Union has divided the world into three regions for administrative purposes, so has IARU found it desirable to conduct much of its activity on a regional basis. The amateur societies of Europe and Africa have had their Region I organization under

* President, ARRL

way for nearly 20 years, with triennial meetings to discuss and solve problems of mutual concern. Largely at ARRL initiative, societies in this hemisphere several years ago formed a Region II division, and are progressing rapidly to an effective working entity. I am pleased to say that, despite the problems of distance as well as cultural and political differences, the amateur societies in Region III are now also under way toward a coalition. I expect to attend the initial meeting in Sydney next month, where hopefully officers of the Radio Society of Great Britain and others will also be present to provide guidance for the fledgling organization.

ARRL undertakes participation in such projects because we feel deeply that amateur radio must be made stronger worldwide, not just in our own country.

The reception accorded League officers and staff members at such conferences overseas has been most reassuring, and we are much impressed with both the ability of our fraternity members in other countries as well as their parallel dedication to strengthening amateur radio.

Another area to which we are devoting increased attention is the matter of non-amateur operation in the ham bands, in violation of international agreements. Some of you are familiar with a provision in the Geneva regulations that an administration may assign any frequency to any station provided no harmful interference is caused to operations conducted in accordance with the table of allocations. What concerns us is that, should we remain latent, at a future conference some nation may say, for example, "Well, we've been operating our broadcast stations on 7085 kc. for ten years and have never had any complaint about it, so we see no reason why we can't continue, and maybe even change the allocation table to provide for it." While for years we have submitted sporadic reports of such improper activity in our bands, the program was stepped up several years ago and formalized under the name "Intruder Watch." Nearly 200 volunteers among our members spend much of their time in monitoring the bands and furnishing intercept reports. We've been keeping the Treaty Division of the Commission well occupied, and as always they've been most cooperative in processing the complaints. A number of intruders have been forced out of amateur bands. Results are slow, but nearly always forthcoming. Most important, we are building a record so that no administration at a future conference can claim interference has not been caused.

Additional current efforts involve the promotion of interest in amateur radio in other countries. Internally we call this the "gear overseas" program, but more formally it is known as "DARE — Developing Amateur Radio Everywhere." Here we have moved slowly and cautiously, because of the possible feeling among some of the developing nations that any project from the States can be labeled interference in their affairs.

Our work is through an amateur society when it exists, and consists of supplying extensive literature on the fundamentals of radio, plus basic code practice apparatus such as oscillators, keys and headphones. In some instances, largely through the cooperation of U.S. manufacturers, we have supplied complete stations for the society headquarters. Countries where we have provided assistance include Gambia, Morocco, Sierra Leone, Liberia, Ivory Coast, Ghana, Nigeria, Niger, Kenya, Zambia, Indonesia, India, Malawi, Laos, Iran, Bhutan, Malaysia, Philippines, Sudan, Uganda, Mauritius, Jamaica.

The growing list of countries with which reciprocal operating agreements have been signed is another indication of the increased stature of amateur radio in the minds of foreign telecommunications administrations. At last count there were some 33 agreements completed by the United States. Here I want to express another word of appreciation for the fine cooperation of the telecommunications branch of the Department of State in efficient handling of the negotiations. It is pleasing, also, to know that no real difficulty has arisen from the application of these bi-lateral agreements, despite some dire predictions in the early stages of attempts to amend the Communications Act.

One matter of great concern to us is the increasing number of amateurs — perhaps I should say holders of amateur license, since they don't deserve the name of amateur in its true meaning — who flagrantly violate the traditional high standards of ethics and conduct in our fraternity, and even the Commission's rules as well. Although but a minute percentage of our number, a few licensees have engaged on the air in name-calling, obscene language, personal attacks, and other forms of wholly undisciplined activity. Some of the culprits may be CB graduates. Possibly this state of affairs is due to the disregard for law and order which unfortunately is growing in the over-all fabric of our society. Perhaps it results to some extent from letting down the bars in the Commission's rules changes in the early 1950s I have previously mentioned. In any event, the problem exists. The Commission is fully aware of it, yet handicapped to some extent both by limited funds and personnel, and by recent court decisions which complicate the functioning of an enforcement body. We have had several conferences with FCC staff, and are most heartened by their determination to do all in their power to see that the matter does not get out of hand.

Our traditional self-policing for rules observance is less effective in the area of inadequate personal discipline in conduct on the air; such an individual pays little attention to notices from Official Observers or other amateurs. His infractions are intentional. Short of our forming vigilante committees, which we feel an undesirable approach, prompt and decisive action by the Commission to nail some of these scofflaws, adequately publicised such as through *QST*, is the only practical solution.

Yet there are ways we can be helpful, for example through local radio clubs. A League official on the west coast recently appeared at a radio club meeting and spoke strongly on the need for self-discipline and proper operating conduct. Visiting officers of another radio club went home and called a meeting of their board of directors to discuss the problem of a couple of local teen-age hams who had been acting up in thorough disregard of decent operating standards. With the knowledge and concurrence of their parents, the youngsters were called on the carpet and told in no uncertain terms to straighten up and fly right. Since then, I'm told, they've been models of propriety.

The action of this League official — an old timer and I'm sure a QCWA member — is an example of the kind of leadership which promises a continuing bright future for amateur radio. You know, many hams are inclined to view League Headquarters as a sort of Mecca — or ivory tower, if you will. In one sense that is true. But the accomplishments

(Continued from page 154)

Antinoise Bill Passed In House
Special Callsign Rules Codified
S.S.B. Band Edges Warning
Executive Committee Minutes

HOUSE PASSES NOISE BILL

The House of Representatives on March 12 passed and sent to the Senate HR 14910, which would give FCC authority to control the manufacture, importation or sale of devices which are capable of causing interference to communications. The Senate two years ago had passed a very similar bill (which died at the end of the Congressional term for lack of House action) so no difficulty is expected in securing passage. However, a drive for early adjournment or some national emergency could sidetrack Senate action; letters, radiograms and telegrams from amateurs to their Senators supporting fast passage of the bill therefore appear to be in order. The text of the measure follows:

DEVICES WHICH INTERFERE WITH RADIO RECEPTION

SEC. 302. (a) The Commission may, consistent with the public interest, convenience, and necessity, make reasonable regulations governing the interference potential of devices which in their operation are capable of emitting radio frequency energy by radiation, conduction, or other means in sufficient degree to cause harmful interference to radio communications. Such regulations shall be applicable to the manufacture, import, sale, offer for sale, shipment, or use of such devices.

(b) No person shall manufacture, import, sell, offer for sale, ship, or use devices which fail to comply with regulations promulgated pursuant to this section.

(c) The provisions of this section shall not be applicable to carriers transporting such devices without trading in them, to devices manufactured solely for export, to the manufacture, assembly, or installation of devices for its own use by a public utility engaged in providing electric service, or to devices for use by the Government of the United States or any agency thereof. Devices for use by the Government of the United States or any agency thereof shall be developed, procured, or otherwise acquired, including offshore procurement, under United States Government criteria, standards, or specifications designed to achieve the common objective of reducing interference to radio reception, taking into account the unique needs of national defense and security.

FCC CLARIFIES FOUR-MONTH RULE

The Federal Communications Commission has made editorial changes to its rule governing "portable" operation of fixed stations which have been changed from the permanent address of record to a new permanent location. Under the new rules, an amateur is to send in a Form 610 for modification of his license within four months of the time he moves. He cannot operate in the new permanent location, however, until he has sent in the application. On the other hand, once the 610 has been filed, the amateur may continue operating until the new license arrives (or he hears to the contrary from FCC, a rare occurrence indeed). The new rules also eliminate the need for a duplicate notice of temporary operation to FCC Washington, but of course the usual notice of portable operation still goes to the District FCC Engineer-in-Charge (see March *QST*, page 82, for map and list of FCC districts).

The revised text follows:

§ 97.95 Operation away from the authorized permanent station location.

(a) Operation within the United States, its territories, or possessions is permitted as follows:

(1) When there is no change in the authorized permanent station location, an amateur station may be operated under the permanent station license anywhere in the United States, its territories or possessions as a portable, mobile, or temporary fixed station.

(2) When the authorized permanent station location is changed, formal application (FCC Form 610) must be submitted to the Commission prior to any operation and within four months of the move for the purpose of modifying the station license to show the new permanent station location. Operation at the new location is permitted under the license for the former station from the date the modification application is mailed until advised of Commission action on that application.

(3) For operations under subparagraphs (1) and (2) of this paragraph, advance notice, as required by § 97.97, must be given to the Engineer in Charge of each radio district in which operation is intended and the portable identification procedures specified in § 97.87 must be used.

* * *

2. In § 97.97, the first sentence of the introductory text is amended to read as follows:

§ 97.97 Notice of operation away from authorized location.

Whenever an amateur station is, or is likely, to be operated during periods in excess of 48 hours away from the fixed transmitter location specified on the station license without return thereto, the licensee shall give advance written notice of such operation to the Commission's office(s) specified in § 97.95.

* * *

§ 97.99 (Deleted)

3. Section 97.99 is deleted.

SPECIAL CALLSIGN RULES CODIFIED

FCC has put into new Section 97.53 all its previously-informal ground rules for issuance and transfer of "preferred" callsigns, both two-letter and three-letter (with a single letter prefix; e.g., K6QRQ, W9XYZ). These rules have evolved over a period of time, some being quite

Behind the Diamond

Number 4 of a Series

We had lots of choices for a photograph of our president: WØNWX greeting dignitaries; WØNWX addressing conventions; WØNWX with HRH Prince Philip; and of course the stock head-and-shoulders. But this one best portrays **Robert W. Denniston, WØNWX** — a ham's amateur, taking a breather in the middle of a DX contest, at the controls of VP1JH.

He's a regular participant in Field Day, Sweepstakes, and the V.H.F. Sweepstakes; claims credit for being the father of the modern DXpedition (see "Expedition Gon-Waki," July, 1948); and put Clipperton Island on the air for its finest hour as FO8AJ (and then rode home courtesy of the Mexican Navy!) — just to mention a few operating feats.

But Bob is much more than a skilled amateur radio operator. He was director from the Midwest Division from January 1, 1956 until his election as sixth president of the League May 7, 1966. He's been ARRL emergency coordinator and RACES radio officer for Jasper County; n.c.s. of the Tall Corn Net; n.c.s., Iowa 160 Meter Phone Net; n.c.s., Jasper County Emergency Net; past president of the Des Moines Radio Amateur Association, Newton Amateur Radio Association and Potomac Valley Radio Club; and member of the ARRL Executive Committee for the past seven years, just to mention a few jobs he's done.

Bob is perhaps proudest — and with reason — of his accomplishments on the international scene. He is of course president of the International Amateur Radio Union. He's a founder and Executive Committee member of the Union Interamericana de Radioaficionados (Region II IARU). He has sat in on the Region I IARU Congress, attended a convention of the International Amateur Radio Club at Geneva, and visited a couple dozen countries to coordinate IARU affairs and strengthen amateur radio relationships.

Somehow, he still manages to serve as president of Denniston and Partridge Company, operating nearly thirty lumberyards. He's a director of the Newton Home Savings and Loan Association and of Dealers Warehouse Company. President Bob makes his home in Newton, Iowa with his charming wife, Nell.

recent (the one-to-a-customer rule), others older: the only effect of the action right now is to put the rules into one place where amateurs can find them and be aware of them. Here's the new section:

§97.53 Policies and procedures applicable to assignment of call signs.

(a) The following are regarded as preferred call signs:

(1) Two-letter call signs — call signs with a single letter prefix (two-letter prefix in Alaska, Hawaii, and in the United States possessions) and a two-letter suffix; e.g. W6AB (KH6AB).

(2) Three-letter call signs — call signs with a single letter prefix and a three-letter suffix; e.g. W6ABC.

(b) An eligible licensee will be permitted to hold only one two-letter call sign. However, a licensee who, by reason of former rule provisions, presently holds more than one such call sign may continue to hold those call signs in the same call sign areas.

(c) Subject to availability, two-letter call signs beginning with the letter "W" will normally be assigned in each call sign area to eligible licensees.

(d) An eligible licensee who holds one or more three-letter call signs must relinquish one of those call signs in order to be assigned a two-letter call sign.

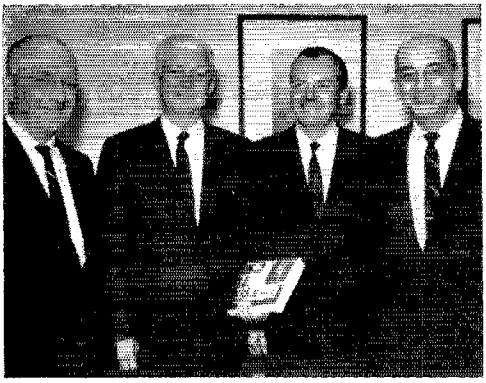
(e) New additional stations will not be assigned a preferred call sign.

(f) An additional station which is presently assigned a preferred call sign will be issued a non-preferred call sign upon modification of license to show a station location in a different call sign area.

(g) Subject to availability, a basic station will be issued the same type of call sign as the one relinquished upon modification of license to show a station location in a different call sign area.

(1) Licensees will not be assigned specific call signs of their choice or counterpart call signs (call signs with identical suffix letters) under this provision.

(2) When a two-letter call sign is not available in the new call sign area, an eligible



Members and staff alike were proud to see the ARRL Handbook on a list of all-time best sellers recently. This reminded us that the 4,000,000th copy had just come off the press! It was presented to Federal Communications Commission Chairman Rosel Hyde, (2nd left) by our president WØNWX while W4GF and W3BG of the Amateur and Citizens Division look on.

licensee may be assigned an available unspecified three-letter call sign.

(h) Call signs which have been unassigned for more than one year are normally available for reassignment.

REMINDER ON BAND EDGES FOR S.S.B.

In response to a letter from an individual amateur, FCC has reiterated its views on the operation of s.s.b. stations near band edges. Although this interpretation is not new, it is tighter than some amateurs believe to be the case; therefore it bears careful attention by all amateurs using s.s.b.:

"The question as to what operating carrier frequency near the edge of a telephone band would assure that transmissions would be in compliance with Section 97.63 of the Commission's Rules cannot be answered in terms of a specific carrier frequency. Obviously, the characteristics of the voice modulating the transmitter and the operational characteristics of the transmitter determine the bandwidth of emission. That part of Section 97.73 which states that 'This spurious radiation shall not be of sufficient intensity to cause interference in receiving equipment of good engineering design including adequate selectivity characteristics, which is tuned to a frequency or frequencies outside the frequency band . . .' is considered applicable to the determination of compliance with Section 97.63.

"The practice you have observed, to operate with the suppressed carrier and sidebands well within the amateur bands, is most advisable. Amateurs attempting to operate with suppressed portions of a signal on the band edge or outside of the amateur band, may upon monitoring the frequencies outside of the amateur band find unsuppressed signal portions in violation of Section 97.63 of the rules. For example, an amateur using a single sideband transmitter with 60 db. carrier suppression, when transmitting a signal with a strength of 40 db. over S9, will find the supposed suppressed carrier being transmitted with a signal strength of possibly S4 to S6. Such a signal, even though resulting unintentionally, if transmitted outside of the prescribed amateur bands, constitutes violation of the Commission's Rules. For this reason it is advisable to confine even suppressed signal portions to the amateur bands." — *James E. Barr, Chief, Safety and Special Radio Services Bureau, FCC.*

SUBBANDS CHALLENGED

An individual amateur, in a letter to FCC, has asked FCC to set aside the second set of subbands scheduled for November 22, 1969, under the incentive licensing plan. The writer felt there were not enough Advanced Class and Extra Class amateurs to justify the space.

FCC, while reassuring the amateur of its intention to watch the occupancy situation closely, obviously feels the time has not yet come for any meaningful evaluation. Here's its answer:

"In its Report and Order in Docket No. 15928 (enclosed), the Commission said: 'Notwithstanding this schedule, the Commission intends careful review and if it is determined that there is insufficient occupancy of any part of the reserved frequency segments then the effective data of the implementation schedule will necessarily be stayed in whole or in part, as appropriate.' The Commission intends to carefully watch the growth of the four classes of licensees primarily concerned over the entire two year period November 22, 1967–1969 and at any time that growth and occupancy indicates a stay in the implementation is advisable, appropriate action will be taken. At the present time the effect the new rules will have on the number of Advanced and Extra Class licensees cannot be accurately anticipated. However, before the November 22, 1969 implementation date there will be plenty of time to evaluate the statistical growth of the classes of operators and to study the occupancy of the first group of reserved segments and stay the final implementation, if appropriate."

James E. Barr
Chief, Safety and Special
Radio Services Bureau, FCC

Leonard Collett WØLUF

R. Leonard Collett, WØLUF, director from the Midwest Division from 1948 through 1951, died March 19. Len was an active DXer and SS operawho as KZ5LC and KG6DEA handed out much-needed multipliers to hundreds of contesters. Recently living in Joplin, Missouri, Len was a retired airways radio operator for the Federal Aviation Agency. Other calls held: W9DEA, WØDEA, W6SGL, and K6GDX.

Earl Thomas, W2MM

Earl R. Thomas, W2MM, president of the Quarter Century Wireless Association, passed away March 7. First licensed as 8KY in 1914, Earl was a Fellow of the Institute of Electrical and Electronic Engineers and had a distinguished career as an engineer with Consolidated Edison Company of New York, retiring last August. A radar development officer during World War II, Earl retired from the USAF in 1960 as a Colonel. A resident of Englewood, N. J., he was active on 20- and 75-meter s.s.b.

Clarence Seid, W2KW, will serve as interim president of QCWA.

STAFF NOTES

The Headquarters 10-year Club met recently to welcome a "new" member, Oswald W. Langer, Sr., and to mark the 25th anniversary of another, Edgar D. Collins. "Ozzie" is assistant traffic manager in our shipping department. He is also unofficial consultant to all of us on any shipping or wrapping problems we may have; the good turns he's done for fellow workers could — and should — fill a book.

Ed Collins has been toiling in our advertising department for a quarter century. Many members know him as "the Ham-Ad man." Around 225 Main Street, he's the guy who can draw up an illustration or cartoon on short notice. And the community knows him, too — a couple of years ago he was honored by the Hartford *Courant* as one of its champion writers of Letters-to-the-Editor! He also has the most interesting summer vacations — he often takes a working cruise aboard a freighter, many times with Captain Kurt Carlsen, W2ZXM on the *Flying Enterprise*.

Elsewhere on the hq. scene, Robert J. Rinaldi, W1CNY/K1AFC, who has been assistant circulation manager and purchasing agent of the League since 1965, now transfers to the post of assistant advertising manager. Bob served six years in the U.S. Navy Reserve, two of them on active duty. He's also been a disk jockey at three Connecticut radio stations, WWCO, WNAB and WDEE. He has a bachelor's degree in economics from Fairfield University. First licensed in 1956 as a Novice in Waterbury, Conn., Bob operates 80 through 10, c.w., s.s.b. and RTTY. In Navy MARS, he's NØZVK; he's former area editor of *The Kilowatt* and former n.c.s. for the Connecticut area. On the civilian ham scene, he's secretary of the Connecticut Wireless Association.

Moving in to replace Bob is Carl E. Smith, W4NQA. Carl put in nearly eight years in the Air Force as an administrative specialist, and later worked for Freck Radio, Hammarlund and IBM. Carl was originally WØYFT out in Kansas City, Kansas, where he was licensed in 1954. Now an Extra Class licensee, he's also a first-rate operator, having taken first place for North Carolina in the Sweepstakes, phone and c.w., 1966 and 1967. He first turned the double-winner trick in 1961 for South Carolina. Carl has also worked more than a hundred countries from each of five states: Kansas, South Carolina, Florida, Arizona and North Carolina. He's been secretary of the Buncombe County Amateur Radio Club and editor of its bulletin. *The Smoke Test*. He also served as official observer and emergency coordinator.

Our new assistant communications manager for contest administration is Robert Hill, W1ARR. He's a "natural" for the job, too — as a prep school student in Concord, N. H., in 1954, Bob acquired his General Class (without first going to Novice), got into the Sweepstakes and took top honors for the state with a score in the 100,000 class! Since that time he earned a bachelor of arts in English from University of New Hampshire. He's had four years in the USAF as a Russian linguist and then worked for the Department of Health, Education and Welfare in Washington. A member of the Potomac Valley Radio Club, and frequent operator at W4BVV, Bob is also founder and chairman of Murphy's Marauders, a contest-oriented club in Central Connecticut. But contests are only part: an Extra Class licensee, he's been an active member of NHN, 1RN, EAN, UTL, HBN, TCPN and the Transcontinental Corps of ARRL's National Traffic System.

W9WNV SUES ARRL

On February 19, 1968, Dr. Donald A. Miller, W9WNV, filed suit in the federal district court at San Francisco against the American Radio Relay League and its General Manager, John Huntoon, alleging defamation and seeking damages in the amount of $550,000. The League has retained a firm of attorneys in San Francisco specializing in libel matters and will vigorously defend the case. The League has received several contributions from members to help defray costs, but these are being returned with thanks.

LICENSE SUSPENSIONS

The Federal Communications Commission has suspended the Extra Class licenses of three Seattle area amateurs for operating a station from an unauthorized location, not under the control of its licensee, and operating with power input in excess of one kilowatt. John D. Allyn, W7YGN; Richard W. LeMassena, Jr., W7WVE; and Donald W. Stribling, W7VGQ of Seattle apparently set up a station at W7VYQ's location and operated it under the call W7YGN during the CQ World Wide DX Contest November 26–27, 1966. Allyn simultaneously operated from another location, also using W7YGN so that additional points could be garnered, according to the FCC suspension orders.

Allyn's license is suspended from December 28, 1967 to December 28, 1968; Stribling's from December 24, 1967 to December 24, 1968 and LeMassena's from December 24, 1967 to its expiration July 18, 1968.

COURT UPHOLDS FCC ON LICENSE DENIAL

The U. S. Court of Appeals for the third circuit confirmed on March 5, 1968 an order of the Federal Communications Commission dismissing the applications of Ralph Ilowite for amateur and citizen's radio licenses. The applicant had refused to answer the Commission's inquiry as to whether he was or had been a member of the Communist Party or of any organization or group which advocates the overthrow of the Government by force or violence.

MINUTES OF EXECUTIVE COMMITTEE MEETING

No. 320

March 9, 1968

Pursuant to due notice, the Executive Committee of The American Radio Relay League, Inc. met at the Gramercy Inn, Washington, D. C., at 9:45 A.M. March 9, 1968. Present: President Robert W. Denniston, WØNWX, in the Chair; First Vice President W. M. Groves, W5NW; Directors Charles G. Compton, WØBUO, Gilbert L. Crossley, W3YA, Noel B. Eaton, VE3CJ, and Carl L. Smith, WØBWJ; and General Manager John Huntoon, W1LVQ. Also present were Directors Robert York Chapman, W1QV, Victor C. Clark, W4KFC, Harry J. Dannals, W2TUK, and Robert B. Thurston, W7PGY; Vice Director L. Phil Wicker, W4ACY; Assistant General Manager Richard L. Baldwin, W1IKE; and Public Relations Consultant Don Waters.

On motion of Mr. Crossley, affiliation was unanimously GRANTED to the following societies:

Bronx Amateur Radio Telephone Organization
Bronx, N. Y.
Brunnerdale Amateur Radio Club (H. S.)
Canton, Ohio
Central Bucks High School Electronics Club
Doylestown, Pa.
Central District Radio Club.....Marcy, N. Y.
The Cincinnati Buckeye Netters...Cincinnati, Ohio
Connecticut Wireless Society.....Stamford, Conn.
Crystal Lake Community High School Amateur Radio Club.....Crystal Lake, Ill.
East Brunswick Amateur Radio Club
East Brunswick, N. J.
Explorer Scout Post 673.....Wantagh, N. Y.
Franklin High School Amateur Radio Club
Somerset, N. J.
Grand Rapids Junior College Amateur Radio Club
Grand Rapids, Mich.
H-P Loveland Amateur Radio Club.Loveland, Colo.
Hughes Fullerton Employees Association Amateur Radio Club.....Fullerton, Calif.
International Harvester Company Amateur Radio Club.....Memphis, Tenn.
Kent-Meridian Amateur Radio Club (H. S.)
Kent, Wash.
Kings County Radio Club.....Brooklyn, N. Y.
Laurentian DX Club.....Dollard des Ormeaux, P. Q., Canada
Linn Technical College Amateur Radio Club
Linn, Mo.
Los Angeles City Amateur Radio Organization
Los Angeles, Calif.
Manzano Radio Club (H.S). Albuquerque, N. Mex.
Minnesota Wireless Association
Bloomington, Minn.
Murphy's Marauders.....Cromwell, Conn.
Nicolet High School Amateur Radio Club
Milwaukee, Wis.
Niobrara Valley Amateur Radio Club..Basset, Neb.
Northeast Oklahoma Radio Amateurs Club, Inc.
Vinita, Okla.
Old Timers Radio Club.....Binghamton, N. Y.
Parma Radio Club, Inc.....Cleveland, Ohio
Polk County Amateur Radio Club.....Salem, Ore.
QRP Amateur Radio Club-New York City Chapter #1.....Ridgewood, N. Y.
Rochester VHF Group.....Webster, N. Y.
South Towns Amateur Radio Society
Lake View, N. Y.
Staples Amateur Radio Club (H.S.)
Westport, Conn.
Teche Amateur Radio Club.....Franklin, La.
Villanova University Amateur Radio Club
Villanova, Pa.
West Valley Amateur Radio Club
Woodland Hills, Ca.
The Winnipeg DX Club.....Winnipeg, Man., Canada

On motion of Mr. Crossley, in confirmation of earlier mail actions, unanimously VOTED to approve the holding of a Rocky Mountain Division Convention in Cheyenne, Wyoming, June 29–30, 1968; a Saskatchewan Province Convention in Saskatoon, June 29–July 1, 1968; a West Virginia State Convention in Jackson's Mill, June 29–30, 1968; and a Southwestern Division Convention in Phoenix, Arizona, August 30–September 2, 1968.

On motion of Mr. Crossley, unanimously VOTED that Life Membership in the League is conferred upon the following members:

Alvin H. Battison, W2IEG
D. F. Brown, VE2AK
Edgar M. Cameron, W6DC
D. V. Carroll, VE3VC
Edward D. Crossley, W3SMF
George E. Cushing, W4QVJ
Carl Chaplin, K1RNN
Rolf B. Dyce, K6DSJ/KP4CMO
Russel E. Gough, W3NQV
Gary M. Hamman, W7CAF
I. Litke, K7AGJ
David J. Mishelevich, W3DMD
James D. Moffat, III, WNØTLT
William A. Owen, W1EEN
Sidney H. Phillips, WA5AUZ
Myron C. Pogue, W2CEI
David P. Shafer, W4AX
Albert L. Stancel, Jr., W9JJL
Edward S. Talley, W2IVA
William E. Ticen, WØIHY/W9MRB
Ronald Tinnermeier, WAØMYM
Harry J. Wellman, W8HSI
Ellen White, W1YYM
Robert L. White, W1CW

The Committee next examined the FCC proposal in Docket 17989, concerning examinations for the Advanced and Amateur Extra Class license to be conducted by volunteer examiners when the applicant is handicapped and unable to travel. After discussion, on motion of Mr. Compton, unanimously VOTED that the League file comment in support of the proposal.

General Counsel Robert M. Booth, Jr., W3PS, and Vice Director Harry A. McConaghy, W3EPC, joined the meeting. Without formal action, the Committee discussed various additional matters including amateur tower restrictions in the Chicago area, DXCC, the possibility of Novice privileges for Technician Class licensees, the favorable ruling of the Internal Revenue Service as concerns ARRL, enforcement of the FCC rules on "obscene, indecent or profane" language, and various state legislature bills covering receiving equipment capable of tuning to police frequencies.

There being no further business, the Committee adjourned, at 2:40 P.M.

JOHN HUNTOON, W1LVQ Secretary

WHO THE DEVIL IS WHO?

A Two-Letter Call Conversion Chart

Continuing where we left off last month, here are the old and new callsigns of additional Extra Class amateurs whose first licenses were issued at least twenty-five years ago, and who have taken advantage of the new privilege, conversion to a two-letter call. This list covers those who told us of the switch up to the middle of March; we'll have another list next month.

Now	*Was*	*Now*	*Was*	*Now*	*Was*	*Now*	*Was*
W1BV	W1JDS	W3IN	W3EIS	K6AR	W6UMI	W7EM	W7LQE
W1CF	W1HKK	W3JK	W3BSC	W6BD	W6CQK	W7EU	W7RDE
W1DH	W1NEJ	W3KE	W3RNY	W6BS	W6GAJ	W7FF	W7GQC
W1DK	W1BIL	W3KN	W3MHR	W6CS	W6ECM	W7FT	W7GGG
W1DL	K1CQO	W3KV	W3KDF	W6DH	W6EVX	W7FN	W6PUZ
W1DO	W1OUZ	W3LB	W3KDZ	W6DY	W6HBD	**W8**AH	W8HGW
W1EP	W1DYV	W3LG	W3ILD	W6EO	W6APL	W8AP	W8MGQ
W1ER	W1JOW	W3LS	W3HXK	W6FD	W6QWG	W8AT	W8YIU
W1EW	W1OOA	W3LT	W3AAY	W6FL	W6UBB	W8BB	W8GLK
W1EY	W1FVF	W3ML	W3CKN	W6FP	W6QWG	W8BD	W8YHX
W1FK	W1BGJ	**W4**DJ	W4NXH	W6FQ	W6ZPX	W8BE	W8SQU
W2CM	W2OQY	W4EX	W4DQH	W6FW	K6HZU	W8BT	W8PQQ
W2CS	W2EOH	W4EZ	W4DKU	W6GB	K6GMA	W8BX	W8CLL
W2DE	W2MJI	W4GK	W2HMJ	W6HW	W6SYN	W8BZ	W8VOK
W2DK	W2OGV	K4GQ	W3DQC	W6HY	W6JYU	W8CA	W8OCA
W2DT	K2ERC	W4HE	W4MUJ	W6IF	W6RDQ	W8CL	W8ZWE
W2DZ	W2DRC	W4HU	W4YAF	W6IG	W6CAJ	W8CR	W8KJS
W2EA	K2BPX	W4HV	W4ZMT	W6IK	W6MWM	W8CV	W8RMH
W2EJ	W2RUJ	W4IJ	W4BFP	W6IL	K6GIL	K8RR	W8HLZ
W2EY	W2TER	W4IL	W4HQW	W6IZ	W6DBW	**W9AG**	W9WIO
W2EZ	K2DYN	W4IM	W4GHP	W6JF	W6CLY	W9AI	W9DSC
W2FJ	W2YFT	W4IR	K4JXG	W6ME	W6MCS	W9BD	W9FCV
W2FK	W2BZJ	W4JK	W4MOJ	W6MF	W6WTQ	W9BK	W9ZQT
W2FQ	W2YRU	W4JZ	K4GEQ	W6MH	W6DII	W9BP	W9QJR
W2GE	W2PUP	W4KE	W4GXU	W6MN	W6UME	W9BT	W9YMZ
W2GN	W2DSU	W4KP	W4TNX	K6NA	W6IBD	W9BX	W9HFK
W2GR	W2TOC	K4LC	W8IPI	W6NH	K6CWH	W9BZ	W7RTP
W2HR	W2IBZ	W4LE	W4EPA	W6NT	W6NJJ	W9CI	W9CSZ
W2IB	W2CMM	W4LO	W4LKQ	W6OJ	W6SEZ	W9CS	W9MIO
W2II	WB2HZH	W4LW	W4MPV	W6OL	WB6KIF	**WØ**AN	WØTZO
W2IQ	W2AFV	W4NG	W4DGW	W6OS	W6EKU	WØAO	KØJAU
W2IX	W2CJU	W4NM	K4UYY	W6OV	K6VUH	WØAR	WØAIW
W2JM	W2MHJ	W4OE	W4CXO	W6PT	K6ENX	WØAV	WØUXQ
W2KA	W2WFL	W4OG	W4BFD	W6PM	W1BSY	WØBA	WØEDH
W2LC	W2YJS	W4PN	WA4FKA	W6QC	W6MUB	WØBC	WØNXE
W2LH	W2CYK	W4PP	W4GGD	W6QP	W6CCE	WØBD	KØUVT
W2LQ	WB2EPE	W4TA	W4DWU	W6QY	W6HJT	WØBE	WØTKX
W2MN	K2YOR	W4TB	W4MXL	W6RQ	W6GQA	WØBF	WØKZL
W2MT	W2KGN	W4TG	WA4TPF	W6SE	W6ECP	WØBG	WØQZW
W2NX	W2DTE	W4UD	W4JGS	W6UZ	WB6SEV	WØBK	WØMCX
W3AA	W3ETA	W4UQ	W4DVT	W6VB	W6BJU	WØBL	W6JWD
W3BY	W3ZBG	W4UR	WA4FMC	W6VD	W6QNJ	WØBM	WØNYU
W3CM	W3GVD	W4UW	K4ZGM	W6VG	W6CBE	WØBQ	WØNVF
W3CN	W3BYK	W4VH	W4DIF	W6VJ	WA6OIL	WØBR	WØTWP
W3CY	K3ZGW	**W5**AG	W5EFC	W6VK	W6PLS	WØBS	WØZGI
W3DM	W3NWB	W5BO	K5LSD	W6WE	W6JZP	WØBX	WØFDL
W3FA	W3MCG	W5CP	W5ENE	W6WJ	W6JKT	WØBZ	W6JBI
W3FC	W3LML	W5DJ	W5CLZ	W6ZD	W6ZXL	WØCA	WØIIC
W3FE	K3EKO	W5DK	K5EJU	**W7**BC	W7FLB	WØCY	WØMVG
W3FR	K3SZS	W5DL	W5KHL	W7BJ	W7HRH	WØDD	WØIRO
W3FX	W3IWS	W5DO	W5DWB	W7BW	W7HMD	WØDL	WØMWS
W3GA	W3KXS	W5DY	K4VKG	W7BZ	W7BMF	WØDR	W9DOY
W3GF	W3PMG	W5FD	W6QQO	W7CE	W7CWE	WØEL	W6HNA
W3GM	W3BES	W5FS	WØLHQ	W7CV	W7BVZ	WØEU	W9OTS
W3IE	W3LWQ	W5FT	W5LGS	W7DF	W7CJN	WØGA	WØQVA
W3IL	W3GBP	**K6**AN	W6LDD	W7DI	W7EKE	WØGB	WØVBE

Strays

I would like to get in touch with . . .

. . . amateurs interested in forming a net to discuss model railroading. WN9SQN.

. . . anyone who has installed a 12-volt transceiver in a 6-volt VW. K1CBV.

. . . teenage YLs and OMs interested in forming a teenage net on 40 c.w. WA9QQB.

. . . amateurs who work in hospital catering. G2DRT.

. . . anyone interested in a DXpedition to the Vatican and San Marino. WA2ZPK.

. . . amateurs interested in UFOs and communications from outer space. WN3JET.

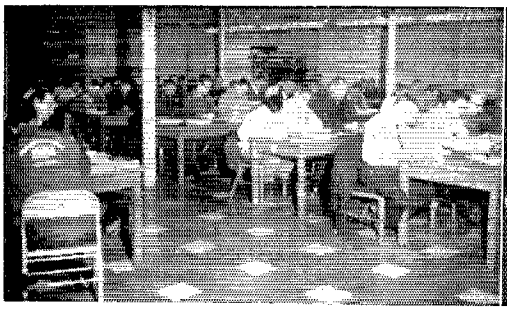
. . . any ham who is interested in the design, manufacture or distribution of material handling equipment. W1OZ.

. . . anyone interested in exchanging ideas and info about parapsychology (ESP), metaphysics and psychic phenomena. W3WZU.

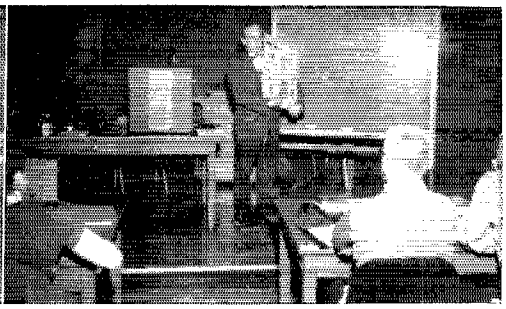
. . . radio amateurs who are also chemists interested in forming a club or net. WA4GLS.

. . . operators of KF3AA, Fletcher's Ice Island. K2YJL.

. . . anyone having experience with raising an extremely heavy antenna system on a high, flat roof. WB2DLB.



A portion of the GCARA class hard at work toward their Novice tickets.



Co-Instructor W8UQI explains some of the fundamentals of electronics.

GCARA Novice and Technician Classes

BY ALBAN A. MICHEL,* W8WC

In the enthusiasm, however appropriate, for club training classes aimed at upgrading present licenses, we must continue to provide opportunity to those of the public wishing newly to join our fraternity. If your club hasn't already embarked on such a project, you may find useful guidelines on this report of how it is capably done in Cincinnati.

For thirteen consecutive years, code and theory classes have been sponsored by the Greater Cincinnati Amateur Radio Association. There are spring and fall classes, each running for sixteen weeks — or more if necessary to graduate the group to Novice or Technician grade. The cost to the student is twelve dollars, and includes an ARRL *Handbook* and *License Manual*, which are mandatory text books. All additional costs are underwritten by the club.

Over this span of time we have graduated 988 students to either Novice or Technician grade. Any student who does not pass the license examination can take the course over for two dollars. There are 103 students in the present class. Each evening there is an hour of c.w. and ninety minutes of theory. The course is taught in our Hamilton County Civil Defense Headquarters Building. Upon graduation, the students are given a free one-year membership to GCARA. The course is administered by three paid amateurs. Jim Abbott, K8CKJ, is the theory instructor; Jim's wife, Lillian, K8CKI, handles all the clerical work and assists with exams and study outline; their nephew, Gene Abbott, W8UQI, handles the code instruction.

Among our graduates are people from all walks of life — high school and college students, professional and business men and women, also men from several of our electronic plants in the area. Two of our past presidents and several of the club's officers are old-time graduates. We also include a County Prosecuting Attorney and two FBI officers.

*Great Lakes Division Director, ARRL

During my travels and talks to the clubs in The Great Lakes Division, I have endeavored to encourage club sponsorship of this activity, because the future of ham radio depends on the help we can offer to new and prospective people. We have our share of students who fall by the wayside, but about 60% of the students have persevered and gone on further.

Publicity is also a must to generate interest. We have had the cooperation of WKRC Radio with several free spot announcements a night for two weeks prior to registration, plus placard displays in all the amateur radio stores, an article in our Sunday *Cincinnati Enquirer* by Jim Weaver, WA8CDA, in his weekly column of "Ham Calls" — and the individual promotional work of our members among their friends and acquaintances.

In my opinion, this is one of the most rewarding activities a radio club can sponsor. It not only increases membership but it guarantees the future of amateur radio and that is what we want and need most of all — and I mean right *NOW*. QST

NEW BOOKS

Electronics in the West, The First Fifty Years, by Jane Morgan. Published by National Press Books, 850 Hansen Way, Palo Alto, California 94304. 194 pages, 9½ × 6, 64 illustrations, hard cover. Price $4.95.

Resembling "From Truck Driver to President" more than "How to Succeed in Business Without Really Trying," the stories of west coast electronics are well displayed. Here are companies that most of us know, going back as far as old-time giants like de Forest. It was the coupling of ideas with perseverance by men like Eitel, Farnsworth, Heintz, Hewlett, Kaufman, Jennings, Litton, McCullough Packard, many of them hams, that brought success. Although *Electronics in the West, The First Fifty Years* in no way exhorts us to get busy, the inference is easily drawn that success in electronics can still be attained. The book offers interesting, informative, and, best of all, enjoyable reading.

— *W1VG*

160-Meter Changes Imminent

For many years the Amateur Radio Service was allocated a band at 160 meters, 1715-2000 kc. World War II disrupted the spectrum in a number of areas, not the least of which was the installation of a then-new system of "LOng-RANge" radionavigation in 1800-2000 kc. Postwar allocations planning required the withdrawal of the 160-meter band from normal amateur use in favor of Loran-A, which had become an important medium-range navigational aid for ships and ocean-flying aircraft. (A new 21-Mc. band was added to the amateur family of assignments in partial compensation.) At the request of the League, and with the agreement of the U.S. Coast Guard (which operates the Loran service) as well as other federal agencies concerned, a footnote was added to the 1947 Atlantic City allocations table to provide for amateur sharing of 1800-2000 kc. on a suitable basis. Since February, 1949, amateurs have been able to use small portions of this segment of the spectrum, with geographical and powerful limitations to provide protection for the Loran service. The available frequencies have been changed from time to time to meet the needs of the Loran service while permitting as much amateur use as engineering studies indicated were feasible. This announcement details further changes soon to be adopted.

A NEW PLAN for amateur sharing with the Loran-A system of radionavigation in the band 1800-2000 kHz will shortly be announced by the Federal Communications Commission.

A general revision of the Loran frequency plan, resulting from changes in the worldwide Loran-A system including the establishment of several new stations in the United States, has been under way for some months. This project is basically a responsibility of the United States Coast Guard, which operates the Loran service. A principal factor is increased activation of the 1900 kHz. Loran channel, in addition to the 1850 and 1950 channels long in use.

The Interdepartment Radio Advisory Committee, which controls government use of the spectrum in the same manner as FCC regulates non-government use, formed a special study group[1] to work out a new amateur sharing plan. The League was invited to participate, and League representatives, including President Denniston, have attended several meetings in Washington for liaison and advisory purposes.

As always, the Coast Guard was most sympathetic to the amateur position, and indicated its intention to provide a maximum amount of amateur usage consistent with the requirement to protect the Loran-A system from the possible effects of harmful interference. Since safety of life at sea is potentially involved, great care was necessary in working out permissive levels of interfering signals. This approach, coupled with extensive engineering studies, has developed a new sharing plan. The draft looks quite complicated at first glance, and this results from multiple breakdowns of frequency, power and geographical distribution to permit as much amateur use as feasible. (By comparison, some countries of Europe authorize amateur operation throughout 1800-2000 kHz., but with only 10 watts input.)

A paragraph from the working group's report is pertinent at this point:

"The basic rationale of the analysis is that the level of interfering signals produced in Loran-A receivers should be little, if any, higher than the expected levels of natural or random manmade radio noise. It is reasoned that since the Loran-A system operation and coverage is limited in any event by natural and random manmade radio noise only slight degradation will be caused to the system by single signals whose equivalent field intensity within the Loran occupied bandwidth is approximately equal to the ambient radio noise. However, the total interfering energy within the Loran receiver's acceptance bandwidth is the factor which can cause trouble to Loran-A. Many weak stations operating simultaneously can cause as much interference as one strong station. It is of course realized that there will sometimes be a fairly large number of amateur stations operating in the shared bands at the same time; but since there will be a natural tendency for them to avoid the Loran signals as much as possible and also to avoid overlapping themselves within their authorized bands, a favorable distribution of the amateur stations with respect to the Loran stations is expected. Since the cumulative effect of these factors is largely unpredictable, the Coast Guard plans to extensively monitor in this band and recommend changes in the sharing criteria if the Loran-A system is seen to be suffering harmful interference."

(Continued on page 144)

[1] USCG: J. L. Stewart, Chairman; A. Tait; Cdr. J. P. Stewart; Cdr. H. A. Feigleson; F. B. Duncan; D. T. Haislip; D. C. Spitz. FCC: S. M. Myers; E. Henry; W. S. Grenfell. ARRL: R. W. Denniston; J. Huntoon; P. S. Rand.

I.A.R.U. News

INTERNATIONAL AMATEUR RADIO UNION

NEW MEMBER PROPOSED

Application for IARU membership has been made by the *Association des Radio-Amateurs de la Principaute de Monaco*, the national society for Monaco. As of November, 1967, ARM had a membership of 21 of which 18 were licensed transmitters (same as total number of amateurs in country). Their official headquarters address is ARM, 16 Boulevard de Suisse, Monte Carlo, Monaco.

The licensing authority in Monaco is the *Direction Generale des Telecommunications*. Their attitude toward amateur radio is favorable and licensing is in cooperation with ARM. Three classes of license are available: A resident license with 3A2 call letters and a visitor's license with 3A0 call letters, both having all amateur privileges, and a resident license with no code test with 3A1 call letters having privileges above 144 MHz. There is an examination for operator and station licenses; the code test (where applicable) is 10 w.p.m. and age limit is 16 years. The power limit for all classes is 100 watts input. Frequencies available are: 3.5-3.8, 7.0–7.1, 14.0–14.35, 21.0–21.45, 28.0–28.7, and 144–146 MHz. Third-party traffic and amateur TV are not permitted. Land and maritime mobile operation is permitted without special license.

Member societies are now participating in a mail vote on the proposal to admit ARM to membership. IARU currently has 77 member societies representing an aggregate of 303,459 individual members of which 159,356 are licensed transmitters.

TEMPORARY PREFIX

The *Liga Mexicana de Radio Experimentadores* announces that during 1968, Mexican amateurs can use the prefix 4A in place of XE when making DX contacts.

CANADA-SWITZERLAND RECIPROCITY

Effective February 28, 1968 there has been an arrangement between Canada and Switzerland to provide for reciprocal licensing of amateurs. A complete tabulation of reciprocal agreements held by Canada and the U.S. appears elsewhere in this department.

NEW MEMBERSHIP APPLICATIONS

IARU headquarters has received membership applications from the *Mauritius Amateur Radio Society* the national society for Mauritus, and *Vereniging Van Radio-amateurs in Suriname* the national society for Suriname. The applica-

DX OPERATING NOTES

Reciprocal Operating

(**Bold face** indicates changes since last list.)

United States Reciprocal Operating Agreements currently exist *only* with: Argentina, Australia, Austria, Belgium, Bolivia, Canada, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Finland, France, Germany, Honduras, India, Israel, Kuwait, Luxembourg, Netherlands, New Zealand, Nicaragua, Norway, Panama, Paraguay, Peru, Portugal, Sierra Leone, Switzerland, Trinidad and Tobago, United Kingdom and Venezuela. Several other foreign countries grant FCC licensees amateur radio operating privileges on a courtesy basis; write headquarters for details.

Canada has reciprocity with: Bermuda, France, Germany, Israel, Luxembourg, the Netherlands, Senegal, **Switzerland** and **U.S.**

Third-Party Restrictions

Messages and other communications — and then only if not important enough to justify use of the regular international communications facilities — may be handled by U.S. radio amateurs on behalf of third parties *only* with amateurs in the following countries: Argentina, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Greenland (XP calls only), Haiti, Honduras, Israel, Liberia, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela. Permissible prefixes: CE CM CO CP CX EL HC HH HI HK HP HR LU OA PY TI VE VO XE XP YN YS YV ZP 4X and 4Z. Canadian hams may handle these same type third-party messages with amateurs in Bolivia, Chile, Costa Rica, El Salvador, Honduras, Israel, Mexico, Peru, U.S. and Venezuela. Permissible prefixes are: CE CP HR K OA TI W XE YS YV and 4Z.

DX Restrictions

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

Cambodia, Indonesia (including West New Guinea), Thailand and Vietnam forbid radio communication between their amateur stations and such of other countries. U. S. amateurs should not work HS XU XV 3W8 or 8F. Canadian amateurs may not communicate with Cambodia, Indonesia, Laos, Thailand, Vietnam and Jordan. Prefixes to be avoided are HS JY XU XV XW8 3W8 and 8F.

This is 9Y4EH/W8. Rabindranath, a student at the University of Michigan is the first Trinidad amateur to operate under the reciprocal operating agreement between the U.S. and Trinidad and Tobago.

tions have been found to be in order, and headquarters will present the applications in the June issue of the IARU Calendar (a semiannual newsletter to IARU societies) for a mail vote.

FAROE ISLAND BEACON

The *Faroese Amateur-Radio Society* reports that their v.h.f. beacon station OY7VHF is now on continuous operation on 145.26 MHz ± 50 Hz. It has been heard in the Netherlands and Denmark but there have been no two-way contacts from the Faroes on 2 meters.

HEADQUARTERS VISITS

Providing a further exchange of information and ideas, officials and members of IARU societies frequently visit IARU/ARRL headquarters in Newington, Connecticut. During the past year, our visitor's log shows entries from HL, VE, GM, VQ9, 9Q5, XE, SV, KZ, LA, LU, KP4, FPS, TU, ZS, F, XW, PK, HK, SM, VK, DJ, G, PA, VP9, JH, and PY. 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. QST

May 1943

. . . It seems that quite a few members have been writing in from all over the country asking what they can do for the war effort. K. B. Warner at some length points out numerous activities in which the stay-at-home can find useful activity. Radio personnel are badly needed for WERS, as is workable gear for those frequencies. Instructors are wanted for local courses in radio techniques, as well as in fully-organized complexes. Even part-time work can be important. Fellows are urged to register their transmitters and good receivers! The Government will buy certain types at a fair price. Local radio clubs should be kept alive, if only on a limited scale. Club bulletins telling about the activities of members and their whereabouts are always very welcome by those in the service.

. . . Robert B. Fischer, W9WJX, has a first-class article on the electron microscope, with a number of illustrations. He tells how it works and what it can do. The reader can get a pretty good idea of how it works and have a general knowledge of the art. There are even some basic circuit diagrams, although there are about fifty tubes involved in a full-sized rig.

. . . Since the first and highly successful article concerning the Gallup's Island installation of the Maritime service two years ago, much has happened there. *QST* was invited to make a return trip and Clinton DeSoto, W1CBD, does just that. The Radio School has been greatly expanded and the always high quality of its graduates has made the Gallup's Island School a model to others since war broke out.

. . . Phase relationships in inductance and capacity are discussed this month by George Grammer, W1DF. This is more must-reading for those interested in elementary a.c. mathematics. He goes into considerable detail in this part of the series.

. . . B. C. Barber, W2MWX, has a two-tube t.r.f. regenerative f.m. receiver. Unlike a lot of f.m. receivers described in the literature, this one does not use hard-to-get and expensive parts. In fact, it was sort of thrown together using parts from the ever-present junk box. The circuit is quite simple — only slightly more complicated than a two-tube a.m. job. Think maybe even I could build it if I were interested much in f.m!

. . . The cover shows a personable young lady in Coast Guard uniform attending to duties she took over from her husband, thus releasing him for sea duty.

. . . The activities of the New Haven, Conn. WERS Warning Service are described by Edmund Fraser, W1KQY, and Carol F. Keating, W9WWP.

— *W1ANA*

Correspondence From Members-

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

NEW HANDBOOK

¶ Congratulations on the first worthwhile *Handbook* to come out of the "Ivory Tower" in many years! I have been quite critical of the *Handbook* over the years and I have written to Headquarters and to my Directors about it on several occasions. But don't rest on your laurels! I hope that over the next few years you can make additional improvements which will make the *Handbook* second to none. — *Jos. P. Fincutter, K3STU, Bethesda, Md.*

¶ You have done a wonderful job on the *Handbook* and I spend many delightful hours studying it. I can also appreciate your problems of cramming all that into 650 pages.

In all probability your attention has been called to the mistake in figure 13-11C of the 1968 *Handbook*. In case it has been missed, here are the details:

The pictorial diagram at the bottom of section A appears to be correct. However, the schematic has the connections to winding reversed. When trying to understand how the balun works, this makes things very confusing. Even with this correction the schematic is not very clear. — *James F. Craib, W2DHF, Plainview, N. Y.*

¶ I recently purchased the 1968 ARRL *Handbook* and have spent many hours absorbed in the material. Let me congratulate you on a superb job of presenting such a mass of information in a concise yet understandable form. In the Semiconductor Devices section particularly, the clarity did not suffer from a generality necessary to prevent a rapid obsolescence due to the speed of technological advances. My last issue was 1961 and I was impressed by the improved format, paper, and printing style used in the latest *Handbook*, which must be one of the best bargains obtainable in the literature on "applied electronics." — *Roger Grant, VE3DWG, Waterloo, Ontario.*

¶ Thank you for your help and please accept my congratulations for compiling an excellent *Handbook*. — *Myron Stein, W2EDY, Fair Lawn, New Jersey.*

¶ Recently I purchased a copy of the new *Handbook*. I have been buying this book for several years (over thirty) and it is the best edition yet published. — *Elmer L. Gladson, W0GVJ, Springfield, Missouri.*

¶ I have before me a copy of the new, forty-fifth edition of the *Handbook*. I had heard there were numerous changes, so I wanted to see for myself. May I say that you and your staff deserve to be highly commended for efforts put forth to rejuvinate the *Handbook* which now make it seem much more worth the price. I have heard a number of comments from ham radio operators to the effect that they weren't interested in buying a new *Handbook* because it contained approximately the same old material year after year, much of which seemed out-dated. I have no doubt that the demand for the new *Handbook* will be greatly increased. May you continue adding new material in future editions and thereby keep the *Handbook* abreast of the times! — *H. Gordon Douglas, W8PMK, Luther, Michigan.*

CQ NO SS

¶ In a mindless, conformist society, where the goal of every man is to look, think, act and live exactly like his neighbor, the ARRL is now adding the automated ham.

Your contests — such as the recent SS debacle — are a perfect example of how to have many so-called "QSOs" without the bother to the operator to have to think of anything intelligent to transmit, or for that matter, with his store-boughten rig, to have to do any thinking at all.

The next logical step, of course, is to eliminate the human operator altogether. A little automation, and we could have an entire contest set up whereby the rigs simply contact each other, and keep their own score!

You certainly are not doing anything constructive for amateur radio with these contests — merely fomenting organized QRM, which we have enough of anyway, and destroying "natural" amateur radio in the interests of magazine circulation and/or manufacturer sales. Because you wrap these abominable tests in the aura of League Holiness, anyone who protests is automatically an outcast. In a conformist society, that is death!

If these frequency-hogs are a sample of "snappy operating" that you like to cite, I want no part of it. — *Ben Lane, W7FNE/MM, SS Constitution State, Pusan, Korea.*

TELEPHONE INTERFERENCE

¶ I am a ham with 20 years experience and a telephone company employee with 29 years experience. In W6FFC's March *QST* article, "Stopping Telephone Interference," I think he has made many general statements that to many persons will seem to apply to all telephone technical employees. Although his statements are no doubt true in many cases, they most certainly are not true in all cases. In addition, almost all telephone companies take a very dim view of anyone other than a company employee working on their equipment. An article such as this may lead many unauthorized persons to attempt telephone repair. There are some technical statements, or lack of statements, in his article that could be questioned, but I won't belabor the point.

I would like to suggest that in the future that all articles concerning the operation of non-amateur radio equipment be referred to a competent person in that field either for correction or at least for a separate clarifying statement or article. — *Marc Malyneux, Jr., W4MVM, Mobile, Alabama.*

¶ I live in a semi-rural area of Tampa, and I am served by the General Telephone Company of Florida. Several complaints to the telephone com-

pany resulted in no improvement of the RF interference I was experiencing, and I was forced thereby into calling the Public Utilities Commission. Shortly thereafter the cooperation of the company became noticeably better and the problem has since been cleared up. In an effort to improve the service rendered by the telephone company I would like to have these articles sent to the company and the utilities commission.

Thank you for the job you are doing in promoting and protecting the interests of amateur radio. — *Travis R. Jarman, WB4IES, Tampa, Florida.*

¶ Although I have worked on such problems and am familiar with the solutions — (transmission — Project Engineer SBT & T Co.) I think the article is fine and should be helpful to others. This type of material is great and should be continued. — *John Keindis, W4NBZ, Louisville, Kentucky.*

SET

¶ I am writing this letter as a complaint about some of the stateside service Alaska received during the recent Simulated Emergency Test.

Our kickoff message, an Earthquake Dummy originated by the U. S. Coast and Geodetic Survey, arrived at the Honolulu Observatory one week after the SET . . . by mail!

Fairbanks was unable to get messages on to the outside nets until evening, due mostly to the contests in operation.

In an area which is especially vulnerable to earthquakes, volcanic eruption, flood, blizzard and what have you, we took the SET quite seriously. In fact, the Coast & Geodetic were anxious to see whether amateur radio could supplement their own communications in an emergency. Needless to say, they weren't very much impressed.

Theoretically at least, contests are supposedly a training ground for making contacts and it would seem that emergency test messages would be accepted in that light. However, if certificate chasing is more important than our justification as amateurs in the first place, something is wrong with the system.

Our long-haul operators made several contacts, only to have it conveniently disappear the moment he told them he had a test message. All I can say is that I hope when our next emergency hits, as it is bound to do eventually, that we can pick a time when there is no contest in operation. — *Lois L. Jensen, KL7EWH, Emergency Coordinator, AREC, Fairbanks Area.*

RST 599

¶ Twenty-two years ago, I set out to study for my amateur license, with a one-tube regenerative receiver to copy code from W1AW faithfully evening after evening. Finally I took my exam and became W1RBT. Since 1954 I've been K6LZM.

A few months ago I decided to check my code speed in preparation for the Extra Class exam. I checked *QST* for the W1AW operation schedule and tuned my Drake R-4A (a big improvement over my regenerative receiver) to your 40-meter code frequency. To hear "QST, QST, QST de W1AW" again after all these years was like meeting an old friend again and really drove home to me the reliability and steadfastness of ARRL accomplishments. Let the operators of W1AW know that 3000 miles away and 20 years later, they are still RST 599 in my log! (P.S. I got my Extra Class ticket first try — thanks.) — *R. J. Schlesinger, K6LZM, Tarzana, California.*

BEHIND THE DIAMOND

¶ May I commend you on the very nice note on Don Mix in March *QST*. Don has been extremely helpful to me in taking my raw material and making it into presentable papers. He certainly has the knack of doing so ably and I have already thanked him personally on more than one occasion. — *H. Rommel Hildreth, M.D., K0HZF, Clayton, Missouri.*

WAR ON HAMPATHY

¶ In reading John W. Fuller's, K4HQK, article "The War on Hampathy" my feelings went from elation to dismay. As an electrical engineer I found myself of course categorized as a Developer/Experimenter in Group I which is the elite group. My doubts about myself began to develop when I found myself also listed as a Certificate Hunter and Contest Operator in the shaky Group II. Then I was horrified to discover myself as a Project Ape and C. W. Man in the bad risk Group III, although I found it somewhat of a consolation that to the best of my knowledge my soul does not belong to the Minibox manufacturers, nor do I have trouble spelling. Naturally I proceeded without hesitation to read what could be done about this deplorable situation. And there it was: "Interest and desire are strengthened when a given act or completed task brings a reward." For years I had been under the mistaken impression that this worked only for circus elephants and other animals, and now I finally learned that human motivation did not function on a loftier plane, as I had hoped. Since my activities in Group II and III have hardly any real value, according to the author, and would definitely get me into hot water sooner or later, I immediately decided to take drastic countermeasures. Being careful to stay in Group I as a Developer/Experimenter, I devised an automatic back-patter so that I could carry on my activities in Group II and III, to which I am unfortunately addicted, without running the risk of non-recognition which is the deadly curse to be avoided. Having thus once again achieved peace of mind, I was able to proceed to the meditation period from which I emerged with the following insight: People can be divided into two groups; those who divide other people into groups, and those who don't. And I definitely prefer the second group. — *Helmut Wilhart, WN2DXW, Morristown, N. J.*

¶ Want you to know I most strongly object to the editorial policy and/or staff that allowed K4HQK article in March *QST* to be published.

Regardless of intent, the categorization/characterizations of amateur activities, in our own magazines, — tongue in cheek or not — are severely damaging to the amateur, in every way. — *R. J. Gleason, W3KW, Annapolis, Md.*

QST EXTRA

¶ Required reading for every v.h.f. enthusiast and future user of v.h.f. bands, should be "Interpreting 50 MHz. M.u.f. Tendencies in the Current Sunspot Cycle," by K6EDX/W5KHT. The "bible" is great, however, the March '68 *QST* Extra puts the spotlight on the use of WWV and of interpreting the code used. Now I don't feel like Diogenes with my low-power rig looking for a contact when I can't even be heard down the mountain. — *Ed Coltrin, WA6FWU, Soda Springs, California.*

¶ Congratulations to you and Mr. Robert Cooper for the fine *QST* Extra on 50 MHz. m.u.f. in your March issue. Now maybe some of the d.c. band

hams (and some on six for that matter) will regard 50 MHz. as more than the amateur's CB band. I'm reading *QST* and tuning six. — *James A. King, WA4GDY, Oak Ridge, Tennessee.*

NO CITIZENSHIP REQUIREMENT — continued

¶ I agree completely with Mr. Pataki's letter in the February issue concerning the citizenship requirement for a radio amateur license. Before I came to the United States I was holding a ham license in Germany. Here I cannot get a license because of the citizenship requirement. I was told that I could operate under my German license, but this license was revoked when I left Germany, because that country has a residence, rather than citizenship requirement. In the US army I was entrusted with official communications, but "on the outside" an immigrant is not trustworthy enough to go on the air. Surely there are many others in the same boat and cannot wait until the 5 years required for US citizenship are up. I hope that soon the FCC will remember this forgotten group, maybe with the aid of the ARRL. — *Wolfgang Pfeifer, Inglewood, California.*

QRZ EVROPA?

¶ May I suggest that hams working DX might do well either to:

(a) study an atlas occasionally to learn at least the countries and their capital cities, or

(b) turn to the proper page of the DX Callbook when calling a DX station.

While impatiently waiting in line to work a DX station, it is frustrating to me and hardly flattering to the DX station to hear conversation like this: "Okay, Jose, I got the EA8XX, Box 111, and the Santa Cruz, but what is the rest of the town name in the Canaries? Break."

"It is Santa Cruz de Tenerife. I'm listed in the Callbook. Break."

"What was that again, Jose? I got the Santa Cruz okay, and something like Tennessee. Could you spell it for me? Break."

Then again, you will hear a U. S. ham who has just snagged MP4BXX ask "What was the name of that island? Break."

"It's Bahrain Island in the Persian Gulf.Break."

"Did you say Borade Island? I got the Gulf okay, but I didn't get which one. Break."

Or "Okay, 7Q7XX, I copied the town name as Zomba, but what did you say the name of the country is? I think you said it is in the southern part of Africa. Did you say Molongi?"

Any day now. I expect to hear some station, perhaps W1IWHO, say "Okay, I copied the District of Columbia and the United States, but will you spell that town you say is the national capital? Is Wishingwand? Break." — *R. Verle, Johnson, W2GTQ, Peekskill, New York.*

CLASS

¶ What is all the QRM suddenly about class status in amateur radio? As a Technician for four years I was in a class looked down on by the big Generals and excluded from such groups as Florida Side Band Association.

There has always been a class division in amateur radio since I have been connected with it. Yes, even when a lowly Novice 5 years ago.

Now that I have received my Advanced Class, Please "No Lids, No Kids, Class A Operators Only." — *Paul Dunaway, WA4RXY, Big Daddy, KKP0527, St. Petersburg, Florida.*

BROADEN THE BASE

¶ What does amateur radio offer the individual whose interests are not essentially in the technical area, viewed in the broadest possible sense? What of the person who, for quite adequate reasons, is not attracted by endlessly repetitive exchanges relative to "My rig," "My antenna," "My Rx," ad nauseum?

Of course he can still give it a try, perhaps starting at the Novice or General level. Perhaps he will go all the way to Extra, but what do we then offer in the way of continuing interest, sufficient to keep him in the amateur ranks, and thus help to arrest the continuing decline in licensed operators?

As of now, darned little.

And as of now, one of the most glaring faults, and one of which too many of us are guilty, is our alarmingly narrow "on the air image." We have apparently not yet tumbled to a fact that even now the leading engineering schools of the country are just beginning to appreciate: that to achieve their academic objectives, technical training must be generally leached with exposure to the liberal arts. Now the target is to produce an engineer who can adequately handle a sonata as well as a schematic.

A few months ago I had occasion to take exception, by letter, to some observations as to amateur radio that appeared in *Time* magazine. To my surprise, and no little consternation, the thing was printed, and since that date I have received letters from many parts of the world, commenting on what was written.

Most had to do with the simple issues of agreement or of exception, but a surprising number speculated upon the apparent lack of depth that was sensed in hearing conversations on the ham bands. It was an interesting reaction, particularly because I deliberately did not include my call in the letter.

More to the point, there was frequent expression of genuine interest in obtaining ham licenses, *if* there were something more to the game than what was heard on the air — and sadly enough, that which was at times encountered in personal meetings with some of us.

Perhaps too many of us are taken in by that "Tnx FB QSO OM" gambit that keeps popping up. It usually means that the other chap could follow some of the keying, or get most of the sideband! Consider that it could mean that the subject(s) discussed were of genuine interest to the other operator, or that you had suddenly become something other than a stereotype. And it could mean that a non-ham eavesdropper, somewhere down the line, would be induced to join our ranks.

And even now, we terribly need that last individual!

Probe a little on your next QSO. It can be done with a question or a remark concerning some subject a bit outside the ham corral. If you like model trains or mini-skirts, or have read a good or bad novel recently, or your favorite football team was euchred out of last Sunday's game — it may put new life in the QSO. But *you* must pop the question, or generate the answer.

Perhaps the ARRL should offer some guidance from competent public relations authority. We have volumes on good air manners and operating practices, but the pickings on good content are mighty slim. This is a real challenge, and it may have a very positive bearing upon our survival. — *Al Smith, K8ZMS/W2AFJ, Doylestown, Pennsylvania.*

QST

The World Above 50 Mc.

CONDUCTED BY BILL SMITH,* WB4HIP

More About The Boxes

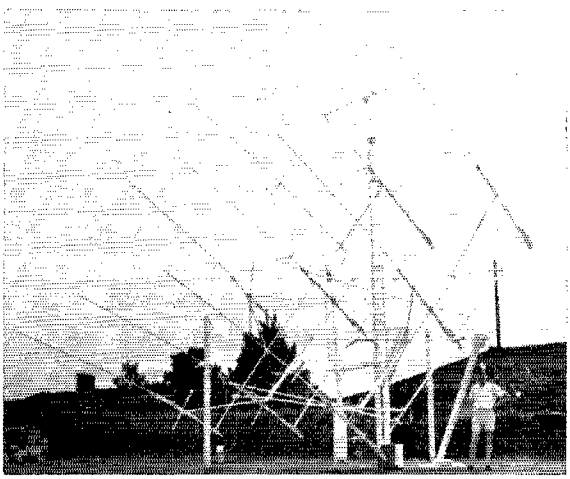
IN March *QST* we discussed the states-worked boxes in some detail, and warned that revision and up-dating were imminent. In this issue are the first listings since then, with information in hand at our deadline.

The 2-meter box includes the records of some 65 percent of the stations previously listed — not bad for the first time. The 20-percent showing of the 420-MHz. fraternity is disappointing. 220 is pathetic. I'm hopeful that our July boxes will reflect more activity on all three bands.

Comments accompanying revised standings are interesting. K2DNR: "Holy mackerel . . . one thing against dropping us low guys is that I call them first for schedules. They're more eager." W2AZL: "About time there was some motivation!" WØLFE: "Looks like I'd better get these in, or I'm going to run off the bottom of the list." K4QIF: "My mileage figures are less than previously quoted; my old map tended to be optimistic." K1HTV: "I've moved 32 miles, and have to start all over." (Good chance for newcomers to get Connecticut!) K2CBA: "I have 4-2-40 on 1215 MHz." K6JYO: "The decision to revise the states-worked boxes is a good one. At worst, it shakes us out of our lethargy, and gives us an incentive to catch up on reporting." W1HDQ: "You can see he wasn't kidding — he dropped the V.h.f. Editor!"

Several reporters used the opportunity to send along information of the sort we like for the column, which is one reason for having the boxes, in the first place. Two fellows objected to the idea of revision. I knew that the move would not be 100-percent popular. The intent was not merely to shift the standings around, but rather, for reasons explained in March, to clarify ground rules, and place everyone on an equal basis. Please check March, 1968, *QST*, pages 81 and 82, again, and send in your contact list and revised standings.

*Send reports and correspondence to Bill Smith, WB4HIP, ARRL, 225 Main St., Newington, Conn. 06111.



This is the 180-element crossed-Yagi array for 144-MHz e.m.e. (moonbounce) at WB6DEX. (photo via K6MYC)

2-METER STANDINGS

W1JSM	33	8	1398	W5AJG	33	9	1360
W1AZK	33	8	1384	W5UKQ	29	8	1150
K1ABR	32	8	1374	W5HFV	27	10	1285
K1WHT	25	8	1300	K5TQP	27	7	1254
K1WHS	24	8	1300				
K1UCQ	22	7	1250	K6JYO	9	4	1240
K1MTJ	19	6	1225				
				K7NII	24	5	1200
W2AZL	35	8	1380	K7ICW	16	4	1246
K2HLA	32	8	1300				
WB2FXB	20	6	915	K9SGD	42	9	1300
K2DNR	19	6	1010	WA9DOT	40	9	1200
WA2PMW	19	6	1000	W9AAG	37	9	1200
W2CRS	19	6	710	W9YYF	32	8	1050
W3GKP	32	8	1108	WØBFB	45	10	1350
W3BDP	22	7	1100	WØDQY	41	9	1300
W3KWH	21	8	700	KØMQS	41	9	1150
K3CFA	21	6	950	WØLFE	36	9	1040
W3HB	17	6	677				
				F8DO	1	1	5100
K4IXC	36	8	1403				
K4EJQ	36	8	1125	OH1NL	1	1	5850
W4FJ	33	8	1080				
K4QIF	26	7	1030	VE3ASO	21	7	850
W5UGO	42	10	1398	VK3ATN	3	3	10417

The figures after each call refer to states, call area and mileage of best DX. Revised May, 1968.

220- and 420-MHz. STANDINGS

220 MHz.				K4QIF	8	4	435
K1BFA	7	3	225	W4FJ	7	4	300
K2CBA	16	5	660	W5AJG	7	3	1010
K2DNR	6	3	175	K7ICW	4	2	225
W5AJG	3	2	1050				
				W8RQL	10	6	425
420 MHz.				K8REG	8	4	300
K1BFA	6	2	250				
				W9AAG	12	4	600
K2CBA	11	5	3000	WA9NKT	9	3	400
W3RUE	13	6	585	WØDRL	10	4	550
K4EJQ	8	4	500	Revised May, 1968			

V.h.f. Conventions

The dates and location of the second annual Central States V.h.f. Conference have been set. The conference will be held in the Howard Johnson Lodge on Osage Beach, Lake-of-the-Ozarks, Missouri, about 170 miles southwest of St. Louis. The two-day conference begins at noon Friday, August 16 and ends at the same time on Sunday, August 18. Literature is on the way to those who attended last year's meeting in Oklahoma, and is also available from Joe Hall, K9SGD; 315 West College; Sparta, Illinois 62286. Early reservations would be greatly appreciated by the conference committee.

I was at last year's meeting and it was one of the finest I've ever attended. But from personal experience I know that conferences aimed towards special interest groups can be financially disastrous if not well supported in the early stages. Another all-v.h.f. meeting in 1967 cost its committee about 150 out-of-pocket dollars. No group makes money on these conferences, so support them if you want them to continue.

And don't forget the oldest of them all, the West Coast V.h.f. Conference, May 25–26, at the Tropicana Lodge in Fresno, California. Details are available from Ken Hollaway, K6HCP; 7733 Rainbow Drive; San Jose, California. This year's meeting is open and promises to be a fine one.

Another v.h.f. conference is being planned for the third weekend in July somewhere in South Carolina, but I have no firm details at this writing.

Distance and Bearing Charts

Dick Allen, K1IGY/WA5KPU, is making available distance and bearing charts for tropo, meteor scatter and e.m.e. (moonbounce) schedules. The charts are especially helpful for antenna aiming. Most ordinary maps are extremely poor and may be so inaccurate that a sharp-pattern beam will miss the intended direction by several degrees. The chart distances, figured between two points in longitude and latitude by a computer, are usually shorter (and much more accurate) than when using a polyconic projection map. If you're interested in accuracy, you'll find these charts a must.

Dick has also worked out a schedule locating the moon at a given time for both polar and elevation-azimuth mounts and antennas having a fixed window, such as rhombics and other non-steerable arrays. Write to WA5KPU at 4915 Linden Street, Bellaire, Texas 77401 for details. The cost is very nominal.

Pictures

For the past several months we've used numerous pictures to dress the copy and pictorially introduce operators who may have been just calls previously. But now the file of useable pictures is nil. What is a useable picture? I believe it should show something more than an antenna atop a 100-foot tower unless, of course, unless it illustrates a method of construction, or is exceptional otherwise. A picture of the station, minus the operator, may be uninteresting, unless a specific item is featured.

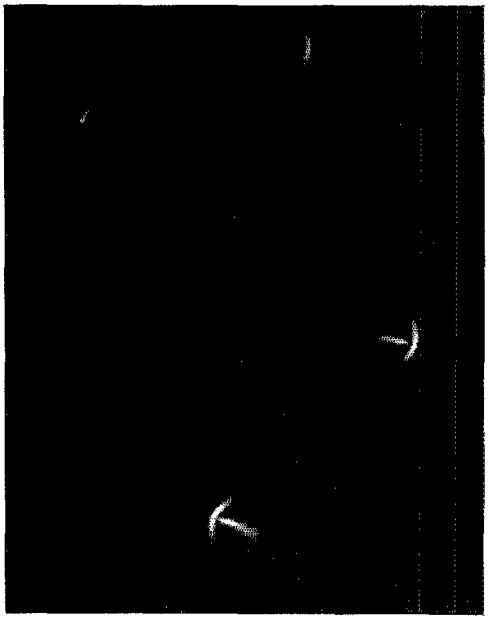
Conferences lend themselves particularly well to interesting photographs — the technical talks, antenna contests and bull sessions. A surprisingly large number of v.h.f. hams are also amateur photographers. Don't be bashful; most of us look at the pictures and read their captions before the remainder of the column.

While on the topic of pictures, the photograph of the "Geminid meteor" in the December column, page 88, stirred some comment. Apparently the photograph is not that of a meteor, but rather a pressure mark from the film having been kinked before development. Robert Appleby, K2VVE, first reported the fact, page 55, February *QST*. In a later letter, A. A. Griffin of the Dominion Observatory's meteor division at Ottawa, Ontario, Canada fully explained the phenomenon.

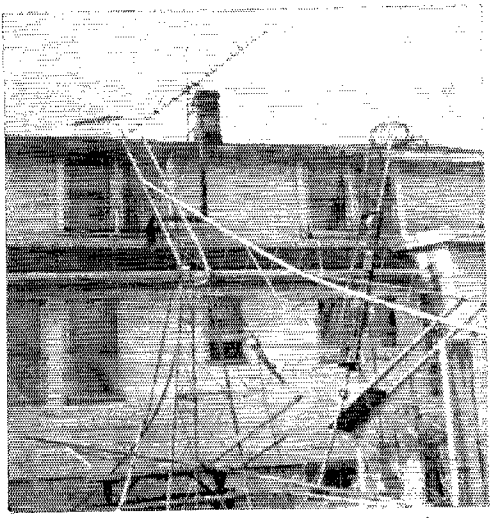
He says the so-called barrier of incandescent air has not been observed with meteors and that the kinks often occur on the beginning of a roll of film being fed into a processing reel or automatic processor. In most cases a careful inspection of the film shows the kink, but sometimes if not kinked severely, the processing eliminates any bends. However, in either case the pressure causes the emulsion to develop as though exposed to light. After I received the Griffin letter I checked the negative — there was the tiny kink. Sorry about that.

OVS and Operating News

50 MHz. conditions will begin perking about now, as sporadic *E* climbs towards its major yearly peak, in June. However, 50-MHz. DXers can't really complain about conditions during the winter months just past. Scattered *Es* openings were reported in all areas of the country, aurora was present several dozen evenings, and there were those *F2* openings between the coasts and to Hawaii and South America. The longest haul was apparently the January 1 contact between Florida's K4QKR and KH6NS, Hawaii, although the Hawaiian briefly heard an unidentified WA2 buried under layers of 6s. If Cycle 20 will just push a bit higher there is plenty of



A.A. Griffin, Meteor Section, Astronomy Division, Dominion Observatory, Ottawa, Canada sent this print of emulsion kinks taken from the end of a roll of film, one of the hundreds exposed over the past 16 years at Dominion Observatory Meteor Stations.



The antennas at WA2FGK were big enough. (W1FZJ always said that if they stayed up, they weren't!)

DX to work. Gary Frey, W3ZGI, an operator at W3KWH, lists these stations active: Alaska, KL7s FNM, FNL, FOV and W7CNK/KL7; in Africa, ZS1s XX, JD, SW, ZS6s JK, NM and OR, in addition to the previously reported KH6s (KH6GKL is W3DGP) and JAs. XE1PY and others are trying to interest HR1DX, British Honduras, in 50 MHz., and both W1HDQ and W3KWH note SP2DX, Poland, has special 50-MHz. permission through 1968, making the Pole the only European presently known to be allowed on 50 MHz. TI2NA says KZ5MV is on 50.124 from the Canal Zone.

At Fairbanks, Alaska, W8KNC/KL7 says he's active, and that he worked Pete, VE8BY, at Yellowknife, N.W.T. by aurora on February 20th and 27th. KL7DJI and KL7FNL also worked Pete the same nights. I hope one or more of the KL7s will report in detail current activity, which seems to be centered around 50.17. KH6EEM, who is W6QMN on the continent, is active from his new location on the east coast of Hawaii. He says Hawaiian SCM KH6BZF recently became active on six.

According to WA1BFD, WA1DPX and WA8EOW there was aurora on February 10, 11, 20, 27 and 28. *Es* on February 2, 12, 13, 14, 18, 20 and 22, was reported by WB6NMT, K7ICW and WA8EOW. There was also an *F2* opening on the 11th between the west coast and Hawaii. Note the relation to aurora dates.

WB6NMT, a faithful reporter to this column, is now stationed with the Navy at Camrahn Bay, South Vietnam, for one year. Before closing shop in San Diego, he reported numerous scatter contacts with W7FN (exW6PUZ) in Washington. Also, on February 11th, two hours after the *F2* to Hawaii, he heard LU8LB in Argentina. On March 1st WB6NMT, W6BJI, K6EDX, K6RNQ, W7FN, XE1PY, OA4C and CE3QG began a series of *TE* tests. We hope to have a report on these soon; perhaps next month.

144-MHz. DXers will be keeping an ear on 141.1 during the upcoming *Es* season. When conditions look favorable, stations in the east will be transmitting during the second 30 seconds of each minute, listening for western stations the first 30 seconds. K5TQP, New Mexico, will again be operating his automatic beacon on 144.073, beamed northeast.

Now some brief notes from various stations. TI2NA is again saying he will be on 144 with a kw., perhaps in time for the August Perseids. K4IXC bemoans the lack of 2-meter DX interest in the Caribbean, and northern South America. John has a good location and could work several countries — if they were active. Is anyone on 144 in the aforementioned areas?

W6CYL is the new Project OSCAR Association chairman. Reportedly, an OSCAR information net meets Mondays at 0200 GMT on approximately 21.380 MHz.

W4LSQ at Montgomery, Alabama has 500 watts and 32 elements ready for m.s. schedules, according to W4UUF. WA7FNK may be able to furnish Washington schedules. W1MEP has a pair of 4X150s on s.s.b. in Vermont. WB2YQU snagged 15 states as a Novice, now has his General and wants schedules.

W9AAG says, "I finally broke down and got a new receiver, a SB-301. It took me about a week to glue it together, but it does a nice job. For a guy with five thumbs per hand, it came out real good." Dallas was on 144 when many of us were still wearing three-cornered pants.

WA4HGN, Memphis, Tennessee, has 900 watts and is running numerous random m.s. schedules, wants more. W5GVE/5 has a La Port rhombic aimed northeast from Waco, Texas for tropo and meteor scatter schedules. And WB2FXB, with his kw. and 15-element Yagi would like m.s. schedules to improve his 20-state total.

For those keeping records of auroral dates, K1HTV, K2HLA, K3CFA, W3BDP and WA8VHG note February 7, 8, 10, 11, 12, 20, 28 and 29. Tropo conditions during the February and early March reporting periods were generally poor, as was random meteor scatter. However, random scatter should be greatly improved now.

220 MHz. activity is being encouraged by the work of several individuals. K4IXC, Melbourne, Florida has completed a kw. and 17-foot Yagi and is running meteor scatter schedules with K2DNR at Hopewell Junction, New York. Results have been nominal, but the diurnal meteor count begins increasing this time of year and K2DNR has replaced his 25-watt rig with a kw. K4IXC is building another Yagi to stack with the first. In South Carolina, K4GL has 250 watts and stacked Yagis. K1ABR in Rhode Island has a similar arrangement. K4EJQ runs a 5894 into a long Yagi at his Tennessee mountaintop location. W9KHH, Brookfield, Wisconsin has completed a 6252 rig and 7-element Yagi. All of these stations will accept schedules.

It is pleasing to see 144-MHz. DX enthusiasts like K1ABR, K4IXC, K4GL and K4EJQ taking an interest in 220-MHz. DX. Some "firsts" are in the making. Recently I visited K4IXC in Melbourne, and John told me he intends to devote much time to 220. He frankly admitted he wants one end of the first 220 meteor scatter contact, and is hoping that more 144-MHz. DXers will try 220. I can think of 12 or 15 who could start things rolling on this almost forgotten band.

432 MHz. conditions should be improving in most areas of the country and especially the Gulf Coast path from Florida to Texas. Much building has taken place this winter and summer activity should reach an all-time high. I'd be especially interested in detailed propagation reports. (220 also.) K7RKH has worked out a modification to the W1QWJ 432-Mc. amplifier (1968 ARRL *Handbook* and *QST* for February, 1966) improving the grid circuit efficiency. K7ICW passes along the details: (1) Remove the

(Continued on page 158)

CONDUCTED BY LOUISE RAMSEY MOREAU* WB6BBO

As Others See Us

SPEND any evening watching TV and, assuming the commercials aren't used to make a dash for the kitchen, or complete a letter or conversation, by the time the late show starts, the evening of advertising will have been a series of short courses in charm school. Between the dinner dishes and the eleven o'clock news we will have been thoroughly indoctrinated in how to become the most desirable, popular, kissable, sought-after person in the human race if only we use that "new improved" product. Television isn't alone in this; every advertisement in magazines, display samples in show cases and shop windows all display their products to the most tantalizing advantage for us to avail ourselves of these charm accessories, and in turn become the winner of every popularity contest.

But when it comes to operating on the air, all the creams, mouthwash, makeup, hairsprays, perfume, in the world will not be one bit of help to us. True, we may be sitting at the key or mike all gussied up as if we were going to be crowned Miss America, but it won't do any good because in radio, the only operating aid we have (short of those available from ARRL) is the technique that we put on display for all the amateur fraternity to examine and decide whether we are the kind of person worth a QSO or not. As we tune across the bands we pick and choose from the many thousands of operators; the kinds of people we want to know. That one who calls 57 CQs and signs 37 times, may catch our attention because we are curious about his endurance, but we seldom answer. The contest operator who works in, around, and all over the nets will indeed catch our interest long enough to log the call as one we don't want to work at *any* time not even in a contest. Those tuners and testers who make our blood boil when a net is in session, the many others with poor operating techniques all can change by using the available "Operating Aids" that can take the worry out of being close. All these can be cured easily, but what about the other little habits that make us vie for top spot on the ham-most-likely-to-be-brushed-off-list? For this there is no outside help, no accessory to add that special something to make us become a most desirable contact. The best way to find out is to ask *ourselves* "Am *I* the kind of person *I would want to work?*"

In our on the air activity we not only have ourselves on display but also Amateur Radio itself, for we are the "product" that advertises this wonderful hobby that is commonly called "being a ham." While we are enjoying our social nets, our contacts, passing traffic, keeping the homefolks in touch with servicemen, or just idly chatting with a friend across town, or across the world, there is an unseen audience on this "party line" that we call radio. Listeners who judge all the amateur population by the people they happen to hear, because each one of us is the yardstick, or measuring device for the entire Amateur Radio Service. We can make it so interesting, so tempting, that by our activity someone may want to get their license, or, because of our thoughtlessness and stupidity condemn all of us.

There is an old proverb that reads: When we meet, I know you a little. When I hear your voice, I know you still more. When I see your actions, I know you altogether. Each one of us should take a long hard look at our operating habits, and see if we are that person whose QSL we would like to have more than any other. If the answer is yes, then the entire amateur fraternity is better for our presence; if not, now is the time to "straighten up and fly right." The reward might be A-1 Operator membership.

MINOW net gals who attended the Walla Walla Ham-fest. Back row: K7PGV, Frieda; K7TWQ, Jessie; W7JRB, Marie; W7FDE, Alma; Second row: K7UBC, Verda; K7MFS, Gladys; WA7BDD, Joan; W7NOB, Gwen. Kneeling WA7DXI, Charlene.

*YL Editor *QST*. Please send all news notes to WB6BBO's home address; 1036 East Boston St. Altadena, Calif. 91001.

Time Is Running Short

There isn't much time left for registration for YL special events that are coming up.

Fresno Hamfest, Fresno, Calif., Saturday, May 4. There will be a YLRL Forum from 10:30 to noon that is open to all the ladies, licensed YLs as well as the gals who are toying with the idea of getting a license. Maxine Hanberry, WA6AOE, President of YLRL will preside. Following the Forum a Ladies' Luncheon has been scheduled for licensed and unlicensed women present at the hamfest.

National ARRL Convention, San Antonio, Texas, June 8, 9, 10. A big Texas welcome and very special activities are planned for all the women who attend. Programs of interest for both the licensed YLs, as well as the unlicensed women are on the books so plan to join in and have fun next month.

YLRL International Convention, Denver, Colorado, June 13 through 16. If your advance registration isn't already made, remember that the deadline is June 1. After that the price goes up. Already they are coming in, and the Colorado YLs are saying "Come One, Come All." YLRL member or not everyone is welcome at this affair that happens only once in four years.

Ann, KØWZN holding the YL "tubes" for the YLRL Convention luncheon on Saturday, June 15 in Denver.

All State or Division ARRL Conventions, as well as the majority of the hamfests scheduled each year have activities for the licensed women operators who attend. These may be anything from an informal get together, through a YLRL Forum, or even include a special YL luncheon.

Whether licensed, interested in becoming licensed, or just curious to find out what we gals with call letters talk about, all the women who attend are always cordially invited to join us in the YL activities at hamfests and conventions.

"XYL"

For those who adore statistics, one complaint that is as certain as the roll of the seasons, as predictable as Christmas, and as explosive as the Fourth of July, is the regular series of objections to the abbreviation "XYL" as applied to the wife of an operator.

The impression that most wives of operators seem to have is that this is a term of opprobrium that implies the absence of youth. That "X" that has upset so many ladies with the degree of "Mrs." refers to her marital status only. Page 74 of the ARRL publication *How to Become a Radio Amateur*, defines YL as "(Young Lady) An unmarried woman or girl operator." XYL as "(ex-Young Lady) Wife or married woman operator." Both are used as words, not as abbreviations, for remember, an XYL may be, and often is, a bride of 18. While a YL can, and in some cases is, eligible for her social security.

WAØEXX, Betty; WAØKRB, Sue; and KØBTV, Kay with the afghan made for the YLRL Convention by K9QGR.

The two terms have been in use for a long time, and have become as much a part of the amateur "language" as OM, which we all know indicates a male operator whether he is 10 or 100 years old. Nothing is about to change in the language of radio the best that we can do is accept it, and wear it gracefully as one more "degree" after the wedding ceremony has changed that Miss to Mrs. There isn't one of us who objects to that.

Ann Warren, K8LGA

Like so many of us, Ann, and OM, Spence, K8LGB, caught the radio "bug" from listening to an old shortwave radio that covered 75 and 40 meter fone bands. The activity got so interesting that they decided they had to join the groups they heard and, in 1958, they took and passed Novice. General class followed and things haven't been quite the same since then.

Ann's favorite form of emission is c.w., but she is very busy on s.s.b. and AM as well, since her major interest is traffic in the National Traffic System as well as Navy MARS. As she puts it: "The great satisfaction derived from delivering a message to someone from their son, husband, or brother in Vietnam, makes all the time spent well

Ann Warren, K8LGA

worth while. It cannot be put into words." With her, this is the voice-of-experience, for her oldest son, Rick, is a radioman with the Marine Corps in Vietnam. The other son, Mike, WA8ORX, is a sophomore at Ohio University.

She is a member of the Buckeye c.w. traffic net, Ohio s.s.b. net, the Morning Watch c.w. net, and is also active in NTS as a liaison to 8RN and EAN. A-1 Operators Club, the Buckeye Belles, and YLRL are some of her other affiliations. Ann holds ROOA, BPL, and Section and Region Net certificates.

Other interests are hi-fi, stereo, photography, art (with dreams of learning how to work with oils), and conservation. Both Ann, and Spence love to travel, and spend their vacations finding out what the world looks like beyond the shack windows.

C.L.A.R.A.

The newest of the nation-wide YL clubs, the Canadian Ladies' Amateur Radio Association, announces Jan Burgess, VE3BII, as the secretary of the organization.

CLARA is a national organization supported by the more local groups. Every Canadian YL is invited to become a member of this rapidly growing club. QST

Pauline Raser, W2QCC. First licensed in 1923, Pauline has operated her way through three calls in 47 years of amateur radio. OM, W2ZI is well known for his outstanding museum of antique wireless gear.

• *New Apparatus*

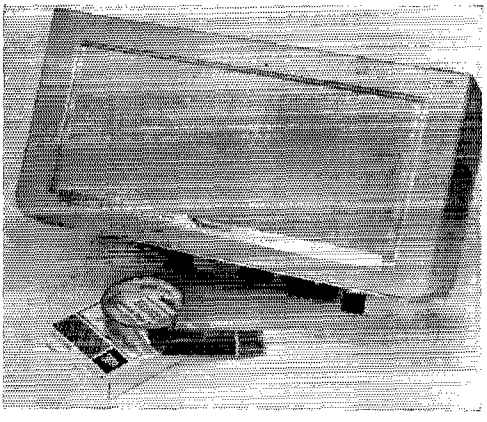
"Scotch" Brand Conductive-Adhesive Foil Tape

THE Minnesota Mining & Manufacturing Co. of St. Paul, Minnesota, is now producing a conductive-adhesive foil tape that has several r.f. shielding applications in amateur radio equipment. Two types of tape are available: X-1170, which has a 2-mil aluminum backing, and X-1181, which has a 1½-mil copper backing. Because both types are coated with a special electrically-conductive pressure-sensitive adhesive, they are totally conductive. The resistance between properly-applied tape and the conductive surface it is applied to is less than 0.1 ohm per square inch. A one-inch wide section of tape can handle approximately three amperes of current before thermal degradation of the adhesive occurs.

As mentioned, there are many uses in amateur radio for this 3M Company product. In any gear where there are sheet-metal breaks, conductive tape makes an ideal sealer for keeping r.f. energy in or out of a cabinet. For instance, a transmitter that has a hinged cover is likely to have many r.f. leaks. By baring the adjacent surfaces at the break and applying the tape as shown in the photograph, you can eliminate a possible source of TVI. Where an irregularly-shaped component needs to be shielded, the tape does a thorough job and requires much less space than, for example, a shield can. In cases where one or more insulated wires need to be shielded, the wires can be laid along the chassis and a strip of conductive tape applied over them. Since this method of shielding doesn't require any soldering, there is no danger of heat ruining the insulation on the wires. Along these same lines, where the heat of soldering might be detrimental to a component, conductive tape can be used to make the connections between the component and the circuit.

Conductive-adhesive foil tape is easy to use: the surface on which it is to be stuck is cleaned and the tape is applied with moderate pressure. The only caution to be observed is that the pressure be limited or the resistance of the joint will increase because the electrically-conductive particles that make up the adhesive will be spread apart.

"Scotch" brand conductive-adhesive foil tapes are supplied in 18-yard lengths in a choice of seven widths: ¼, ⅜, ½, ⅝, ¾, ⅞ and 1 inch. The price class per roll is from $3 to $11. — *W1YDS*



How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

Whew!

Off-key strains of the DXHPDS Wouff Hong Song drifted out to the street from within. We dodged a wavering protest sign labeled NO AWARD FOR NONHAM. Jeeves was nicked by the corner of another careening placard scrawled GUEST? PEST! Brushing off flower petals and hair, we squirmed through jeering demonstrators and entered Long Hall to attend the annual spring rally of the DX Hoggery & Poetry Depreciation Society.

Delayed by the pickets outside, we found the meeting already under way. Watt A. Pylup, standing between our seated chairman and guest of honor, was orating the first item of business:

Two big-gun DX men — boom-boom! —
On bands that have plenty of room
Spend night after night
In the silliest fight
To see who'll move slightly for whom.

Through hazy bedlam we surveyed the controversial unlicensed guest, a sorry specimen who alternately sneered, winced and twitched. Harry Splatter then climbed to center for

The lid with new keyer so flashing
Gives Old Samuel's code such a thrashing
You quit with a groan
And call him by phone
To ask if he's dotting or dashing.

Don Witlids, chairman, formed an *ad hoc* committee to bury Harry. The honored visitor flinched at the gore, and we noticed that his own hands were seared and scarred as if by fiery a.c.-line shorts. Les Turnemoff continued:

A careless DXer named Saul
Hopped a boat for the isle of St. Paul
When he got there
He was kept off the air —
Saul's call was for Peter, not Paul.

"But *how* does he get out so well with no ticket?" demanded someone loudly from the balcony, referring to our fidgety guest. "Well, he has the only R-10,000-Q certificate in town!" countered a shout from the noisy scuffle below. The guest nervously leaned down from the platform and proudly passed out copies of his paper titled "Salvaging Antique Vacuum Cleaners, Defunct Mixers, Ancient Electric Fans, Old Heating Pads, Etc." Izzie Sirius delivered:

Persistent, indeed, was McGong
Whose calls were exceedingly long.
He started one Sunday,
Continued it Monday —
On Tuesday six shots stilled his song.

"What's your *antenna*?" roared an inquirer in the gallery. "Do-it-yourself house wiring with old pieces of unbonded BX cable!" bragged our guest from the stage. The hubbub increased, and Major Bloodcurdle had to yell his offering over the hooting crowd:

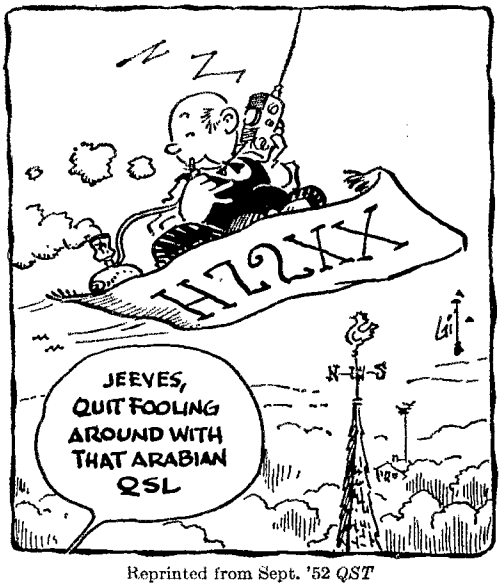
When caught they'll quite likely be fined,
The wisecracks-anonymous kind
Who save lots of juice
In their sneaky abuse
By leaving the garbage unsigned.

Amid showers of lethal junkbox debris our celebrated visitor seized his award as DX Hog of the Year and ran for a rear exit. We let him escape. When he plugs in that fancy neon wall plaque next to his Ruined-10,000-QSOs diploma, relishing the potential QRN, a hidden laser will drill him right between the eyes.

What:

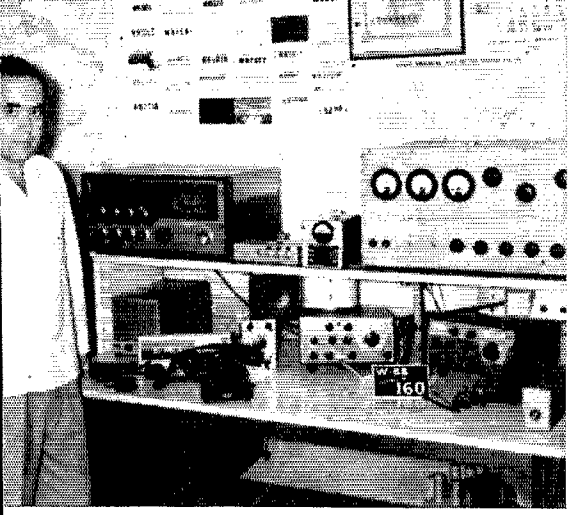
So much for the activities of the DXHPDS Air Pollution Committee. Under all the rasps, hash and scratches the "How's" gang manages to find a goodie or two on twenty's low side. Remember that "JT2AB (20) 13-14" means that JT2AB is reported near 14,020 kc. at 1300-1400 hours GMT, a space-economy device almost as confusing as conserving. And so . . .

20 c.w. DXcellence is described by **Ws** 1AYK 1DAL 1VAH 2ADP 3HMR 3HNK 3WXW 4YOK 6EAY 7BE 8IBX 9LCG 9LNQ, **Ks** 2BMI 3CUI 4TWJ 5MHG/6 5YUR 6OZL ØSAJ, **WAs** 1CJE 1CYT 1DJG 1FHU 1GXE 2PZD 3HRV 5PUQ 6JDT 8MCQ 8PVN 8VZS 9THB ØRVR, **WBs** 2SSK 2UVD 2ZQE 6UVH, 1IER and **KP4**DBJ in terms of **AP**5HQ (21) 13, **CEs** 2DI 23, 2OF (56) 23, 3AG (43) 0, 3ZK (47) 3ZN 4AD (52), 8AA (29) 12, ØZI/mm, **CM**2QN, **CN8s** AT FV (80) 21-22, **COs** 2FC (75), 2RL 6RM (5) 4, **CP**5AQ, **CRs** 3AD (20) 8, 4AG (40) 23, 4AJ (38) 0, 4BB (67) 19, 6AI (24) 19-2, 6BX (50) 18, 6CD 6CK (2) 22, 6DX 6EI 6HG (26) 20, 6IK 22, 6KB (32) 18, 7BN 7IZ 4, 8AA 8AE 9AE (10) 19, **CTs** 1AC (46), 1CO 1IT (65), 1SO 1TL (11) 21, 3AS (12) 20, **CXs** 1OP 1BBV (20) 21, 2BBV (23), **DMs** 2AQF 4ZXH 8RLW,



Reprinted from Sept. '52 *QST*

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



PY2BJH puts out big signals from Sao Paulo on h.f. bands down through 160 meters. On the latter range, using just an "L" wire, Hercilio has worked numerous W/K/VEs and DX as rare as VQ9JW. (Photo via W1BB)

DUs 1FH 1NL 1RS (15) 19, 1TR (10) 13, 7SV (90) 9–10, **EAs** 6BD (51) 23, 6BH 8ET (8) 23, 8FE (55) 4, 8FF 21, 8FG 8FJ (5) 8, 9EJ (15) 18, **EI9s** J LG (5) 18, **ELs** 2AX (73) 22, 2D (12), 2R (10) 2, 2Z (59) 0, 8F (12) 19, **EPs** 2BQ (25) 15, 3AM, **ET3s** FMA USA, **Fs** 8TT/**FC** (15) 16, 9VN/**FC** (59) 22, **FB8s** XX (38) 16–17, YY (7) 20, ZZ, **FG7s** TD TE (20), TG (119) 18, XF XQ (49) 23, XT (88) 22, **FL8HM** (16) 14, **FM7s** WH WO (15) 23, **FO8s** AA (20) 20, BT (45) 4, BU (40) 14, BV (40) 23, **FP8s** CT (12) 22, CY (28) 22, **FR7s** ZD (37) 13, ZN (3) 16, **FY7s** TY (58) 19, YG (33), **Gs** 3XEM/**HZ** (5) 17, 6ZY/CN, **GC3IEW**, **GD3AIM** (30) 12, **HAs** 1VE 5DA (18) 6, 7PJ (60), 8KUC (21), **HC2RT** (66), **HIs** 7JMP 8IBC (10) 0, 8RV (28) 23, **HKs** 3AVK 3HY (25) 22, 3RQ (55) 23, 7XI (44) 23, 7YB (70) 23, **HL9KI**, **HMs** 1DK 2CM 4, **HPIs** BR IE 22, XSP (46) 0, **HRAs** KS SN, taboo **HS2A**, **HZs** 1AB 3TYQ (4) 20, **IS1SCB**, **IT1s** AF (34) 19, GSA (43) 19, **JAs** 1AHO 1CWZ 1EZT 1IIX 1KAA 1NPO 1RHM 1SHO 1UGW 2BVL 2DJ 2YL 3BN 3IG 4BJO 6PN 7CDV 0AZE 0CCE 0DJE, **JTs** 1AG (85) 13–2, 1KAA (35) 1–3, 2AB (20) 11–13, **JXs** 3XK (19) 19–20, 6QL (44) 23, **JW5YG** (19) 19–20, K8NHW/**XV5** (11) 18, KC4USF/mm, **KG6s** AAY (9) 13, AQG AQI, **KL7s** BZO EBK (20) 8, FPA FRX MF, **KM6BI** (10) 7–8, **KP4s** ALU (70), BBN (22), COX DAC (25) 23, **KR6s** IS SM 23, **KS4CR**, **KV4s** AA (81) 20–23, CI EX, **KX6s** BQ ER (50) 8, FA FN, **KZ5s** CN CO (5) 23, EM (77), JO L1 (45) 0, NG, a dozen LUs, **LZIs** KPG (67) 16, KRD (4) 4, KSA, **MP4BGU** (20) 10, **OAIs** PF (11), UO (13) 23, **OEs** 5RI (26) 6SWG, **OXs** 3CJ (32) 23, 3EL (105) 4, 3LP 3MB (54) 22, 4AB 4FT, **OYs** 1X (46) 23, 2EL (67) 0, 3L (13) 21, 5NS (60) 23–0, 6FRA 7ML (15) 23, 9IM (24) 13, off-limits **PK**1s AA (2) 13, SH (40) 18, **PJs** 2ME 2SE 3CC 3CL (100) 2, 3CR (50) 4, two dozen PYs, **PZ1s** AH (9) 21, AO AQ (21) 23–0, BF (30) 19, BH (48) 23, BL (72) 23, CQ, **ST2s** PO (65) 20, SA (35) 19, **SVØs** WB (31) 16, WP (20) 20, **TAs** 1AV (80) 19, 1IB 1KT 1MB 7, 1VY (1) 22, 2BK (35) 19, **TFs** 2WKR 2WKS 22, 3AB 3AU, **TGØAA**, **TI2PZ** (30) 22–23, **TJ1s** AO AS (7) 21, QQ (11) 23, **TT8s** AN AQ (32) 22, U5ARTEK 13, **UAs** 1KAE/M (24) 14–16 of Mirny base,

EL9A likes 15-meter phone DX from his remote Liberia location. A homespun three-element beam is hooked to Don's TR-3. (Photo via Ws 8WRP and 1IKE)

1KED (42) 21 in Franz Josef Land, **1KFT** on Nova Zemlya, **2CA** (45) 4, **2KAP** (27), **9BW** (15) 0, 9CM (5), **9DN** (37) 2, **9FI 9FN 9GW** (31) 14, **9HL 9HN** (55) 23, **9IB** (71), **9JH 9JS** (52) 2, **9KAI 9KCE 9KHA 9KQA 9KUA** (7), **9KUK** (27), **9OH 9VB 0AP** (10) 12, **0CO 0CU 0EQ** (58) 23, **0IL 0KAE** (19) 13, **0KCS 0KEA** (27) 22, **0KFS 0KIP** (16) 13, **0KJA** (10) 10–11, **0KQU** (15) 5, **0KUA** (45), **0KYA 0KZB 0KZD 0LL** (5) 22, **0MIX** (8) 0, **0PY** (10) 15, **0QP** (5) 14, **0RB** 1, **0RE** (26) 16, **0SN** (17), **0UU** (6), **0YT** (18) 15, **0ZI 0ZU**, many a UB5, **UC2s** AX CX (13) 22, **UD6s** AM (12) 14, AY BW 3, BZ (15) 4, CE, **UF6s** HS KAR 4, KPA LA 4, VN, **UG6s** AD (30) 4, EA (52) 5, KAA LR, **UH8s** AD AE (72) 19, BI (57) 14, BK (20) 12–13, CI (16) 10, CS (43) 23, DC, **UI8s** AG (19) 21, AX BS (53) 10–11, FB 23, IK 3, IO (10) 27, IZ (20) 18, KAA (13) 13, KAD (37), KNA (28) 15, LC MU, **UJ8s** AB (25) 14, AC AJ (15) 10, AR (10) 13, AZ 3, KAA (46) 6, KAB (17) 6, **UL7s** BF (30) 3, BG (38) 4, CA CG CT (30) 13, GW (30) 12, IF JT KAB (39) 4, KAD (30) 10, KAR (33) 4, KBF (24) 16, KGG (72) 13, KKB KKL (65), ND (63) 8, PA TD (16) 6, WH 2, **UM8s** AP FZ (42) 7, IE (13) 4, KAB, **UO5s** DN GN, UPOL-15 (25) 15, **UP2s** CT (45) 4, KBC KCB (23), KDB (10) 12, KNP, **UQ2s** AN DK CC (27), MR KCR, **UR2s** BV DE (70) 3, **UT5s** BP KSA QE (30) 20, SE (19) XB, **UV9CU**, **UWs 9ER 9OA 9PT 0BX 0FY 0IF** (25), **0IG 0IH** (15) 16, **0IQ** (13) 0, **0IW** (5) 23, **0JA 0MIT**, **UZ9ZA**, **VEs** 8MIL ØMIN, **VKs** 8UG 0JW (15) 16, VO1AW (25), **VPs** 2AR (18) 12, 2GL 2MJ (58) 11, 2MU 2SC 2VL 7NF (43) 23, 8JF 8JH 8JR (11) 21, 9BO (21) 23, 9FW (13) 19, 9WB, **VQs** 8CC 8CDC (25) 17, 9B (27) 15, 9JW (17) 19, 9V (45) 18, **VRs** 2EK 2ER (55) 22, 4CR (30) 7, **VSs** 6FX (30) 13, 9MB (58) 22, **VU2s** CC (50) 17, DIA (17) 1–2, DQ (71) 12, FSZ (10) 19, GX (28) 18, JA (67) 2, JN (40) 2, KZ 20, LN (45) 13, LOZ (25) 14, MD 19, MS (7) 23, VZ (35) 23, W0GTA/**LA**, **XEs** 2T 0YL (74) 23, **XP1AB**, **XW8s** AZ (24) 15, BP (71) 12–15, CAL (75) 18, **XZ2DW** (5) 18, YA3TNC (6) 1, **YJ8BW** (13) 12, YN1AA, **YOs** 2QZ 3RG (25) 5, **YS1s** WKE 21, XEE (43) 2, plenty of YUs and YVs, **ZB2s** AZ BG, **ZC4s** BI (14) 7, GM, **ZDs 5M** (18) 14, **7GS 8J** (24) 23, 8M (28), 8RK (18) 18, **ZEs** 1BF (38) 20, 1S 3, 2KV (41) 3–4, 5JJ (52) 5, 8JW (38) 20, **ZP5s** FT (17) 23, KA (75) 2, **ZS3LU** (7) 18–19, **3A2s** AB (49) 1, CQ (67) 12, EE (54) 14, **4L3A**, **4M4A**, **4S7s** DA (39) 1, EC (20) 12–13, JP NE (30) 1, RN (25) 17, **4X1s** CJ RD RH (65) 16, VL (9) 2, VO (55), WN YM, **4Z4s** BG (65) 16, NAI, **5H3KJ** 4, **5N2AAF** (20) 6, **5R8CC**, **5Z4s** DW KL (40) 1, SS 4, **6W8CW** (60) 17, **6Y5s** ET (35) 3, GS (25) 2, **7P8AB** (64) 19, **7Q7LC** (25) 16, **7Xs** 2ED 2VJ (45) 18–0, ØAH (29) 23, ØWW (20) 23, **7Z3AB**, **8N1WP**, **8P6s** AE (85) 22–23, AO (58) 0, AY (45) 12, BU (8) 12, CF (22) 11, **9A1AA** (25) 19, **9F3USA**, **9G1s** GC (60) 23, HM 4, **9H1s** AQ (18) 19, BC (3) 22, **9J2s** CL (2) 16, MX 4, VB (4) 5–6, W 1, **9L1TL** (31) 0, **9M2LW** 14, **9N1BUZ** (18), **9V1s** NV 18, OB (40) 12, OC (15) 12–13, OO 21, OS (5) 12–13, **9X5s** AS PS (60) 18, **9Y4s** DS RA (24) 23 and VU (60). Twenty sagged a bit in late winter but spring should have things jumpin' again around the clock.

160 c.w., where we now hear thunderstorms QSOing each other, winds up the 1967-'68 season in a blaze of DX glory. Ws 1BB ØVXO, **WA1s** FHU GXE and the clubs press list 1.8-Mc. action by **CEs** 3CZ 0PC, **DJ6TR**, **DK1KH**, **DLs** 1FF 5YZ 6AT 5YZ 9KRA, **EI9J**, loads of Gs, **GC3HT** (13), **GD3TNS**, **GI3s** JEX (22) 22, NPP OQR (23) 20, SSR (35) 0, **GM3s** FXM (35) 22–23, FSV (30) 20, HUN (5) 0, KMR (40) 0, OXX PFQ (43) 23, UVL (18) 21, **GWs** 3PPW (30) 20, 3SVY (68) 0, 3TOW (38) 0, 5BI 5TW (22) 20, **HB9s** QN TT YL, **JAs** 1 BHG 1CJQ 1CR 1CYS 1LQV 1PIG 1PVK 1RST 2CLI 2CXF 3AA 3JM 4AH 4IO 7AO 7CQB 7NI 8CTU 9LR ØBD all 12–14 out west, **KA9s** AK MF MQ (80) 11–14, LX1AF, **OEs** 1KU 2JG 5BOL, **OHs** 2KH **0NI**, two dozen OK-OLs (20–35) 22–0, **PAØs** GMU PN, **PY2s** BJH (3, 27), BKO, **PZ1AH**, **TGs** 9EP ØAA, **VKs** 2BGH 5KO, **VO1FB**, **VP7DX** (4, 20) 5, **VQs** 8CC (27) 23–2, 9JW, XEØVXO, YV1OB, **ZB2AY**, **ZLs** 1XX 3RB and **6W8CW**, to name a few. . . . . Wandering WØVXO found a superlocation in southwest Colorado canyon country, draped a Marconi in a 40-ft. tree and worked a flock of aforementioned JAs and KAs as WØVXO/Ø in early March. "Didn't know 160 could get this hot!" Out east W1BB & Co. still await a decent opening to Japan. Better watch 1.8 Mc. even in the warmer season, OM, because of probable transequatorial phenomena involving PYs, VKs, ZLs, ZSs and who knows what else.

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Next column we may inspect other slots thanks to reports from (10 c.w.) Ws 1VAH 3IMR 4YOK 5QGZ,

4U1ITU, operated in turn by a stream of itinerant hams passing through Geneva, here welcomes visitor K7YUC. (Photo via W1UED)

Ks 1FKW 3CUI, WAs 1CYT 1DJG 1FHU 5PIF 8MCQ 9QBM, 1IER; (10 phone) Ws 2VOZ 4YOK 5QGZ 8YGR 9LNQ, K4TWJ, WAs 1CYT 1DJG, WB2UVD, KG6IC, KH6BZF, KP4DBJ, P. Kilroy; (15 c.w.) Ws 1DAL 1VAH 3HMR 3HNK 4YOK 7BE 8IBX 9LNQ, Ks 1FKW 5MHG/6 5YUR, WAs 1CJE 1CYT 1DJG 1FHU 3DSD 5MIN 8PVN 9RVR, WB2s FPG SSK, WNs 1ION 4GRN 4GSS 4GTI 4IIF, 1IER; (15 phone) Ws 2DY 3DWG 4JVN 9LNQ, K4TWJ, WAs 1CJE 1DJG 3DSD 5PIF 7AUW 9RVR; (20 phone) Ws 2DY 2VOZ 3WXW 9LNQ, WAs 1CJE 6JDT, KP4DBJ; (40 c.w.) Ws 1DAL 1VAH 3HNK 4YOK 7BE 8YGR, K5MHG/6, WAs 1CYT 1DJG 1FHU 3DSD 5MBC 5PUQ 8MCQ 8PVN, WBs 2FPG 6UBC, WNs 3INI 4IIF; (40 phone) Ws 3DWG 8YGR, WB2UVD; (80 c.w.) Ws 1DAL 1SWX 1VAH 4YOK, WAs 1CYT 1FHU 1GXE 8MCQ, WNs 1ION and 4IIF. How's the spring skip treating *you*?

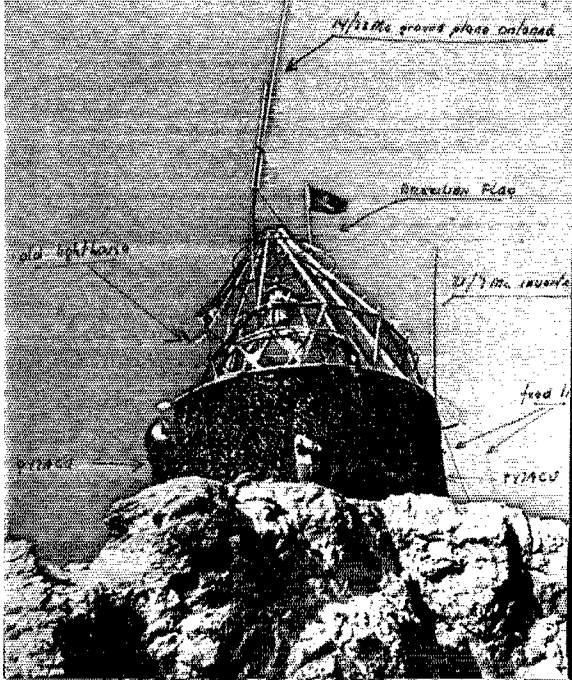
Where:

HEREABOUTS — "The correct address for VP7 QSLs is Bahama Amateur Radio Society, Box 6004, Nassau," finds K9GZK. Scratch the old Box 913 info. Jack opines that self-addressed stamped envelope cooperation is mighty poor these days. "Of fifteen cards just received for H18CNJ only one came with s.a.s.e." Maybe the multitude is satisfied with slow bureau routes? . _ . _ . _ "Still have OX5AN logs and QSLs," reminds K1QGC . _ . _ . _ WB2UKP has no QSL connection with KZ5MF, VE1ASJ likewise re FP8DM . _ . _ . _ "Cards will be issued from P.O. Box 10816, Caparra Heights, Puerto Rico, 00922," chorus KP4s CSW and DBU concerning their multicountry VP2 swing scheduled to conclude later this month. Nick and Bob would like all QSLs in by June 22, 1968, to expedite handling . _ . _ . _ WB4EFE affirms his QSL-aid contract with VP2DAJ for QSOs on or after February 1, 1968, and with VP2SG starting March 1, 1968. S.a.s.e. and GMT, of course . _ . _ . _ VP7BG informs, "Anyone wanting my QSL for QSO since January can obtain it from DXpedition of the Month, P.O. Box 7388, Newark, N. J., 07107." . _ . _ . _ *DX News-Sheet* says WA6OKN will take care of QSLs for his own February TI9AM contacts . _ . _ . _ Attention short-wave listeners: There may be yeries awaiting you at SWL/QSL Bureau, c/o LeRoy Waite, 39 Hannum St., Ballston Spa, N. Y., 12020. Roy, amateur bands editor for Newark News Radio Club's *Bulletin* for many years, welcomes s.a.s.e. inquiries about this nonprofit operation . _ . _ . _ CEs 3ZN/0 0PK, CRs 6CK 7BN, EA9EO, EP3AM, HR1KAS, HV3SJ, KP4RK, KR6IS, OAs 1IB 4JR, SP5AKG, TI2LA, VQ9JW, XE2T, ZD3D, with QSL managers Ws 1RLV 9JVF, WBs 2ETI and 6GOV, are "QSLers of the Month" nominated by Ws 1SWX 8IBX, Ks 2BMI 6EC and WB2YVP for snappy confirmations. Any fasties you'd like to see commended here? . _ . _ . _ *Help*! These italicized brethren seek hints toward shaking QSLs from holdouts mentioned. *K6CQF*, FQ8s AJ AP of '58; *K6EC*, FB8XX (Jacques), UI8MN, 3A2MJC all '66; *WA1CJE*, OH0NM; *WA1HEC*, CR6FP, FM7WD, FP8GX, HC1EPN, PJ2CC; *WB4HFJ*, FK8BD, OX1AB, ST2PO, TY2KG and 6W8DQ. Any 'alp? . _ . _ . _ WA1CJE and WB4EFE confess interest in becoming QSL tenders for DX stations requiring such assistance.

ASIA — 4X4s SK and SO haven't changed QSL manager. It's just that former W2IWP now is W4TKN at 9301 Hamilton Dr., Fairfax, Va., 22030. Calls vary almost as fast as postal rates these days! . _ . _ . _ WA4WTG's tenure as 4X4VB's QSL tender is effective as of February 23, 1968. Bob emphasizes, "S.a.s.e., or s.a.e. with International Reply Coupons from non-W/Ks, will bring direct reply, others to go via bureaus." . _ . _ . _ W8HXR says MP4MBC QSLs move faster via G3HSR than by direct Masirah mail . _ . _ . _ LIDXA's *DX Bulletin* reports rapid QSL results from AP5HQ through use of W2SAW's foreign mint postage enclosures . _ . _ . _ K1QGC, who disclaims connection with XW8CAL's QSLing, wonders if anyone has word of the whereabouts of VQ9MB for whom Ken still holds logs and cards. "Haven't heard from Merle since over a year ago." . _ . _ . _ "Until I came to Cyprus I always felt that an operator should be prepared to deal with his own QSLs," writes ZC4GM. "But I now find that, with the apparent demand for ZC4 QSOs, I do not have sufficient time to cope with QSL requirements while at the same time keeping active as I would wish. I've just completed the first four months of a three-year tour of duty here and have already issued more than a thousand cards." Anyone interested in a sleeves-up QSL-tending job should get in touch with Gordon . _ . _ . _ Relax, lads — W6EAY received his 3W8AA QSL via Czechoslovakia after only a ten-year wait.

AFRICA — 5Z4SS employs K9KLR as QSL aide for contacts on or after January 1, 1968, on the customary s.a.s.e., or s.a.e. with IRCs, basis . _ . _ . _ W1JSH informs Hq. he has no EL2Y QSL managerial arrangements, and W7WLL points out that FL8HM now handles his own cards at the address in the listings to follow . _ . _ . _ The *DX News-Sheet* of Mr. Watts says VQ8CC is assisting VQ8CDC's Chagos QSLing at the Mauritius home base, also that Botswana amateurs may soon be displaying labels from the 8O prefix block courtesy International Telecommunications Union . _ . _ . _ K4KZE, ex-VQ9BC, notifies, "My Seychelles logs have been delayed but I will confirm all contacts as requested when records arrive at my present VP7BG location." W2CTN still handles Bud's ZD8BC cards.

OCEANIA — VS5JC's QSLing, ably handled by W5VA, leaves a residue of unclaimed Brunei pasteboards. 9M2XX, ex-VS5JC, pens, "I'll be leaving the far east in September and would like to ensure that all stations requiring VS5JC QSLs receive them by that time." Those concerned are urged to supply W5VA full QSO data and the usual s.a.s.e., or s.a.e. plus IRCs. You also may have worked Jack as G3DPS, GM3DPS, ZC4XX, 9Ms 6JO and 8JC . _ . _ . _ K1QGC recommends direct consultation with K1EBY regarding QSLs for the latter's operation



PYØs DX and SP recently managed thousands of QSOs from the desolate isles of St. Peter and Paul through the DXpeditionary efforts of PY7s ABU ACJ ACQ AKW and AOA. The crew operated inside a battered 35-year-old lighthouse hull, only shelter among bleak and barren crags protruding above the stormy Atlantic. (Photos via W1CW and magazine O Cruzeiro)

"DXCC²" No. 52, the first from Puerto Rico, is filed by KP4RK—a photo of QSLs confirming contacts with active ARRL DX Century Club members in a hundred or more countries. New "rule": Use only DXCC listings appearing in the most recent 36-month stretch of QSTs. No QSLs, please; just a clear picture of same.

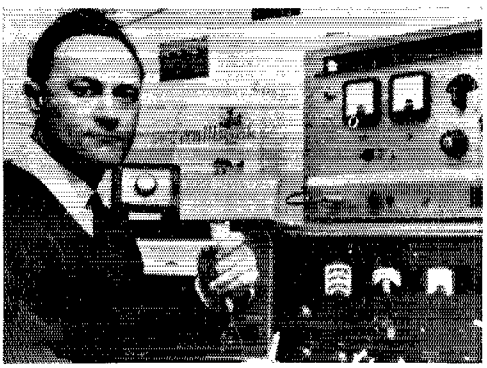
at KX6BQ in November and December, 1967 ._._._. "Each contact with VKØAL will receive a number beginning with 1001," advises QSL manager VE6APO. "This serial will facilitate log checking and should be quoted in all QSL requests. Cards enclosed with IRCs will be returned promptly, others via bureaus." The code numbers will be omitted during contest work.

SOUTH AMERICA — WA5QKE, CX8DV's QSL agent, gives prompt response to s.a.s.e. applicants and takes care of all others via bulk shipments to the bureaus each July and January ._._._. It seems that U.S. Twos generally fail to heed self-addressed stamped envelope stipulations in their petitions to QSL managers. K9KLR finds them about 60-per-cent delinquent so far as his 9Y4DS managerial labors are concerned. "Cards without postage must go via bureau," declares Nick ._._._. WA9WNJ helps with OA6BU's QSLing at the latter's home W9IBT address ._._._. *DX News-Sheet* suggests 5130 Hillcrest Dr., Clarence, N. Y., as a possible QSL route to and/or from KC4USP of Palmer archipelago ._._._. VE1ASJ, QSL agent for HC5s EJ KA, VP8JT and others, wonders where so many W/Ks get the idea that Canadian QSL managers can use U.S. postage and U.S.-stamped envelopes. IRCs for VEs, men, or your replies must come via the leisurely bureau routes. Andy also disclaims PY0 confirmational connections.

EUROPE — HV3SJ tells W9VNG that his call is arrogated periodically on voice and code. You'll get a QSL for sure if you work the real HV3SJ ._._._. No wonder they're fooling with exchange rates — 8M4DXL tells WA1CJE a new *Callbook* is (or was) priced around fifteen smackers in Sweden ._._._. In *Long Skip*, organ of the Canadian DX Association, VE3DDR points out that Russian antarctic station UA1KAE, Mirny base, signs portable designators /1 for Dmegrosky base, /2 Oaza base, /3 Pionierskaja, /5 Komsomolskaja, /6 Vostok and /7 for Sovietskaja base. KC4VOS is sometimes used at Vostok base by cooperating U.S. and U.S.S.R. personnel. Near the opposite pole UPOL, followed by selected numerals, stands for Alexander island and outposts adrift on ice islands ._._._. Now our QTH catalog, but be mindful that each datum is necessarily neither "official," complete nor accurate. How about

CEØXE (not via XE2NZ)
CT2AA, W. Wood, 305 Estrada do Aeroporto, Praia, Terceira, Azores; or Box 215, 1936th Comm. Sqdn., APO, New York, N. Y., 09406
DL4LL, Lt. W. Lloyd (KØVMIZ), S&MA Admn., APO, New York, N. Y., 09052
EA6BK, Casilla 818, Palma de Mallorca, Balearic Islands
EL2AL, Box 1025, Monrovia, Liberia
EL8J, Box 1477, Monrovia, Liberia
FG7TG, G. Procida, 42 Cite des Sources, Capesterre, Guadeloupe
FL8HM, Hassan Kadiry, Box 215, Djibouti, French Territory of Afars-Issas, E. Africa
G3SVK/a, F. Curtis, GRSF, RAF Cottesmore, Oakham, Rutland, England
G3WKN/VP2K (via VE3ODX)
HG1PC, Peace Corps, c/o U.S. Embassy, Quito, Ecuador
HC5s EJ KA (via VE1ASJ)
HKØBMO, P.O. Box 18, San Andres, Colombia
HRs 1KAS 2GK (via VE1ASJ)
K3HVG/mm, D. Platt, 7411 Glenside Dr., Takoma Pk., Md., 20012
K8IVC/VO2, F. Schelter, Box 232, Goose Bay, Laborador
KA2PX, Maj. D. James (WA4PXX), USAF Air Sect., MAAG, APO, San Francisco, Calif., 96390
KM6DE, Box 43, FPO, San Francisco, Calif., 96614
LJ2X, J. Roth, Box 51, Overbygd, Norway
OA5AY, Box 199, Lima, Peru
OK3ER, Box C-53, Bratislava, Czechoslovakia
PY2EGA, Box 30048, Sao Paulo, Brazil
PZ1CE, K. de Miranda, P.O. Box 830, Paramaribo, Surinam
TA1s IB NC VY, c/o TRAC, Box 699, Karakoy, Istanbul, Turkey
TJ1AL, G. Monin, B.P. 1037, Douala, Cameroon
TJ1AP, C. Marques, B.P. 5370, Douala, Cameroon
UB5KMX, Box 56, Kiev, Ukrainian S.S.R., U.S.S.R.
VK0AL (North Americans via VE6APO, others via VK4XY)
VP2s DAJ SG (via WB4EFE; see text)
VPs 7NF 7NS 8JT (via VE1ASJ; see text)
ex-VS5JC (via W5VA; see text)
XE1DP, P.O. Box 266, Cuernavaca, Mexico
XE0RZW, D. Packard, USAID/Mexico, Dept. of State, Washington, D.C., 20521
XP1AA, CMR 1279, APO, New York, N. Y., 09023
XW8BP, Statistics Dept., Box 46, Vientiane, Laos
XW8BX, c/o U.S. Embassy, APO, San Francisco, Calif., 96352
YU3TXT (W/K/VE/VOs via WB6UJO)
ZB2BM, RAF Stn., North Front, Gibraltar
ZF1QW, P.O. Box 72, Grand Cayman, W. I.
4X4s SK SO (via W4TKN; see text)
4X4VB (via WA4WTG; see text)
5Z4SS (via K9KLR; see text)
6W8AR, Box 8124, Dakar, Senegal
9G1GG, A. Murray-Stone, % Seamen's Mission, Takoradi, Ghana
9G1GJ, H. Schebkel, P.O. Box 625, Tema, Ghana
9G1HM, J. Horsky, Box 2165, Accra, Ghana (or to OK3HM via CAV)
9J2NW, Box 1588, Ndola, Zambia
9M2DQ, J. Pershouse, Selama Estate Gp., Serdang, South Kedah, Malaysia
9K2BV, % American Independent Oil Co., P.O. Box 69, Kuwait
9U5GR, Box 1323, Bujumbura, Burundi
9U5HI, B.P. 307, Bujumbura, Burundi
9U5SK, K. Schillebeecks, B.P. 1358, Bujumbura, Burundi

CE9AT (via CE3ZN)
CX8DV (via WA5QKE)
DM9AJM (to DL9LJ)
FY7YN (via VE1KG)
G3BID/6W8 (via W2CTN)
ex-HZ2AMS (to 9G1GG)
I7RUI (via I1ZIZ)
IS8CLC (to I1CLC)
KC4USP (see text)
KX6BQ (see text)
MP4MBC (via G3HSR)
OA6BU (to W9IBT)
PA0GHI (to WB2GHI)
PJ5CL (to KØIDV)
PJ5MJ (to W2BBK)
TI9AM (see text)
VK1EC (via VK2AWW)
VK9XO (via VK6RU)
VK0DK (via WIA)
VK0IA (via VK3UQ)
VP2GRN (via W9YSM)
VP5CB (to K3NAU)
VP7BG (via W2GHK)
VP7NO (via K9GZK)
VP9GD (via RSB)
VQ9JW/a/c (via W2GHK)
W6TNS/TA (to W6TNS)
WA5JDR/VE3 (to W5PSB)
XE1FFC (via LMRE)
XE1PLJ/4 (to XE1J)
XT2FA (via REF)
YK1AM (to YK1AA)
ZD9BJ (via GB2SM)
ZF1CP (to W4YKH)
3A2CL (via 3A2CW)
5V4AB (to DJ2VZ)
5W1AT (via W4ZXI)
8N1WP (via WIA)
8P6AM (via VE1ASJ)
9Y4DS (via K9KLR)
9Y4IDV (to KØIDV)



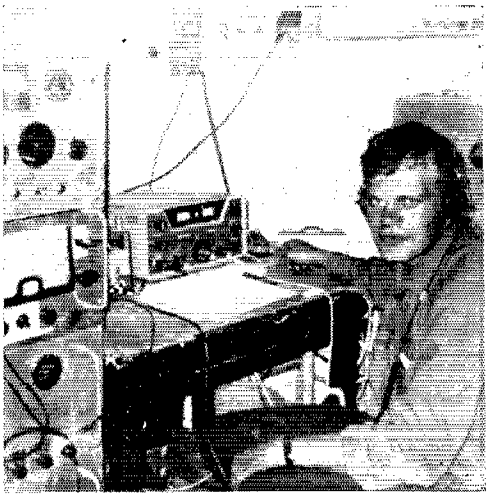
GW3DZJ enjoys being "first Wales" for single-sideband DX hunters world wide. Frank concentrates on 15 and 20 meters. (Photo via W3HNK)

These suggestions come through the good offices of **Ws** 1APU 1DAL 1MBX 1SWX 2VOZ 3WXW 8HXR 8IBX 9LNQ, **Ks** 2BMI 6EC, **WAs** 1CJE 1FHU 1HEC 8MCQ, **WBs** 2UVD 4EFE, WN1ION, **KP4**DBJ, Columbus Amateur Radio Association *CARAscope* (W8ZCQ), DARC's *DX-MB* (DL3RK), *DX News-Sheet* (G. Watts, 62 Belmore Rd., Norwich, Nor.72.T, England), Far East Auxiliary Radio League (AI) *News* (KA2LL), Florida DX Club *DX Report* (W4BRB), International Short Wave League *Monitor* (A. Miller, 62 Wardward Ln., Selly Oak, Birmingham 20, England), Japan DX Radio Club *Bulletin* (JA1DM), Long Island DX Association *DX Bulletin* (W2GKZ), Newark News Radio Club *Bulletin* (L. Waite, 39 Hannum St., Ballston Spa, N. Y. 12020), North Eastern DX Association *DX Bulletin* (K1IMP), Northern California DX Club *DXer* (Box 608, Menlo Park, Calif., 94025; attn. K6CQF), Canadian (formerly Ontario) DX Association *Long Skip* (VE3DLC), Southern California DX Club *Bulletin* (WA6GLD), Utah DX Association *Bulletin* (W7LEB) and VERON'S *DXpress* (PA0s FX LOU TO YDV WWP). Those calls and/or data in parentheses are included for your convenience in directing inquiries about the organizations concerned. Come again!

Whence:

EUROPE — K5VTA and W6TMP ran one-two as the only U.S. entrants in the 1967 EDR (Denmark) OZ-CCA DX Contest, 3C2IL the sole Canadian filing. Not much of a showing against 143 Russian logs! Single-op highs per country include CT1OI, CR7IZ, DL1GN, DM3YPA, G2DC, GD3AIM, GW3MTL, HA1VE, HI8XAL, JA2ITH, LA2Q, OE3AX, OH8RC, OK3CCC, OA4CF, PAØVB, SM5DSF, SP9AAB, UAs 1CE 2DM 9WS ØIL, UB5TR, UC2AD, UD6BW, UF6LA, UG6JJ, UH8BO, UI8CD, UJ8AC, UL7GW, UM8AX, UO5AA, UP2AN, UQ2MU, YO8DD and YU1NOH. Oh, well, we didn't do too well at Grenoble, either. This year's OZ-CCA affair, No. 17 in the series, comes off 1200 GMT the 11th of this month to 2400 the 12th, a c.w.-only ball on 10 through 80 meters. DXers throughout the world are invited to trade RST001, RST002, etc., serials at three points per QSO (six points per OX-OY-OZ contact). Final score equals QSO points multiplied by the number of countries accumulated during the fracas (each W/K VE PY LU VK and ZL call area counts as a separate multiplier). Log entries, together with the signed statement "I certify on my honor that I have observed all rules and regulations established for amateur radio in my country and for the present contest and that I will agree with the decisions taken by the EDR Contest Committee" should be shipped to said committee at P.O. Box 335, 9100 Aalborg, Denmark, postmarked no later than June 15, 1968, to be eligible for certifications of performance. An IRC with your entry will bring you a subsequent results summary from EDR. And don't forget the U.S.S.R. DX Test on this month's first week end, specs in April *QST* . . . . . DL4LL (KØVMZ) plans probable LX and PX action this summer. Neighboring club station DL4RM received enthusiastic commendation in the *Gateway*, peppery press outlet for Rhein-Main Air Base . . . . . Those Hertzes and kiloHertzes moved in, and now K3CUI hears that Gs are abandoning GMT. What next? . . . . . GCs 3KAV 3LMR 3ONJ 3UMX and 3WOW help GC8HT spread Guernsey s.s.b. cheer, mostly on 20 . . . . . Continental comment via the clubs press: OZ2CL occasionally tries his sideband DX luck as 3A2CL. . . . EA6s BG BJ and BK push straight a.m. on 15 meters at 1200-2000 GMT. . . . CT2AA, whose opr. Bill mentions a two-year tour, breaks the Azores s.s.b. drouth on 3790, 14,160 and 21,305 kc. at 0030 GMT or so. . . . PA0AA, VERON's W1AW, suffered fire damage in March. PA6AA makes its annual DX appearance at a society camp-out near the end of this month.

ASIA — 9M2DQ (G3KPY) expects to include 80- and 160-meter DXperiments in renewed activity. "My new QTH looks excellent. It has a good supply of electricity. At my previous location a line surge to 265 volts burned out my power supply. Hope to have my towers and beams back up by May." Neighbor 9M2s XX (G3DPS) and NF cook up more VS5RCS plans, phone and code on 10 through 80 . . . . . UA9DT tells W4RBZ that Wyoming would clinch his WAS after an eight-year search. Vadim tunes upward from his 14,190-kc. spot at 0300-0330 GMT daily, 0300-0500 on week ends . . . . . W5QGZ sadly relates the passing of 4X4UJ/W5, ex-SP5ALG, killed in a Fort Hood training mishap. Jim also reports ex-DL5s HH (WA4RMX) and NC (K8SXO) en route Vietnam . . . . . W2POK, s.w.Ling in Turkey, hears fat 2-Mc. c.w. signals from Ws 1AXA 1ECH 1ETV 1JAC 2BZT 2HAQ 2PVG 2SUC 3KDF 3PZF 3VND 4BYV 4KXV 8SH ØBLK ØLOD, K1DIR, WA2BEX, WB2s CRX and MZJ . . . . . FEARL's annual DX field day, wherein DXers world wide are urged to collect KAs on voice and code, is scheduled for the July 3rd–5th week end on 3.5 through 50 Mc. More details next month. Current Far East Auxiliary Radio League officers include KA2s VT pres., SF v.p., DJ secy., JC treas., ES gen. mgr., HC QSL mgr., DL awards, and LL *News* ed. New or renewed FEARL memberships are held



4X4RD gets out well from Givataim, sometimes sharing equipment with 4X4UH. Avram also operates from other middle east spots from time to time. (Photo via W3HNK)

by KA2s DJ (WB6AFZ), EP (K2QGC), HC (W2AUK), RP (W3CFD) and SP (WA9THF) . . . . . W6TNS found a mike available but no key while on business in Turkey in February. "Quite a stir on 20 as W6TNS/TA!" . . . . . YA5RG hunts Europeans on 40 and 75 when not pursued by the W/K posse on higher bands . . . . . XZ2s DW, 14,005-kc. c.w., and KO on 14,120-kc. sideband, bring Burma back into DX dispatches . . . . . Ryukyus national KR8EA is popular on 21,375-kc. s.s.b., 1000 GMT.

OCEANIA — PK8YZZ writes s.w.l. James W. Young about Indonesia's burgeoning hamdom. "We're running about six months now with several types of transmitters, most of them self-built a.m. with second-hand components. Very few are yet qualified to work 14 Mc. and higher. Our Novices use 3.5 Mc. locally." At time of writing QSOs with this new PK-8F gang still are under ITU/FCC prohibition but keep an ear on W1AW . . . . . For long-time DX QSO/QSL reliability K6EC terms DU7SV the "KV4AA of Oceania" . . . . . VE6APO advises, "VKØAL (VK3UL) will operate from Amery ice shelf for roughly a year with a 350 and external v.f.o. mainly on 20, also on 15 and 10 meters, fixed and mobile." . . . . . This year's VK/ZL/Oceania DX Contest is slated for (phone) October 5th–6th and (c.w.) October 12th–13th. We'll schedule pertinent participation particulars for September's "How's . . . . . FO8BU enjoys French leave as F5IG . . . . . Rarish VK8s HA and NO frolic on 20 c.w. between 0500 and 1130 GMT.

SOUTH AMERICA — W4IG and WB2UVD relay PY4BLR'S warning that PYØBLR will represent Trindade isle for about thirty days beginning early this month, mostly c.w. on 7005, 14,045 and 21,045 kc., also sideband on 14,195 and 21,295 . . . . . OA6BU (W9IBT) likes contest DX citement, according to WA9WNJ, and neighbor OA8V expects to be in Peru another eight or ten years . . . . . W8IBX wonders if anyone clocked LU8DQ's code speed in this year's ARRL DX donnybrook. South America's answer to KH6IJ? . . . . . YL HK5BFJ's OM operates her Cali station frequently and, though a foreigner, is president of the local ham club. "I was active in my native country as an OD5 some years ago."

HEREABOUTS — ZF1CP will be the tag for Grand Cayman sports by Ws 3CER and 4YKH early this month . . . . . K1FKW, recovering from Vietnam battle wounds in a Connecticut hospital, studies 15-meter DX with an SB-101, SB-640 and 3-element spinner. "Want to join a c.w. net and handle traffic for the guys in XV5." . . . . . WN1ISH, with a logful of G3s, DJ/DLs and SMs, exhorts rarer DX types to try the 21-Mc. Novice range . . . . . WA1FHU says he had to go see K3JH's famed big stick to believe it . . . . . W6EAY finally tried a quad after running the gamut of long-wires, Lazy Hs, sterbas, etc. "Works fine but I still long for the old rhombic." . . . . . Took W1MBX only a few months to hit No. 100 as KP4DBJ . . . . . Coast Guardsman VP5CB (K3NAU) tells W3WXW he plans DXtensive South Caicos activity with his 350 and quad, especially around 28,500-28,550 kc. . . . . A quad and 75 watts brought WB4EFE 132 countries within 18 months on 21 Mc. . . . . WB6UBC joins the giant-killers by working

(*Continued on page 148*)

Operating News

GEORGE HART, W1NJM, Communications Manager
ELLEN WHITE, W1YYM, Deputy Comms. Mgr.
Administration: LILLIAN M. SALTER, W1ZJE — *DXCC:* ROBERT L. WHITE, W1CW
Contests: ROBERT HILL, W1ARR — *Training Aids:* GERALD PINARD
Public Service: WILLIAM A. OWEN, W1EEN

SS Exchanges. One of the things contest men like to kick around is what should and should not be part of the exchange in the November Sweepstakes Contest. There are almost as many opinions as there are contesters — or anyway, that's the way it seems. Thus, if there are 100 ways of doing it, any way adopted is bound to be at least 99% wrong.

Actually, it's not so bad as all that, because there is such a thing as a compromise. With a little concerted effort, something can be worked out so that a majority will be at least satisfied, if not completely happy.

The arguments about SS exchanges have been endless, ever since the debut of this annual fracas, which started out in 1930 as a two-week marathon, 24 hours a day, and was subsequently trimmed to its present scope. The exchange was a *complete message*, not just a preamble. Those were *men*, back in those days.

From this, we came down to a quick one-weekend operating period and a partial message exchange, some parts of which were known in advance so that many contest stations didn't even bother sending them. A little introspection then revealed that of the six parts of the exchange, two of them were definitely known to the receiving operator before they are sent, and two others could be arrived at through a fairly good guess; so two were eliminated by substituting year of first license in place of the check and date of birth in place of the date. Two others, the station of origin and the time, are still pretty obvious before the exchange is sent.

We once mentioned that a psychologist would have a ball if he ever started analyzing the motivations of amateur operators for the things we do. We still think so. But from an administrative viewpoint, contests are supposed to be more than just games of fun. Each contest should have an underlying educational or institutional motivation quite aside from the obvious one of personal enjoyment for its own sake. For the DX Contest, promotion of international good will is thought by many to be an underlying factor. For the Field Day, it's emergency preparedness. For the Sweepstakes, we try to get in some educational swipes in the mechanics of message handling. The way it works out, those pushing the educational concept of contests want meaningful exchanges that are not obvious in advance, while those in it strictly for the fun of it want the easiest possible exchanges or no exchange at all except the most perfunctory. The former usually outnumber the latter, although the latter are usually the highest scorers who spend the most time on the air and are more enthusiastically outspoken.

At a recent CD staff conference (we have 'em

OPERATING EVENTS (Dates in GMT)
ARRL-IARU-SCM-Affiliated Club-Operating Events

May	June	July
2 **Qualifying Run, W6OWP** 5 **LO Time** (League Officials only) 4-5 Russian Contest (p. 100, April *QST*). Nebraska QSO Party (p. 134, April *QST*). 11 **FMT** (ARRL Official Observers, only). 11-12 OZCCA (p. 100, this issue). 11-13 Georgia QSO Party (p. 154, April *QST*). 15 **Qualifying Run, W1AW** 18 Armed Forces Day (p. 61, this issue). 25-27 Missouri QSO Party (p. 116, this issue).	2 **LO Time** (League Officials only) 8-9 **VHF QSO Party** (p.57, this issue). 8-10 New York State QSO Party (p.108, this issue). 13 **Qualifying Run, W1AW** 14 **Qualifying Run, W6OWP** 18-20 Rhode Island QSO Party (p. 120, this issue) 22-23 **Field Day** (p. 58, this issue).	7 **LO Time** (League Officials only) 11 **Qualifying Run, W6OWP** 12 **Qualifying Run, W1AW** 13-15 **CD Party** (c.w.)* 20-22 **CD Party** (phone)* * League Officials and Communications Dept. Appointees only. Sept. 7-8 **VHF QSO Party** 14 **FMT** Oct. 12-14 **CD Party** (phone) 19-21 **CD Party** (c.w.) Nov. 9-11 **SS** (phone) 16-18 **SS** (c.w.)

CERTIFIED CODE SPEED
Courtesy W6OWP

For 20-plus years **W6OWP** has been transmitting ARRL Qualifying Runs, a perfect example of service from the membership! For C-P, the 80-meter signal is from a revamped surplus Navy transmitter TBW-4, running 300 watts input. The 40-meter transmitter is a B&W 5100B. Both rigs have been in use since 1960 and dipoles are used for each of the bands. The tape equipment consists of a Wheatstone perforator and Boehme sending unit. Bart is well qualified in this c.w. business—note that C.W.A. 50-w.p.m. certification adorning the wall. This is undeniably a code-oriented family, his young son's initials being C.W. The cat? His name is Webster.

once a month), voluminous membership comment on Sweepstakes exchanges was discussed. In the matter of the power multiplier, it was noted that the great majority both of those returning poll survey sheets and those making detailed comment preferred to keep a power multiplier. Quite a few of the commentators, however, felt that some changes should be made. As usually there was little spontaneous unanimity of opinion on just what changes should be made, but one thing kept cropping up — that the phone multiplier needs to be adjusted to equal the c.w. multiplier. The reasoning behind this was that with s.s.b. coming into widespread use, there is less reason to give phone a multiplier "bulge" over c.w. than in the old days when nearly all phone was a.m. How does that one grab you, gang?

Let's call the above Idea No. 1. Here are a couple of additional ideas that might be worth considering:

2) For those who commented that the month and date of birth aren't meaningful or interesting except to some who use the dates to originate meaningless "happy birthday" messages, how would you feel about indicating your pride in your organization by sending the month and day of your membership expiration? Life members could simply send LM and Charter Life Members could send CLM (or LM also, if the addition of the C makes it too long). We wouldn't dream of excluding non-members from the contest, but they'd have to identify themselves as such. Several ideas were suggested, from just NM (which seems so short that some members might drop their membership just so they could use it!) to making them spell out NONMEMBER or something equally as long.

3) The principal argument by proponents of abolishing power multipliers was that such multipliers merely "encourage cheating." Obviously, most of those polled did not go along with this, which may mean that we all haven't gone high power yet. On the other hand, it may be a feeling of confidence that the cheaters are a small minority. In any case, wouldn't the cheating be reduced if each station was required to indicate the power level it was using? As it is now, if a contestant is cheating on his power level, he has to indicate it only once — when he sends his log into headquarters. If he has to indicate his power classification with every exchange, he'll be cheating every time he sends A when he's running over 150 watts. This takes a lot of unconscience. Anyway, the suggestion is that instead of the precedence designation R in every

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for February Traffic:

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
K6BPI	5257	1866	1688	167	8978
W3CUL	237	3172	3001	119	6529
WA4SCK	21	976	955	11	1963
WA2UWA	15	900	880	5	1800
W8UPH	13	809	726	79	1627
KØONK	31	798	763	34	1626
W5OBD	39	782	782	0	1603
WA4IJH	14	753	745	8	1520
K5TEY	12	746	650	1	1409
K3MYS	19	677	637	6	1339
W7BA	3	668	605	61	1337
W6GYH	91	577	555	12	1235
W6RSY	20	608	459	120	1207
WB6GGL	4	592	578	14	1188
W3VR	94	491	464	23	1072
K9IVG	3	524	484	7	1018
WA9MHU	94	460	297	148	999
W3EML	26	474	347	3	850
W7DZX	16	426	351	5	798
WA1EEJ	37	394	329	19	779
WB6BBO	22	387	347	1	757
WA7DXI	19	365	326	25	735
W1PEX	29	368	309	15	721
W3FGQ	30	360	250	80	720
WØLGG	12	368	330	5	715
WB4AIW	8	343	334	9	694
W9MM	0	340	320	20	680
K3NSN	91	278	270	8	647
KØZSQ	1	323	1	322	647
WB2RKK	33	295	272	9	609
WØLCX	14	326	238	19	597
W7ZIW	31	267	256	6	560
W2FR	27	279	233	13	552
W9ZWL	0	311	0	234	545
WA1FYY	31	252	210	34	527
W6MLF	143	193	177	7	520
K5BNH	21	263	148	74	506
W7HMA	19	244	236	6	505
WA2VYS	13	261	220	8	502
Late Reports:					
W6VNQ (Dec.)	26	430	390	3	849
* W6LRU (Dec.)	20	407	344	63	834
K4HJX (Jan.)	371	198	143	15	727

More-Than-One-Operator-Stations

W9ODD	508	42	22	14	586

BPL for 100 or more *originations-plus deliveries*

WA8AUZ 234	KH6GHZ 118	WB4DMW 103	
KIWIM/1 169	WB2DDQ 117	WN4HPS 103	
W8IV 163	WB4DIN 117	W8NAL 102	
WA3CQO 152	WA7EDC 116	Late Reports:	
WA9SYD 134	WA8VOG 115	WB6TYZ (Dec.)	117
W3TN 133	WA6BYZ 107	W6MLF (Sept.)	114
WB2NSV 120	WA1FVH 106	W6MLF (Aug.)	109
WB6SQZ 119	WA3AOJ 106		

More-Than-One-Operator-Stations

WA1HWX 109

BPL Medallions (See Aug., 1954, p. 64) have been awarded to the following amateurs since last month's listing: W3EEB, K3NSN, K3VBA, WA4VEK, WA5KZA, K7NHL, W7PI, W8IWF, WA9MHU, WAØMLE, KØYBD.

* Correction from W6IRU, Mar. *QST* BPL.

The BPL is open to all amateurs in the United States, Canada and U.S. Possessions who report to their SCM a message total of 500 or a sum origination and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

exchange, we send our power classification, additionally making it necessary to *copy* on this part of the exchange as well as on all the others.

Just a few flags up the pole. Fire away!

DXCC Notes

In response to information received from the field concerning QSL cards sent out by VP2ME, plus visual indications on such cards submitted for DXCC, inquiries concerning the method used for verifying information on these cards have revealed that no QSO was necessary to receive confirmation. In view of this, we are unable to grant DXCC credit for any VP2ME cards.

Field Day Rules. Elsewhere in this issue are the complete Field Day Rules. If you haven't done so, we suggest you *read them carefully.* There are many changes, nearly all in conformity with comments received, the poll survey, and/or deliberations of the Contest and Awards Committee in consultation with the communications manager. All the major changes made are in accordance with the poll survey. One major change suggested by the poll survey that was *not* made was the establishment of a geographical multiplier. This had to be held over for further consideration at a later date because of the practical difficulties of administration. When you consider we already have three different FD

DX CENTURY CLUB AWARDS

From February 1 thru February 29, 1968, DXCC Certificate based on contacts with 100-or-more countries have been issued by the ARRL Communications Department to the amateurs listed below.

New Members

W8DCH....209
VO1IB....204
WA4MUB...204
WA2KQZ...191
5Z4KL....162
WB6AZP...153
OZ7ON....147
CE1EK....135
OE1BFW...131
DJ3LR....129
DJ4UF....123
VE4SA....122
VE3DLC...121
OZ6MI....119
VE3CKW...119
W5ODJ....119
VE3ADX...115
W7SLU....114
DL8KO....111
W6EOU....111
FK8BK....110
SP6ARE...110
WA8TEJ...110
W9ELG....110
YU3NY....108
DL1PC....107
W1DXB....107
W7RGL....107
HA1DC....106
K3CRC....106
W6YLL....106
F2JV.....105
UA9LH....105
W2QXE....105
W3DPJ....105
WA4UQQ...104
WB2LCZ...103
OK1ZQ....102
WA4SPC...102
W9IDL....102
CP2CR....101
VO1HP....101
WB4EWU...101
WA5PSJ...101
WA9NSR...101
K1SUB....100
K4PSD....100
K9MFD....100
OK2BBI...100
VU2DIA...100
WA2RQH...100
W3IRE....100
W3TLQ....100
WA4VTB...100
WA5AVL...100
W6MPZ....100

Radiotelephone

VO1IB....192
WA2KQZ...188
W5TBH....144
JA6JH....142
DJ3LF....139
W6VVR....132
FO8BS....130
K6PIH....129
VV3KX....129
OE1BFW...126
5Z4KN....126
G13WFA...124
5Z4KL....118
DL9XN....115
W5ECT....113
DJ9JX....111
FG7XR....110
VE3ADX...110
CR6HF....109
FK8BK....108
HI8XDA...107
WA2JYA...107
W4FUM....107
WA0OAH...107
W8WRP....105
W9QEE....104
VE4JK....103
W4GRG....103
K4AJR....102
WA9NFL...102
WB2LCZ...101
VE6AHV...100
W1PRT....100
WA1HHN...100
WA1EDR...100
WB2AIOI...100
W3KCS....100
WA8DEX...100
YS2CEN...100

Endorsements

Endorsements issued for confirmations submitted from February 1 thru February 29, 1968 are listed below. Endorsement listings through the 300 level are given in increments of 20, above the 300 level they are given in increments of 10. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

340
W1HX
W4GXB

330
W2HO
W6CHV

320
G6TA
W3AFM

310
W2GKZ
W4RBZ

300
K6OHJ
SMØKV
WA2HUV
WB2EPG
W6VUW
W7ACD

280
K6BFZ
K9BVR
VE1AFY

260
HK3RQ
K2DJD
W1VAN

W4RVW

240
K1ZSI
W4GTS
W9BGX

220
K2KNV
K9YOE
W1EZD
W2MZV
WA4QBX

200
DJ4OQ
DL1ES

K2QOU
K7VYU
K8VSL
KØGSV
VE5KG
W1GTO
WB2YQH
W4GRG
W6TZN
W7FKK
W7NNF
W7QY
W8GGE

180
K1OBT
K8UDJ

KØBHT
VE3FKL
WA1DJG
W2CNQ
W2RIR
WA2CFG
W3KJ
W3HTW
WA5JSY
W6CDJ
W8BRL
W9NVJ
W9ZWH

160
K9WEH
OK1HA

SM5RC
SM7BWZ
VE2BGJ
W1AIO
W1CNU
W4CRW
WA5AUZ
W8GGQ

140
G3OIZ
K3AIG
K3ZVM
K9DWG
K9VYT
SL6BU
VE6AKV

WB2QKG
WB2RJJ
W3LMZ
WA4EPL
W5MOQ
W8ZVU
WA5BFB
W6TMP
W6QFU
WA6HKG
WB6OLR
W9MFW
ZD3G

120
K2UFT

KØJHE
OK3JV
SM5FC
UB5FL
VE6AKV
W3LXN
WA5BFB
WA5OUW
WB6PGK
W9AEM
W9HDR
W9MJJ/1
WA9MMT
WA9OVU

Radiotelephone

330
ZL1HY

320
G6TA

300
K6VVA
W2GQN
W4FPS

W6VUW

280
PAØSNG
PY2PC
W2GKZ
YV5BBU

260
K6OHJ

220
SM5LM
W4LLV

200
W1FXD
WA1CJR
WA4MUB
W6ISQ
W8FPM

WØMGI
9G1DY

180
11GZ
K2QOU
K8VCB
VE3FKL

VP7NH
W1HOO
W2CNQ
WB2PWU
W3KJ
W4HOS
W6TZN
W9ZWH
WØYDB

160
K1QMV
K2GPL
K4RQZ
VE3EG
VE5KG
WB6UJO
W8BRC
W9BGX

ZF1GC

140
K2DJD
W2RIR
W4ZNI
WA6RTA
W9DOR
W9YMZ

120
F2VX
SVØWL
WB2QKG
W5NOO
W6UQU
W6ZC
WA6HKG
WAØHMP

multipliers (power, independence of mains and battery), adding a fourth one can introduce so many complications that no one would be able to calculate his score without a computer or a degree in engineering, or both. We tried a few weird examples — hypothetical setups for a group which had transmitters in all four categories, varying in power on all bands, some operating off the generator and some off commercial power, some off batteries, etc. The possibilities became so outlandish even without a geographical multiplier that we (the committee) had to throw up our hands. Maybe next year we'll have another go at it.

One other proposed rule which got the axe in committee was to prohibit use of electronic or mechanical time-sharing devices or other methods of conducting simultaneous contacts on two or more bands without counting them separately in the transmitter classification.

Have fun on FD next month. When you send in your log, attach your comments. We'll put 'em on file and consider them before next FD rolls around, maybe have another poll survey on those which seem on the borderline judging by comments. — *W1NJM.*

CODE PROFICIENCY PROGRAM

Twice each month special transmissions are made to enable you to qualify for the ARRL Code Proficiency Certificate. The next qualifying run from W1AW will be made May 15 at 0130 GMT. Identical texts will be sent simultaneously by transmitters on c.w. listed frequencies. The next qualifying run from W6OWP only will be transmitted May 2 at 0100 Greenwich Mean Time on 3590 and 7129 kc.

CAUTION! Note that since the dates are given per Greenwich Mean Time, Code Proficiency Qualifying Runs in the United States and Canada actually fall on the evening previous to the date given. *Example:* In converting, 0130 GMT May 15 becomes 2130 EDST May 14. Each month the ARRL Activities Calendar notes the qualifying run dates for W1AW and W6OWP for the coming 3-month period.

Any person can apply. Neither ARRL 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 through 35 w.p.m., you will receive a certificate. If your initial qualifications is for a speed below 35 w.p.m. you may try later for endorsement stickers.

Code practice is sent daily by W1AW at 2330 and 0130 GMT, simultaneously on all listed c.w. frequencies. At 0130 GMT Tuesday, Thursday and Saturday, speeds are 15 20 25 30 and 35 w.p.m.; on Monday, Wednesday, Friday and Sundays, speeds are 5 7½ 10 13 20 and 25 w.p.m. For practice purposes, the order of words in each line may be reversed during the 5 through 13 w.p.m. tests. At 2330 GMT daily, speeds are 10 13 and 15 w.p.m. The 0130-0220 GMT runs are omitted four times each year, on designated nights when Frequency Measuring Tests are made in this period. To permit improving your fist by sending *in step with W1AW* (but not on the air!) and to allow checking strict accuracy of your copy on certain tapes note the GMT dates and texts to be sent in the 0130-0220 GMT practice on those dates:

Date	Subject of Practice Text	March QST,
May 17:	*It seems to Us*,	p. 9
May 22:	*League Lines*,	p. 10
May 28:	*A Look at Integrated Circuits*,*	p. 11
June 6:	*Interpreting 50-Mc. M.U.F. Tendencies*,*	p. 19
Date	Subject of Practice Text from	*Understanding Amateur Radio*, First Edition
June 7:	*A Practical Circuit*,	p. 85
June 10:	*Adjusting for 100 Per Cent Modulation*,	p. 86

* Speeds will be sent in reverse order, with highest speed first. QST

W1AW SCHEDULE, MAY 1968

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 1 P.M.–1 A.M. EDST, Saturday 7 P.M.–2:30 A.M. EDST and Sunday 3 P.M.–10:30 P.M. EDST. The station address is 225 Main Street, Newington, Conn., about 7 miles south of Hartford. A map showing local street detail will be sent upon request. If you wish to operate you must have your *original* operator's license with you. The station will be closed Memorial Day, May 30.

GMT*	*Sunday*	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*	*Saturday*
0000	.....	CW-OBS[1]	CW-OBS[1]	CW-OBS[1]	CW-OBS[1]	CW-OBS[1]	CW-OBS[1]
0020–0100[4]	.....	.....	3.555[6]	14.1	14.1	7.08[6]	14.1
0100	.....	Phone-OBS[2]	Phone-OBS[2]	Phone-OBS[2]	Phone-OBS[2]	Phone-OBS[3]	Phone-OBS[2]
0105–0130[4]	.....	145.6	3.945	145.6	50.7	1.82	21.41
0130	**Code Practice Daily[1] 15–35 w.p.m. TThSat., 5–25 w.p.m. MWFSun.**						
0230–0300[4]	.....	.....	3.555	7.08	1.805	7.08	3.555
0300	RTTY-OBS[3]	.....	RTTY-OBS[3]	RTTY-OBS[3]	RTTY-OBS[3]	RTTY-OBS[3]	RTTY-OBS[3]
0310–0330[4]	.....	.....	3.625	14.095	3.625	14.095	3.625
0330	Phone-OBS[2]	.....	Phone-OBS[2]	Phone-OBS[2]	Phone-OBS[2]	Phone-OBS[2]	Phone OBS[2]
0335–0400[4]	.....	.....	7.255	3.945	7.255	3.945	7.255
0400	CW-OBS[1]	.....	CW-OBS[1]	CW-OBS[1]	CW-OBS[1]	CW-OBS[1]	CW-OBS[1]
0420–0500[4]	.....	.....	3.555[6]	7.08	3.945	7.08[6]	3.555
1700–1800	.....	21/28[5]	21/28[5]	21/28[5]	21/28[5]	21/28[5]	.....
1900–2000	.....	14.28	7.255	14.28	7.255	14.28	.....
2000–2100	.....	14.1	14.28	14.095	21/28[5]	7.08	.....
2200–2300	.....	21/28[5]	21.075[6]	RTTY-OBS[3,7]	7 255	14.28	.....
2330	**Code Practice Daily 10, 13 and 15 w.p.m.**						

[1] CW.OBS (bulletins, 18 w.p.m.) and code practice on 1.805, 3.555, 7.08, 14.1, 21.075, 50.7 and 145.6 Mc.
[2] Phone OBS (bulletins) on 1.82, 3.945, 7.255, 14.28, 21.41, 50.7 and 145.6 Mc.
[3] RTTY OBS (bulletins) on 3.625, 7.045, 14.095 and 21.095 Mc. 170/850 cycle shift optional in RTTY general operation.
[4] Starting time approximate. Operating period follows conclusion of bulletin or code practice.
[5] Operation will be on one of the following frequencies: 21.075, 21.1, 21.41, 28.08 or 28.7 Mc.
[6] W1AW will listen in the novice segments for Novices on band indicated before looking for other contacts.
[7] Bulletin sent with 170-cycle shift, repeated with 850-cycle shift.
Maintenance Staff: W1QIS W1WPR. * All times/days in GMT, general operating frequencies are approximate.

Aeronautical ATV at The Pasadena Rose Parade

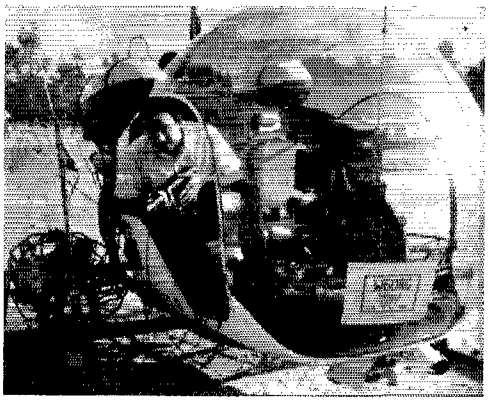
BY TOM O'HARA,* W6ORG

THE Southern California ATV Club was contacted two weeks before New Years and asked if it could provide video from a LA-County helicopter to the Pasadena Police Department's parade command post to monitor traffic flow. Dow Radio of Pasadena was asked about the possibilities of mounting a camera in a helicopter when they were demonstrating some Concord cameras and video tape equipment to the police dept. One of the members of the ATV club, Glenn WB6VQD, heard about the discussion when he was in the ham department of the store and started the ball rolling for an ATV r.f. link instead of video tape. As president of the club, I was called and, in turn, called some of the members to line up gear.

The big problem was that the copter only had 28 v.d.c. power available and everything we had was 110 v.a.c. Dow came through and let us use a Concord 12 v.d.c. 300-watt 60-Hz. power converter, transistor camera with 4:1 zoom lens, and a monitor. We then hooked everything up, including my converted 10-watt RCA CMU-10 TV transmitter and a dropping resistor to go from 28 to 12 volts.

All this equipment was taped, wired, and tied down on a small two-man Bell helicopter. The transmitter and power supply were placed outside in a basket normally used for injured persons. The antenna was a 3 half-wave collinear made out of aluminum clothesline wire taped to a broom stick. As I said, we only had a few weeks so it was a mass of haywire; but it worked.

The receiving end used a u.h.f. converter and TV set belonging to Dave, W6QDP. Just in case, we had a padded down Blonder-Tongue Ultraverter as standby. This set-up was placed



along with the various police communications sets used by Capt. Cockel and Lt. Wilson of the Pasadena P.D. to direct Officers during the Pasadena Rose Parade and Bowl game. We flew from 8 A.M. to 2 P.M. televising the various traffic jams and freeway conditions so that the captain could get-on-the-spot visual information. The police department expressed quite an interest in this method of traffic control for special events. Other ATVers that received the pix on that day were WA6MKI, WB6VQD, K6MWN, WA6EPX, W6TFS, W6QUI, WA6BJV, and WA6KAA, all in a radius of about 30 miles.

Next time we will be prepared with solid-state portable equipment. The Southern California ATV club has about 40 members and is growing. We have applied for a club call, W6ATV. We meet once a month and are on the air Sunday nights at 9 P.M. on 144.45 and 146.7 MHz. Look for us Field Day on 6, 2, 220 phone and 435 MHz. TV.

* 10253 E. Nadine St., Temple City, Cal. 91780.

TVI in Eskimo Land

BY STEVE DEXTER,*

THE splendid cooperation afforded visitor, W. O. "Bill" Holmes, KL7FSD, upon his arrival in Nome, Alaska, by the North Star Hotel was certainly heart warming. Cecil M. Worley, owner of the hotel, in this predominantly Eskimo community near the top of the world, International Date Line and the Arctic Circle, not only gave Bill permission to erect his antennas on the roof, he even provided a houseman to help with the installation.

First contact was with KØJHP, Aeronautical Mobile over the Aleutian Islands; then W9ADT, Maritime Mobile aboard the *S. S. Green Bay* in the North Pacific. Near the end of a 45-minute QSO with W4UDJ, in Birmingham, and his daughter who is a Novice, the phone rang. "This is the manager," the voice said. "We are receiving a lot of complaints from our guests, Mr. Holmes. I am afraid your station is interfering with their television." "Very well, Mr. Worley. I will sign with this station and come right down to the desk."

Before the dejected operator had a chance to pull the big switch, Mr. Worley was at the door flashing a big good-natured grin and unable to hold back the laughter that had built up in his six-foot plus frame. He let go in a big round of jolly guffaws. "You don't have to shut your station down, Bill," he explained. "I was only joking. The nearest television is in Fairbanks, 700 miles away!" QST

* % W. O. Holmes, Box 1031, San Carlos, Cal. 94070.

Station Activities

ATLANTIC DIVISION

DELAWARE—SCM, John L. Penrod, K3NYG—PAM: W3EEB. PAM: W3DKX. Endorsements: W3HKS as ORS, W3DKX as OPS, WA3DUM as OPS, K3MPZ as OBS, W3EJU as OO, W3BDP as OVS, K3BBR as OBS. Long-time V.h.f.er W3LML is now W3FC. W3HKS is now Extra Class. W3DEO exhibited amateur radio at his church hobby show. WA3GSM has made up a directory of all amateurs in Sussex County, which is available from him for an S.A.S.E. W3EEB vacationed in Florida. Most 2-meter amateurs in Kent County are building the K3FPB quad antenna. W3BDP has completed an FET preamplifier for 2 meters. WA3DUM is busy with the MDD. MDD and MDDS need more participating amateurs from Delaware. The auto license plates of Silent Key W3JFR are being used by the committee to obtain license plates in New Jersey. Net traffic: DEPN—QNI 59; DSMN—QNI 48, QTC 5; DTMN—QNI 34, QTC 2. Traffic: (Feb.) W3EEB 98, W3DKX 22, WA3DUM 8, W3HKS 3. (Jan.) W3EEB 168.

EASTERN PENNSYLVANIA—SCM, George S. Van Dyke, Jr., W3HK—SEC: W3AES. RMs: W3EML, K3MVO, K3YVG, W3MPX. PAM: K3MYS. V.H.F. PAM: W3FGQ. EPA, QNI 380, QTC 505; PFN, QNI 582, QTC 1029; PTTN, QTC, 364; EPAEP&TN, QTC 316; EPA V.H.F., QNI 270, QTC 327. OO reports were received from K3PSW, W3BFF, K3RDT, K3MYS, K3AOH, W3NNC, W3KEK and K3HNP; QBS reports from WA3AFI and K3WEU; OVS reports from W3CL, WA3HTX, K3VAX, WA3BJQ, WA3EEC, WA3CQO and W3ZRR. New Officers Dept.: Penn State University ARC—K3OMF, pres.; K3QHO, vice-pres.; WA3CFU, secy.-treas.; W3YA, club advisor. The EPA V.H.F. Net is moving to 51.15 Mc. The S.N.J. boys are going to pick up this net Sat. and Sun. to make it a 7-day-a-week net. The EPA V.H.F. Net will expand to include a 2-meter net on 146.15 Mc. at 8 P.M. Mon. through Fri. WA3CQO, W3EML, W3CUL, WA3AOJ, W3VR, K3NSN, K3MYS and W3FGQ made the BPL. K3HNP reports a slow OO month but W3NNC and K3RDT had a field day. K3YVG and K3UIU are teaching code to a class of 30 Novices. WA3JGS has a new TR4 and a quad. K3AKN reports the busiest CD last time. WA3FCP got his big "A" ticket. WA3IDK is doing a nice job of NCS on the V.H.F. Net. WA3AFI is rebuilding his antenna farm. K3MYS keeps busy. WA3EMO reports his club now is WA3JKH and he has become an A-1 Operator. W3ABT is active on the traffic nets and working long-haul RTTY. W3HNK is going to the Virgin Islands in June to work some DX. W3EML expects to have his new antenna airborne soon. W3RKP is putting up a new antenna between Novice classes. W3ELI is now W3HK. WA3CQO is going great on the v.h.f. traffic nets. W3AXA is now in semi-retirement. K3WEU finally made WAS. W3CUL is back in cold country. K3MVO is back from sunny Italy and reports that the micro keyer he built worked the first time. K3MYS reports the biggest Feb. on record. W3CL still is pounding out code practice every night on 50.2 Mc. for license upgrading. W3NNL is about ready for the Extra Class exam. WA3ATQ is busy with her many skeds. WA3CTP is now an A-1 Operator. WA3CKA has a new HQ-180AC. W3CID is a new ORS. Traffic: W3CUL 6529, K3MYS 1339, W3VR 1072, W3EML 850, W3FGQ 720, K3NSN 647. K3MVO 405, WA3CQO 271, WA3AOJ 270, K3VBA 258, K3YVG 249, WA3JCA 239, WA3CTP 216, WA3IPX 200, WA3AIZ 176, W3CID 151, WA3FPM 125, WA3EEC 117, W3FPC 111, WA3ATQ 109, K3PIE 101, W3KJJ 96, WA3GLI 95, WA3EXW 90, W3HK 88, WA3AFI 86, WA3EMO 82, K3WEU 79, W3ABT 76, WA3CKA 70, K3WAJ 61, WA3CND 55, WA3FCP 52, WA3IDK 40, W3JKX 40, K3KTH 39, W3NNL 37, K3PSO 32, WA3CFU 26, K3BHU 24, WA3AXA 22, K3RUA 22, W3VAP 22, WA3GAT 20, W3OY 20, W3HNK 18, K3KKO 18, K3MDG 17, W3ADE 11, K3AKN 11, WA3EMQ 10, WA3HIT 10, WA3EIO 9, K3HNP 9, K3SLG 9, W3BUR 8, WA3HMU 8, WA3BSV 6, W3PVY 5, WA3IAZ 2, W3BFF 1, WA3BJQ 1, W3CL 1, W3EU 1, W3ID 1, WA3JGS 1, W3KEK 1, W3NNC 1, K2NPC 1, K3PSW 1, W3RDT 1, W3RKP 1, W3RLT 1, W3YPF 1, W3ZRR 1.

MARYLAND-DISTRICT OF COLUMBIA—SCM, Carl E. Andersen, K3JYZ—SEC: W3LDD.

Net	Freq.	Time	Days	Sess.	QTC	QNI Avg.	Mgr.
MDD	3643	0000Z	Daily	29	269	11.8	K3OAE, RM
MDDS	3643	0130Z	Daily	28	44		W3CBG, RM
MEPN	3920	2300Z M-W-F 1800Z S-S		22	96	29.4	K3NCM, PAM
MDCPN	3920	2300Z	T-T-S-S	10	44	12.2	K3GZK
MTMTN	145.206	0100Z	W-T-S-S	13	24	9.5	K3NOQ
CVTN	145.615	0200Z	Sn-F	8	10	3.0	WA3CFK
AREC	3920	2230Z	Sn	4			W3LDD, SEC

• 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.

New appointees: WA3GDG as OPS, WA3JAM as OO Class III, W3PYW as OO Class IV. Endorsed appointments: W3GKP as OVS, WA3CFK as ORS and OPS. A *new section net is born.* On Feb. 13 the Maryland-District of Columbia Phone Net (MDCPN) started operation for the sole purpose of handling traffic. W3SRC and K3GZK are the co-managers for the present. This net meets only on the days that MEPN does not function and uses the same frequency and time, 3920 kc. at 2300Z. Try it out. W3UE is in the Jefferson Memorial Hospital, Alexandria, Va., for an extensive checkup. W3TN again is the only BPLer in MDC. W3TMZ has sent the PVRC members back to their shacks to look for missing log sheets after receiving a report of only 13.6 million points collected in the ARRL Phone DX Contest. The wind wiped out WA3HTQ's antenna farm. W3MVB has cooled his hot rectifier tubes by connecting the pins directly to the wire and suspending same from top of the equipment case. WN3IYS reports 5400 points in the Novice Roundup. WA3GDG reports success in Frederick County with the following new AREC members: WB2YBJ/3, WA3CGU, WA3AMH, WA3ISA and K3IAG. WA3HTQ hosted an antenna party to replace wind damage, consisting of K3OAE, K1ANV/3 and K3JYZ. W3FA, ex-W3MCG, tried the DX test with a 21-ft. high wire with little success. WA3CBC is the chairman of the 2-Meter Termite Contest. The Frederick Co. AREC Net meets on 145.47 Tue. at 0200 GMT. K3NCM still is on the sick list. K3LFD also lost a 6-meter beam to the wind and ice. School work has finally limited WA3CKF's operating time. Traffic: (Feb.) W3TN 310, WA3EKP 258, WA3HTQ 181, W3CBG 152, K3JYZ 151, WA3DO 99, W3ATQ 93, K3GZK 90, K3ZLE 61, W3PRC 57, W3PQT 48, K3LFD 45, W3ZNW 35, W3FA 33, WA3CFK 25, WA3ERL 22, WA3CBC 20, K3LFN 15, WA3FRL 10, WN3IYS 9, WA3GDG 8, K3ORW 5, K3VHS 4. (Jan.) W3PRC 57, K3VHS 24.

SOUTHERN NEW JERSEY—SCM, Edward G. Raser, W2ZI—Asst. SCM: Charles B. Travers, W2YPZ. SEC: W2BZJ. RMs: WA2KIP, WA2BLV. PAM and NJPN Net Mgr.: W2ZI. Have been requested by two former S.N.J. members to let their friends know what has become of them. Dick Harris, formerly K2MBT/K7VCD in Seattle, is now with CBS in N.Y.C. He has received his old call back and will be on as K2MBT. Art Westneat, W2KHA, of Princeton, is now W1AM with Raytheon in Middletown, R.I. I will be available now to meet with local radio clubs in S.N.J. as guest speaker at your meetings. I would be most happy to meet your members and discuss ARRL matters. Looks like W2PEV, Asst. Mgr. of NJPN, did an outstanding job during the SET. He reports 5 NCSs on the job, 57 stations participating, 7 liaison stations, 180 messages handled, NJN reports QNI 442, traffic 393; NJPN reports QNI 490, traffic 269. W2ORS is now Camden County EC. If interested in AREC, please let him know. W2BZJ has his Extra Class ticket and new call W2FK. W2FYT is now W2FJ, K2-SOL, WB2FJE and WB2SFN are new OPSs. New ORSs are WA2ABY and WB2BGH. WB2SZK has applied for OO appointment. W2PU has been handling 2RN and EAN like a vet. W2RXB joined Navy MARS and is now NØJZE. WB2GTE worked 150 countries. WB2RVE reports the AREC Net meets on 50.9 Mc. at 2000 EST. W2LVW is NCS. W2ZI worked 38 stations in the 1st National OOTC QSO Party Feb. 26, 27, 28. WB2UZB moved and his new call is WA3IPR. W2ZVW has an SB-

100 in his car. Traffic: (Feb.) WA2KIP 240, W2PU 228, W2ZI 158, W2YPZ 118, WB2UVB 86, W2ORS 79, WA2ABY 72, WB2VMQ 64, WB2BGH 63, WA2ANL 50, W2CKF 45, W2FK 30, K2SHE 28, WA2DID 23, K2JJC 21, WA2KAP 20, WB2SFX 19, W2ZVW 14, K2MBW 7, K2RXB 5. (Jan.) WA2KAP 5.

WESTERN NEW YORK—SCM, Charles T. Hansen, K2HUK—SEC: W2RUF. PAM: W2PVI. RMs: W2FEB and W2RUF. NYS C.W. Net meets on 3670 kc. at 1900, ESS on 3590 kc. at 1800, NYSPTEN on 3925 kc. at 2200 GMT, NYS C.D. on 3510.5 and 3993 kc. at 0900 Sun. and 3510 kc. at 0900 Sun. and 3510 kc. at 1930 Wed., TCPN 2nd Call Area on 3970 kc. at 0045 and 2345 GMT, NYS County Net on 3510 kc. at 1400 GMT Sun. and 2345 GMT on Mon. Congratulations to W2SE1, who has the new call W2FR, on making the BPL. Our other stalwart, W2OE, is vacationing in California. He also is a new grandfather. The EA staff of NTS held a two-day meeting in Syracuse with K2KIR and W2FR as hosts. RAGS had W6SAI as speaker at a recent meeting. The Syracuse V.H.F. Club elected K2QWD, pres.; W2RHQ, program dir.; W2PJO, secy.; W2UKA, treas. RHQ says "eu at 1968 V.H.F. Roundup. It will be held!" Endorsements: W2IDM as EC St. Lawrence Co.; W2RQF as OO and OPS; K2SSX/W8ZGC as ORS; K2KTK as ORS and OO; W2IDM as OVS. The Northern Chautauqua ARA named its president, W2FUL, "Ham of the Year." The presentation was made at the club's Annual Banquet. W2RUF was guest speaker and W2SB was presented a microphone in appreciation for the years of service to the club. WA2ANE is now trustee of W2WUX, the Utica ARC call. W2PZL just finished an SB-101. WA2HSB reports that Plattsburgh RACES has added an SB-200 and two Clegg 22ers to its equipment, which also includes 9 Gonsets, 4 HW-30s, 4 HE-45As and an HW-12. W2CFP is attempting to get the "East Coast Amateur Radio Service" started on 7255 all day, every day. K2KLP and W2UTH have a new SB-200 which already has been converted to 6 meters. Don't forget the W.N.Y. Hamfest and Eastcoast V.H.F. Conference May 11 at Vince's 50 Acres, sponsored by the Rochester ARA. This month's meeting of your club may well be the last time you can effectively plan for Field Day. In case you haven't noticed, the rules have changed slightly. The WB2TLJ repeater has been off the air because of a technicality (license expired). It has been really missed in the Buffalo area. Traffic: W2FR 552, WB2OYE 412, WA2HSB 359, WB2GAL 313, W2HYM 153, WB2SMD 106, W2AITA 104, K2JBX 98, W2RUF 95, K2RYH 91, WA2NDC 84, K2DNN 64, WB2YUT 42, W2RQF 38, W2PZL 37, W2FEB 36, WB2YVP 32, WB2VND 23, K2OFV 21, W2PVI 18, W2CFP 17, W2FCG 17, K2IMI 17, K2KIR 16, WA2ANE 10, W2EMW 4, WA2GLA 3, WB2NZA 3, W2PNW 2, W2BLO 1.

NEW YORK STATE QSO PARTY

June 8-10, 1968

The South Shore Amateur Wireless Association invites all amateurs to participate in the 1968 New York State QSO Party.

Rules: (1) *Contest Period:* 1700 GMT June 8 to 0100 GMT June 10 (2) *General Call:* On c.w. "CQ NY" or "de NY." On phone, "CQ New York State." (3) *Exchange:* QSO number, RS(T). ARRL section country or N.Y. county. (4) *Scoring:* One point per QSO. Out-of-state stations multiply by the number of New York State counties worked. N. Y. stations by the number of ARRL sections and countries. Station may be worked once per band and mode. (5) *Suggested Frequencies:* 3560, 3900, 7060, 7225, 14060, 14250, 21060, 21300, 28060, 28600 kc. (6) *Awards:* Certificates will be sent to the high scorer in each section, N. Y. county and country, provided a minimum score of 100 points is attained (50 for DX including KL7, KH6). (7) *Entry:* Logs must show GMT date/time, station worked, exchange sent and received, band, mode and total claimed score. Additionally, each entry must be accompanied by an s.a.s.e. if a result sheet is desired. Logs must be postmarked no later than July 15, 1968. Send logs to the SSAWA, 32 Elmwood St., Valley Stream, New York 11581.

WESTERN PENNSYLVANIA—SCM, Robert E. Chawrvia, W3NEM—SEC: K3KMO. PAM: K3VPI (v.h.f.). RMs: W3KUN, W3MFB, W3UHN, K3SOH. Traffic nets: WPA, 3585 kc. daily at 7 P.M. local time; KSSN, 3585 kc. Mon. through Fri. at 6:30 P.M. local time, KSSN does not function from May 1 through Sept. 30. The Pennsylvania State University Club station, WA3HCG, has a new slate of officers for the coming year: WA3BSV, pres.; WA3CFU, vice-pres.; WA3GSH, secy.-treas.; K3SDQ, station director; K3PBL, assistant station director; K3KQY, WB2QEM and K3QXV, executive board. The Nittany Amateur RC reports the following slate of new officers: WA3EPQ, pres.; K3CFA, vice-pres.; W3NEM, secy.; W8OKT/3, treas.; W3SAY, trustee; W3WLF, K3RBH, K3AKR and WA3FJE, board of directors. WN3EVP is now General Class with the call WA3JFK. *The Spark Gap* reports WA3FET has a new Hornet beam; W3NWB is telephone relaying; W3MRZ has returned from a vacation in Florida; WA3GUN is a new General Class licensee, W3NWB is now W3DM. Other two-letter call converts are W3KXS to W3GA and W3BYK to W3CN. *Kilo Watt Harmonics* reports W3DGP is now KH6GKL, from Honolulu. WA6DPD/3 is a grad student at Carnegie-Mellon University in Pittsburgh and will be in WPA-Land for two years. K3WWP/WA3IXO passed the Extra Class and 2nd-class radiotelephone exams on the same day. The WPA Traffic Net had 29 sessions, 351 messages, 413 regular stations QNI plus 28 visitors during Feb. Traffic: WA3BLE 281, W3KUN 266, W3NEM 212, WA3AKH 209, W3BLZ 164, W3LOS 138, K3PYS 99, K3SOH 54, WA3IPU 47, K3HKK (W2KAT, K3AHT ops) 35, K3HCT 34, WA3HSI 34, W3IYI 31, K3RZE 31, WA3HLI 28, WA3GPK 27, K3ASI 26, W3LOD 16, K3SMB 14, K3SJN 12, WA3GQJ 11, W3KQD 8, W3YA 8, W3UHN 2.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—SEC: W9RYU. RM: W9EVJ. PAMs: WA9CCP and WA9RLA (v.h.f.). Cook County EC: W9HPG.

Net	*Freq.*	*Times*	*Days*	*Tfc*
IEN	3940 kc.	1400Z	Sun.	6
ILN	3960 kc.	0000Z	Daily	229
NCPN	3915 kc.	1300Z	Mon.-Sat.	121
NCPN	3915 kc.	1800Z	Mon.-Sat.	135
Ill. PON	3925 kc.	1700Z	Mon.-Fri.	924
Ill. PON	50.25 Mc.	2000Z	Mon. & Thurs.	no report
Ill. PON	145.5 Mc.	2000	M.W.F.	56
TNT	145.36 Mc.	2100	Sun.-Fri.	158

Make reservations now for the Central Division Convention which will be held in Springfield, Ill., Aug. 3 and 4 at the St. Nicholas Hotel. Write Convention Committee, 104 North Sixth St., Springfield, Ill. The Barrington Civil Defense is setting up a communications system on 145.5 Mc. The club station at the U. of Ill. has a Drake R4B TAX B and a pair of 813s linear. W9KII has a new Heath HW-16 and a v.f.o. K9FHV is back on the air. WA9SDT has a new five-element beam on 6 meters and a TR-106 to go with it. The new QTH of W9DOQ, manager of the North Central Phone Net, is McLean, Ill. 61754. W9KFG is now RTTY with a Model 28 teletype. The Wheaton Radio Club's "Winter Hamfest" held Feb. 18 was SRO. K9FTJ has a new Swan 350 and WA9EMP is working the hard ones with a Galaxy V. WN9YLK is now editor-publisher of the Kankakee Area Radio Society *Newsletter*. W9YMZ is now W9BT and W9KQL is W9BQ. K9TXJ has received his WAS certificate. From reports received, the SET was very successful. For information on the Illinois Sesquicentennial QSL cards write Mr. L. A. Wollen, Jr., Myers Bldg., Springfield, Ill. 62701. K9DQU is mobiling on 160 meters with a new antenna. W9KDK presented a transistor demonstration at the Rockford Amateur Radio Association's Feb. meeting. The club's Mini-Hamfest will be held Aug. 18 at the Boone County Fairgrounds. The Ninth Regional Net had a traffic count of 721 for Feb., according to W9QLW RM/9RN. WB4DHB, K9DRS, WA9QXU and WA9MFX were elected officers of the Illinois Institute of Technology (IIT) Radio Club (W9YW). W9UWC and WA9WLS are back hamming after a long idle period. WA9JIY has built a 572B home-brew kw. New Advanced Class licensees heard were K9WYX and K9HSK; new Generals, WA9UXT and WA9UUU; new Technicians W9VMP, W9WBY, WA9WGZ and WA9WYN; new Novice, WN9WQX. New appointments include W9YZE as EC of Madison County, W9JCK as OBS, W9KFQ as OO and WA9QBM and W9KII as ORSs. WA9UHA has returned from 6Y5-Land. K9LLU has moved to Point McGue, Calif. Navy Missile Base and is awaiting his 6 call. WA9CCP was honored by a *Chicago Tribune* article for her activity on MARS and the ham bands for her service to the servicemen and their families. New officers of the Northwest ARC are W9HWG, WA9ENA, WA9TKO and W9DRN. WA9MHU is the only BPL certificate recipient this month. Traffic: (Feb.) WA9MHU 999, WA9HHH 271, W9JXV 209, K9KZB 147, W9EVJ 128, W9KII 122, WA9PIJ 109, WA9SFB 85, W9KFQ 78, W9HOT 76, WA9SEO 69, W9DOQ/9 65, WA9QXT 40, K9BTE 34, W9HPG 17, K9HSK 17, W9PRN 17, WA9SPA 12, W9UHD 10, W9-

LNQ 9, K9TXJ 9, W9CWH 7, W9DBO 7, WN9VLK 7, K9DQU 6, W9IDY 5, WA9KQD 4, W9SXL 4, K9HRC 3, K9IDQ 3, WN9VOX 3, K9HVS 2. (Jan.) W9NXG 271, K9AVQ 138, K9KOI 49, WA9POZ 10.

INDIANA—SCM, William C. Johnson, W9BUQ—Asst. SCM: Mrs. M. Roberta Kroulik, K9IVG. SEC: W9JUK.

Nets	*Freq.*	*Time*	*Feb. Tfc.*	*Mgr.*
IFN	3910	1330Z Daily 2300Z MF	399	K9IVG
ISN	3910	0000Z Daily 2130Z MS	903	K9CRS
QIN	3656	0100Z Daily	248	W9HRY
Ind. PON	3910	1245Z Sun.		K9EFY
Ind. PON	50.7	0200Z Thurs., Mon.	280	WA9NLE

V.H.F.

W9PMT, mgr. of the v.h.f. nets, reports Feb. traffic as 21. WA9KAG, mgr. of RFN, reports Feb. traffic as 38. W9ILU, mgr. of the Great Lakes Emergency Net reports Jan. traffic as 50. Red Cross in the Indianapolis area held another bomb shelter exercise Feb. 17. Communication was furnished by the Metropolitan AREC Net on 50.7 Mc. K9APH and W9HCQ were net controls. Stations participating were W9KLM/A1, W9BUQ, K9BEN, WA9QXZ, WA9FZR, W9TIZ, WA9JAT/M and WA9LGQ. Lake County ARC held its Annual Banquet Feb. 10. W9HPG, W9PRN and W9BUQ represented ARRL. W9DUD is home from the Bloomington Hospital. WA9IIE is using his new keyer. WA9LTI/WA9MTY hosted approximately 30 cub scouts who wanted to see a ham shack. W9IHO is the Indiana Director for RACES. W9MIO was the winner of the code speed contest held at Cincinnati, Ohio, with a perfect copy of 45 words per minute. WA9ITB's schoolwork is keeping him off the air quite a bit. Indiana Navy MARS held its spring meeting Mar. 10. Don't forget the Central Division ARRL Convention to be held in Springfield, Ill., Aug. 3-4, 1968. K9KFM and WA9ITB have received their Advanced Class licenses. The Lake County ARC's call is W9LJ. The Radio Amateur of Indianapolis will provide public safety communication for the 1968 Indianapolis 500 Festival Parade. W9JUK is our new SEC. QIN Honor Roll: W9BDP 28, WA9MTY 27, WA9KAG 21, K9VHY 23, WA9KOH 22, W9JUK 21, WA9MXG 20, W9UQP 20, WA9VZM 20. *Amateur radio exists because of the service it renders.* BPL certificates for Feb. traffic went to K9IVG and W9MM. Traffic: (Feb.) K9IVG 1018, W9MM 680, K9FZX 284, W9HRY 203, WA9LTI 185, WA9AUM 146, WA9BGI 140, W9VAY 120, K9EOH 92, K9CRS 89, WA9KAG 86, W9BUQ 81, WA9MXG 71, WA9GJZ 57, W9UQP 57, K9-ZLB 52, K9CBY 44, K9EFY 43, WA9BHG 39, K9FUJ 383, W9FWH 37, W9DKR 34, W9YYX 34, WA9AXF 29, W9-VHY 29, WA9GOV 28, W9SNQ 28, W9CMT 27, K9JDK 22, W9PMT 20, W9CUC 17, K9RWQ 14, K9WGN 14, WA9BNX 13, W9RTH 12, W9BDP 9, K9GBR 8, K9ILK 8, WA9JIX 2, K9QVT 2. (Jan.) W9QLW 200, W9VAY 125. (Dec.) W9VAY 117.

WISCONSIN—SCM, Kenneth A. Ebneter, K9GSC—SEC: W9NGT. RM: WA9MIO. PAMs: W9NRP, WA9-QNI, WA9QKP.

Net	*Freq.*	*Time*	*Days*	*QNI*	*QTC*	*Mgr.*
BWN	3985 kc.	1200Z	Mon.-Sat.	362	241	W9NRP
BEN	3985 kc.	1700Z	Daily	671	165	WA9QKP
WSBN	3985 kc.	2200Z	Daily	1226	269	WA9QNI
WIN	3662 kc.	0015Z	Daily			WA9MIO
SWRN	50.4 Mc.	0200Z	Mon.-Sat.		1	K9DBR
SW2RN	145.35 Mc.	0130Z	Daily	279	25	WA9IZK

Net certificates went to W9GXU, W9KRO, WA9PPA and W9BCH for BWN, and K9TBY for BEN. Renewed appointments: W9NRP, W9UFY, W9HWQ and K9UTN as ECs; W9CBE and W9YT as ORSs; K9GDF as OPS; W9FBC as OVS; W9CBE and K9KJT as OBSs. A new appointee is W9BZU as EC for Manitowoc County. K9-LJX is in graduate school at Duke Univ. WA9KFL and K1ZJH (with W9ODD) received Advanced Class licenses. K9WRQ and W9BCH are both sporting new HW-12As. The Ozaukee County Radio Club will hold its hamfest at Belgium, Wis., May 19. The WNA Picnic will be held July 14, at Fond Du Lac, Wis. (not July 7 as previously reported in this column.) The Central Division Convention will be Aug. 3-4 at Springfield, Ill. WA9NDV got his WAS certificate. W9DXV is on RTTY with a Model 15. W9IQW is now receiving with a 75-A4. K9GDF led the OOs with 6 notices sent and passed the Extra Class exam. BPL certificates for Feb. traffic went to WA9-SYD and W9ODD. Traffic: (Feb.) W9ODD 586, W9DND 293, W9AOW 292, W9ESJ 221, WA9SYD 211, WA9QKP 188, W9CXY 172, W9DYG 167, WA9VNJ 110, WA9RAK 108, W9BCH 107, W9IFS 100, WA9QNI 96, WA9NDV 77, W9RTP 67, WA9GJU 60, W9DXV 59, W9ABH 56, W9-AYK 53, W9GXU 52, K9KSA 52, K9CPM 44, K9TBY 44, W9CBE 43, W9KRO 37, W9NRP 36, WA9TUP 29, WA9LRW 26, WA9PKM 26, K9UTQ 19, WA9OMO 13, K9GSC 12, K9FWF 5, W9IQW 4, WA9KFL 4, WA9EZU 1. (Jan.) WA9OFF 2.

DAKOTA DIVISION

MINNESOTA—SCM, Herman R. Kopischke, Jr., WØ-TCK—SEC: WAØIEF. RMs: KØORK, WAØEPX. PAMs: WAØMAV, WAØHRM. MSN meets daily on 3685 kc. at 2330Z. MJN meets Tue.-Sun. on 3685 kc. at 0000Z. Noon MSPN meets Mon.-Sat. on 3945 kc. at 1705Z, Sun. and holidays at 1400Z. Evening MSPN meets daily on 3945 kc. at 2315Z. *Note*: Net times are listed to correspond with local DST. Evening Phone Net stays the same GMT time, all other nets meet one hour earlier by GMT. New appointees: WØGWJ as EC for Rock Co., WAØSSN as OVS. Renewed were WØMZR as EC Nobles Co., KØMEQ as EC LeSeuer and Rice Co., WAØEPX as ORS. OO WOOFS reported 17 notices sent in Jan., and OO WAØIAW sent 16 notices in Feb. The OGS 5th Annual Picnic will be held at Gunn Park near Grand Rapids again this year on July 14. The St. Paul ARC is planning a spring banquet in May or June. Check with WØ-QKJ for details. K6EA and WØMFW again are spending the winter in California but hope to be back in Minnesota by May. WØPAN is enjoying a new tri-band beam. WØTKX has obtained a new two-letter call, WØBE, and also holds WØAA for the Minn. Wireless Assn. WØPEV, WØTLE and WØJYA upgraded to Extra Class. WØPEV has a 62S1 on 6 and 2 plus a BTI linear. KØZFB upgraded to Advanced Class. The new pres. of the Minneapolis ARC is WAØOOS. WAØSEN, who recently upgraded from Novice, is the club's newsletter editor. The Mankato ARC recently purchased a used panel truck for use as a public service communications unit. Traffic: WAØIAW 258, KØZRD 224, KØORK 170, WAØOEJ 112, WAØEZQ 82, WØZHN 79, WAØEPX 75, WAØHRM 62, KØSRK 60, WAØMMV 49, WAØODB 49, WØUMX 48, KØFLT 45, WØTCK 37, KØQBI 36, KØ-ZBI 35, WAØIYM 31, WØISJ 27, WAØLVK 27, WØBUC 24, WØHEN 24, WAØJKT 23, WØKNR 22, WAØDOT 17, WØSZJ 16, WAØEDN 15, WAØJPR 13, WØEQO 12, KØDEF 10, WAØDFT 8, KØMGT 8, WAØPPY 8, WØ-BUO 6, KØCNC 6, KØLWK 5, WØKLG 3, WAØSSN 3, WØPAN 1. (Jan.) WAØPPY 8.

NORTH DAKOTA—SCM, Harold L. Sheets, WØDMI—SEC: WAØAYL. OBS: KØSPH. OPS: WØCAQ. RM: WAØELO. We regret to report the passing of WØIHM. WAØLZD has a new 14AVQ. WØCGM, now deputy sheriff, has the call WAØTFA for the office. WØKZL received his new two-letter call, WØBF. WAØGRX's OM received his two-letter call, WØGB. They took a jaunt up to WØAYA's and WØNVV's QTH at Munich. WØDMI operated portable at Detroit Lakes with the SB-34 and took advantage of WØTXQ's 70-ft. towers on 75 meters. WAØMSJ and WAØOVT are doing some 2-meter work in Bismarck with some Twoers. WØNVV operated portable between Langdon and Munich while on jury duty. KØSOE recently had a QSO with WØBIH. It had been 40 years since the last one! KØRSA reports that Kay, the XYL, and several others are about ready for the Novice exam. The FARC has classes on Mon. evenings. WØDMI has started another class for Novices at the Valley Junior High School in G.F. to keep busy. WAØKRI reports that things are moving with the International Hamfest at the Peace Gardens in July. Don't forget the annual one at Fargo May 5, and the one to be held in Kindred on June 30. WØBIH is in the hospital in Northwood for treatment. WAØOAT was in town for the State Basketball Tournament. WAØPPK keeps the bands hot from N. Dak. for the DXers. KØOVE had to buy her a new *Call Book* in self defense. WØGFE has been telephone relaying for South Pacific servicemen and folks here in G.F. WØDMI still is having a hardtime getting to his son in Guam.

YL WX NET	Sess. 19	Check-ins 440	Tfc. 6	WAØMND-WA9GRX, NCS
C.W. Net	" 12	" QNI 53	QTC 19	WAØELO RM
PON	" 7	Check-ins 138	Tfc. 8	WAØHUD NCS
ND RACES	" 21	" " 732	Tfc. 121	KØSPH-WØHJU-WØEFJ KØPZK-WØCAQ-WØGFE

Traffic: WAØHUD 128, WAØELO 112, W9QNI/Ø 36, KØSPH 22, WØDXC 14, WØDMI 12, WØLZD 5, KØ-OVE 4, WAØJPT 2, KØRSA 2, WAØTBR 2.

SOUTH DAKOTA—SCM, Seward P. Holt, KØTXW—SEC: WØSCT. PAM: WAØCWW. RM: WØIPF. New calls: WAØTWF, Hitchcock; WØSBT, Watertown; WNØTRR, Vermillion. New appointments: WAØCWW as PAM; KØKXR as ORS, OBS and OPS; WAØPNB as net manager, OPS and OBS; WAØRIQ as net manager. Note the net time and frequency: NJQ Net, 1815; S.D. Early Phone Net, 2350; S.D. Late Net, 0030 GMT on 3955 kc. The WX Net remains on 3870 until Apr. 15,

then resumes on 3955 kc. in the fall. The Morning Net, 1400Z, will be on 3955 kc. Apr. 15. The S.D. C.W. Net, is on 3645 kc. Mon., Wed. and Fri. at 1845 and 2200 CST. Net reports: S.D. Phone Net, 1313 QNI, 52 QTC; S.D. C.W. Net, 120 QNI, 25 QTC; NJQ Net, 263 QNI; Sioux Falls 2-Meter Net, 9 QNI, 1 QTC. Traffic: WØZWL 545, WØMYS 56, WØSCT 51, WAØLLG 43, WAØRIQ 26, WØDVB 25, WAØPNB 22, WAØNWM 19, WØIPF 15, WØBQS 4.

DELTA DIVISION

ARKANSAS—SCM, Curtis R. Williams, W5DTR—SEC: WA5IIS. PAM: WA5PPD. RM: W5NND. WA5KAK's dad has the new Novice call WN5TXC. Appointments endorsed: W5NND as RM/ORS, W5OXU as ORS, and WA5BQI as ORS and WA5AER as OO. WA5QPI has been appointed EC for Pulaski, Saline, Lonoke and Faulkner Counties. ExK5TYW is now ORS under his new call, W5BED. The Central Arkansas ARC started a Novice Class Mar. 9 with a very good turnout. Net reports for Feb.:

Net	*Freq.*	*Time**	*Sess.*	*Traffic*	*Stations*	*Mgr.*
OZK	3790	0100Z	29	55	250	W5NND
RN	3815	0030Z	29	75	688	WA5PPD
APN	3885	1200Z	25	9	638	K5ABE
APON	3825	2130Z	21	105	375	W5MJO

*Most nets will meet one hour earlier with Daylight Saving Time. The Fort Smith ARC is conducting classes for Novice licenses. The club also received a nice letter from its c.d. director complimenting the members on an outstanding SET. The S.E. Arkansas ARC reports in its club newsletter, *The Grid Drive*, considerable interest in its Novice classes. Traffic: (Feb.) W5OBD 1603, W5NND 166, W5DTR 100, W5MJO 80, WA5PPD 44, WA5QPI 16, WA5KEF 12, WA5BQI 6, K5TYW 1. (Jan.) WA5BQI 1.

LOUISIANA—SCM, J. Allen Swanson, Jr., W5PM—SEC: W5BUK. RM: W5CEZ. V.H.F. PAMs: WA5DXA, W5UQR.

Net	*Freq.*	*Days*	*Time/GMT*	*Net Mgr.*
LAN	3615	Daily	0030/0400	W5MBC
Delta 75	3905	Sun.	1330	WA5EVU
LaPON	3870	Sun.	1300	W5KC
LARTTY	3612.5	Sat.	0100 (Sun.)	W5GHP

W5EA continues activity on 40 meters. W5MXQ also continues to work the nets and handles traffic. W5JFB says the new League *Handbook* is the best in years. WA5KLF is active with MARS daily. WA5OJG is now Advanced Class. Yours truly also passed the Extra Class exam. W5CEZ reports the La. Army MARS gang held a meeting in Pineville. WA5KQN displays the Advanced Class license now. W5GHP and K5ANS welcome more members in the new State RTTY Net. We all wish WA5MDX a speedy recovery. The GNOARC heard a very fine talk on v.h.f. repeater stations by W5JYN. W5PBQ, pres. of the Ozone RC in Slidell, has named W5PFT, W5OAR, K5AGI, WA5CKJ and W5PYJ as heads of the various club committees. W5CEZ has sent to LAN members a two-year history of the net. K5WOD reports the SARC has 14 fellows attending a Novice Class. It is said that W5FYZ is getting active on 2 meters again. W5QIX built a keyer and is raring to snag the 15- and 10-meter DX bugs. W5VLQ has a new HW-12A. K5HFE and K5JKR are active in the Thibodaux area on 2 meters. WA5SWZ is on the air with a KWM-2. WA5RHL has three states to go for WAS. The Thibodaux ARC, W5YL, held it's annual get-together recently with about forty-five attending from South Louisiana and Mississippi. Mayor W. J. Harang of Thibodaux, proclaimed Amateur Radio Week in the City to celebrate the event. New officers of the club are K5HFE, pres.; WA5SWZ, vice-pres.; WA5RHL, secy.; WA5BDB, treas.; W5TAO, act. mgr. W5EXI, up Lafayette way has started a twelve-week class for Advanced and Generals with sessions each Tue. evening. W5BV, W5BUK, W5CEW, WA5CAU, W5SWS, W5PM, W5BMM, W5GMO and a few others keep 3900 hot each morning at 1230 GMT. Traffic: W5CEZ 243, W5KRX 215, W5GHP 103, W5MXQ 73, K5ANS/5 61, WA5KQN 22, WA5OHH 15, W5EA 12, W5PM 6, WA5OJG 5, WA5KLF 4.

MISSISSIPPI—SCM, S. H. Hairston W5EMM—SEC: W5JDF. The meeting of the Miss. Sideband Net at Raymond was a fine success. An excellent meeting was conducted by WA5KEY and W5ODV. W5EHZ and his XYL really deserve a lot of credit for the fine arrangements they made for it. W5BW has a new kw. linear and is doing a great job on s.s.b. and c.w. K5HKE is very active with a much improved signal. WA5GHF has a fine signal from his college station. Be sure to check for the new frequency for the Miss. Sideband Net. Glad to hear that W5OSA is more active. We need our old-timers to keep going. W5CUU has had good results on 20 meters telephone relaying to his son stationed at Goose Bay, Labrador. K5MOH is now using a Swan 240 with a potent signal. W5JHS is still "old faithful" as NCS for the Gulf Coast Sideband Net with able assistance from K5SYG. I wish to congratulate the net control stations of the MSBN for a fine job—WA5PTE, W5LEA, W5BW, W5WMQ, WA5OHQ, WA5MPQ, with WA5KEY if needed. Traffic: K5ZFM 54, W5BW 53.

TENNESSEE—SCM, Harry A. Phillips, K4RCT—Asst. SCM: Lloyd Shelton, WA4YDT. PAMs: W4PFP, WA4CGK, WA4EWW, WB4GHL. RM: WA4YEM.

Net	*Freq.*	*Days*	*Time*	*Sess.*	*QNI*	*QTC*	*Mgr.*
TSSB	3980	Tue.-Sun.	0030Z	25	1899	182	WA4CGK
TPN	3980	M-Sat.	1245	29	1160	145	W4PFP
		Sun.	1400				
ETPN	3980	M-F	1140	21	513	41	WA4EWW
TCN	3980	Thurs.	0200	(Wed. night CST)			W4OGG
Tn	3635	Daily	0100	29	174	114	WA4YEM
TTN	7270	Daily	2200	29	401	45	WB4GHL

Appointments: WA4YEM as RM, WA4CRU as OVS. Hamfests: Humboldt, May 26; Memphis, June 1 and 2; Crossville, July 20 and 21. Sorry to report that W4PQP, one of our most active net members, is a Silent Key. W4HHK reports DX of 10 feet on 2300 Mc. W4OGG reports 75 countries worked on 10 meters in the DX Contest. Anyone interested in joining the newly-formed club in Lebanon, contact WA4CRU. The Tenn. Teenage Net continues to grow stronger with increasingly good QNI and QTC. Everyone is urged to apply for appointments described in *Operating an Amateur Radio Station*. Applications for OPS should be sent to PAMs and ORS to the RM. If you can serve as liaison station between the phone nets and c.w. net, contact WA4YEM. Traffic: W4FX 433, W4SQE 229, W4OGG 210, W4DIY 151, WA4URA 119, W4RUW 93, WA4YDT 93, WA4YEM 78, W4WBK 65, W4PFP 43, K4MQI 40, WB4EHK 28, WA4TWL 28, W4TYV 28, WB4ESE 26, WA4GLS 25, K4OUK 21, WA4EWW 16, WB4EQI 15, WB4FCE 15, WB4GHL 15, WA4IZB 14, WB4EHK 13, WA4CGK 12, WA4NEC 11, WA4CRU 9, K4VZI 9, W4PRY 8, WA4AJB 4, K4BTY 4, WN4FZP 2, W4SGI 2.

GREAT LAKES DIVISION

KENTUCKY—SCM, Lawrence F. Jeffrey, WA4KFO—SEC: W4OYI. Appointment: K4MAN as OPS. Endorsements: WA4DYL, K4NYO and WA4WWT as ORSs; WB4BTM, K4CSH, WA4GMA and K4LOA as OPSs; K4CC as EC; W4CMP as OO; K4FPW as OBS and OVS.

Net	*Freq.*	*Days*	*GMT*	*QNI*	*QTC*	*Mgr.*
KRN	3960	M-F	1130	376	69	K4KIS
MKPN	3960	Daily	1330	295	65	K4TRT
KTN	3960	Daily	0000	828	608	WA4AGH
KYN	3600	Daily	0000/0300	428	425	W4BAZ

The FACTN meets on 50.7 Mc. at 0200 GMT Mon., Tue. and Fri. Stations reporting RTTY activity are WA4AGH, WA4TWB, K4YZU and WA4WQZ. Others who are active, please let me know. WB4FOT gets out in spite of a very limited antenna system. W4RHZ runs code practice sessions Mon., Wed. and Fri. at 9 P.M. EST on 51, 145.6 and 220.14 Mc. WB4AIN now has his Extra Class license. W4BTA worked with RACES on a simulated atomic attack problem in Louisville. W4EBX is heard on KSN WA4BSC is back on KYN after a long layoff. WB4CFH is heard on 2-meter f.m. Traffic: WA4DYL 413, W4BAZ 167, WA4AGH 147, WB4AIN 126, WA4KFO 126, WA4WWT 126, W4NBZ 118, WA4TWB 106, WA4UAZ 90, WA4IBG 67, K4MAN 61, WA4SMS 54, WA4GHQ 53, WA4GMA 53, WA4VUE 47, WB4FOT 41, W4OYI 35, K4TRT 26, WA4BSC 23, WB4BKG 19, WA4UHR 18, W4CDA 14, WA4WQZ 14, K4HOE 12, WB4CTY 11, K4FPW 11, W4KJP 11, W4BTA 10, WB4BTM 10, K4LOA 10, W4YOK 10, W4MWX 9, W4SZB 7, W4JUI 5, K4VDO 4, W4ADO 3.

MICHIGAN—SCM, Ralph P. Thetreau, W8FX—SEC: K8GOU. RMs: W8FWQ, W8RTN, WA8OGR, K8KMQ. PAMs: W8IWF, K8JED. V.H.F. PAMs: W8CVQ, W8YAN. Appointments: W8DVB, WA8PII, W8SWF, WA8VGQ as OPSs; K8MXC as ORS; W8SWF as OBS; WA8LPI as OVS; W8FLW as EC. Silent Keys: W8ANY, K8AWC, W8EVM (ex-W8AHQ), K8NUH, WA4DSU (ex-W8AWJ).

Net	*Freq.*	*Time*	*Days*	*QNI*	*QTC*	*Sess.*	*Mgr.*
QMN	3663	2300	Dy	983	515	58	W8FWQ

(*Continued on page 118*)

EIMAC zeroed in on some grid problems so you can get higher power gain.

Want up to 20 times power gain in a cathode driven circuit? Try one of the tubes in our complete zero-bias power triode line. While you're solving problems, throw out the bias power supply. Forget some of the associated circuitry. And don't worry about destroying the tubes if you lose grid voltage. They don't need any.

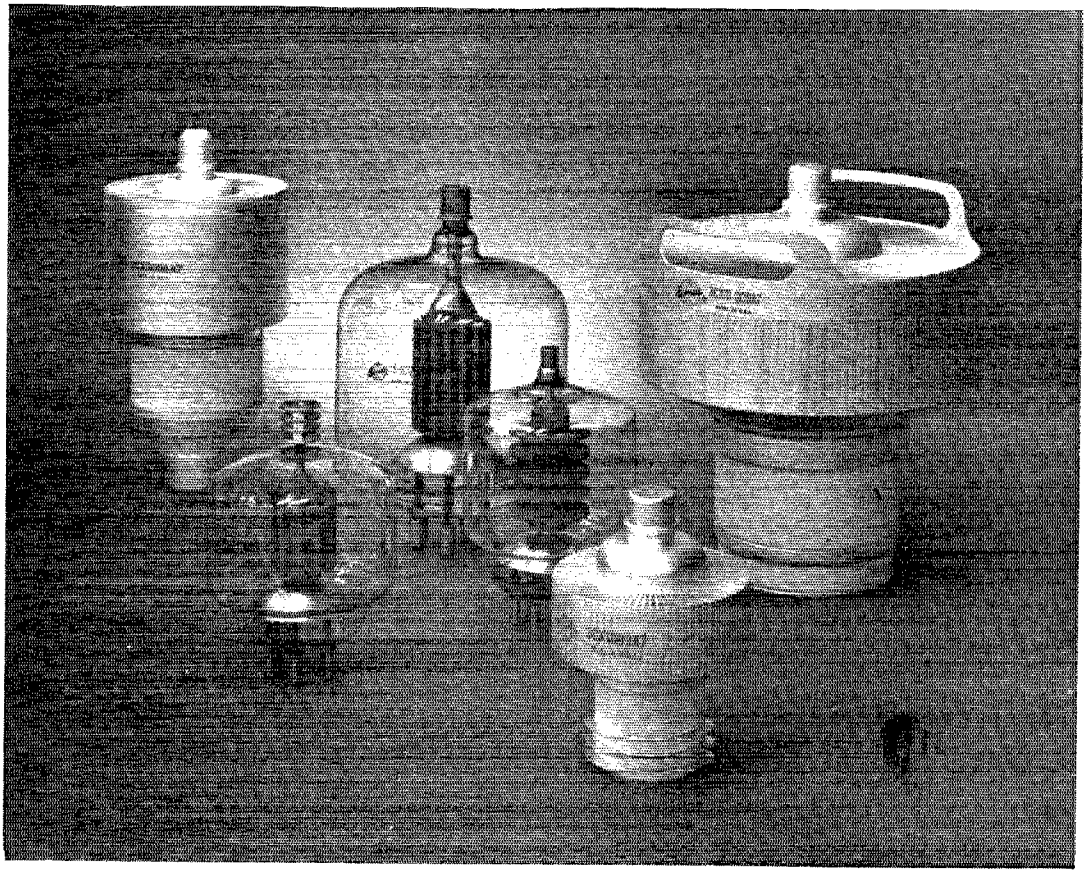
These triodes are designed for use as Class B or C amplifiers in audio or radio-frequency applications. We've got zero-bias triodes ranging from 400 watts to 10,000 watts—the most complete range of zero-bias triodes available.

For more information on EIMAC's line of zero-bias power triodes, write Amateur Services Department, or contact your nearest EIMAC distributor.

TYPICAL OPERATION
CLASS B RF LINEAR POWER AMPLIFIER, GROUNDED GRID

	GLASS			CERAMIC		
	3-400Z	3-500Z	3-1000Z	3CX1000A7	3CX3000A7	3CX10000A7
Plate Voltage, Vdc	3000	3000	3500	2500	5000	7000
Max Signal Plate Current, A	0.333	0.333	0.75	0.800	1.56	5.0
Drive Power, W	32	35	85	60	215	1540
Output Power, W	655	644	1770	1170	5500	24,200
Filament Voltage, V	5.0	5.0	5.	5.0	7.5	7.5
Filament Current, A	14.5	14.5	21.5 23.0	28/33	51	94/104

EIMAC
Division of Varian
San Carlos, California 94070



EIMAC new 3-500Z offers high power gain, less circuitry.

EIMAC's new 3-500Z is a compact, heavy-duty power triode with 500 W plate dissipation, designed for operation in zero-bias Class B r-f or audio amplifiers. The tube can be used as a cathode driven (grounded grid) linear amplifier where low distortion, high plate dissipation, and great thermal anode reserve are desired. The 3-500Z may be operated at plate potentials up to 3000 Vdc, and eliminates expensive, bulky screen and bias supplies. The 3-500Z will replace EIMAC's 3-400Z where additional plate dissipation or greater reserve is desired. Forced-air requirement is approximately equal to that of the 3-400Z, and a blower capacity of only 13 cfm at a back pressure of 0.2 inch is satisfactory for a single tube. The 3-500Z's zero-single plate current is somewhat higher than that of the 3-400Z. When used as a replacement for the latter tube, the 3-500Z's zero-signal plate current can be reduced by addition of a simple zener diode in the cathode return. This technique is particularly suggested if plate potentials over 3000 Vdc are contemplated, or if the tube is used in equipment that is power supply limited.

3-500Z TYPICAL OPERATION*
(Minimum Distortion Products at 1 kW PEP Input)

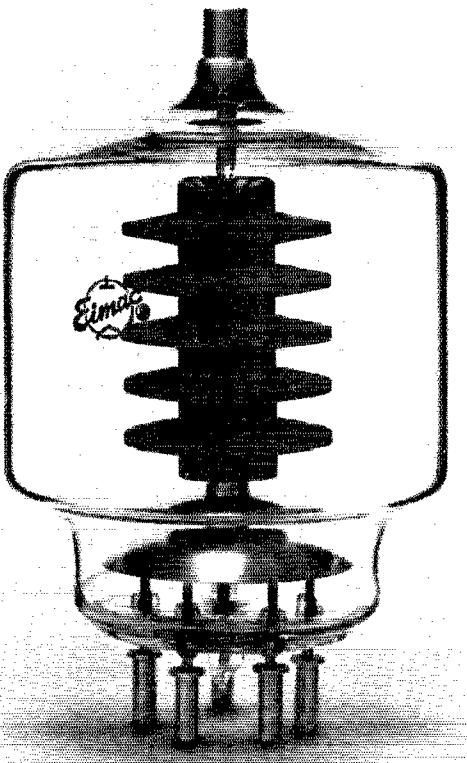
DC Plate Voltage	2500 V
Zero-Sig DC Plate Current**	130 mA
Single-Tone DC Plate Current	400 mA
Single-Tone DC Grid Current	120 mA
Two-Tone DC Plate Current	280 mA
Two-Tone DC Grid Current	70 mA
Peak Envelope Useful Output Power	500 W
Resonant Load Impedance	3450 ohms
Intermodulation Distortion Products	−33 dB

*Measured data from a single tube
**Approximate

EIMAC
Division of Varian
San Carlos, California 94070

Eimac

For additional information, write Amateur Services Department or contact your nearest EIMAC distributor.



W8SB	3935	0000	Dy	989	138	29	K8AYJ
PON-DAY	3935	1600	M-Sat.	287	360	25	WA8OGR
UPEN	3920	2230	Dy	484	31	29	K8ZSM
PON-CW	3645	2400	M-Sat.	161	44	25	VE3DPO
B/R	3930	2230	M-F	769	84	21	K8JED
M6MTN	50.7	2400	M-Sat.	313	44	25	WA8LRC
LENAWEE 2	145.36	0200	Dy	237	49	28	WA8UWQ
NOON 50	50.41	1700	M-Sat.	207	4	25	WA8FXR
QWN	7160	2230	M-W-F	32	53	13	WA8VOG
MEN	3930	1400	Sun.	248	20	4	K8JED
SWM2	145.26	0100	Tue.	74	00	4	W8CVQ

Because of lack of space this is the last time nets that meet only once a week will be listed. New officers: Van Buren County ARC—WA8QHI, pres.; WA8UOD, vice-pres.; WA8PQO, secy.; WA8QGV, treas. Huron Valley ARA—WA8TDA, pres.; K8RUR, vice-pres.; WA8VME, secy.; WA8OPC, treas. Stu Rockafellow ARS—WA8GLH, pres.; WA8TLW, vice-pres.; K8TEI, secy.; WA8QCV, treas. Fordson Elect. Comm'n, Club—WN8WHA, pres.; WN8YAI, vice-pres.; Lenore, secy.; WN8WVA, treas. Tawas RC—K3KRX/8, pres.; W8GZF, vice-pres.; WØGXQ/8, secy.-treas.; WAØLNS/8, act. mgr. K8NKB says the Oak Park RC will have a station at Northland for Michigan Week. WA8PWZ is organizing "Reach," a 14-Mc. Missionary Traffic Net. The East Coast Traffic Net on 7290 at 2130 wants Michigan check-ins. W8CRH is home from the hospital. "OT Nite" will be held May 4 at the Henry Ford Museum. W8FZ has a 2-meter antenna up now. The S.W. Michigan 2 Net sponsors a QSO Contest, handled by WA8DFU. Hazel Park ARC will have a Swap and Shop May 19 at Hazel Park High School. K8VYG is home from Beaumont hospital. W8LL now is in Harper for a hip operation, Room H 492. WA8MAP is back home now. W8MGQ is no more, it's now W8AP. Traffic: (Feb.) K8KMQ 307, W8ZGT 291, W8IWF 277, WA8OGR 224, W8IV 184, WØGXQ/8 184, WA8VOG 179, WA8LXY 171, WN8WQS 147, WA8SQC 139, K8ETU 112, WA8MAM 110, K8GOU 108, K8MXC 106, K3KRX/8 104, W8QQK 101, W8IUC 100, W8RTN 93, K8ZJU 79, WA8IAQ 74, W8EU 61, W8FX 59, WA8ORC 54, W8TDA 53, WN8WHG 48, W8NOH 46, W8MRM 44, W8PBO 39, WA8LRC 34, W8UFS 34, K8HKM 33, W8WVL 31, K8JED 29, W8FWQ 28, W8YAN 27, WA8ENW 26, W8BEZ 24, W8IHD 22, K8EXE 21, WA8KRH 15, WA8MCQ 15, W8SWF 15, WA8GTM 14, W8TBP 13, WA8UYJ 13, WA8VGQ 13, W8JTQ 11, W8ZHB 11, K8BYX 10, W8MO 10, W8RHF 10, WA8TSB 10, WA8VHG 9, WA8UPB 7, W8HKT 6, WA8PIM 5, W8OWG 4, K8VDA 4, W8AUD 3, WA8URE 3. WA8PZT 2. (Jan.) K8HKM 29, WA8AXF 13, K8VDA 10, WA8UYJ 7, WA8PZT 3.

OHIO—SCM, Wilson E. Weckel, W8AL—Asst. SCM: J. C. Erickson, W8DAE. SEC: W8OUU. RM: W8IMI. PAM: K8UBK.

Net	*QNI*	*QTC*	*Sess.*	*Ave*
BN	507	365	57	6.4
OSN		77	26	
OSSBN	1798	1115	54	20.
06mtrN	96	96	29	

W8TZO is now W8AN, W8SQU is now W8BE, W8YHX is now W8BD, W8DJD is now W8BQ and W8ZWE is now W8CL. Suggest that when you modify or renew your license you have a photostat copy of your license to send in along with your 610 form. K8HDO reports that Van Wert ARC's W8FY won the 1967 Field Day trophy from the Ohio Council of ARCs. Sunday Noon Naggers Net's 1968 officers are WA8RIV, pres.; WA8CGY, vice-pres.; WA8SMZ, secy.; WA8SOG, treas. W8IBX and W8RZ received their Advanced Class licenses. The Cincinnati Enquirer's *Ham Call*, edited by WA8COA, tells us Miami U. ARC's 1968 officers are WA8EOH, pres.; K8UNG, vice-pres.; WA8UXQ, secy.-treas. The 40 Meter Talk-in Net meets every Sat. at 1430 EST on 7290 kc. with WA8VZX as net control. The East Coast Traffic Net, on 7290 kc. at 2130 GMT Mon. through Sat., needs Ohio check-ins with WB2VSL as mgr. Mt. Vernon's K8EEN reports that W8CPU received his Extra Class license. Treaty City ARA's *The Beam* informs us that K8QXE joined the Silent Keys. Toledo's *Ham Shack Gossip* says WS8ZNE and WN8ZNT are new Novices, the Toledo Mobile RA held its 13th Annual Auction, the stork brought K8ZCS a new son, WA8THA in attending Ohio U., W8ESN and W8GJS vacationed in Florida, WA8WGB visited Alaska-Japan-Okinawa and the Philippines. Your SCM attended the joint banquet held by the Massillon and Canton ARCs in Massillon. According to the V.H.F. High Banders ARA's *High Banders Log* we learn that the club's 1968 officers are K8WSH, pres.; WA8SJV, vice-pres.; K8TFL, secy.; K8QBY, treas. Inter-City RC's *IRC News Bulletin* tells us the club held an auction and W8DVM is in the hospital. Appointments made in Feb. were W8UBI, K8LFI and WA8RWK as ECs; WA8TWC as ORS; WN8YXH as OVS. Southeast ARC's *Ham-Fax* tells us the club held its Annual Award Dinner, WA8OBY vacationed in Florida and W8ISX, WA8GGE, WA8PXL, WA8THR and WA8YDB received their General Class licenses. Westpark Radiops *The Radiops Log* says the club saw two movies, "More than Meets the Eye" and "Secret Cargo." W4RHZ informs us that those who won the code test at the Cincinnati Stag Hamfest were W9MIO at 45 w.p.m., WA8CFJ at 40, WA4WWT at 30, WA8OCG at 30, WA8KUW at 30, WA4YEK at 30, WB4AIN at 20, WA8LOY at 20, W8HQX at 20, WB4BWR at 20 and WA8AKE at 15. There are 299 QCWA members in Ohio. Of these, 29 hold Extra Class, 165 Advanced, 98 General, 2 Conditional and 5 Technician. W8WEG reports the Lima Area ARC's 1968 officers are WA8RWK, pres.; WB8AEI, vice-pres.; W8LEV, secy.; W8WEG, treas. The Northwest Ohio Six Meter Traffic Net meets Mon. through Fri. at 0100 on 50.750 Mc. and is anxious to affiliate with other Ohio v.h.f. nets. Contact K8WKS. Traffic: W8UPH 1627, WA8AUZ 339, W8NAL 295, W8SZU 256, W8QZK 236, WA8PQL 233, W8IMI 207, K8ONA 173, W8GVX 152, WA8UPI 144, WA8NTA 143, WA8FSX 137, WA8PPX 112, W8QCU 105, WA8OCG 100, W8UDG 97, W8OUU 81, K8BYR 75, W8DAE 75, WA8QFK 68, W8LRE 62, W8TV 60, WAMTS 55, W8ERD 54, WA8IPN 54, W8PAIJ 53,W8OE 52, W8FGD 50, WA8SED 50, WA8ZGC 46, K8UBK 43, WA8PMN 42, K8LXA 38, W8SHP 38, W8HII 37, W8UFM 37, WA8KPN 29, W8WDU 29, K8DDG 28, WA8ADU 27, W8IWX 27, WA8UTX 26, K8QYR 23, K8DHD 22, W8LAG 21, WA8MVV 21, WA8BCX 20, K8LXA 19, WA8MHO 18, K8YDB 18, W8BQ 16, W8BZR 12, K8VCW 11, K8LFI 10, W8QXQ 10, K8DMZ 9, K8WZI 6, W8EEQ 2, W8IBX 1, W8WEG 1.

HUDSON DIVISION

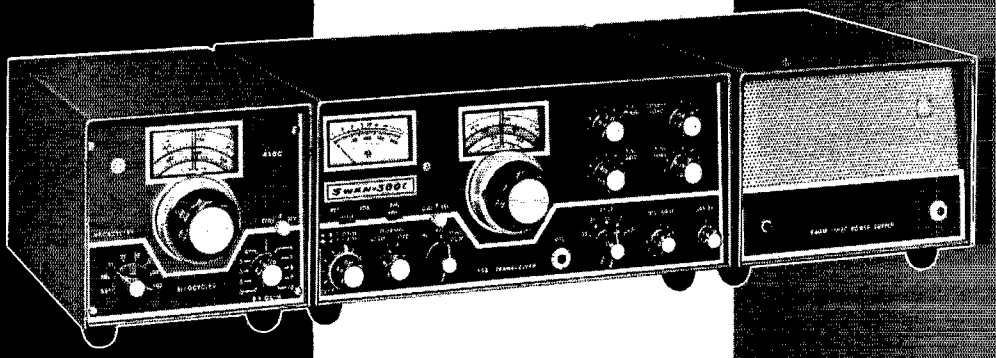
EASTERN NEW YORK—SCM, George W. Tracy, W2EFU—SEC: W2KGC. RM: WA2VYS. PAM: W2IJG. Section nets: NYS on 3670 kc. nightly at 2400 GMT; NYSPTEN on 3925 kc. nightly at 2300 GMT; ESS on 3590 kc. nightly at 2300 GMT. Appointments: W2EAF as OO, WA2BAH as EC, WB2GXF as OVS and WB2VVS as ORS. Endorsements: W2KGC as SEC and WB2VUK as OVS. Our thanks to W2AWF, who served as Albany County EC for over 20 years, and congrats to his successor, WA2BAH. Hats off to RM WA2VYS on making the BPL roster in Feb. The Schenectady Club held "traffic nite" in Feb. with K2HUX, W2PKY, WA2RTZ and W2EFU on the panel of speakers. New Rochelle Club members are now wearing handsome new call-letter name badges. The Albany Club held "old timers" nite and reports that W2GM has restarted the Hermit's Net on 3835 kc. each Sun. at 1600 GMT. Sorry to report K2OTQ, and WA2JWG, as Silent Keys. The ESS Net reports 326 messages handled in Feb. Delmar recently dedicated a new ARPSC room in its newly-constructed town building near Albany operating as K2BUV, according to EC W2GTI. Four transmitters can be operated with direct contact to northeastern Red Cross headquarters in Albany, as well as Albany County Civil Defense. WB2WBA is a new Navy MARS station. WN2BHK is now General, WB2BHK. Thirty-eight attended the Third Annual Dinner of the Overlook Radio Society at which W1CER, of ARRL, was featured speaker. WB2RBG has a new SB-300. Traffic: (Feb.) WA2VYS 502, WB2UHZ 316, WA2VYT 256, W2THE 186, W2EAF 169, WB2VVS 89, WB2SOA 75, W2CVR 73, W2ODC 49, K2SJN 42, W2ANV 39, WB2VJB 35, WA2RTZ 33, WB2FOA 31, WB2ZEC 27, WB2SIH 25, WA2BHN 22, W2UC 19, WB2UEO/1 17, W2URP 14, WA2WGS 14, WA2JWL 10, WA2BRF 9, WB2PZL 3. (Jan.) W2ANV 51.

NEW YORK CITY AND LONG ISLAND—SCM, Blaine S. Johnson, K2IDB—Asst. SCM: Fred J. Brunjes, K2DGI. SEC: K2OVN. PAM: W2EW.

W2EW was whacked by Murphy's Law in Feb. with a flame-out in the HQ-150, the Gonset II went on strike, the Hallicrafter Sky Buddy flipped its dial cord and the AR-22 rotator packed up and went west! The following have picked up two-letter calls: W2CMM is now W2IB; W2CYK is now W2LH; W2GFY is now W2IW; K2YOR is now W2MN. W2UWA made the BPL in Feb. K2UBQ wishes there were more insomniacs who enjoyed waggling a key for his midnight session of the Mike Farad Net. WB2AEK reports the NYSPTEN Policy Committee met in Utica, N.Y., at the beginning of Apr. Freshman baseball practice at C.W. Post College is beginning to interfere with WB2QIL's schedules. W2PF worked many old friends in the annual QCWA QSO Party during the last week end in Feb. Congratulations to K2JFE, who received his Advanced Class license. W2DID, K2EWB, W2IVL, K2JDH, W2MZB and W2WJS are now active on 446.750 Mc. using wide-band f.m. W2UAL is using an HQ-170 receiver now while the 20-year-old HRO-5 is on stand-by duty. WA2QJU, over at Colum-

(*Continued on page 116*)

RELIABILITY QUALITY VALUE



SWAN 410C FULL COVERAGE EXTERNAL VFO

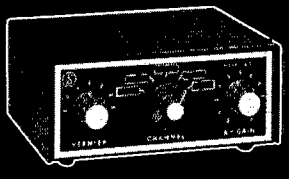
The Model 410C Frequency Control Unit is designed for full coverage of 80, 40, 20, 15 and 10 meters. It is intended for fixed station operation and plugs directly into Model 500C. It may also be used with Model 350C. Eight ranges, 500 kc each, 5 kc calibration.

$115

DUAL VFO ADAPTOR

Provides for the addition of second VFO for separate control of transmit and receive frequencies. Plugs directly into Model 500C and may also be used with Model 350C and other Swan transceivers.

MODEL 22 . . . . .$25



MARS OSCILLATOR

Five crystal controlled channels with vernier frequency control. Plugs directly into Model 500C and may also be used with Model 350C and other Swan transceivers.

MODEL 405X (less crystals) . .$45

SWAN 500C SSB-AM-CW TRANSCEIVER

Five band, 520 watts for home station, mobile and portable operation.

The new model 500C is the latest evolutionary development of a basic well proven design philosophy. It offers greater power and additional features for even more operator enjoyment. Using a pair of the new heavy duty RCA 6LQ6 tetrodes, the final amplifier operates with increased efficiency and power output on all bands. PEP input rating of the 500C is conservatively 520 watts. Actually an average pair of 6LQ6's reach a peak input of over 570 watts before flattopping!

The 500C retains the same superior selectivity for which Swan transceivers are noted. The filter is made especially for us by C-F Networks, and with a shape factor of 1.7 and ultimate rejection of more than 100 db, it is the finest filter being offered in any transceiver today.

For the CW operator the 500C includes a built-in sidetone monitor, and by installing the Swan VOX Accessory (VX-2) you will have break in CW operation.

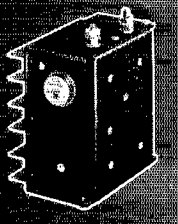
Voice quality, performance and reliability are in the Swan tradition of being second to none.

$520

SWAN 117XC MATCHING AC POWER SUPPLY

Complete A.C. supply for 117 volts 50-60 cycles, in a matching cabinet with speaker, phone jack, and indicator light. Includes power cable with plug for transceiver, and A.C. line cord. Ready to plug in and operate.

$105



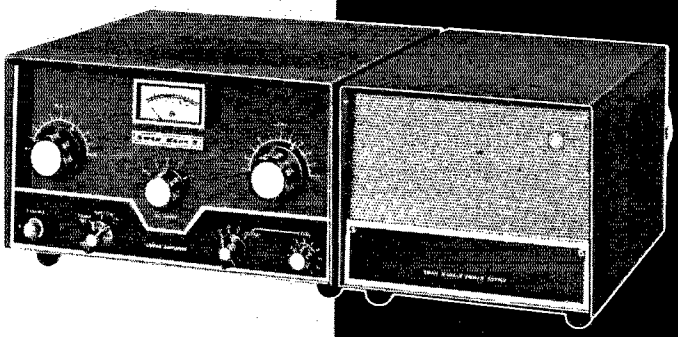
SWAN 14C DC CONVERTER

Converts the above 117XC A.C. power supply to 12 volt D.C. input for mobile, portable, or emergency operation.

$65

SWAN SPEAKS YOUR LANGUAGE . . . ASK THE HAM WHO OWNS ONE

POWER VERSATILITY



Illustrated on these pages is a complete Swan amateur radio station, one of the finest money can buy. Starting with the powerful 500C and an AC power supply, you are immediately on the air with a powerful, high quality signal. Thanks to the excellence of the high frequency crystal lattice filter made especially for Swan by CTS Networks, you will have one of the cleanest and most readable signals on the air, as well as outstanding receiver selectivity and sensitivity. The various accessories from the Swan line may be added at any time to provide greater operating pleasure and performance. The refinements and appearance of Swan products by radio amateurs throughout the world is most gratifying to all of the people at Swan. It is our continuing policy to offer the finest communications equipment we know how to design and manufacture with quality control, craftsmanship and service that stands second to none.

SWAN MARK II LINEAR AMPLIFIER

Two Eimac 3-400Z Triodes provide the legal power input: 2000 Watts P.E.P. in SSB mode or 1000 Watts AM or CW input. Planetary vernier drives on both plate and loading controls provide precise and velvet smooth tuning of the amplifier. Greatly reduced blower noise is provided by a low RPM, high volume fan.

Provides full frequency coverage of the amateur bands from 10 through 80 meters and may be driven by any transceiver or exciter having between 100 and 300 watts output.

$395

MARK II POWER SUPPLY

May be placed beside the Mark II, or with its 4½ foot connecting cable, may be placed on the floor. Silicon rectifiers deliver 2500 volts D.C. in excess of 1 ampere. Computer grade electrolytic filters provide 40 mfd capacity for excellent dynamic regulation. A quiet cooling fan allows continuous operating with minimum temperature rise, thus extending the life and reliability of all components. Input voltage may be either 117 or 230 volts A.C.

$235

PLUG-IN VOX UNIT

Plugs directly into Model 500C, and may also be used with Model 350C and other Swan transceivers.

MODEL VX-2 . . . . $35

SWAN 350C SSB-AM-CW TRANSCEIVER

Our improved standard 5 band model, now in production and still only . . .

$420

SWAN 14-117 12 VOLT DC SUPPLY

Complete D.C. supply for 12 volt mobile or portable operation. Includes cables, plugs, and fuses. Will also operate from 117 volt A.C. by detaching the D.C. module & plugging in 117 volt line cord. Negative ground standard. Positive ground available on special order.

$130

Be sure to visit your Swan dealer soon.

SWAN ELECTRONICS

OCEANSIDE, CALIFORNIA

A subsidiary of Cubic Corporation

bia, says the work gets harder each term, but luckily it also gets more interesting. Sounds like Flatbush RC has a good idea: One meeting each year is devoted to discussions of safety practices! Our lovable old Division Director, W2TUK, certainly made Feb. a busy month by speaking at twelve division radio clubs and even judged a cake-baking contest at one of them! WIICP, ARRL technical staffer, made a hit with the New York RC at its Feb. meeting with his masterful presentation on directive antennas. WB2CSS called his club, the NYC QRP No. 1, from North Africa where he is currently working and wished them happy G.W. birthday! WA2-JKX received a telephone relayed call from his Marine son in Viet Nam. K2HKJ also has a son in Viet Nam. WB2RQF now has his RTTY gear in operation while W2PVY has his RTTY Braille printer almost ready. WA2HYY and his XYL are looking for a new harmonic to arrive this May. WN2DMI made his first out-of-state QSO last Jan. and hooked up with a guy in Jacksonville, Fla. At about the same time, WN2DPW scrounged up enough courage to answer a CQ and enjoyed a fine contact with an Ellingham, Ill., Novice. When WN2DNT started complaining about the zero degree temperature in N.Y.C., a North Bay, Canada, ham gave him quite a kidding. Veteran ORS/OO W2BCB now has an Apache TX-1 and is looking for skeds on any band. Listen, been thinkin' about the old radio club lately? Been wonderin' how it's doin'? Been itchin' for another Field Day after all these years? Been thinkin' about what old what's-his-name is doin'? Ever figure them buncha guys is wonderin' about you? So, why not drop around and see what's doin'? You'll be glad you did! Traffic: (Feb.) WA2UWA 1800, K2UBG 186, WB2RQF 133, W2EW 125, W2GKZ 90, WB2AEK 55, WB2MIZE 37, WB2QIL 33, WB2PJH 31, WB2HYK 28, W2GP 10, W2EC 9. WB2BAW 8, W2PF 6, K2JFE 2.

NORTHERN NEW JERSEY—SCM, Louis J. Amoroso, W2LQP—Asst. SCM: Edward F. Erickson, W2CVW. SEC: WA2ASM.

ARPSC Section Net Schedules

New appointments: WB2RKK as RM for the new NJSN, as listed above; WA2VQP as OBS. Her schedule will be Mon., Wed., Thurs., Sat. and Sun. on 146.7 at 9:15 P.M. We all wish to thank K2ZFI, who retired as SEC for NNJ. He did an excellent job and earned the rest. WA2ASM has accepted appointment as SEC. Please give him your cooperation. Endorsements: W2PEV as PAM for NNJ; K2AGZ, W2BVE and W2TPJ as OOs. WB2RKK as ORS. He also joined Army MARS. WB2-VLC discovered a dipole worked out best on 40, his favorite band. WA2KZF is using a 22er and a sixteen-element beam on 2 meters. WB2BCS has his net on two nights a week. WN2CEW is in the v.h.f. traffic nets. WB2YPQ is giving WB2CLI an assist in getting back on the air. W2NVA is working on his DXCC. K2VVI has a new Comm. III. WA2UDG is operating 6-meter mobile. WA2RJJ lost his quad in a storm. WN2DZE is on with an R4A and a 2NT transmitter. WA2MXT is back on 2. WB2ZBI has an HB KW linear. K2BMI is a weekend DX hound with a total of 145/114. WA2BLB is looking for a c.w.chess player. WA2VQP is the first YL NCS in the ECTN. WB2RHT and WB2RHS have a new v.f.o. in the shack. WB2IYO expressed his thanks to all for the cards and mail during his recent 3-week stay in the hospital. He is on the mend. WB2MVI is giving a refresher traffic-handling course for the v.h.f. nets. WA2-TNA has his rig problems cleared up. Congratulations to WN2CKL on passing the General Class exam. WN2-DRJ's claimed score was over 17,000 for the Novice Round-up. WN2EOG is a new ham in the Chester area. WB2EES has applied for membership in c.d. and Army MARS. Our N.N.J. section lost a distinguished pioneer with the passing of W2MM, of Englewood. He was president of the QCWA. His many friends will miss him. Traffic: (Feb.) WB2RKK 609, WA2TEK 372, WB2DDQ 229, WB2VLC 221, WA2TBS 195, WB2NSV 170, WA2IGQ 168, WB2ZSH 142, K2KDQ 140, WB2SEZ 135, W2PEV 128, WB2NZU 95, WB2TKP 66, WB2EES 58, WA2ACJ 56, WA2JSB 56, WB2WFO 42, W2LQP 31, W2QNL 30, WB2-BXK 29, W2BSC 28, WA2NJB 28, WA2VQP 28, WA2CCF 26, WB2PXO 25, W2DRV 24, WA2KZF 23, WB2BCS 22, WA2ZDA 17, W2TFM 16, W2EWZ 15, K2JSJ 15, K2ZFI 14, WB2KPD 10, K2MFX 8, WA2WGR 8, WB2SJH 6, WN2CEW 5, WB2YPQ 2, WN2DRJ 1, WB2YBE 1. (Jan.) W2DRV 26, W2BSC 16, K2EQP 3, WB2JWB 1. (Dec.) W2EWZ 41.

MIDWEST DIVISION

IOWA—SCM, Owen G. Hill, WØBDZ—Asst. SCM: Bertha V. Willits, WØLGG. SEC: KØBRE. PAM: WØNGS. RM: WØTIU. There are several appointees whose certificates need endorsing, so please check yours. They need endorsing to be kept in force. A "well-done" to KØAZJ and WØDRE for their continuous conscientious OO activity. The 50-Mc. activity of WØPFP includes working W2DRZ on scatter, and to Florida and Texas and he has a sked with WØQIN, Minneapolis, with good results. According to the Ia. Wx Net, weather information will be transmitted on 3950 kc. during periods of possible severe weather. KØGEY, a new OVS, reports several aurora openings, and he is getting ready for 432 Mc. WNØSZB is a new Novice in Grinnell. TLCN operated three SET sessions Feb. 15. QTC 1.

Ia. 160-Meter Net	QNI 826	QTC 27	Sess. 29
Ia. 75-Meter Net	QNI 1289	QTC 156	Sess. 25
TLCN (Tallcorn Net)	QNI 88	QTC 27	Sess. 25

Traffic: (Feb.) WØLGG 715, WØLCX 597, WØCZ 275, WØNGS 32, WAØDYV 31, KØTDO 14, KØQKD 13, KØBRE 12, WAØIYH 12, WAØNRC 10, WAØAIW 8, WAØMIT 6, WØGKN 4, KØGHH 3, WAØOTE 3. (Jan.) WAØSDC 4.

KANSAS—SCM, Robert M. Summers, KØBXF—SEC: KØEMB. PAM: KØJMF. RMs: WAØMLE, WAØJFV. V.H.F. PAMs: WAØCCW, WØHAJ, WAØLSH. Feb. net reports: Ks. P.O. Net, 29 stations, QNI 903, QTC 226; KSBN, QNI 758, QTC 160, 28 sessions; KPN, QNI 228, QTC 32; KWN, QNI 670, QTC 62, 30 sessions; Kans. EC Net, QNI 67, QTC 15; QKN, QNI 24, QTC 5, 4 sessions. Zones 7, 9, 11, 15 and Newton v.h.f. AREC nets report 25 sessions, 113 QNI, 8 QTC. Other v.h.f. activity gives us an additional 25 sessions, 150 QNI and 4 QTC, comprising 2 sections of the Kans. PI Net ACARA, NCK 2-Meter Net and Coffeyville Radio Club. The South Central Section of the Kans. PI Net meets at 0230Z Sat. NE and North Central Sections still open at 0305Z on 145.34 Mc. Lo-Band AREC Nets, Zones 7, 9, 10, 11, 13 and 15, report 27 sessions, 384 QNI 45 QTC. Zone 11 is tops in that group with a combined Jan. and Feb. report totaling 209 QNQ, 44 QTC in 8 sessions. KØJDC/5 is stationed at Altus AFB, Okla., with a 5BE 33 and a 75-meter dipole his link back to Kansas. A new General Class license in Leavenworth is WAØTJU. Correction—Family of four hams in Wichita—Dan WØDKU, Gaye WAØIAS, Peggy WAØHYK, Kitty WAØQPK, KØJMF and myself were guests at the El Dorado Annual Banquet Feb. 17. A wonderful program highlighting the twenty years of the Flint Hills Amateur Radio Club was presented. Johnson Co. Amateur Radio Club's new club bulletin is *Feed Back*. Traffic: (Feb.) WØHIN 247, WAØ-MLE 153, WAØLLC 145, KØJMF 144, KØLPE 87, WØ-LXA 85, WØPSN 78, KØMRI 67, KØHGI 65, WAØNDZ 46, WAØQOH 37, KØEMB 33, WAØCCW 31, WAØKDJ 28, WAØNFP 27, WAØJOG 24, KØUVH 20, WAØJFC 13, WAØOZP 12, KØGIG 6, KØGZP 6, WØFDJ 4, WAØ-JFV 4, WAØKDQ 4, KØJID 3, WAØSVO 3, WAØTAS 3, WØZGK 3, WAØTCM 2. (Jan.) WØZGK 35.

MISSOURI—SCM, Alfred E. Schwaneke, WØTPK—SEC: WØBUL. Renewed appointments: WØGCL ORS; KØRPH as ORS and OPS; WØBV as OVS and ORS. WNØSBP is a new OVS. KØYGR is now WØBV. WAØ-MGV passed the Adv. Cl. test. WAØRMX is a new Gen. Cl. WNØTSI is a new Nov. Cl. in Liberty. WNØSBP has reactivated the Mo. Slow Speed Net (MSN). It meets daily on 3715 kc. at 0300 GMT (9 P.M. CST). MSN af-

1968 MISSOURI QSO PARTY

Starts 2300 GMT Saturday May 25
Ends 0300 GMT Monday May 27

This is the 5th Missouri QSO Party sponsored by the Northwest St. Louis Amateur Radio Club. There is no time limit or power restrictions, and the same station may be worked on more than one band, phone or c.w. for additional contact credits.

Exchange: QSO number, RS(T) and QTH. Missouri stations send county; stations outside Missouri send state, province or country.

Scoring: For Missouri stations; count one point per contact, total contacts multiplied by the number of states, provinces and countries. Out-of-state stations; 2 points for each Missouri contact multiplied by the number of different Missouri Counties worked (possible 115).

Awards: A certificate to the highest scorer in each State, Canadian province and foreign country (minimum of 5 contacts). The top 5 single operator stations in Missouri and the 3 top clubs (no aggregate scores) in the world will receive awards.

Frequencies: c.w. 3520 7025 14050 21050 khz., phone 3950 7225 14330 21350 khz. Check 3950 at 0300 GMT, 7225 khz at 1600 GMT and 14330 khz at 2000 GMT on May 26 for Missouri stations.

Mailing deadline: Logs must be in by June 30, 1968. They should be sent to John Carter, KØIFL, 4236 Shaw Blvd., St. Louis, Mo. 63110. Be sure to include an s.a.s.e. for a copy of the results.

(*Continued on page 118*)

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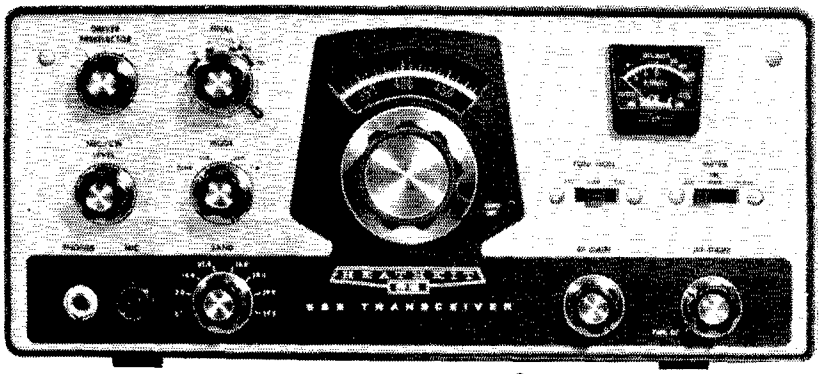

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Kit HP-13, DC power supply, 7 lbs., $7 mo. **$64.95**
Kit HP-23, AC power supply, 19 lbs., $5 mo. **$49.95**
Kit SB-600, 8 ohm speaker, 6 lbs. **$18.95**

HW-100 SPECIFICATIONS — RECEIVER. Sensitivity: Less than .5 microvolt for 10 dB signal-plus-noise to noise ratio for SSB operation. **Selectivity:** 2.1 kHz minimum at 6 dB down, 7 kHz maximum at 60 dB down (3.395 MHz filter). **Input:** Low impedance for unbalanced coaxial input. **Output impedance:** 8 Ω speaker, and high impedance headphone. **Power output:** 2 watts with less than 10% distortion. **Spurious response:** Image and IF rejection better than 50 dB.

TRANSMITTER. DC Power input: SSB: 180 watt P.E.P. (normal voice: continuous duty cycle). CW: (A1 emission) 170 watts (50% duty cycle). **RF Power output:** 100 watts on 80 through 15 meters; 80 watts on 10 meters (50 Ω nonreactive load). **Output impedance:** 50 Ω to 75 Ω with less than 2:1 SWR. ***Oscillator feedthrough or mixer products:*** 55 dB below rated output. **Harmonic radiation:** 45 dB below rated output. **Transmit-receive operation:** SSB: PTT or VOX. CW: Provided by operating VOX from a keyed tone, using grid-block keying. **CW Sidetone:** Internally switched to speaker or headphone, in CW mode. Approximately 1000 Hz tone. **Microphone input:** High impedance with a rating of —45 to —55 dB. **Carrier suppression:** 45 dB down from single-tone output. **Unwanted sideband suppression:** 45 dB down from single-tone output at 1000 Hz reference. **Third order distortion:** 30 dB down from two-tone output. **RF Compression (TALC):** 10 dB or greater at .1 ma final grid current. **GENERAL. Frequency coverage:** 3.5 to 4.0; 7.0 to 7.3; 14.0 to 14.5; 21.0 to 21.5; 28.0 to 28.5; 28.5 to 29.0; 29.0 to 29.5; 29.5 to 30.0 (megahertz). **Frequency stability:** Less than 100 hertz per hour after 30 minutes warmup from normal ambient conditions. Less than 100 Hz for ±10% line voltage variations. **Modes of operation:** Selectable upper or lower sideband (suppressed carrier) and CW. **Dial calibration:** 5 kHz. **Calibration:** 100 kHz crystal. **Audio frequency response:** 350 to 2450 Hz. **Front panel controls:** Main tuning dial. Driver tuning and Preselector. Final tuning. Final loading. Mic and CW Level control. Mode switch. Band switch. Function switch. Meter switch. RF Gain control. Audio Gain control. **Side controls:** Meter Zero control; Bias; VOX Sensitivity; VOX Delay; ANTI-TRIP. **Internal controls:** Carrier null; neutralizing. **Tube complement:** OA2 Regulator (150 V); 6AU6 RF amplifier; 6AU6 1st receiver mixer; 6AU6 Isolation amplifier; 6AU6 1st IF amplifier; 6AU6 2nd IF amplifier; 6BN8 Product detector and AVC; 6AU6 VFO Amp.; 6CB6 2nd transmitter mixer; 6CL6 Driver; 6EA8 Speech Amplifier and cathode follower; 6EA8 1st transmitter mixer; 6EA8 2nd receiver mixer and relay amplifier; 6EA8 CW sidetone oscillator and amplifier; 6GW8 Audio amplifier and audio output; 12AT7 Heterodyne oscillator and cathode follower; 12AT7 VOX amplifier and calibrator oscillator; 12AU7 Sideband oscillator; 6146 Final amplifiers (2). **Diode complement:** 6 Germanium Diodes: Balanced modulator, RF sampling, and crystal calibrator harmonic generator; 9 Silicon Diodes: ALC rectifiers, anti-trip rectifiers, and DC blocking; 1 Zener Diode: cathode bias. **Transistors:** MPS105 FET-VFO; 2N3393 — Voltage regulator. **Rear apron connections:** CW Key jack; 8 Ω output; ALC input; Power and accessory plug; RF output; Antenna; Spare. **Power requirements:** 700 to 850 volts at 250 ma with 1% maximum ripple; 300 volts at 150 ma with .05% maximum ripple; —115 volts at 10 ma with .5% maximum ripple; 12 volts AC/DC at 4.76 amps. **Cabinet dimensions:** 14-13/16" W. x 6-5/16" H. x 13-3/8" D.

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fords a good opportunity to learn c.w. net procedure and improve code operation. All stations, whether Nov. Cl. or higher, are invited to check in, especially if you have K.C. traffic. The Lees Summit High School ARC visited at WNØSBP's shack Feb. 15. WAØPWR reports that Truman High School in Independence is organizing an amateur radio club. Members of the ARC of Central Mo., Sedalia (WAØSDO), are converting 15 mobile f.m. units for the 6-meter net. The Mo. Post Office Net (MoPON) changed frequency to 3930 kc. as of Feb. 1. KOONK prepared 10 pages of copy on Amateur Radio History for the Saline Co. history book. The Parkway High School ARC (WAØQFT) has a new 60-ft. tower with a TH-3 beam. KØDEQ received DXCC. Net reports:

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
MEN	3885	2330Z	M-W-F	12	182	6	WØBUL
MON	3585	0100Z	Daily	27	233	220	WØTDR
MNN	7063	1900Z	M-Sat.	25	106	19	WØOUD
MoSSB	3963	2400	M-Sat.	26	726	172	WØRTO
MTTN	3940	2300Z	M-F	24	279	77	WAØELM
MoPON	3930	2100Z	M-F	21	243	115	WØHVJ
MoPON	(Jan.)			20	238	112	WØHVJ
QMO	7075	2200Z	Sun.	4	19	6	WAØFKD
PHD	50.4	0130Z	Tu. (GMT)	4	86	3	WAØKUH
MSN	3715	0300Z	Daily	6	6	6	WNØSBP

Traffic: (Feb.) KOONK 1626, KØYBD 233, KØAEM 164, WOOUD 160, WAØHTN 142, WØZLN 114, KØRPH 97, WAØPZI 88, WØTDR 81, WAØJIH 60, WAØHVJ 53, KØVVH 49, WØBV 43, WØRTO 25, WAØELM 23, WAØCXI 22, WØBUL 21, KØREV 166, WAØFKD 14, KOORB 14, WAØOZO 14, WAØNOK/Ø 12, WØGBJ 8, WAØRMW 8, KØDEQ 6, WAØKUH 6, WAØIHV 4, KØGOB 3, WØKIK 1. (Jan.) WØHVJ 96, KØRPH 66, WAØFKD 37, WAØPYJ 33, WAØNOK/Ø 5.

NEBRASKA—Acting SCM, V. A. Cashon, KØOAL—SEC: KØOAL. Monthly net reports for Feb.: Nebr. Emergency Phone Net, WAØGHZ, QNI 1189, QTC 51. Nebr. Morning Phone Net, WAØJUF, QNI 1185, QTC 41. West Nebr. Phone Net, WØNIK, QNI 685, QTC 39. Nebr. C.W. Net (NEB), WAØQMZ, 0100Z session, QNI 69, QTC 44; 0400Z session, QNI 70, QTC 38. AREC C.W. Net, WAØEEI, QNI 12. AREC Phone Net, WØIRZ, QNI 149, QTC 3. Nebr. Storm Net, WAØLOY, 2330Z session, QNI 781, QTC 59; 0030Z session, QNI 1040, QTC 94. Cornhusker Teenage Net, WAØOCW, QNI 267, QTC 37. 160-Meter Phone Net, WAØCBJ, QNI 598, QTC 8. Dead End Net, WAØMCW, QNI 233, QTC 16. The Nebr. C.W. Net (NEB) has changed frequency to 3782 and meets daily. WAØQMZ succeeds KØAKK as RM and solicits support. The Lincoln ARC is now sponsoring an Explorer Scout Troop in Radio. Traffic: WAØDOU 420, WAØQMZ 131, WAØLOY 81, WAØPOC 68, KØKJP 54, WAØORO 54, WAØOCW 51. WAØGHZ 49, KØJTW 39, KØDGW 24, KØQIX 22, KØJFN 16, WAØJUF 15, WAØPCC 15, KØECH 14, WAØGVJ 12, KØIXY 12, WØBFV 11, KØJPP 11, WAØEEI 10, WAØGAT 9, WAØIXF 8, KØFRU 7, WØNIK 7, WAØPIF 7, KØFJT 6, WØHTA 6, WAØIVV 6, KØODF 6, WAØCBJ 5, WAØIBB 5, KØOAL 5, WAØJKN 4, WØLJO 4, WØVEA 4, WAØIBL 3, WØBFN 2, WØEGQ 2, WAØOMY 2, WAØRPB 2, WØYFR 2, WØNNL 1, WØSAI 1, KØSFA 1.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, John J. McNassor, W1GVT—SEC: W1PRT. RM: W1ZFM. PAM: W1YBH. Net reports for Feb.:

Net	*Freq.*	*Days*	*Time*	*Sess.*	*QNI*	*QTC*
CN	3640	Daily	18:45	29	387	433
		Mon.-Sat.	18:00			
CPN	3880	Sun.	10:00	29	473	298

High QNI: CN—WA1GOI, WA1HSN, W1ZFM, W1WCG. CPN—WA1EG 29, WA1FVH and W1GVT 26, W1YBH 25, W1YU 23, WA1EEJ and K1EIC 22, W1LUH 20, WA1-FXS 18, WA1HEW, W1MPW and K1SRF 17. SEC W1-PRT would appreciate the support of all clubs in his efforts to provide an active EC for all areas of the state. News letters from our Director, W1QV, keep clubs well informed. Please circulate this information and keep him up to date on the activities of your club. The Candlewood ARA will sponsor a C'B/Novice program. The Talcott Mt. UHF Society made considerable progress during its first year of operation. W1EFW continues his fine 1RN Bulletin. The *Murphy Message* newsletter announces a new contest club for this area. Contact W1-YYM or W1ARR for information. The Southington ARC has started a Novice Class. New officers of the Meriden ARC are W1WKH, pres.; K1WJL, vice-pres.; WA1DTE, secy. It is with deep regret that we add the call of W1ZL to the list of Silent Keys. Carl was a regular member of CN. Congratulations to: W1RGJ for Extra Class; WA1DIH for Advanced Class; WN1IXJ and WN1JCC new Novice Class; WA1CJE for DXCC and WAS. It will be my pleasure to continue as SCM for another term. My sincere thanks to all who helped make it so enjoyable. A special thanks for net members and the overworked NCSs and especially to SEC W1PRT, RM W1ZFM and PAM W1YBH. Traffic: (Feb.) W1YU 439, W1EFW 415, WA1HSN 282, WA1FVH 279, K1WIM/1 200, K1RQO 191, W1EEN 144, W1AW 136, WA1HEW 126, WA1CYV 119, WA1HWX 118, W1WCG 111, WA1FNJ 105, W1GVT 92, WA1IEG 79, WA1FGN 74, W1KAM 71, W1-BDJ 56, WA1GGN 56, W1MPW 51, WA1GIX 43, W1YBH 38, WA1GUD 33, W1QV 29, K1SRF 28, WA1FXS 27, WA1GFW 27, W1CTI 26, K1SXF 26, WA1GOI 22, K1LMS 16, W1CUH 6, K1CEC 5, K1YGS 5, W1BNB 4, W1CSM 4. (Jan.) WA1IUL 149, K1RQO 90, WA1GIX 50, WA1DIU 34, W1NFG 11, W1WHR 9.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, Jr., W1ALP—New appointments: WA1EYD and W1ZMO as ECs. W1PW is a Silent Key. WN3ITR is going to MIT. The Whitman RC has voted to affiliate with ARRL. W1DJ is ex-W1DPI. WN1ISH has a two-element beam for 15 and worked ZC4GM. WA1HCL (15) is now Advanced Class. Middlesex ARC is showing a series of technical films. W1IAU is working at WOKW. W1BGW is on 75. WA1IYI is putting up a curtain array on 80 for contest work. W1SMO is becoming active again. The South Shore Club held a meeting with some code work and W1DTY spoke on his new magazine; he also was a Quannapowitt RC. K1ZCU is getting ready for the yearly science fair at school. WA1ETC still is on the Avon AREC Net, on 51 Mc. EC K1QAM is civil defense director for Mansfield. WA1ELV is going to handle AREC publicity. WN1IDP has a DX-60B and a dipole on 15. W1EKG, now retired, is having a ball working DX. W1BB sends a copy of his 160-meter DX bulletin. W1RST and two others have been busy writing a book, "Vigor for Men Over 30." WA1ECY is in the Army at Fort Dix, N.J., and going to Radio Communications School. W1-EIR is ex-W1JOW. WA1FBH is working on a special project. W1CFU is on 160 c.w. with an RK-38. K1EMU has a new dipole for 6. W1OIW is taking flying lessons at Norwood. W1DYS made up some coffee-can cavity filters to get rid of channel 2. W1USH has the RTTY rig on receive only. W1AYA is mobile on 40 on the way to work. The Newton C.D. meets every Tue. night at 2000 at City Hall. Officers are W1CFU, pres.; W1RNG, secy.; W1USH, treas. W1FLD is back on 2. W1LMU, on 160 c.w. and phone, is going after WAS. W1RM, on 3999 every morning, is going to put on a demonstration for the Newton Retired Men's Club. New officers of the South Eastern Mass. ARA, W1AEC, are W1AIE, pres.; W1WID, vice-pres.; WA1FNM, secy.; WA1CRA, treas. The Wellesley ARS held a meeting and Mr. John Mack spoke on "Teletype Codes for the Amateur." WA1DPX is active on 2 and 6, W1AX is ex-W1JYH. The Capeway RC met at K1LOE's. K1ROA got married. W1PEX and WA1EYY made the BPL. W1FJI has a pair of 813s on the air. W1DAL has WAC and WAS. W1MX will be on 220 soon. WA1DEC/DED vacationed in Bermuda. WA1-CRA and his XYL had their 7th harmonic. W1AEC has a new antenna for 6. WN1JDY is new in Gloucester. WA1GBT has an ARC-5 for v.f.o. K1EPL has the call WA1JDH for his QTH in Yarmouth. Fall River RC held an auction. Our sympathy to W1WK on the death of his mother. WA1BFD worked into VE3- and W8-Land on 6. Appointments endorsed: W1AX, W1FJI, W1AAR, W1BB as OPSs; W1s BB, CT, AX ,K1YKT. WA1FSI as ORSs; K1QAM as EC. EM2MN had 22 sessions, 133 QNIs, 178 traffic. W1AYG is mobile on 75 and is on 2 and 10. W1NF has been endorsed as OO. Art has been a ham for 66 years. The 6-Meter Crossband Net had 21 sessions, 153 QNIs, 29 traffic. K1BGK is feeling pretty good, he says. K1OKE has been endorsed as PAM. The EMNN had 11 sessions, 43 QNIs, 19 traffic. K1ZUP is the new EC for Wakefield. Traffic: (Feb.) W1PEX 721, WA1EYY 527, W1OJM 344, W1EMG 238, WA1FAD 192, W1FJI 186, W1DAL 129, WA1HUM 115, K1CLM 91, W1-CTR 67, WA1DPX 60, W1DOM 36, W1MX 31, W1SMO 30, WA1FKQ 22, W6JCF/1 22, WA1DEC 20, K1LCQ 17, W1CT 16, WA1AJN 13, WA1GCH 13, K1OKE 12, WA1-DED 8, K1YUB 6, W1DKD 4, K9AQP/1 4, W1AEC 2, W1AYG 2, WA1DJC 2, WA1GBT 1. (Jan.) W1MX 44, WA1GCH 42, W1JDP 20, W1AEC 11, K1EPL 6, K1-YUB 5.

MAINE—SCM, Herbert A. Davis, K1DYG—SEC: K1CLF. RM: W1BJG. PAM: WA1FLG. Traffic nets: Sea Gull Net, Mon. through Sat. on 3940 kc. at 1700, Pine Tree Net, daily on 3596 kc. c.w., at 1900. With regret we advise that K1PII is a Silent Key. He was active on most of the bands and nets and will be sadly missed by all who knew him. WA1BEB plans on a couple of treks this summer to some high mountains to operate 2-meter portable. Some of the fellows are getting their Air Force MARS calls and will be active there. The Ellsworth High School Radio Club is holding theory classes

(*Continued on page 120*)

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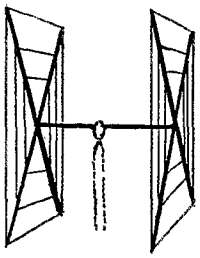


CUBICAL QUAD ANTENNAS — these two element beams have a full wavelength driven element and a reflector; the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount; uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a foolproof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you!

10/15/20 CUBICAL QUAD SPECIFICATIONS

Elements: A full wavelength driven element and reflector for each band.

Frequencies: 14-14.4 Mc.; 21-21.45 Mc., 28-29.7 Mc.

Dimensions: About 16′ square.

Power Rating: 5 KW.

Operation Mode: All.

SWR: 1.05:1 at resonance.

Boom: 10′ × 1¼″ OD, 18 gauge steel, double plated, gold color.

Beam Mount: Square aluminum alloy plate, with four steel U-bolt assemblies. Will support 100 lbs.; universal polarization.

Radiating elements: Steel wire, tempered and plated, .064″ diameter.

X Frameworks: Two 12′ × 1″ OD aluminum 'hi-strength' alloy tubing, with telescoping ⅞″ OD tubing and dowel insulator. Plated hose clamps on telescoping sections.

Radiator Terminals: Cinch-Jones two-terminal fittings.

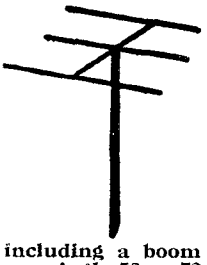
Feedline: (not furnished) Single 52 ohm coaxial cable.

Now check these startling prices — note that they are *much lower* than even the bamboo-type:

10-15-20 CUBICAL QUAD.....$35.00
10-15 CUBICAL QUAD..... 30.00
15-20 CUBICAL QUAD..... 32.00
TWENTY METER CUBICAL QUAD. 25.00
FIFTEEN METER CUBICAL QUAD. 24.00
TEN METER CUBICAL QUAD..... 23.00
(all use single coax feedline)

BEAMS

The first morning I put up my 3 element Gotham beam (20 ft) I worked YO4CT, ON5LW, SP9ADQ, and 4U1ITU. THAT ANTENNA WORKS! WN4DYN



Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history! Each beam is brand new! full size (36′ of tubing for *each* 20 meter element, for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; ⅞″ and 1″ aluminum alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

2 El 20.....	$16	4 El 10.....	$18
3 El 20.....	22*	7 El 10.....	32*
4 El 20.....	32*	4 El 6.....	15
2 El 15.....	12	8 El 6.....	28*
3 El 15.....	16	12 El 2.....	25*
4 El 15.....	25*	*20′ boom	
5 El 15.....	28*		

ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, T12FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4AQL, SM5BGK, G2AOB, YV5CLK, OZ4H, and over a thousand other stations!

V40 vertical for 40, 20, 15, 10, 6 meters.....$14.95
V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters. $16.95
V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters...$18.95

How to order: Send check or money order. We ship immediately upon receipt of order by railway express, shipping charges collect.

GOTHAM, 1805 Purdy Ave, Miami Beach, Fla. 33139

to help the members to further their licenses. The boys are active on c.w. and gaining all the time. They have a new Novice, WN1JDM, and a General, WA1HPL. Traffic: W1BJG 312, W1GU 143, K1SOW 81, W1NND 38, WA1FLG 36, WB2ZOH/1 18, WN1HZJ 2.

NEW HAMPSHIRE—SCM, Robert S. Mitchell, W1-SWX/K1DSA—SEC: K1QES. PAM: K1APQ. RM: K1-BCS. The GSPN meets at 0000Z Mon. through Fri. and Sun. at 1430Z. The NHEPN meets at 0000Z Sat. Both of the above are on 3954 kc., while on 3685 kc. the c.w. net, VTNHN, starts at 2330Z Mon. through Fri. We welcome new hams in Hampstead, WA1JAM and WA1JAN. Endorsements: K1AEG, K1NBN, W1PYM and W1SWX on OOs and W1BYS as OPS. WA1EUJ has a new NCX-3. WN1IIH passed the General Class exam and will be joining the c.w. net soon. New Nashua Mike and Key Club officers: K1SYJ, pres.; W1GWE, vice-pres.; W1-RCC, secy.; W1YJC, treas.; W1AEM, act. mgr. New Hampshire hams are rare on c.w. and K1PQV has been helping "outsiders" with contacts. W1MHX is active in his town's RACES program. K1QES reports intentional interference on NHEPN. WA1DLI is Asst. EC for MV-AREC doing liaison to the 75-meter N.H. nets. Concord Brasspounders president, W1FTZ, has a new Advanced Class ticket and reports the WNH award still is available from the club. K1QES says the SET was successful and I also thank all who participated. Traffic: K1BCS 109, K1PQV 94, WA1EUJ 57, W1MHX 42, K1QES 18, WN1IIH 1.

RHODE ISLAND QSO PARTY

May 18-20

The Fidelity Amateur Radio Club, K1NQG, announces the Rhode Island QSO Party and invites world-wide participation.

Rules *Time:* 2300 GMT May 18 to 0200 GMT May 20. Phone and c.w. are considered the same contest. A station may be worked twice per band, once on phone and once on c.w. *General Call:* "CQ RI" R.I. stations will identify themselves by signing "DE RI" on c.w. and "Rhode Island calling" on phone. Only phone-to-phone and c.w.-to-c.w. contacts count. *Suggested Frequencies:* 1812 3530 3890 7030 7230 14030 14240 21060 21400 28600 50.2 and 14. Phone activity times: 0100 0400 1500 1900 2300 and 0100 GMT. *Exchange:* QSO number, RS(T) and county (for R.I. station) or section. *Scoring:* Outside stations multiply the number of stations worked times the number of R.I. counties (maximum of 5). R. I. stations multiply the number of stations worked times the total number of sections. *Awards:* Awards will be sent to the highest scoring station in each section and 1st and 2nd place awards in each R. I. county. Novice and Technician awards will also be issued: *Logs:* Logs must, in addition to the above information, show date, time in GMT, band and emission. They must be received no later than June 20, 1968. Send logs to: Frank Carroll Jr., WA1EEJ, 167 Legion Way, Cranston, Rhode Island 02910.

RHODE ISLAND—SCM, John E. Johnson, K1AAV—SEC: K1LII. RM: W1BTV. PAM: W1TXL. V.H.F. PAM: K1TPK. RISPN report: 29 sessions, 344 QNI, 83 traffic. The W1AQ of Rumford is now on 6 and 2 meters with a new rig. The club now has rigs on all bands and is equipped to operate on emergency power if necessary. Plans are being made for Field Day and a beam with a rotator will be purchased to be used for FD. WA1EEJ, net manager, of the Teen Age Net, reports that the net has been very active. He has received a QSL card from KH6IJ and has been very active in work on the nets. Rhode Island Amateur Week will take place again in this, the smallest state. On May 11 through May 20 several activities will take place. K1RI, the official station during the week, will operate from the Midland Mall. Frequencies and requirements for the R.I. Amateur Week certificate will be announced later. It is hoped that K1RI will handle several messages during the week. R.I. hams who would like to operate in the C.W. Net should contact RM W1BTV. He will be glad to instruct you on net operation. Traffic: WA1EEJ 779, W1BTV 102, K1YEV 71, K1VPK 21, WA1CSO 19, K1TPK 17, WA1FRZ 11.

VERMONT—SCM, E. Reginald Murray, K1MPN—

Net	*Freq.*	*Time*	*Days*	*QNI*	*QTC*	*Mgr.*
Gr. Mt.	3855	2130Z	M-S			W1VMC
Vt. Fone	3855	1300Z	Sun.			W1UCL
VTNH	3685	2230Z	M-F	124	103	K1UZG
VTCD	3990½	1400Z	Sun.	36	26	W1AD
Carrier	3855	1300Z	M-F	260	1	W1KKD
VTSB	3909	2130Z	M-S	650	147	W1CBW
		1230Z	Sun.			

All times above are summer schedules. Note the new a.m. Carrier Net on 3855 at 9 A.M. Mon. through Fri. Congrats to new General WA1JBM, in Rutland. Bouquets to W1HRG for his help and assistance during WA1DHK's confinement in the hospital. K1IJJ has WAC 8 times on his dipole inside barn. W1AIM is stationed at Chanute, Ill. AFB. Traffic: W1FRT 52, K1UZG 34, K1MPN 32, W1MRW 20, WA1GUV 10, W1KJG 4, K1IJJ 4.

WESTERN MASSACHUSETTS—SCM, Norman P. Forest, W1STR—SEC: Open. RM: W1DWA. WAIN (c.w.) meets at 7 P.M. every evening and invites you to call in. Attendance in the order of activity in Feb. was: K1IJV, W1DVW, K1WZY, WA1ISJ, W1AMI, W1DWA. Total traffic was 135, sessions 29, QTC 105, QNI 126 for 17 days in Feb. The most active stations were WA1HXF, WA1EEJ and W1FJI. Acting PAM W1FJI has agreed to manage this phone net until someone is found from Western Mass. to manage it. We are open for suggestions. A good go-between is needed from the phone net to the c.w. net. The phone net meets every evening from 6:15 P.M. to about 7 P.M. The Conn. Valley V.H.F. Net is doing well Mon. at 9 P.M. (145.35 Mc.) The 10-meter net (28.990 Mc. Wed.) is doing well. W1ALL has four students studying for the Novice exam. The HCRAI will have a homebrew night May 3. The VARC will have Mr. V.H.F., W1HDQ, on May 10 to speak on the problems in getting on 6 and 2 with the latest in antennas. Ex-W1BNO, now in Clearwater, Fla., has the call W4TTB and can be heard on 15 daily during late afternoon. Congratulations to ex-WN1HMF, now WA1HMF. Ex-W1-TCW (now WA3EQD) looking for W. Mass., is on 20, 15, 10 week ends from Rockville, Md. Traffic: K1IJV 181, K1AEC 119, W1DVW 63, K1WZY 55, W1EOB 49, WA1-GAB 49, W1DWA 39, W1STR 19, W1AMI 17, WA1ISJ 14, WA1GWV 6, W1ZPB 4.

NORTHWESTERN DIVISION

ALASKA—Acting SCM, Albert F Weber, KL7AEQ—KL7FLS reports that the Aurora AREC Net meets on 28.6 at 0600Z or on 3830 kc. if 10 is out. The 6-meter boys made some contacts during Feb., although nothing fantastic to this date. The AREC push in the Anchorage and Fairbanks areas has been very successful and much cooperation has been obtained as a result of the January SET. Anyone interested in getting in on the fun, catch KL7FLS or KL7EWH. Word has just been received that KL7BAJ passed away while vacationing in Mexico. The QRP bug has bitten some of the hams around Fairbanks, but the problems of obtaining decent transistors has been a bit of a hang-up. KL7GBD will be trying 2 and 6 from Adak. The first long-haul attempt will be Adak to Cape Romanzoff with KL7EDK at the Romanzoff end. Traffic: KL7CAH 275, KL7FLS 66, KL7-GEF 40, KL7FON 8, KL7FNX 2.

IDAHO—SCM, Donald A. Crisp, W7ZNN—SEC: K7-THX. The FARM Net convenes on 3935 kc. week days at 0200 GMT. K7QKA has a new Swan 500. KL7FOZ/M17 won the hidden transmitter hunt sponsored by the Lewiston-Clarkston Club. W7KHI moved to Boise. W7JJA has a new Swan 500. K7HLR is active from his new QTH in Utah. WA7AZQ is fighting TVI. W7GYG has a new mobile installation. WN7JHY and WN7JLS are new hams in Lewiston. FARM Net report: 19 sessions, 835 check-ins, 63 traffic handled. Traffic: WA7BDD 206, WA7ETO 44, K7OAB 43, W7KHI 6, W7ZNN 6, WA7EWV 4.

MONTANA—SCM, Joseph A. D'Arcy, W7TYN—SEC: W7RZY. PAM: W7ROE. RM: WA7DMA. Appointment: WA7FCG as OPS.

Montana Traffic Net	3910 kc.	0100 GMT M-F
Montana Section Net	3950 kc.	1700 GMT Sun.
Montana PON	3950 kc.	1515 GMT Sun.
Montana RACES	3996.5 kc.	1600 GMT 1-3rd Sun.

New calls in the state are WA7HPL, WA7HIX and WA7IYS. W7FLB's new call is W7BC. W7CJN's new call is W7DB. Congratulations to both of these gentlemen. The Butte Amateur Radio Club has begun a class in code and theory Wed. night in preparation for the Advanced and Extra Class FCC exams. The Electric City Radio Club has reorganized and meets each Mon. in the Court House. W7TYN and W7TUO attended the RMI School at MSU in Bozeman. The Butte-Anaconda amateurs are getting on 2-meter f.m. K7OEK and W7TQC have returned from a tour of the Hawaiian Islands. Several Great Falls stations are working into Helena on 2 meters. K7KVN is the latest to join this group. WA6-

six pack

National offers six of the world's finest receivers to meet *your* particular requirement.

Receiver number one provides greater amateur band performance and features than any amateur receiver ever built. ■ Receiver number two has the widest frequency range (from 5 Kc to 30 Mc) of any general coverage communications receiver ever built for lab or commercial application. ■ Receiver number three is *completely* solid-state for high reliability, versatility and portability. It operates from 12/24 V.D.C. or 115/230 V.A.C. This receiver draws less current than a couple of dial lamps (when its dial lamps are switched off), and provides instant-on operation. ■ Receiver number four incorporates specific features for high selectivity and has a six-pole filter to provide built-in steep-skirted 500 cps, 2.5 Kc, 5.0 Kc, and 8 Kc bandwidths with *passband tuning* for CW and SSB. Also *AGC threshold control* to knock out background QRM. Also a 50 db notch filter. ■ Receiver number five has a phase-locked frequency synthesizer to replace conventional high frequency oscillator crystals for superior stability and over-all calibration. ■ Receiver number six offers frequency meter performance with 1 Kc dial calibration and accuracy over its entire tuning range, 24 feet of bandspread per megacycle, and 10 Kc per turn tuning rate.

Each of these receivers is called the HRO-500. National's new HRO-500, at $1675, is the finest *total* receiver you can buy . . . at any price. Interested in trying out National's new sixpack? See your National dealer for an opener.

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MDL now has his private pilot's license. Traffic: (Feb.) K7DCH 83, WA7DBN 56, K7EGJ 47, WA6MDL/7 37, W7LBK 25, W7TYN 17, W7FIS 4, K7MOW 3. (Dec.) WA6MDL 45.

OREGON—SCM, Dale T. Justice, K7WWR—RM: W7ZFH. PAM: K7RQZ. Section nets:

Net	*Freq.*	*Time*	*Days*	*Net Mgr.*
AREC	3875 kc.	0300Z	Daily	WA7AHW
AREC	145.35 Mc.	0330Z	Tue.-Sat.	WA7DLE
OSN	3585 kc.	0230Z	Tue.-Sat.	W7ZFH
BSN	3875 kc.	0130Z-2000Z	Daily	K7IFG

WA7AHW reports for the AREC net for Feb.: Sessions 29, check-ins 689, contacts 76, traffic 33, maximum number of counties 17. W7ZFH reports for the OSN for Feb.: Sessions 22, check-ins 85, traffic 48. WA7DLE reports for the AREC two-Meter Net for Feb.: Sessions 21, check-ins 573, traffic 22. WA7BYP was QRT for some time in April because of an operation. The Grants Pass H.S. Club station, W7FII, is on with s.s.b. equipment. Also, the Southern Oregon ARC, K7LIX, is on s.s.b. A new Novice in the Grants Pass area is WN7JKX. A new Novice in Eugene is WN7IFS. She is getting her code training from WA7GCE's sessions. WA7GFP is now on 2 meters with a seven-element beam and a TR 20/144 transmitter. K7ZMO/7, in Salem, is now on RTTY. Traffic: (Feb.) K7RQZ 248, W7ZFH 119, K7WWR 87, WA7-BYP 86, W7ZB 62, K7OUF 54, WA7AHW 20, WA7GLP 20, W7MLJ 16, WA7IHKV 13, W7FSU 5, K7KPT 5, WA7-DWK 2. (Jan.) W7ZB 51, WA7EZJ 16.

WASHINGTON—SCM, William R. Watson, W7BQ—SEC: W7UWT. RM: K7CTP. PAM: W7BUN.

WSN	3590 kc.	0245Z	Daily	QNI	302	Tfc.	290	Sess. 29
NTN	3970 kc.	1930Z	Daily	QNI	855	Tfc.	420	Sess. 28
WARTS	3970 kc.	0200Z	Daily	QNI	1281	Tfc.	106	Sess. 29
NSN	3700 kc.	0300Z	Daily	QNI	428	Tfc.	122	Sess. 28

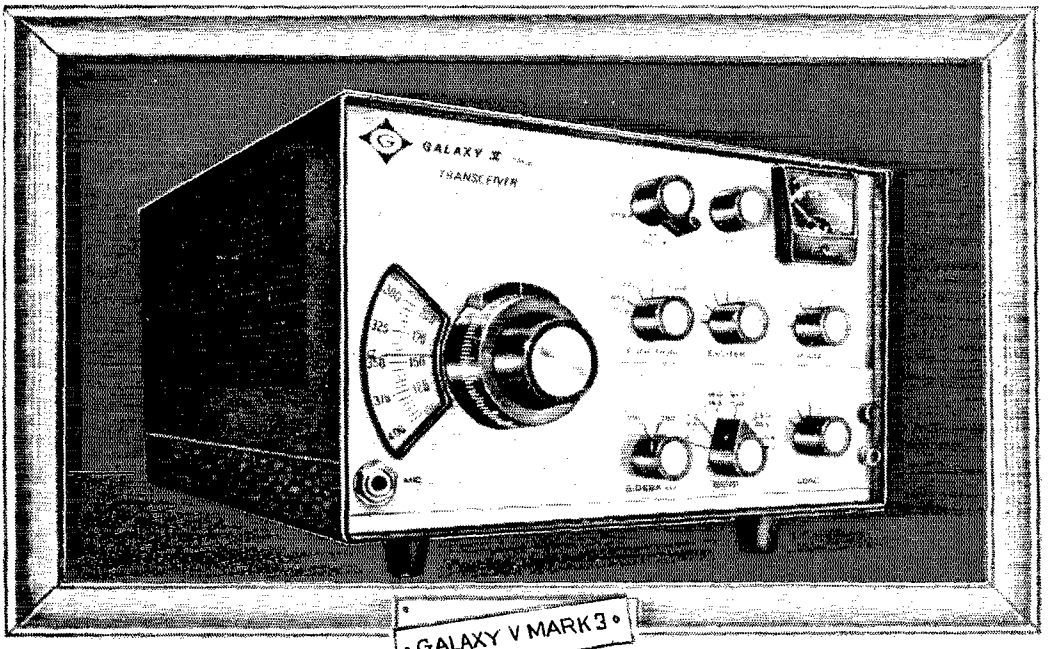
Among those with new two-letter calls is W7BQ, SCM, who has put K7JHA on the trophy shelf. Draft of the Legislative Bill to restore State Amateur License Plate fees to $5.00 has been completed and approved by the Director of Motor Vehicles. No action is possible until the next legislature meeting in 1969. So far no opposition has been indicated. New appointments: W7UU as ORS, W7EXM as OO. Members of the Tacoma Club participated in a mountain rescue operation Feb. 17 with K7CZF mobile at Mt. Ranier using 3930 kc. link to Tacoma. New officers of the Puget Sound Council are W7-HMJ, pres.; W7IIJW, vice-pres.; W7BUN, secy.; W7-KLO, treas. W7BQ, SCM, met with the SEC, RM, PAM and net managers hosted by W7BUN at McChord AFB; also with the PSCARC and the License Plate Committee. The Northwest Chapter of the QCWA will have its Annual Meeting at Holiday Motor Inn, Tacoma, June 8 and 9. W7PI turned over the WSN recorder job to W7GYF after three years of doing a superb job. W7IEU is planning a DXpedition to Wahkiakum and Skamania during the summer. W7ZIW-W7AAO now is modified for break-in c.w. with a Swan. The Grays Harbor Club added a trailer for its emergency generator. The club's Field Day activity will be at the Community Center and open to the public. WA7CYY is the new EC for Snohomish, replacing W7ETR now on the East Coast. NTN Mgr. K7-OVN now is an OPS. The Walla Walla Club roster now includes 67 members. NW Director W7PGY attended a planning meeting in Wash., D.C., in March. The Rodeo City Club is planning a local v.h.f. net. Club station K7NWS received its WAS. We regret the passing of K7-LBD, of Yakima. Traffic: W7BA 1337, W7DZX 798, WA7-DXI 735, W7ZIW 560, W7HMA 505, WA7DZL 296, W7KZ 221, K7CTP 153, W7JEY 149, W7PI 141, W7PQ 117, W7-MCW 112, WA7EDQ 102, W7BTB 72, W7AXT 58, K7KPA 51, K7VNB 50, W7IEU 47, K7TCY 38, K7THG 38, W7-APS 37, WA7IHKR 33, K7OXL 24, W7BUN 22, W7AIB 21, WA7DBQ 20, WA7FKM 20, W7OEB 14, W7RXH 14, W7GYF 13, W7ZHZ 8, K7MGA 7, W7UWT 6, K7YFJ 6, W7UU 5, K7SUX 3, K7EFB 2.

PACIFIC DIVISION

HAWAII—SCM, Lee R. Wical, KH6BZF—SEC: KH6-GHZ. PAM: KH6EEM. RM: Vacant. RACES Nets (40, 10, 6 and 2 meters) coordinate with KH6AIN.

Net	*Freq.*	*Time (GMT)*	*Days*
League Appointees	7.290 Mc.	0700Z	Wed.
Friendly Net	7.290 Mc.	2030Z	M-F
Pacific Interland	14.330 Mc.	0830Z	M-W-F

A reminder: Field Day, June 22-23, '68, from 1900 GMT Sat. to 2200 GMT Sun. We had another nice 50-Mc. opening Feb. 10. KH6NS worked from 1917Z until 2117Z contacting Calif., Nev., Texas, N. Mex. and Ariz. The West



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Changes aren't accidental at Galaxy...we make them on purpose. It takes a lot of guts (and know-how) to improve an already great product and still sell it for the same price...$420.00...*but we've done it!*

That's why we're putting a new name plate on our masterpiece. Those classic lines remain the same . . . but it's now the improved GALAXY V Mark 3!

We use two of the specially designed GE 6LB6's—the most efficient tube of this type. That means a 30% increase in plate dissipation...less heat...more reliability, and longer life!

A new grid/cathode design, coupled with easier-to-drive tubes, means greater protection against TVI. A new, improved ALC circuit design insures positive control of flat-topping and spurious signal emission.

New "horsepower"! The all-new power capability is greater. We're rating the new Mark 3 with a conservative 500 Watt PEP input. Any questions?

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Coast boys complained that Ed's kw. of s.s.b. and 360-ft. per-leg rhombic has a tendency to be hard on their receivers, reports KH6EEM, our V.H.F. PAM. A new one on 6 meters was KH6BZF, using a SB-110 and making a hasty decision to incorporate his 7-Mc. dipole. Feb. 11 was Lee's first day on 50 Mc. and he made 26 contacts, working Calif., Nev. and Ariz. Meanwhile KH6-GKL, ex-W3DGP, located at Sunset Beach, used a Venus at 65 watts and an aluminum dipole 4 feet off the ground and bagged 9 contacts, all in Calif. KG6IC has been very active on 15 and 20. KH6EDY is active again. WA4-TKE has been assigned to USASTRATCOM-PAC. KH6GKT is the new station at Iolani School. WH6-GLB has been copying the W1AW code sessions. KH6-GJW will be assisting Ed DeYoung, ex-K6CAA, ex-KP6AP, ex-KP6AP [Kuualpuu Molokai,] and presently VR3DY as well as KH6GLU in QSLing efforts. KH6FRO now has WAZ. WA6JQR/KH6 is on from Ewa Beach. New Novices at the PUNAHOU (School) Radio Club are WH6GKC, WH6GLN, WH6GLO and WH6GLP. Don't forget those of you on Oahu the Advanced and Extra Class tests are conducted at 8 A.M., *sharp*, Tue. and Wed., Room 502, Federal Bldg. (Downtown Post Office Bldg.) Honolulu. Traffic: (Feb.) KH6BZF 18. (Jan.) KH6GHZ 200.

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: WA7BEU. Hats off to the SNARC on its 100% ARRL membership annual report. The Las Vegas RAC has a very good amateur code and theory class going with some CBers attending. Ex-WN7GXK is looking for his General Class license. K7ICW reports lot of use and not much preventive maintainence have resulted in failures on most of his v.h.f./u.h.f. gear. However, he, K7RKH, K7ZOK, K6PBW/7, W7SNP, WA7DSP and WA7IER worked KH6NS on 6 meters. WA7GIV and K7WSX are active on 6 meters. W7MWF has given up c.w. for mini-skirts, plus a new antenna farm designed for his retreat in Idaho. W7PBV and WA7BEU were host to DL6KG. W7YDX visited with W7VYC and has been active on 6 meter f.m. We welcome WAØPPS/7 to Boulder City. W7DIM is a new one in Nevada on RTTY. W7-BVZ is now W7CV and active on 40-meter c.w. K7ZOK received a very nice write-up and picture in the Las Vegas papers. W7ZT still is active telephone relaying for the armed forces personnel. The Southern Nevada FM Assn. has its repeater down for modification. WN7JIG almost earned his WAS in less than a month.

SACRAMENTO VALLEY—SCM, John F. Minke, III, WA6JDT—RM: W6LNZ. ECs: WB6MXD, K6RHW, W6-SMU, WB6RSY, WA6TQJ.

Net	*Freq.*	*Time*	*Days*	*Mgr. or NCS*
NCN	3630	0200Z	Daily	WB6HVA
NCN/2 (Slow-speed)	3630	0330Z	Daily	WB6HVA
Yolo C.D.	146.94	0200Z	Tue.	WA6TQJ
SCEN	146.25	0400Z	Wed.	WA6CXB
Nevada Co.	145.80	0230Z	Wed.	W6ZUZ

Please note that the above nets are in GMT for both time and days. K6KDZ says that the Nevada County bunch may switch to 160 meters since v.h.f. is not working out in the hills. The frequency will be 1980. The GEARS is another club which meets on 160 meters. The Oroville ARS has acquired the call W6AF which belonged to Amos Fuller, an OBS appointee until he joined Silent Keys recently. New calls in the Oroville area are WN6-BQY and WN6ZUE. WB6HAW is sporting a new rig. WB6RSY now holds down a TCC spot as Station G. That should help the S.V. traffic count since no station has joined a net above section level recently. W6CC, in Colusa, has joined the AREC. W6DSX reports the Public Utility Net meets on 3865 Each weekday at 0930 local time. Traffic: WB6RSY 77, W6LNZ 54, WB6MAE 18, WB6QZZ 14, K6KRL 13, WA6JDT 2.

SAN FRANCISCO—SCM, Hugh Cassidy, WA6AUD—WA6BYZ made the BPL in Feb., continuing a string going for six months. W6GQA is now W6RQ. W6KVQ just missed the BPL in Feb. Most of the Section was represented at the Pacific Division meeting in Oakland Mar. 23 with the San Francisco Radio Club, the HAMS from San Francisco, the Marin Radio Club, the Sonoma Radio Amateurs and the Humboldt County Radio Club in attendance. W6GGC has some new gear and is regularly checking into the Mission Trail Net again. JA1KFQ was a visitor in Humboldt County while his ship was docked in Eureka. W6JSY is the new manager of the Tri-County Emergency Net with W6AEY as assistant manager. DXers WA6OET and WA6MWG visited W6-PTS and WB6UJO, in Marin recently. The Marin Red Cross Sun. morning frequency has been moved to 3915 kc. WB6OGF is now mobile and K6JGX is looking for some a.m. activity on 10 meters. The K6GWE repeater is back on the air. WA6QFV is trying 6-meter mobile action.

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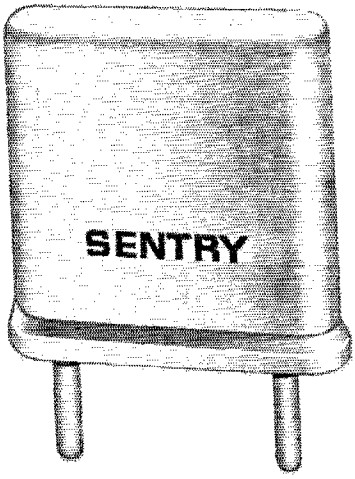

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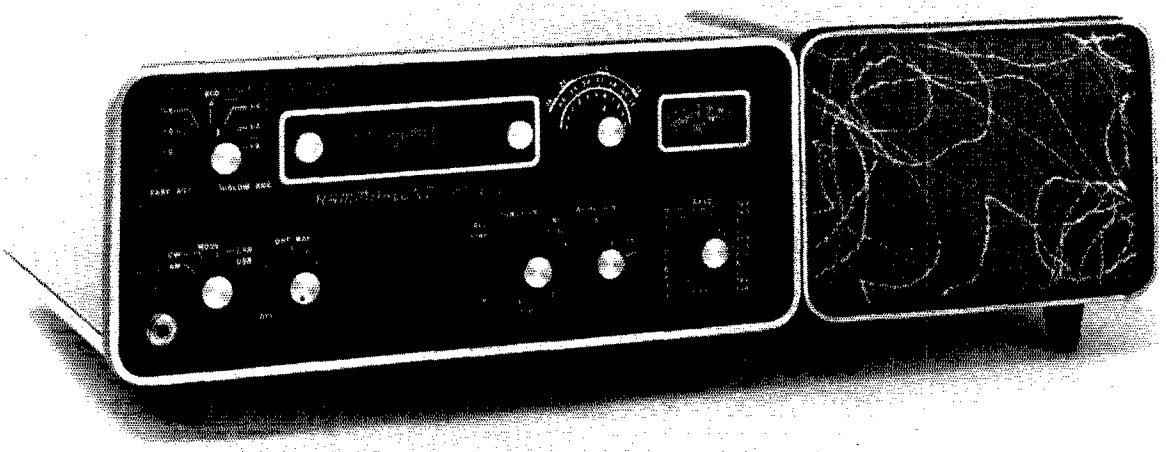
The new president of the Tamalpais Radio Club is WA6-QCR. The San Francisco Radio Club is holding classes to help the members upgrade their licenses. W6BIP is handling the theory end of things. Also attending the Fresno DX meeting in Jan. were WA6DJI, W6HSA and W6ERS. WA6DJI has his new beam working. W6KUF is going high-power mobile with a linear in the trunk of his car. WB6CIE has worked out some problems with her rig and is back on the air regularly. The San Francisco Section Net continues to meet Mon. and Fri. at 1830Z on 3900 kc. K6TZN has been taking over as Net Control when needed. W6WLV, W6BWV, WA6BYZ and WB6FLT are regulars on the Northern Calif. Net on 3630 kc. at 0300Z. K6KQN is trying to revive the Cathay Radio Club. Traffic: W6KVQ 485, W6WLV 251, WA6BYZ 155, K6TWJ 44, WA6AUD 29, W6BWV 20, K6TZN 8, W6RQ 4.

SAN JOAQUIN VALLEY—SCM, Ralph Sarovan, W6JPU—This being the month of May, should find you attending the 26th Fresno Amateur Radio Hamfest in Fresno. W6PIX has a Drake TR-4, WB6OZB has an HA-460 on 6 meters, K6RBB, EC for San Joaquin County, held a successful drill and states that enthusiasm is high for this type of activity. The Central California S.S.B. Assn. held a dinner and social hour in Visalia with 28 in attendance. W6ASV is organizing a net to assist the sheriff of Kings County. If interested, please contact Orval. WB6HMY and WA6YOS were heard on 75-meter s.s.b. WB6JTZ is on 75-meter s.s.b. K6KQA has a Swan 500 and is heard on 40-meter s.s.b. WØBMN is now W6DPD, located in Fresno, and is active on 6 and 2 using an SB-110, an SR-46 and an SR-42. WB6TTP states that the TARC has been averaging 15 check-ins every Tue. WB6INO has a Swan 350 mobile. K6KOL is chasing bugs out of a 40-meter converter. The TARC held its Annual Sweetheart Banquet with 34 members attending. The Turlock Amateur Radio Club is planning a 160-meter hunt. WA6VNH is [illegible] on 15-meter s.s.b. Traffic: WB6HVA 317, W7AAF/6 317, WB6INO 303, W6-ADB 238, WA6SCE 176, K6KOL 123.

SANTA CLARA VALLEY—Acting SCM, Edward A. Gribi, WB6IZF—Asst. SCM: Ed Turner, W6NVO. SEC: W6VZE. RM: W6QMO. Section meeting places: Bay Area AREC Net, 3900, Sun., 1830 GMT; Northern California Net, 3630, Daily 0300 GMT; Monterey Bay Emergency Net, 147.16, Tue, 0400 GMT. Section AREC ECs met with SEC W6VZE, PD Director W6ZRJ, and the SCM and Asst. SCM at Monterey Feb. 17 for a fine discussion of emergency planning. KL7FSD/6 told of the pitfalls and successes of emergency operation from his experience in the Alaskan floods last August. WA6HVN told of Red Cross plans. W6VZE explained present procedures and discussed preparation of a new Section Emergency Plan. WB6ITM now represents Carmel on the NCN. Other section traffic-handlers of note: WA6-LFA, Asst. Mgr. NCN, RN6, PAN, TCC; W6RSY, RN6, PAN; W6DEF, NCN; and K6DYX, PAN, TCC. We understand the gung-ho Palo Alto Club is deep in Field Day planning. K6LY is NCS for the Monterey Naval Postgraduate School Club Net, Tue., 7:30 P.M., 28,650. W6PLS is now the proud possessor of a new call, W6VK. Gene is chasing DX and reports 10 is great. W6ZRJ has been traveling to club meetings but still found time to build an external LMO to go with his SB-101. W6AUC is busy on several 75 s.s.b. nets. K6ZNM operates 2-meter portable from the TV station on Fremont Peak. W6MMG reports that SCV was well represented in the C.W. DX Contest. WB6OQS's 2-meter repeater now has a brother repeater on 450 f.m. W6NVO is mostly 40-meter mobile, both c.w. and s.s.b. WB6-DBS Pacific Grove, is now working the world with his six-element 20-meter beam on a 60-ft. tower on the beach. K6YIW, at the U.S. Geological Survey Center for earthquake study, now has an informal earthquake-reporting service going through the facilities of WCARS, 7255, aided by other geologists, WB6WAV and K6AUL. K6IEC has over 240 countries. Traffic: W6RSY 1207, WA6LFA 324, W6YBV 200, W6DEF 89, K6DYX 82, W6-ACW 44, W6PLS 32, W6ZRJ 23, W6AUC 17, WB6ITM 15, WB6IZF 10, W6OIL 10, W6MMG 1, K6YKG 1.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Barnett S. Dodd, W4-BNU—Asst. SCM: James O. Pullman, WA4FJM. SEC: WA4LWE. RM: K4CWZ. PAM: W4AJT. V.H.F. PAM: W4HJZ. W4VON reports a new Extra Class certificate. WA4QLP/3 has been made trustee of the U.S. Naval Academy Club station, W3ADO. The Buncombe County ARC code and theory classes are in full swing, according to K4TTN. WA4KWC is having lots of fun telephone relaying for military personnel on 10 meters. It is with regret that we report the death of Richard A. Black, K4SNV, EC for Orange County, N.C. We wish to thank K4EO for his assistance as pick-up station for individ-



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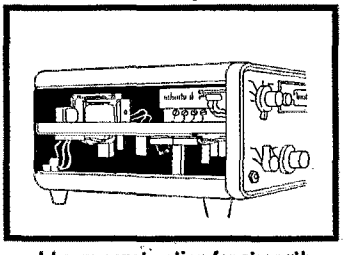

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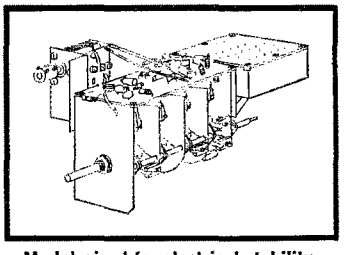

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Net	*Freq.*	*Time*	*Days*	*QTC*	*Mgr.*
NCN (E)	3573 kc.	2330Z	Daily	189	W4IRE
THEN	3923 kc.	0030Z	Daily	154	W4ZZC
NCN (L)	3573 kc.	0300Z	Daily	126	WA4CFN
SSBN	3938 kc. (Jan.)	0030Z	Daily	41	WA4LWE
NCN (E)	3573 kc.	2330Z	Daily	121	W4IRE
SSBN	3938 kc.	0030Z	Daily	75	WA4LWE

Traffic: (Dec.) W4EVN 326, W4LWZ 225, W4RWL 193, WB4BGL 166, WA4CFM 143, K4EO 59, WA4VNV 55, WA4ZLK 50, W4ZZC 49, W4FDV 34, K4VBG 30, WA4-FJM 29, K4CWZ 28, W4AJT 23, WA4GMC 22, W4BNU 18, WA4KWC 18, WA4AKX 11, K4ZKQ 11, WA4LVJ 10, WB4CKS 9, W4RF 9, WA4UQC 9, W4ACY 7, K4TTN 7, WA4ZPC 6, W4NAP 5, WB4EFJ 4, K4PKE 4, WA4RVI 3, K4UVM 2. (Jan.) WA4VTV 21.

SOUTH CAROLINA—SCM, Clark M. Hubbard, K4-LNJ—SEC: WA4ECJ. Asst. SEC: W4WQM. RM: K4-LND. PAM: WA4EFP.

SCN	3795 kc.	Daily	0000Z/0300Z	
SCSSBN	3915 kc.	Daily	0000Z	Feb. Tfc. 197

The Carolina Repeater Society, recently organized, has a 6-meter repeater in operation and plans to have one for 2 meters in the near future. Information can be obtained from W4TYS or K4MOC in Columbia. Congratulations to WN4IQT, a new Novice in Spartanburg. WB4EOC has his General Class license. WN4FAN has passed the test. W4FVV and WA4VKB have new Advanced Class tickets. The Greenville Hamfest is scheduled for May 5 with the SCSSB Net meeting and supper on May 4 in Greenville. Traffic: WB4DXX 185, WA4EFP 122, W4NTO 72, W4PED 63, WA4HFA 45, K4LNJ 35, WB4BZA 23, W4JA 18, W4FVV 13, W4UMV 11.

VIRGINIA—SCM, H. J. Hopkins, W4SHJ—SEC: K4-LMB. PAM: W4OKN. RMs: WA4EUL, K4MLC. New two-letter call holders are W4DVT to W4UQ, W4MUJ to W4HE and W4QDF to W4FF. WB4FDT has been appointed OPS and WA4TCF has earned a VSBN certificate. W4KMS was first in the 4th call area in the 1967 PACC Contest. WB4DRB, WN4HUE and WB4FDT are officers in the new Yorktown H.S. Amateur Club. The Virginia Emergency and Traffic Net meets on 3711 kc. Tue. and Sat. at 1930 local time; it is being sparked by members of the Tidewater Club. WB2VSL announces the operation of the East Coast Traffic Net on 7290 kc. at 2130 GMT and welcomes check-ins from Virginia. K4CG runs up those big traffic totals on the QTC Net, 7240 kc., and the Coast Guard Net, 14.337 kc. The Roanoke Hamfest will be held May 25 and 26 in the Roanoke area. The Virginia nets meet between 6 P.M. and 10 P.M. nightly on 3680, 3835 and 3935. Traffic: (Feb.) WB4GTG 365, K4-KNP 302, W4NLC 301, W4DVT 288, K4CG 170, WA4EUL 142, WB4DRB 109, WB4CVY 100, WB4FDT 85, K4FSS 85, WB4IBF 80, W4RHA 57, W4OKN 56, W4TE 55, W4-YZC 42, K4MLC 40, W4HE 38, K4KDJ 38, WA4PBG 38, W4IA 36, K4TSJ 35, WA4NJG 26, WA4JJF 23, WB4DOY 21, W4SZT 13, WB4QDF 11, WB4FLT 9, K4GR 9, W4-BZE 8, W4KX 7, W4GEQ 6, K4YEE 6, WB4GYV 5, W4LK 5, K4LMB 4, W4OP 2, W4SHJ 2, WA4WQG 2. (Jan.) W4NLC 226, K4LMB 105, W4QDF 50.

WEST VIRGINIA—SCM, Donald B. Morris, W8JM—SEC: W8IRN. RMs: K8MYU, K8TPF. PAMs: K8CHW, W8IYD. New officers of the Tri-State ARC, Huntington, are WA8HSZ, pres.: WA8KCJ, vice-pres.; W8WBH, secy.; WA8HLV, treas.; WA8RQB, trustee for W8VA, club station. K8BHV, 84 years young, received a nice write-up in the Weston paper. W8PQQ now is W8BT. The West Va. Tech. Radio Club received the call W8AHZ in memory of Milton Propps. New amateurs in the Wheeling area: W8WUT, WN8ZBE, WN8ZBF, WN8ZBG, WN8ZBH, (71 years), WN8ZIT, WN8ZIU, WN8ZNH. The new full-wave Zepp at W8SQO helps in traffic work. The West Va. Phone Net with 29 sessions and 1003 stations handled 203 messages. The C.W. Net reports 29 sessions, 108 messages and 215 check-ins. WA8NDY and WA8-WCK, new ORS and OPS, report the Upshur County ARPSC had 6 operators handling 22 messages in the SET. WA8YSB has new frequency measuring gear. Appointment renewals: W8DUV as ORS; W8DUW as OVS; W8CWY, WA8SLG, K8CHW, W8GUL, WA8KCJ, W8-DFC, K8INA, K8MISP, W8QR as ECs. New officers of the Greenbrier ARC are WA8PFB, pres.; W8FFC, vice-pres.; WA8AVZ, secy.-treas. PY2TI and VK9BN visited the Kanawha ARC. Traffic: (Feb.) W8SQO 142, WA8-NDY 105, K8MYU 96, WA8YSB 83, WA8RQB 73, WA8WCK 61, K8MQB 40, W8CKX 37, K8BIT 33, W8-HZA 19, W8IRN 18, W8AHZ 14, W8JM 13, K8CHW 8, W8WEJ 8, K8QQS 7, W8GUL 5, WA8CKN 3, W8EEO

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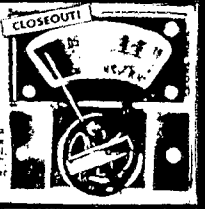

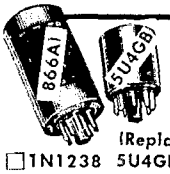

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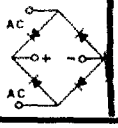

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☐ 6.4	☐ 15.	☐ 50.	☐ 100
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☐ 9.1	☐ 24.	☐ 68.	☐ 150
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100 ☐	7¢	1000 ☐	29¢	2000 ☐	1.25
200 ☐	8¢	1200 ☐	42¢	3000 ☐	1.50
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600 ☐	15¢	1600 ☐	69¢		

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100 ☐	9¢	800 ☐	25¢
200 ☐	12¢	1000 ☐	39¢
400 ☐	17¢		

2 AMP SILICON RECTIFIERS

PIV	Sale	PIV	Sale
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400 ☐	16c	1200 ☐	59¢
600 ☐	19¢	1400 ☐	69¢
800 ☐	29¢	1600 ☐	89¢

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100	☐ .07	☐ .22	☐ .25	☐ .75
200	☐ .09	☐ .30	☐ .39	☐ 1.25
400	☐ .16	☐ .40	☐ .50	☐ 1.50
600	☐ .20	☐ .55	☐ .75	☐ 1.80
800	☐ .30	☐ .75	☐ .90	☐ 2.30
1000	☐ .40	☐ .90	☐ 1.15	☐ 2.70

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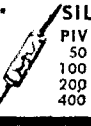

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PIV	Sale	PIV	Sale
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100 ☐	7¢	800 ☐	21¢
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ROCKY MOUNTAIN DIVISION

COLORADO—SCM, Richard Hoppe, KØFDH—Asst. SCM: WAØNQL. SEC: WØSIN. PAM: WØCXW. Welcome back to WØCXW, new net manager for the Colorado Emergency Phone Net. Shreve has been active with the net for many years and already has lined up a well-qualified NCS staff. Congratulations to the Columbine Net on again leading our section in both QNI and QTC in February. CCN continues to hold a comfortable margin in traffic rate, with the High Noon Net in second place. We note with interest that the Denver Radio Club may schedule a traffic-passing contest to see whether phone or c.w. is more efficient. Some of our local phone men are very proficient in accurate message-handling now so you c.w. ops better sharpen up to convince them! We note with pride that KØWMD, of Colorado Springs, received a nice letter from the Governor of Arizona thanking him for his "loyal, cheerful, and selfless contribution" in providing communications during the recent heavy snowstorms in Arizona. We are certainly proud to have devoted amateurs such as KØWMD to set an example for the rest of the fraternity. Traffic: KØZSQ 647, WØKAU 170, WAØMNL 122, WØLRN 112, WØSIN 54, KØECR 46, WØUAT 33, KØDCW 30, WØLEK 22, KØIGA 16, WAØLRJ 11, WAØJTB 9, WØLRW 2.

NEW MEXICO—SCM, Kenneth D. Mills, W5WZK—New appointments include WA5FPS as OVS, K5DAB and W5QNQ as OPSs. The recent trip made by your SCM covered almost 1400 miles. It was a distinct pleasure to meet all of you. Many problems were discussed and it is hoped that we can work together to solve them. Special thanks to K5DAB, W5DMG, W5NUI, K5YRY, W5WPA, WA5RGR and WA5OMY's XYL for organizing the meetings, food and lodging. We saw and/or talked to over 50 hams in two states and eight major towns during the six-day trip. WA5FLG, trustee for WA5UEA, believes this call to be issued to the first junior high club west of the Mississippi. WA5UEA was issued in Jan. to the Central Jr. High School, Alamogordo. Congratulations, fellows. Attend the Rocky Mountain Division Convention in Cheyenne, Wyo., June 29-30. New officers of the AARC are K5MGR, W5IH, K5GLJ and WA5QIO. The Albuquerque V.H.F. Club meets the 3rd Mon. of the month. New officers are WA5FPS, K3UYA/5 and W5HOE. The clubs 32½-ft. dish will be operational on 50, 144, 432, 1296, 2300 and 3300 Mc. by the time this article is seen. K5HMN and W5HDE are in charge of this operation. Traffic: W5MYM 36, W5DMG 16, K5DAB 8, W5NON 7, W5BWV 4, WA5MIY 2, WA5BLI 1.

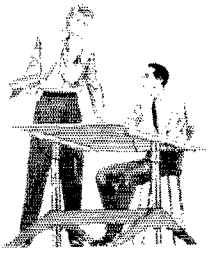
UTAH—SCM, Gerald F. Warner, W7VSS—SEC: W7WKF. RM: W7OCX. Traffic nets:

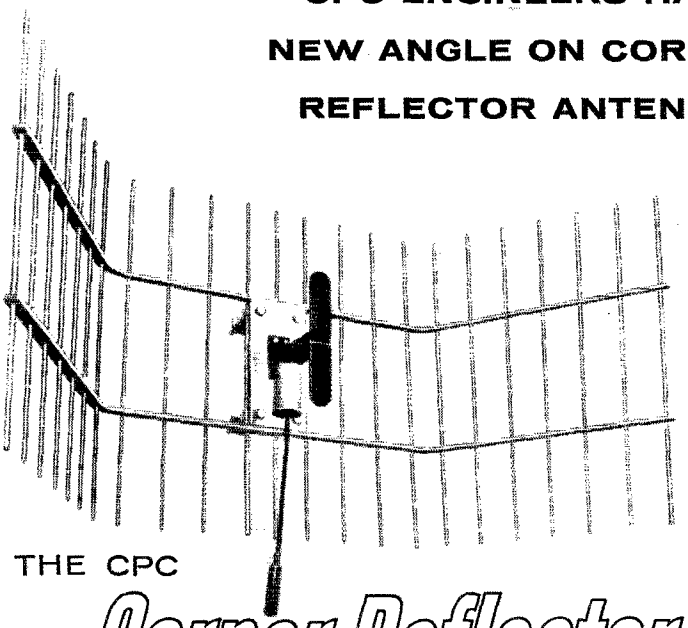
BUN	Daily	7272 kc.	1930Z
UARN	Sat.-Sun.	3987.5 kc.	1500Z

Congratulations to K7JLF and the Utah Council of Amateur Radio Clubs staff on their successful management of the Utah Hamvention. Throngs of Utah amateurs came to hear technical topics, see old friends and swap small talk. Director Smith, WØBWJ, was the featured speaker. The Uintah Basin ARC now has a monthly bulletin, the *Gazette*, and a very active training program under way. W7LQE has a new call, W7EM. The Utah ARC has challenged all the section clubs and groups to unseat them as Field Day champs. A trophy sponsored by the UCARC awaits the FD winner. Traffic: W7OCX 179, K7SOT 74, W7LQE/W7EM 35.

WYOMING—SCM, Wayne M. Moore, W7CQL—SEC: K7NQX. RM: WA7CLF. PAMs: W7TZK, K7SLM. OBSs: K7SLM, K7NQX. Nets: Pony Express, Sun. at 0800 on 3920; YO, daily at 1830 on 3610; Jackalope, Mon. through Sat. at 1215 on 7260; Wx Net, 0630 Mon. through Sat. on 3920. Notice the frequency change on the Jackalope Net. New appointments: K6UVJ/7 as EC in Cheyenne and K7DEJ, of Lusk, as ORS. K7AHO spent some time in Mexico during Feb. WA7GYQ and WA7GYP are a couple of new ones on in Sheridan. K7LZL is now on s.s.b. New officers of the University Club: K7SDD, pres.; WA7CGK, vice-pres.; WA7FIB, secy.-treas. Don't forget the Convention in Cheyenne June 29-30 and the State Hamfest at Togwotee Lodge July 27-28. The Casper Club says it will keep the Field Day trophy for another year—any competition? Traffic: WA7EDC 117, K7NQX 78, K7ITH 70, K7VWA 68, W7TZK 67, W7YWW

CPC ENGINEERS HAD A NEW ANGLE ON CORNER REFLECTOR ANTENNAS





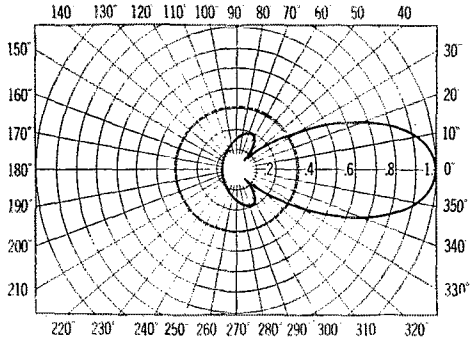
Combining maximum strength with optimum electrical performance, this 10.0 db gain antenna meets the increasing demand for rugged durability at minimum weight. Cat. No. 465-509, has a reflector 55 in. by 29 in., yet weighs only 20 lbs. Its rated wind velocity is 150 mph. The radiating element material is brass, reflector screen components are of high strength aluminum alloys, and mounting accessories are fabricated of hot galvanized steel. This CPC Corner Reflector Antenna is ideally suited for use in multiple corner arrays.

THE CPC

Corner Reflector Antenna

Cat. No. 465-509

Frequency Range 406-470 Mc



Horizontal field strength pattern; a dipole pattern is shown for reference.

Note: dbd gain indicated as per EIA RS-329

Electrical Specifications

NOMINAL INPUT IMPEDANCE	50 ohms
FORWARD GAIN	10.0 db at 450 Mc
FRONT-TO-BACK RATIO	25.0 db
MAXIMUM POWER INPUT	250 watts
TERMINATION	Type N Female with metal weather shield and Type N Male with Neoprene housing
VSWR	1.5:1
BANDWIDTH	406-470 Mc
LIGHTNING PROTECTION	Direct Ground

Mechanical Specifications

REFLECTOR	55" wide by 29" high
REFLECTOR MATERIAL	6061-T6 aluminum
RADIATING ELEMENT MATERIAL	Brass
RADIATING ELEMENT SIZE	13-1/4" long by 2" wide
RATED WIND VELOCITY	in excess of 150 MPH with no ice 85 MPH with 1/2" radial ice
LATERAL THRUST AT RATED WIND	164 lbs. no ice 180 lbs. with rated ice load
WEIGHT	20 lbs.

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40, K7SLM 29, W7DXV 20, W7GSQ 17, K7YUG 14, WA7BDI 11, K7HHW 10, W7VJI 8, W7NKR 7, K7RFL 4, W7BKI 2, K7BTE 2, K7LOH 2, W7ILP 1.

SOUTHEASTERN DIVISION

ALABAMA—SCM, Edward L. Stone, K4WHW—SEC: W4FPI. PAM: WA4EEC. RM: WA4EXA. The B'Hamfest will be held this year the week end of May 4 and 5 at the Oporto Armory in Birmingham, same place as last year. The Mobile ARC is planning to have the Mobile Hamfest again this year. This will be welcomed by all area "Festers," since it has been several years since the last one in that city. Remember the last week end in May for Mobile and the first week end for Birmingham. WB4CKM placed second in the Lauderdale County Science Fair with his amateur TV project. He is interested in hearing from others who are working on similar projects. Quite a bit of interest and traffic was generated at Florence State College by the fine efforts of WB4DIN, WA4OCM, K4RCE, WB4DMW, WB4FIR, WB4DSA and WB4CMK. They set up a station and display in the Student Union building and gave a real demonstration. Progress is continuing on the repeater station for 2-meter f.m. at Huntsville. This project is not just for the locals, but is intended for all interested North Alabama amateurs. Contact W4WGI for latest developments and details. Traffic: (Feb.) WB4DIN 307, WA4AVM 276, WA4EEC 108, WB4DMW 105, K4WHW 93, K4BSK 78, K4AOZ 62, WA4VEK 60, WA4JSM 57, K4KJD 53, WA4UXC 36, K4TNS 32, K4HJM 31, W4FPI 26, WB4EKK 25, WA4VUG 16, WA4ROP 15, W4YER 12, WA4AZC 11, W4DGH 8, K4KMG 8, W4MKU 8, WB4GZW 6, W4WLG 6, WA4UUC 4, WA5TOT/4 4, W4WGI 2. (Jan.) K4HJX 727, WA4EEC 228, WB4ENX 30, W4MKU 20.

CANAL ZONE—SCM, Russell E. Oberholtzer, KZ50B—KZ5FU raised a 10, 15 and 20 mono beam. Field Day arrangements are in the planning stages. KZ5EH is stateside for 4 or 5 weeks. KZ5JV (KZ5SM), Father John, now is operating as HP3XQB. HP2MR, operating portable in Gainesville, Fla., came back home for the carnival. All KZ5s are invited to join the net which meets each Wed. night at 7 EST on 7.090. Traffic: KZ5AD 188, KZ5IK 75, KZ5NF 63, KZ5OA 45, KZ5JC 36, KZ5WR 27, KZ5OB 18, KZ5LM 6, KZ5FU 3.

EASTERN FLORIDA—SCM, Jesse H. Morris, W4MVB—Asst. SCM: William G. Blasingame, Jr., WA4NEV. SEC: W4IYT. Asst. SEC: W4FP. RM C.W.: W4ILE. RM RTTY: W4RWM. PAM 75M: W4OGX. PAM 40M: W4SDR. V.H.F. PAM: WA4BMC. I have been patiently waiting for the postman to bring a note from the SCM along with the copy for this column. It is a good thing that we keep regular schedules on the air. He informed me that I should get out my trusty mill and start writing. Jess tells me that the job is keeping him very busy for now, but that he will be back with us before too long. W4DUG/4 operated during the Florida State Fair in Tampa again this year. A new record was set with the origination of 3945 messages. These were handled on both the phone and c.w. nets. The welcome sign is out to WB4HKP, who recently became active on the phone traffic nets. Frank is bringing in a lot of traffic. W4BKC reports that 34 Central Florida amateurs assisted with traffic for the Cerebral Palsy Telethon recently held in Orlando. Congratulations to all you guys and gals. K4YWW has a new RTTY station, as does W4YPX. I hope to be on that mode also. W4ROA (ex-K9TVA) has been appointed OO and OBS. The Duval County AREC recently participated in Operation Goodwill. This is an annual affair in which the Boy Scouts of Northeast Florida help gather usable items for Goodwill Industries. Communications between the base station (at Goodwill) and the various pick-up points are handled by the AREC members on 2-meter f.m. Traffic: (Feb.) WA4SCK 1963, WA4IJH 1520, WB4AIW 694, WA4NEV 409, W4ILE 386, WB4EPD 344, WA4FGH 299, W4SMK 259, W4SDR 176, K4LEC 122, W4ZAK 114, WB4DDO/4 110, WN4HPS 105, W4AKB 89, WA4TWD 85, WA4NBF 79, W4OGX 71, WA4OHO 69, K4DAX 64, W4MVB 61, WA4FJA 58, W4IAD 58, W4TRS 56, W4UQZ 55, W4DVO 50, WA4CIQ 49, WA4HED 43, WB4DSP/4 40, W4FP 40, K4COO 69, W4EHW 39, WA4HDH 35, WB4FLW 30, K4SJH 29, K8LNE/4 27, W4NGR 26, K4IEX 24, W4TJM 24, WA4WEB 23, WB4HKP 22, W4VDC 22, K4BLM 20, W4SME 20, W4YPX 20, W4KHY 19, K4LPS 18, WB4KC 15, WA4EYU 14, WA4PWF 14, W4PBK 13, W4IYT 12, K4EBE 9, WB4FGW 9, W4ROA 8, WA4TJS 8, WA4WZZ 5, W4VPQ 4. (Jan.) WA4NEV 371, W4IAD 46, K4DSN 9.

GEORGIA—SCM, Howard L. Schonher, W4RZL—SEC: W4DDY. Asst. SEC: WA4WQU. RM: W4CZN. PAMs: WA4WQU, K4HQI. WA4WQU went off the air because of rig trouble. WB4FMJ reports a 6-meter opening to Central Texas Feb. 24. WN4FNS is on with a 2er. K4HQI shows openings on 50 Mc. Feb. 3, 9, 12, 17, 18, 19

The Latest Advance in Long Range Radio Communications

The Controller and Courier SSB Transceivers have been under development at R F Communications for almost three years. These are the first of an entirely new line of transistorized transceivers with many unique and advanced features.

The Controller and Courier are in the middle price range for Commercial Grade Equipment. Within the next few months, we will announce:

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- A new line of specially designed MARINE SSB Transceivers with Full F.C.C. Type Acceptance.
- A line of equipment with D.O.T. Approval for use in Canada.
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- We have supplied a greater number of military grade SSB Transceivers to military users than any other company.
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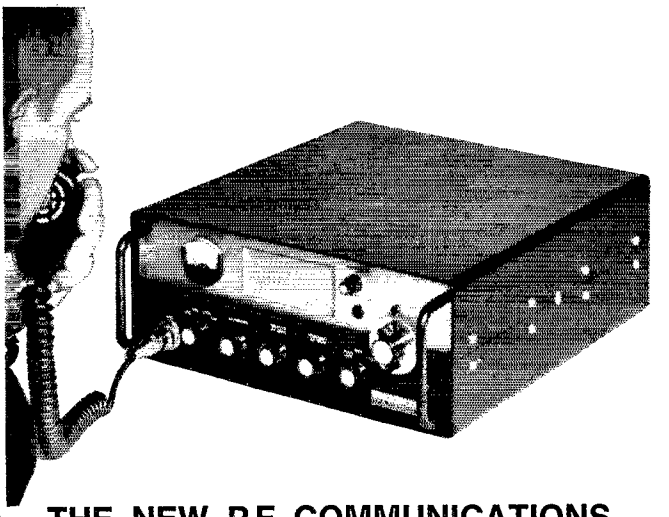
- And, we have introduced a larger number of new and unique SSB communications products than any other company.



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and 21 to the 5, 6, 7, 9, and Ø areas. W4FEW is active on 2-meter a.f.s.k.

Net	*Freq.*	*Days*	*Sess.*	*QNI*	*QTC*
GSN	3595	0000 & 0300 Dy.	58		257
GSSB	3975	0100 Dy.		Not reported	
GTN	3718	2200 Dy.		Not reported	

Atlanta Early Bird Net 50.110 s.s.b. 1300Z Sun. Drive Net 50.110 0200Z Sun. and Wed. W4LRR is working on 20-meter c.w. W4PGU has an SB-610 scope. K4HQI is on 6-meter s.s.b. with an HX-30. WA4ARS is on 6 and 2 with a TX-62. WB4EMQ is working with an 829B final for 2. W4OVS is handling Viet Nam traffic. The Athens Area V.H.F. Society now meets at Athens Memorial Park. W4CZN is Extra Class but elected to retain his call. W4ARH has an SB-401. W4KE reports he is now a "store-bought OT." Hi. W4HYW participated in the Arizona, Louisiana and QCWA QSO Parties. Traffic: (Feb.) W4FOE 386, W4CZN 181, W4FDN 143, W4PIM 111, WB4EMF 79, K4JFY 75, W4ARH 64, K4PIA 42, WA4LLI 35, W4RZL 32, WA4WQU 32, WA4JES 25, K4BAI 18, W4KE 18, W4DDY 13, W4HYW 9. (Jan.) W4DDY 39, W4GXU 20, K4TXK 11, W4PGU 2.

WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4IKB. PAMs: H.F.-W7BNR/4, V.H.F.-W4CUF. RM: W4BVE. Section nets:

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*
WFPN	3957 kc.	2300Z	Daily	29	728	108
QFN	3651 kc.	2330/0300Z	"	58	—	—

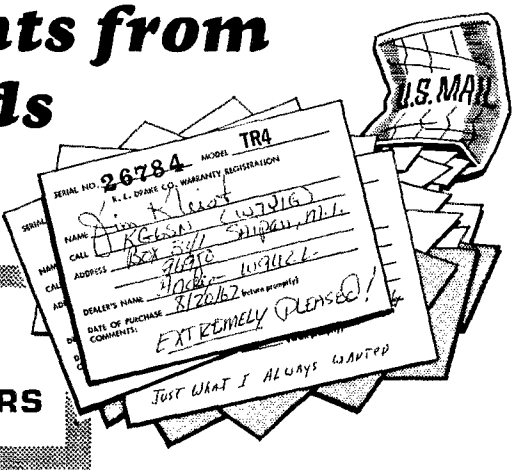
Pensacola: W7BNR/4 is now PAM and WFPN manager. W4UUF has 500 watts and a 32-element array up 78 feet on 144.1-Mc. s.s.b. The 6-Meter S.S.B. Net meets on 50.11 Mc. daily at 1930 CST with WB4DHL as NCS. Fort Walton/Eglin: WN4GMH, WN4HUJ and WN4ICY passed the General Class test. K4UBR returned from a Viet Nam tour. The Playground ARC has resumed work on its emergency communications van. The EARS had a good attendance at its annual banquet. WB4GYX is etching crystals for 2 meters. WA4IYH acquired a tri-band beam. W4ZGS is mobile on 2-meter f.m. WA4EVU raised his repeater antenna to 80 feet. Chipley: WB4FLK is moving to Kissimmee. Port St. Joe: As part of the new Courthouse dedication, the c.d. radio room was manned and contacts were made around the state on 75 and 2 meters. Those taking part in the 2-meter f.m. link to District Hq. in Panama City were EC K4RZF, W4WEB, W4MXN, K4LQQ, K4YSQ, W4IKB, W4RKH and WA4NRP. Tallahassee: WB4AWU is on 146.94 f.m.; W4MQQ and K4HQC are looking for rigs. W4JGD had a nice write-up in his company newsletter. Cross City: K1FVW/4 was appointed EC for Dixie County. Traffic: (Feb.) WA4IMC 271, WB4DHZ112, W4BVE 105, W7BNR/4 100, WB4GYX 72, W4IKB 40, WA4EOQ 34, W4JGD 6, K4DOT 4. (Jan.) K4BSS/4 143.

SOUTHWESTERN DIVISION

ARIZONA—SCM, Floyd C. Colvar, W7FKK—PAM: W7CAF. RM: K7NHL. OBSs: K7MTZ, K7VOR, WA7GOG. OOs: K7OIX, W7CAL. Arizona stations participating in the Second Arizona QSO Party, sponsored by the Saguaro High School Amateur Radio Society, were W7CAL, W7IMA, K7AL, K7WL, WA7HOP, WA7APE and WA4KGT/7. K7NOS now has a Heath SB-200 linear. WA7FIK has completed modification of his station for one-switch operation. OBS WA7GOG has resumed ATV transmissions on 444.1 Mc. after being off the air to permit relocation of the station. K7TNW and his XYL are the proud parents of a new harmonic. K7QWR received his Advanced Class license. The time is near for nominating your SCM for the next two years. Because of the pressure of business and other comitments I will not be a candidate for another term. It is up to you, the ARRL members, to nominate and elect my successor. WA7IFD now has a Mosley Classic 33 beam. Traffic: K7NHL 362, K7MTZ 59, WA7IFD 54, W7FKK 19.

LOS ANGELES—SCM, Donald R. Etheredge, K6UMV—SEC: K6QPH. Asst. SEC: K6AVQ. A Novice traffic net now meets at 2000 local time each Tue. and Fri. on 7155 kc. Visitors are welcome. BPL awards have been sent the following for their work in Feb. traffic: W6GYH, WB6GGL, WB6BBO and W6MLF. WA6ARC has constructed a 6-meter transverter for his h.f. gear. WB6IMV is working on a transmitter for 220 Mc., while WB6TSM is busy converting an APX-6 for 1296 Mc. and the June ARRL V.H.F. Test. The San Gabriel Valley RC was recently involved in a RACES exercise at the Camellia Parade. WN6UWJ is a new General Class licensee. WB6ALU is working on his Advanced Class license. K6HZI, of Loyla HS, recently visited W7-Land. WA6UPD recently retired from Lockheed. Los Angeles City RACES is becoming quite an active organization under W6TXJ. For information on this group, write L.A. City RACES, Room 1600, City Hall, 200 No. Spring St.,

Some comments from warranty cards by owners of



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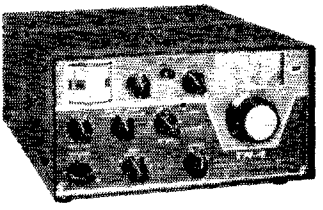
"Best gear I have had the pleasure of working with. Receiver is exceptionally sharp and stable."
Albert V. Mitchell, WA9BUP
Jeffersonville, Ind.

"Nothing to comment, except that my TR-4 is a real jewel, and I am very satisfied with it. I would like to receive the catalogue of your products."
Joe Braz Ribeiro, PY4UK
Monte Carmelo (MG) Brazil

"A very F.B. piece of equipment. Audio very nice, especially on SSB, which is rare."
Thomas F. Totten, Jr. WB2GZR
Saratoga Springs, N. Y.



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Ashland, Va.

"Why not build a good 6 Meter SSB & AM Transceiver . . . hurry up, I'm waiting."
Harold A. Zick, WA9IPZ
Creve Coeur, Ill.

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"O.K. 100 x 100. RV-4: O.K./W-4: O.K./ L-4: O.K. Very Good!"
Franscisco Fau Campmany, TI-2-FAU
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"A beautiful piece of equipment. My second piece of Drake. The first was a 2-B and this sold one friend an R-4 receiver and another a TR-4. We are Drake-minded here in town. Many thanks."
Charles E. Boschen Jr., WA4WXR
Ashland, Va.

"I'm sure this, like the other Drake equipment I have, is the finest money can buy. YOU MAY QUOTE ME ON THAT."
C. E. (Ed) Duncan, WA4BRU
Greenville, S. C.

"I'm a real happy man with it. Does a real good job of getting thru."
Jerome D. Lasher, W2RHL
Hamburg, N. Y.

"Replaces my TR-3."
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Lakewood, N. J.

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Lakewood, N. J.

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Lititz, Pa.

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Memphis, Tenn.

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. . . or write for details . . .

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Los Angeles, Ca. WN6BZW recently was credited with quick-action first aid in helping in a highway automobile accident. The West Valley Radio Club (SFV) recently elected the following as 1968 officers: WB6KPN, WB6TVH, WB6TYW and WB6WGG. A new appointee in the section is WB6TQS as ORS. W6FD now has 40-meter mobile capability. WB6SXY expects to erect a new tower soon. K6ASK presently is involved with 450-Mc. control of a 2-meter repeater with K6VBT and WA6VIF. W6USY now has his antenna back up and has become active again. W6RCV was involved in the QCWA Party recently and reports considerable activity. Recent two-letter call licensees include the following in the section: W6BJU now W6VB; W6IBD now K6NA; K6GIL now W6IL; W6UME now W6MN; W6WTQ now W6MF; K6CYG now W6EL; W6ITA now W6RR. W6IPP is moving to Encinitas and larger antenna facilities. The LERC RC, W6LS, is holding a hamfest May 18 and 19 in Burbank. Contact WA6RQQ for information. The hamfest is being held at 2814 Empire Ave., in Burbank. We regret to report that K6YDJ is now a Silent Key. K6HV reports being active on the WCARS Net, which meets at 12 noon daily on 7255 kc. WB6WDS's work schedule is limiting amateur activities. WA6KZI has 10-meter gear mobile in his VW. Los Angeles section radio clubs are invited to join the Los Angeles Council of Amateur Radio Clubs by contacting G. Shaw, W6NI, 10326 Bogardus, Whittier, Ca. 90603. Much information is discussed of importance to local clubs. Is your club a member? Traffic: (Jan.) W6GYH 1235, WB6GGL 1188, WB6BBO 757, W6MLF 520, W6QAE 349, WA6KZI 285, K6CDW 191, W6OEO 123, WB6OLD 50, W6DSC 40, WB6TMC 39, WB6TQS 36, W6HUJ 33, W6BHG 30, W6PCP 22, WB6AEL 21, W6FD 16, K6UMV 16, WB6SXY 11, W6AM 10, W6DQX 8, W6TN 8, K6ASK 6, K6HV 4, W6USY 4, W6DGH 2, W6DMP 1, W6RCV 1. (Sept.) W6MLF 411. (Aug.) W6MLF 394.

ORANGE—SCM, Roy R. Maxson, W6DEY—EC WA6TAG reports new AREC members are WB6ZPN, WB6PPJ and WN6ZHS. PAM WA6IDN was SCN liaison in the SET and with W7ZC is performing research on extraterrestrial intelligent life. Their skeds on 40 weekly invite other interested hams. OVS WB6MWL advises some F2 was heard on 6, Costa Rica, etc., and says the SCS Net is going along smoothly. W6FB kept skeds with XE3PGR (WA6DNI in Mexico) and with W6VX and W6SRI visited W6GH's antique wireless museum in Santa Barbara. Visitors were K6ILE, WB6UZU, WA6OZY, W6DLN and K6IY. New calls: W6GU, ex-K6GMA; W6NT,ex-W6NJJ. Ex-W6RDQ is now W6IF and he and Martha, W6QYL, are on the Island of Cypress until Aug. '68. W6MRO, the call of the late Richard O. Brazelton, has been issued as a memorial club call to the Newport ARS. W6BUK, ex-K7RUR, now is in a mobile home at Hemet. EC K6CID advises the Riverside County AREC Net meets on 3945 kc. at 0830 local time Sun. Check in and join up. EC WB6CQR advises OC 2-meter AREC meets Sun. on 145.53 at 0700 and 1030 local time. WA5OPW now is WA6BYJ, WB6QQL is a new one on 6. WB6UCK is a new General, per OVS WB6MNL. ORS WB6TIF is busy with Navy MARS. WB6WKN is home from W1-Land. Traffic: (Feb.) WB6TYZ 218, K6IBI 174, WB6UTC 111, WA6ROF 75, K6IME 48, K6MCA 32, WB6UCK 28, WA6IDN 17, WB6MWL 14, WB6TIF 12, W6WRJ 11, W6CPB 9, WA6TAG 7, WA6IDN 3, W6PQA 2. (Jan.) WB6MWL 12. (Dec.) WB6TYZ 222, WB6RVM 20.

SAN DIEGO—SCM, James E. Emerson, Jr., WB6GMM—The Palomar Radio Club recently elected K6HAV, pres.; K6SLA, vice-pres.; W6YZV, secy.; and WA6HYC, treas. WB6PFO upgraded his license recently and is now working on the Extra Class exam. Good luck, Gene. Among the new two-letter calls heard in our section are W6SE, formerly W6ECP; W6QP, formerly W6CCE; and W6MI and W6WH, brothers, who represent 75 years in the amateur ranks. If you are looking for a north San Diego County contact, check 3930 kc. nightly at 2100 local. This year's San Diego County Ham of the Year Award went to W6ZOM for his aid to disaster victims in Mexico. WA6DDD is running code classes in the South Bay area. W6EPO will speak on and demonstrate amateur TV at the May meeting of the Amateur Radio Club of El Cajon. K6CAG has received a WAC award for 40-meter c.w. WB6UMT is using an inverted "V" nightly on the Mission Trail Net. WB6SQZ finds radioman training for the Coast Guard Reserve very interesting. WB6NMT continues nightly scatter QSOs with W7FN on 50.105 Mc. at 0700Z and is looking for others interested in scatter study. Traffic on Nav MARS has kept W6YDK off the amateur frequencies for the past two years, but their new Chop is finding time to check in with local nets. Traffic: (Feb.) K6BPI 8978 ,W6VNQ 433, W6EOT 352, K6CAG 342, W6BGF 318, W6ECP/W6SE 276, W6LRU 232, WB6SQZ 152, WA6QAY 45, WB6UMT 36, W6YKF 13, K6HAV 12, WB6GMM 8. (Dec.) W6VNQ 849.

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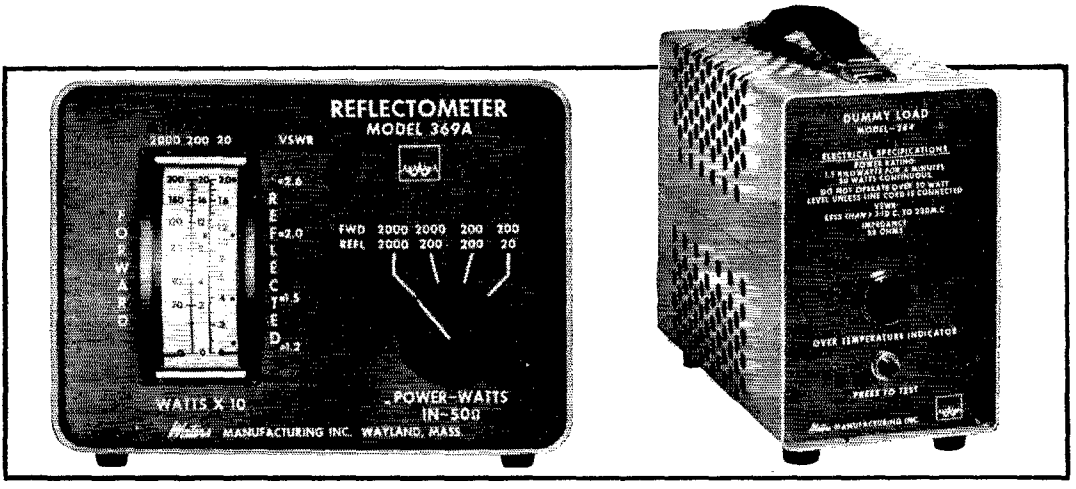

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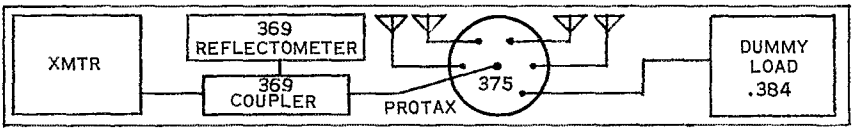

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SANTA BARBARA—SCM, Cecil D. Hinson, WA6OKN—SEC: K6GV. WB6BWZ has passed the Extra Class license and reports on growing AREC activity in the Santa Maria area. WN6WKC is soon to become a WB6, having passed the General Class test recently. He celebrated the event with the purchase of a National 200 transciever. WB6WQF is another new General in the Santa Barbara area. Active during a recent successful search for a missing boy were K6LOV, W6YNX and K6VDL. It is always a pleasure to report worthy amateur efforts and a new one is known as V.I.T.A., a group of engineers and technicians who specialize in the problems and needs of Central/South America. The Santa Barbara chapter is active and growing to meet the needs of the organization. WA6JBE is out of the hospital and doing well. WB6DRY has a new two-letter call—W6HW. WN6ZWM, also known as TI9AM, has returned from the expedition to Cocos Island which I had the pleasure of joining on the trip down as WØCUG.

WEST GULF DIVISION

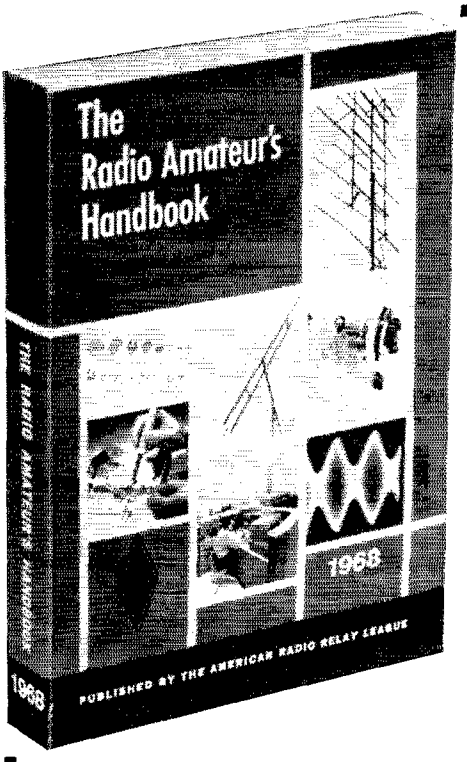
NORTHERN TEXAS—SCM, L. L. Harbin, W5BNG—Asst. SCM: E. C. Pool, W5NFO. SEC: W5PYI. PAM: W5BOO. RM: W5LR. It is not often that I hear of an amateur who has been notified that he has key clicks, rough note splatter or any other defect in his signal who takes the attitude that he has been a ham longer than the one telling him of his bad signal, but it seems that there still are some left. Some of the old-timers say they have forgotten more about ham radio than many of the new hams will ever know. That is probably the truth. That is, they have forgotten some of the finer points of operating. Have you checked your signal lately? I am very sorry that I had to miss the Lawton-Ft. Sill Hamfest this year. Although it is not held in my section I usually see about as many hams from the Northern Texas area there as from Oklahoma. I understand a fine time was had as usual with about 250 in attendance. New club officers for the Irving ARC are K5ZSB, pres.; W5TTY, vice-pres.; K5EPX, secy.-treas.; WA5DHD, act. mgr. The club's code and theory class still is going strong. W5TTY made 120 contacts in the recent DX Phone Contest. Wed. night has been set aside as work night to complete the club's communications room; 7:30 P.M. is the time if you can help. The Garland ARC now has a permanent club room located in the old school bus repair garage on Austin Ave. The KC ARC, Ft. Worth, is proud of 109 paid-up members. Three years ago there were 12. The 7290 Traffic Net had 1910 stations and handled 916 messages. The North Texas Tfc. Net had 1547 stations and handled 329 messages. Traffic: K5BNH 506, W5QQR 92, W5PBN 77, K5LZA 74, W5HVF 67, W5KIK 53, W5JSM 17, WA5RIX 13, W5BNG 6, W8GIU/5 6.

OKLAHOMA—SCM, Cecil C. Cash, W5PML—SEC: WA5AOB. PAMs: W5MFX, K5TEY, WA5JGU and K5ZCJ. New officers of the Wheat Straw Club are WA5JES, pres.; WA5JHB, vice-pres.; K5GBN, secy.-treas. A new net is the Central Oklahoma 6-Meter Traffic Net. Net reports:

Net	*Sess.*	*QNI*	*QTC*	*Net*	*Sess.*	*QNI*	*QTC*
OLZ	19	—	67	OPEN	4	191	4
SSZ	16	—	63	OPON	21	84	78
6 MTR	4	43	8	STN	25	770	190

K5MBK traded his Johnson 500 for a Drake TR-4. WA5RHM was in California on two-week duty with the Navy reserve. W5EHC is keeping the road hot to Fort Polk, La., visiting his son. Congratulations to a new Advanced Class licensee, WA5IVS; also to new Novices WN5s UJF, UJG, UJH, UJI, UJJ, UJK and UJL. W5OLB is moving to Dodge City, Kans. WA5LOB now has the v.h.f. bug with an ARC-1 on 2-meter RTTY, along with W5UCJ and others in the Tulsa area. K5CBA is on 6 and 2 meters, 100-watts a.m. 2 meters really is going strong in the western high plains area. WA5OUV has 100 watts. WA5OUJ is running a 4X-150. K5JJC will be on high power soon. W5HGH is pumping his 100-watt signal from a 125-ft. tower. W5NOR is about ready to smoke test. K5KHA is working on a new 4X-150K rig. WA5OWO has a half kw. on. W3CEA, ex-K5ZGV, is back in Tulsa. W5EYK is retiring in XE1-Land. Traffic: K5TEY 1409, W8VDA/5 178, W5QMJ 65, WA5KZA 53, WA5AOB 50, WA5JGU 48, W5MFX 44, WA5QGN 44, WA5KFT 34, W5WAX 32, W5FKL 31, W5PML 29, K5SWL 29, W5OLB 27, WA5IMO 16, K5DLP 13, WA5KNR 12, K5CBA 11, K5WPP 9, K5CAY 8, WA5DZP 8, K5OCX 5, WA5GFP 3.

SOUTHERN TEXAS—SCM, G. D. Jerry Sears, W5AIR—SEC: K5QQG. PAM: W5KLV. RM: W5EZY. We wish W5LQP, in the hospital in Port Arthur, a speedy recovery. We regret to report the passing of WA5GIG to Silent Keys. Notes from *Off Resonance*, the bulletin by EC W5KR at Brownsville for the Texas Southmost ARC,



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Inc., and the Magic Valley Emerg. Net. "Mexican hams have been granted franking privileges for their QSL cards." Mexico is proud of its amateurs effectiveness during emergencies. CARCOB is the official name of the new club of the Union Carbide plant at Brownsville. W5HBL is doing a good job getting the new club going. WA5GZI received a Special Service Award and W5KR a plaque from the Weather Bureau for their outstanding service during Hurricane Beulah. Keep in mind the ARRL National Convention June 7-9 at the HemisFair, San Antonio, Texas. Make your reservations early. Also the STEN Convention will be held in Kerrville May 3-5 at the Bluebonnet Hotel. The El Paso ARC is perplexed as to Field Day operations. Seems the Forest Service has turned thumbs down on power plants in the National forests because of complaints from campers, etc., of noise. K5HZR, EC Bexar County, advises that the San Antonio ARC will be operating W5SC from the HemisFair location. Contact them and receive a beautiful QSL. Major emergency nets in South Texas: West Gulf Emerg. Net on 3945 kc. Sun. at 0800 local time; South Texas Emerg. Nets, s.s.b., on 3810 kc. Wed. at 1900 local time and c.w. on 3780 kc. Tue. at 1900 local time; Magic Valley Emerg. Net on 3955 kc. Sun. at 1400 local time; Also the TEX Traffic Net c.w. on 3770 kc. daily at 1900 and 2200 local time. Traffic: WA5INZ 377, W5QJA 87, K5HZR 83, WA5LVJ 62, W5ABQ 58, K2EIU/5 53, WA5GZX 49, W5KLV 42, WA5TOW 41, WA5DTK 40, W5BGE 28, W5AIR 24, W5TFW 20, K5QQG 14, K5HMF 13, K5WYN 9, WA5QKE 2.

CANADIAN DIVISION

ALBERTA—SCM, Harry Harrold, VE6TG—SEC: VE6FK. PAM APSN: VE6ADS. ECs: VE6SA, VE6SS, VE6XC, VE6PL, VE6AFQ. ORSs: VE6BR, VE6ATH, VE6ATG. OPSs: VE6HM, VE6SS, VE6AFQ. OOs: VE6HM, VE6TY. OPSs: VE6HM, VE6AIF. We now have an RTTY net with VE6ATG as net manager. This net meets every Mon., Wed. and Fri. on 3610 kc. at 0330Z. Alberta members of this are VE6ATG, VE6AOO, VE6HM and VE6MM. Our liaison between BCEN and RN7 are VE6ATH and VE6ATG with some help from VE6AO. The Border Area Radio Club sponsored a curling event with 24 taking part. VE6AM and his foursome took top honors and VE6AJF took the booby prize. A very nice lunch was served by the ladies of the club, with VE6ASL the first to sit down at the table and the last to leave. Of course he is not married! The Vulcan Club now has three more members to cause more QRM. Things are shaping up very nicely for the International Glacier-Waterton Hamfest. Don't forget the dates, July 20 and 21. Traffic: VE6ATH 45, VE6HM 43, VE6ATG 40, VE6FK 14, VE6SS 7, VE6FS 6, VE6KS 6, VE6XC 5, VE6AFQ 4, VE6AOO 3, VE6HF 3, VE6AGZ 1, VE6AM 1, VE6NU 1.

BRITISH COLUMBIA—SCM, H. E. Savage, VE7FB —Nanaimo ARC's new officers are VE7BUO, pres.; VE7MG, vice-pres. VE7BDR, secy. VE7BCV reports the Nanaimo Club went up island and visited Duncan ARC. VE7BWC showed off his homebrew, transmatch with a built-in s.w.r. indicator. The Columbia and Beaver Valley Clubs sure send in interesting reports on their clubs. The North and West Club's officers are VE7EQ, pres.; VE7AIY, vice-pres.; VE7BTL, secy. The Canadian Pacific Amateur Radio Society, is the newest organization and has a project that is going a long way. Code and theory classes are conducted at Pearson Hospital (poliomyelitis ward) twice per week. The Canadian Handicap Net meets on 14,160 kc. at 2000 GMT every Wed., with VE7BDG as NCS. Because of the growth of this net it could be that several NCSs will be required in other parts of the country. The QCWA Party for June 8 and 9, 1969, is now being arranged. Traffic: (Feb.) VE7BQA 61, VE7BLO 47, VE7AC 32, VE7FQ 24, VE7BLS 16. (Jan.) VE7ASY 283, VE7BQA 47.

MANITOBA—SCM, John Thomas Stacey, VE4JT—Officers of the newly-formed Winnipeg ARC are VE4SN, pres.; VE4QL, vice-pres.; VE4NS, secy.; VE4GL, treas.; VE4RY, VE4OL, VE4AX, VE4HK, VE4RS and VE4ZB, executives. This club is the result of an amalgamation of two former groups, the ARLM and WARA. During the recent St. John's Snowshoe Race the AREC operated for eleven hours with base station VE4TC ably assisted by VE4EI, VE4HI, VE4LK, VE4AX, VE4JC. At the recent capping service at Grace Hospital, Dauphin, VE4BC, VE4NS and VE4NE saw their daughters enter the ranks of nursing. RM VE4EI is actively working on the low Winnipeg QNI for MTN and hopes to have the situation rectified shortly. VE4QK and VE4FQ are newcomers to MTN. The Brandon ARC has finished its current code and theory classes. The first issue of *The Manitoba Amateur* is out and should go far in uniting the amateurs of the Province. VE4AO has an HQ-170 receiver. Net reports: Phone Net, sessions 29, QNI 744, QTC 12. C.W. Net, sessions 29, QNI 152, QTC 101.

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SPECIFICATIONS

FREQUENCY RANGE: 3.5-4Mc, 7-7.5Mc, 14-14.5Mc, 21-21.5Mc, 28-30Mc (3 more 500KC receiver bands can be added).
FREQUENCY STABILITY: Less than 100 c/s drift in any 30 minute period after warm up.
ANTENNA IMPEDANCE: 50 to 120 ohm unbalanced.
MAXIMUM INPUT: 500W P.E.P. SSB, 440W CW, 125W A.M.
CARRIER SUPPRESSION: —40db
SIDE BAND SUPPRESSION: —50db (at 1,000 c/s)
DISTORTION PRODUCT: Down at least 25db
AUDIO BANDWIDTH: 300-2,700 c/s
RECEIVING SENSITIVITY: 0.5uV, S/N 20db (14Mc SSB)
SELECTIVITY: 2.3Kc (—6db), 3.7Kc (—55db)
IF AND IMAGE RATIO: More than 50db
AUDIO OUTPUT: 1 watt @ 5% distortion
OUTPUT IMPEDANCE: 8 ohm, 600 ohm
TUBES AND SEMICONDUCTORS: 18 tubes, 9 transistors and 33 diodes
POWER SOURCE: AC 117 volts, 50/60 c/s
DIMENSIONS: 15¾" wide x 6¼" high x 13¾" deep
WEIGHT: 50 Pounds

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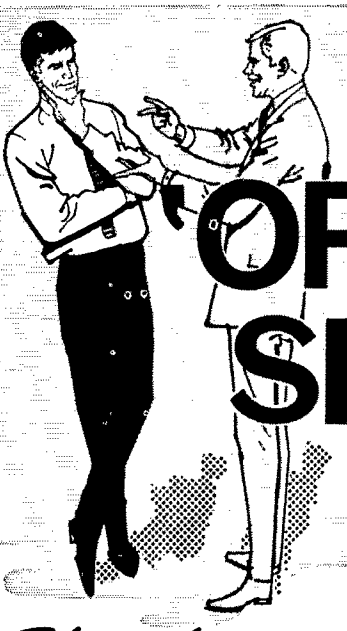
Traffic: VE4TC 264, VE4AX 137, VE4EI 80, VE4NE 58, VE4HI 47, VE4RW 34, VE4JT 31, VE4FO 14, VE4YC 13, VE4OL 9, VE4JA 8, VE4GN 6, VE4QJ 6, VE4AP 4, VE4FQ 3, VE4FX 2, VE4RO 2, VE4TE 2, VE4DV 1, VE4EX 1, VE4IW 1, VE4NO 1, VE4PA 1.

ONTARIO—SCM, Roy A. White, VE3BUX—AREC Asst. National Coordinator: VE3YC. PAMs: VE3ETM and VE3BLZ. RMs: VE3BZB, VE3DPO and VE3EBH. The Lakehead ARC advises that VE3EEC became a Silent Key in Feb. Welcome to VE3AKQ, VE3CFR and VE3OE as controllers on the OPN. VE3OE, by the way, transmits ARRL Bulletins at 2330 EST on 3790 every Tue., Thurs. and Sun. How come nobody seems to be interested in putting on the ARRL convention this year? Slow-scan TV is being talked up and VE3CEB has been giving hints and tips on 75. We hear Orillia has a rather unique club. No officers, no constitution, no set meeting date or place. But it works! DOT has been—and is—looking into the garbage on 11 meters. We wish the Ontario Trilliums all the luck in the world with their Midwest YL Convention at the Canadiana Motor Hotel in Scarboro May 16-18, 1969. VE3GOC, in Armstrong is having difficulty getting his rotor to turn at 55 below. The president of the South Waterloo ARC, VE3OU, mentioned in the February bulletin that he would be missing the first meeting of the club, executive or otherwise, since its inception. Seems he was about to get married! Our congrats to you both. One of the worst ice storms to hit this province in many a moon occurred Jan. 14 and lasted about five days. London and Toronto really suffered while Brantford and Hamilton escaped with less serious consequences. Nortown ARC reports 80-meter DX with DL, LA, YV, FB8 and Gs coming in Q5. Who said this is an Old Man's Band! Traffic: (Feb.) VE3GI 146, VE3BUR 136, VE3GCE 94, VE3DBG 64, VE3DPO 64, VE3BZB 60, VE3BQL 52, VE3EHL 52, VE3ATI 51, VE3NO 38, VE3BLZ 35, VE3DV 32, VE3FGV 26, VE3AWE 24, VE3DMU 24, VE3EBC 18, VE3AUU 12, VE3DH 9, VE3DU 9, VE3VD 5. (Jan.) VE3EWD 6.

QUEBEC—SCM, J. W. Ibey, VE2OJ—SEC: VE2ALE. RM: VE2DR. PAMs: VE2AGQ, VE2BWL. Our traffic report is very good for this period. Many stations have had their first taste of good net operation and its efficient traffic-handling abilities with the necessary discipline that goes with such an operation, seen for the first time during the SET, and are going to try for the Advanced Class license. Please take a close look at our amateur bands and the clutter of various non-amateur signals and perhaps you will give VE2ZM a call signing up in the Intruder Watch. VE2CF received a letter from DOT for his work by amateur radio during an epidemic in the north and a very interesting article appeared in *L'Observateur*, official organ of the students at the Technical School at Three Rivers, re their amateur radio setup. Section news from VE2ASU: La fin de semaine du 27 janvier, consacrée aux exercices d'urgence simulés, a remporté un grande succés sur les reseau de téléphonie du Quebec. Les stations les plus actives du réseau en ont profité pour acheminer une quantité de messages d'un bout à l'autre du Québec du Canada. Felicitations à VE2BWL pour son magnifique travail d'organisation de se reseau d'urgence. Traffic: VE2DR 205, VE2ALE 168, VE2OJ 74, VE2BRD 62, VE2BWL 45, VE2BVY 44, VE2AJD 40, VE2ADE 27, VE2EC 21, VE2CP 11, VE2AGQ 9, VE2CK 7.

SASKATCHEWAN—SCM, Gordon C. Pearce, VE5HP —First and most important of all is the reminder of the Saskatchewan Hamfest to be held in Saskatoon June 29, 30 and July 1. Our Saskatchewan Net has been operating at an all-time high with our new PAM, VE5PZ, doing an FB job. The Trans-Canada Net too, is being kept busy with check-ins from most provinces. RTTY in Saskatchewan is advancing with VE5LG, VE5DR and VE5FU leading the way. Not long after the successful SET exercise an opportunity presented itself for further service to a community in the north where telephone communication failed for some time in and around the town of LaRonge. An important message was relayed to the south. Those involved were VE5LK, VE5RP and VE5HP. Our Canadian Phone Nets are having difficulty with the C.W. QRM. When the skip is long, especially on 75 meters between 3750 and 3790, it is most difficult to conduct the phone net with the strong c.w. We in Saskatchewan are concerned with the problem as it relates to 3780 at 1900 CST (0100 GMT) every night of the year. A plea and sincere request is sent out for a clear channel. There appears to be lots of free space below the so-called phone band—that is below 3725. Traffic: VE5HP 47, VE5LG 32, VE5LM 17, VE5RJ 12, VE5OO 11, VE5RE 7, VE5LK 6, VE5WL 6, VE5HV 5, VE5LQ 5, VE5EQ 4, VE5OG 4, VE5PZ 4, VE5FU 3, VE5TS 3, VE5BD 2, VE5VE 2.



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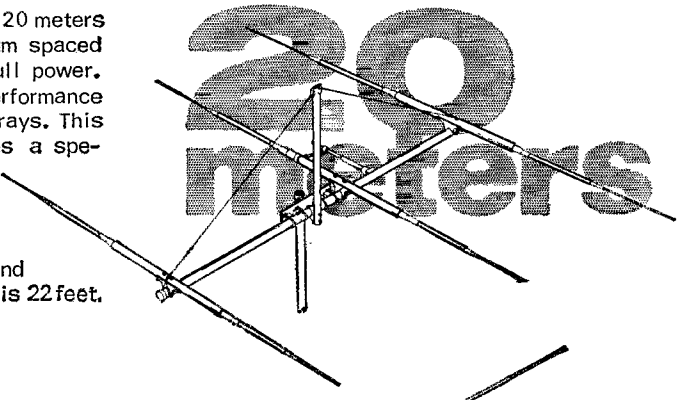
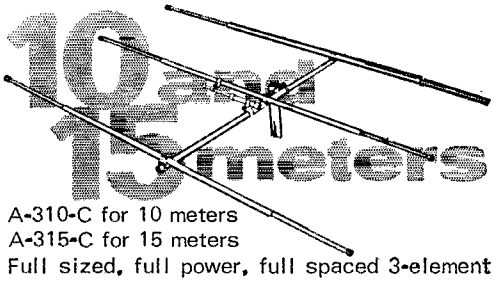
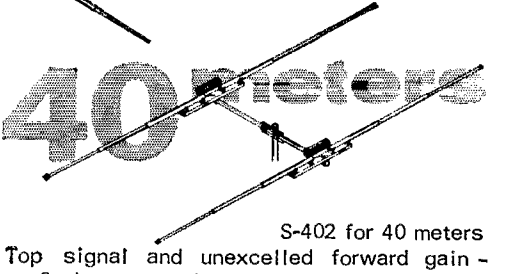




A-310-C for 10 meters
A-315-C for 15 meters
Full sized, full power, full spaced 3-element arrays. 100% rustproof all stainless steel hardware; low SWR over entire bandwidth; Max. Gain; Gamma matched for 52 ohm line.



S-402 for 40 meters
Top signal and unexcelled forward gain - a 2-element optimum spaced beam. 100% weatherproof. Low SWR. Heavy duty construction. Link coupling results in excellent match over full bandwidth.

For detailed specifications and performance data, write Dept 157A.

Mosley Electronics, Inc. 4610 N. Lindbergh Blvd., Bridgeton, Mo. 63042

160-Meter Changes Imminent

(*Continued from page 85*)

Noteworthy features of the new plan include:

1) The privileges will be changed in one way or another for nearly every area.

2) States formerly split with different privileges are now each considered as an entity.

3) With the rarest of exceptions, no area will have fewer privileges in either frequency or power than before.

4) In a majority of areas, the changes will provide increases in available frequencies and/or power. In a few states, a full kilowatt is anticipated on one 25-kHz. segment.

Action by FCC is expected shortly (perhaps by the time you read this) and will be completely reported in the next available *QST*. QST

A.R.R.L. QSL Bureau

The function of the ARRL QSL Bureau system is to facilitate delivery to amateurs in the United States, its possessions and Canada of those QSL cards which arrive from amateur stations in other parts of the world. All *you* have to do is send your QSL manager (see list below) a stamped self-addressed envelope about 4¼ by 9½ inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner.

Cards for stations in the United States and Canada should be sent to the proper call area bureau listed below.

W1, K1, WA1, WN1[1] — Hampden County Radio Association, Box 216 Forest Park Station, Springfield, Massachusetts 01108.

W2, K2, WA2, WB2, WN2 — North Jersey DX Assn., P.O. Box 505 Ridgewood, New Jersey 07451.

W3, K3, WA3, WN3 — Jesse Bieberman, W3KT, RD 1, Valley Hill Rd., Malvern, Pennsylvania 19355.

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

WA4, WB4, WN4[1] — Richard Tesar, WA4WIP, 2666 Browning St., Sarasota, Florida 33577.

W5, K5, WA5, WN5 — Hurley O. Saxon, K5QHV, P.O. Box 9915, El Paso, Texas 79989.

W6, K6, WA6, WB6, WN6 — San Diego DX Club, Box 6029, San Diego, California 92106.

W7, K7, WA7, WN7 — Willamette Valley DX Club, Inc., P.P. Box 555, Portland, Oregon 97207.

W8, K8, WA8, WN8 — Paul R. Hubbard, WA8CXY, 921 Market St., Zanesville, Ohio 43701.

W9, K9, WA9, WNØ — Ray P. Birren, W9MSG, Box 519, Elmhurst, Illinois 60216.

WØ, KØ, WAØ, WNØ — Alva A. Smith, WØDMA, 238 East Main St., Caledonia, Minnesota, 55921.

VE1 — L. J. Fader, VE1FQ, P.O. Box 663, Halifax, N. S.

VE2 — John Ravenscroft, VE2NV, 135 Thorncrest Ave., Dorval, Quebec.

VE3 — R. H. Buckley, VE3UW, 20 Almont Road, Downview, Ontario.

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

VE5 — Fred Ward, VE5OP, 899 Connaught Ave., Moose Jaw, Saskatchewan.

VE6 — Karel Tettelaar, VE6AAV, Sub. P.O. 55, N. Edmonton, Alberta.

VE7 — H. R. Hough, VE7HR, 1291 Simon Road, Victoria, British Columbia.

VE8 — George T. Kondo, VE8 ARRL QSL Bureau of Department of Transport, Norman Wells, N.W.T.

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

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

KH6, WH6 — John H. Oka, KH6DQ, P.O. Box 101, Aiea, Oahu, Hawaii 96701.

KL7, WL7 — Alaska QSL Bureau, Star Route C, Wasilla, Alaska 99687.

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

[1] **These bureaus prefer 5 × 8 inch manila envelopes.**

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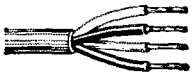
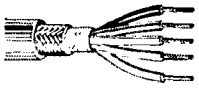
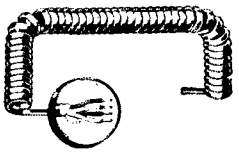


Antenna Rotor Cables
Sturdy, flexible, plastic insulated cable for rotor applications. Color coded. Chrome, vinyl plastic jacket resists sun and aging.



Power Supply Cables
Excellent mechanical and electrical characteristics for long service life. Special jacket offers maximum resistance to abrasion and ozone. Use as power supply cords and interconnecting cables. Ideal for remote control circuits, special press-to-talk microphone circuits, and other applications.

Shielded Hook-Up and Grid Wire
Provide most effective TVI suppression. Vinyl insulated with tinned copper braid shield. Available from 24 AWG to 12 AWG.



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Provides low impedance for mobile microphone applications. Neoprene jacket remains flexible at low temperatures. Available with or without shielded conductors.

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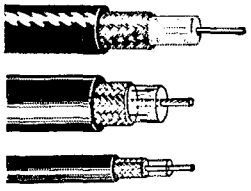
Uniform quality control provides uniform impedance. Brown polyethylene for best weather resistance and lowest losses.



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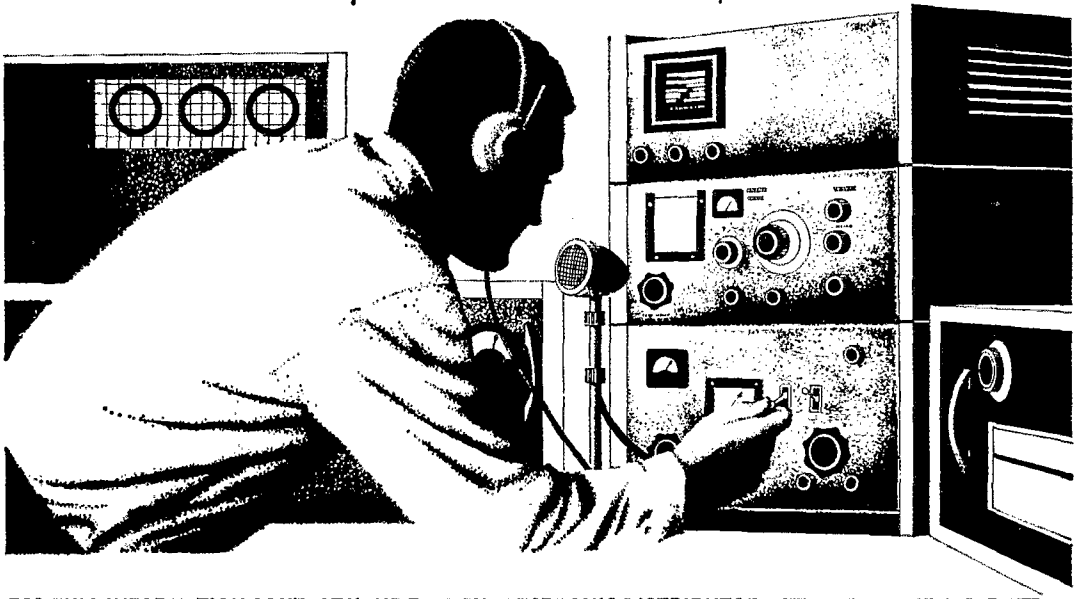

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WA1BQD, Edwin Kay, Lewiston, Maine
WA1CTE, John C. Lees, Hopedale, Massachusetts
K1KIQ, Louis J. Simoneau, Somerville, Mass.
K1PII, John C. "Mike" Estey, Franklin, Maine
W1PW, Charles E. Duffy, Hyde Park, Mass.
W1YQM, John "Jack" Strong, Melrose, Mass.
W2CYQ, E. Francis Larham, Penn Yan, N. Y.
K2HKJ, Pat Gordon, Ridgewood, New York
W2PBG, Robert J. Straub, Huntington, N. Y.
W2OOE, Clifford K. Ellinger, Long Beach, L. I., New York
W2VRN, Stanley J. Wojton, Niagara Falls, N. Y.
W3DCW, William Wright, Bethlehem, Pa.
K3NKO, Donald S. Cawley, Milton, Pennsylvania
WA4DSU, Melvin "Mel" Duffy, New Smyrna Beach, Florida
K4GYV, Oscar D. Bryant, Mount Vernon, Ky.
WA4JLL, Lloyd Ladell, Pinellas Park, Florida
K4SNV, Richard A. Black, Chapel Hill, N. C.
K4WTJ, Earl W. Chandler, Rome, Georgia
W5DHS/KL7BAJ, William Holman III, San Antonio, Texas
K5EBK, Charles W. Thornton, Corpus Christi, Texas
W5FSU, John R. Potts, Lubbock, Texas
W5KTX, Homa S. Reece, Lubbock, Texas
W5JZ, Arthur W. Meek, Albuquerque, N. M.
W5LM, Jess Coleman, Temple, Texas
K5RAS, Gene Francis Guidrey, Ville Platte, La.
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WA6TRJ, Art Gravelle, Fort Jones, Calif.
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W7CKJ, Bruce Daly, Seattle, Washington
W7DOW, Charles N. Richardson, Phoenix, Ariz.
W7ENF, Philip F. Hoover, Shelton, Washington
W7GEF, Chris Howard, Wilsall, Montana
W8ABS, B. C. "Corky" Angle, Conneaut, Ohio
ex-KN8AZO, George Miller, Canfield, Ohio
W8CKU, Roy Vortman, Parma, Ohio
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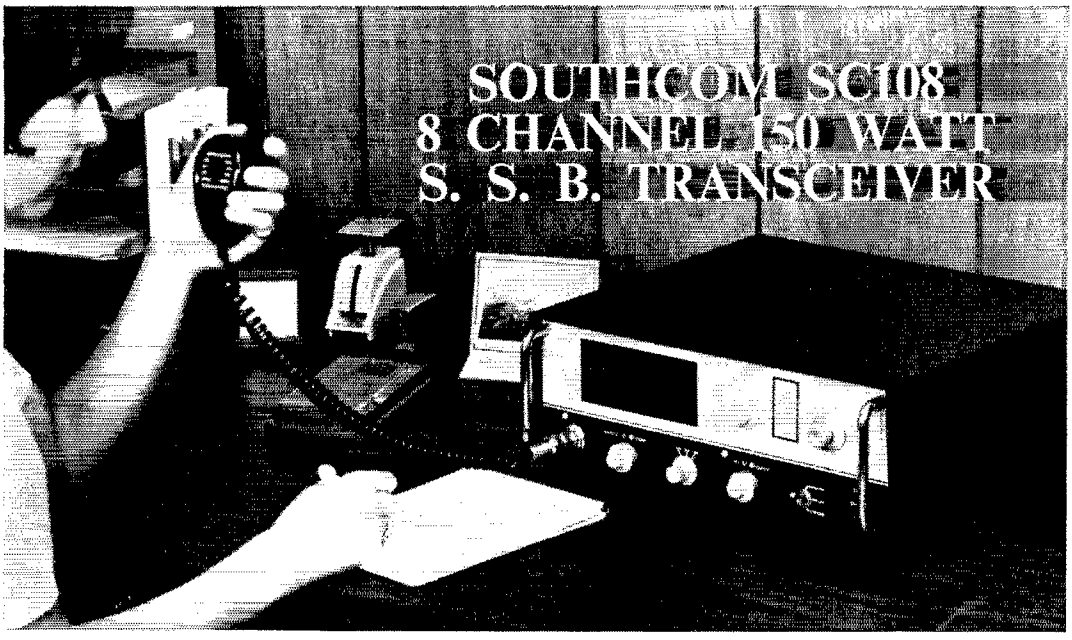
WA8HIA, David Darvas, Cleveland, Ohio
W8JWR, Bernard "Bud" Bright, Parma, Ohio
W8IAJ, Primo Scipio, St. Albans, W. Va.
K8QXE, Kenneth Hoover, New Madison, Ohio
WA8UDA, William A. Newell, Ferndale, Mich.
W8VMI, Ray E. Deemer, Cleveland, Ohio
W9CXU, Harold Doschadis, Black River Falls, Wisc.
W9DJM, Charles Smith, Auburn, Indiana
W9HPX, Arthur Kraatz, Highland Park, Ill.
WØKAJ, Gene R. Field, Pretty Prairie, Kans.
KØSRV, Gerhard Wiard, Sutton, Nebr.
GM8MN, Frank McAinsh, Crieff, Perthshire, Scotland
VE7BQU/W7, Jim J. Palmer, Gresham, Oregon

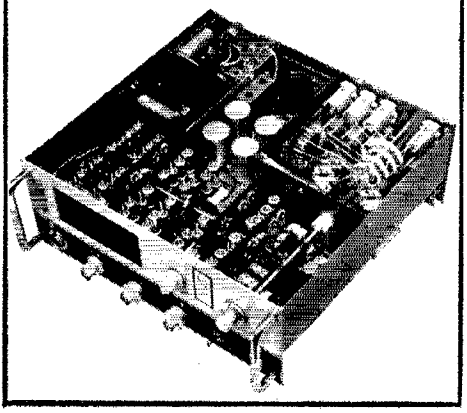


The SC108 is a new high performance SSB Transceiver for operation on up to 8 channels as a base or mobile station. Automatic circuitry including wide range ALC and AGC permits operation by unskilled personnel. The advanced circuitry using FETs and high Q toroids circuits has given the good technical specification with simplicity of design. This results in a substantial lowering in cost compared with earlier dual conversion bipolar solid state and vacuum tube designs.

- **CHANNELS:** 8 separate channels each pre-set to any frequency 2-16 MHz. Also available in 2 or 4 channel versions.
- **POWER SUPPLIES:** Internal plug-in supplies for 230/115 AC or 12 V DC operation.
- **SIZE:** Smallest 150 W PEP output Multi Channel Transceiver 14″ x 5.3″ x 13.0″, includes power supply.
- **SOLID STATE:** 10 FETs, 11 Bipolar transistors, 30 diodes, Tubes only in P.A.
- **MODES:** SSB, Compatible AM, Selectable Sidebands*, CW*, (* Optional).
- **CONTROLS:** Bandswitch, RF & AF Gain, On/Off/Standby, Clarifier, USB/AM/LSB*, Squelch*, VOX*, (* Optional).
- **ACCESSORIES:** Mobile Antennas, Mobile Mounting Rack, Remote Control Units, Handset, Antenna Selector.
- **LOW PRICE:** Models from $765* complete. (* 2 Channels). Also available, the SC100 low cost single channel transceiver.

SPECIFICATIONS

POWER: 150 watts PEP output
DISTORTION: —30dB 3rd order
STABILITY: ±25 Hz —10° to 60°C (With ovens)
IMAGE: —60dB minimum
SIGNAL TO NOISE: .5 μv for 15dB
AGC: 5μv—.1V for 10dB
AUDIO OUTPUT: 2 watts



Please write for information.

SOUTHCOM INTERNATIONAL, INC.
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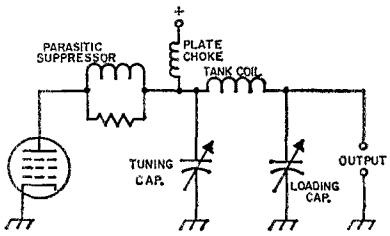
Escondido, California. 92025

Those Higher-Class License Examinations

(Continued from page 67)

Answers to license quiz: Q1—D; Q2—E; Q3—E; Q4—C; Q5—C; Q6—see diagram below.



Sixer & Twoer Modifications

(Continued from page 80)

Notes

In setting up the code oscillator, we tried several varieties of n-p-n transistors, including several surplus units scrounged from circuit boards. Nearly all of them worked. If you have any n-p-n transistors on hand they are worth trying.

Converting these units for A2 would appear to be ideal for club projects where clubs are conducting Novice classes. As mentioned earlier, there is plenty of QRM-free room on 2 meters, and beam antennas with good gain for this band are easy to make.[2] And after the Novice has passed his General exam the transceiver can be used on phone without any further modifications.

QST—

[2] *The Radio Amateur's V.H.F. Manual* or *The Radio Amateur's Handbook.*

How's DX?

(Continued from page 101)

40-meter stuff like HC8FN with a 12-watt 50C5 crystal oscillator . . . . . KP4s CSW and DBU, signing portable designators and/or VP2 calls, expect to hit Grenada May 3rd, St. Lucia on the 6th, Dominica the 7th, Antigua the 8th, St. Kitts the 9th, Anguilla the 10th–11th, St. Maarten the 12th and Tortola the 13th or 14th of this month if all goes according to plan. "Operation will be from about 2000 to 0500 GMT, also possibly 1000–1300, near 3820, 7220, 14,220, 14,340 and 21,260 kc." Check with either gent concerning a special certification available to he who works them at two or more stops on the swing . . . . . WA1CJE found ARRL President WØNWX enjoying our DX Test from his VP2VL hideaway . . . . . HR1KAS, VE1ASJ and YV4QG work on plans for Clipperton and HKØ DXpeditionary doings . . . . . VP7BG (K4KZE) started out on 75 but new skyhooks will urge him to higher DX bands . . . . . K6KDS hopes to reactivate ZF1DX this summer . . . . . DXasperating! W8ZCQ, *CARAscope* DX scribe, takes to task those rare DX operators who encourage liddism by rewarding liddishness . . . . . Canadian DX Association is Ontario DX Association renamed. CDXA brass features VE3s DLC pres., ACD DDR veeps, CKW NE secs., and HL treas. . . . . Doubtless delighting QSL printers, SCDXC's *DX Bulletin* observes two-letter calls being gobbled up by the Extras at a frantic rate. Who's who? . . . . . As detailed elsewhere in *QST*, KØJPL and Northwest St. Louis Amateur Radio Club invite the worldwide DX gang to join in the 1968 Missouri QSO Party from 2300 GMT on the 25th of this month to 0300 the 27th. Recommended rallying spots are (c.w.) 3520, 7025, 14,050, 21,050; and (phone) 3950, 7225, 14,330 and 21,350 kc. Further inquiries may be directed to KØIFL.

QST—

Quads and Yagis

(Continued from page 19)

area where the antenna is to be used does not have high-wind problems, the best and simplest choice would be a long-boom Yagi antenna. If multiband operation is desired, or if wind problems were to limit the length of the boom to some nominal value, then the quad antenna would be a good choice. Likewise the choice of available materials in your locale, and the acceptance of the appearance of the antenna by your neighbors or family, constitute other determining factors. The best approach is to survey your requirements and environmental restrictions, make your choice and proceed accordingly.

Acknowledgements

It is very difficult to acknowledge systematically and completely all those who have made the quad antenna a successful communications antenna. However, surely credit must be given to C. C. Moore, the father of the quad antenna; to William Orr who presented the first written material on the theory and construction of two-element quads; to Lee Bergren who showed the feasibility and advantages of using multielement quad arrays; to the Japanese workers, Adache and Mushiake, of Tohoku University, who presented a detailed analysis and experimental verification of the electromagnetic properties of loop antennas of large circumference; and finally, to all the radio amateurs, in all corners of the world, who developed constructional and design techniques and proved or disproved their validity.

I would like also to acknowledge the help of Mr. Hal Wolff (WAØIOR) for his aid in constructing the model Yagi and quad arrays and running the patterns. These patterns were obtained by using the antenna range of the Denver Research Institute of the University of Denver.[6] Many Denver area amateurs have entered into these quad experiments, notably Messrs. Jim Snyder (KØZCM), Butch Ford (WAØIMX), Ed Wood (KØKKU), Keith Farris (WØYDM), Warren Wheeler (WØREQ), and many others. The author gratefully acknowledges their assistance, help, and encouragement.

Additional References

Jasik, *Antenna Engineering Handbook*. New York: McGraw-Hill, 1961, p. 16–25.

J. E. Lindsay, "A circular loop antenna with non-uniform current distribution," *IRE Trans. Antennas and Propagation (Communications)*, vol. AP-8, pp. 439-441, July 1960.

J. E. Lindsay, "A parasitic end-fire array of circular loop elements," *IEEE Trans. Antennas and Propagation (Communications)*, vol. AP-15, Number 5, pp. 697-698, Sept. 1967. QST

[6] At the time these tests were performed (1962–64) the author was Head of the Antenna Laboratory, Denver Research Institute, University of Denver. Mr. Hal Wolff was the research technician at this facility.

—···—

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Auroral Notes

(Continued from page 40)

a flare that has produced particles that missed the earth. An example of this was the aurora in January 1967, which is thought to have been the result of a flare on December 12, 1966.

Prediction depends on knowing what is happening on the sun, or has happened, and how the earth is being affected. There are three rapid sources of such information: 3815 kc., the Geoalerts transmitted on WWV, and your local Weather Bureau. The first two are undoubtedly familiar. The last results from the merger of the old Central Radio Propagation Laboratory with the Weather Bureau to form the Environmental Science Services Administration (ESSA). ESSA issues radio propagation forecasts, and these are distributed to all Weather Bureau offices via TWX. Your local forecaster (of the weather, that is) is receiving these bulletins, and is probably filing them in his circular file. Get to know him, and you may find a good source of information.

Detecting an Aurora

Many man-hours have been spent constructing various types of detectors for auroras. These are generally of three types. One monitors some geophysical parameter which is known to be affected by the presence of aurora. Earth-current measurements by WØMOX and the magnetic-field measurements of W5UGO are examples. Ways of making these measurements are shown in Fig. 6. Another auroral detector is forward-scattered radio signals in the h.f. or v.h.f. range. In the h.f. range, flutter on 75-meter signals or garbling of Radio Moscow at 7145, 7240 or 7250 kc., or warbling of CHU at 7335 kc. may herald the approach of an aurora. Forward-scattered v.h.f. signals are also useful, with best results found on the big signals that occasionally originate from Stanford, California, and Long Branch, Illinois, just below the six-meter band. Also useful are TV, FM and VOR stations. Another detection scheme is monitoring backscattered signals in the h.f. and u.h.f. regions. If one is sufficiently close to WWV, a backscattered signal superposed on normal propagation may provide a good indicator of the presence of auroral ionization. In the u.h.f. range, radar stations provide useful backscatter signals. Along the coasts, these are often found just below the 220-Mc. band, while in other areas, the 420-Mc. band contains useful radar signals.

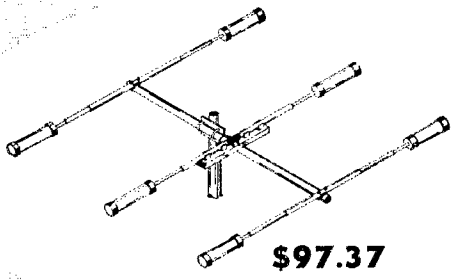
Each of the three types of detectors is useful, and a combination of these is better yet. There is one other kind of auroral detector, for which there is no equal: *getting on the bands, listening, and making some noise!*

Acknowledgement

Photographs and drawings used in this article have been made available by the Environmental Science Services Administration of the Department of Commerce.

now...

these great antennas from Mosley



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Classic 10-15

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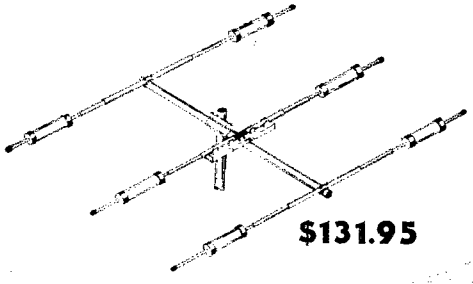

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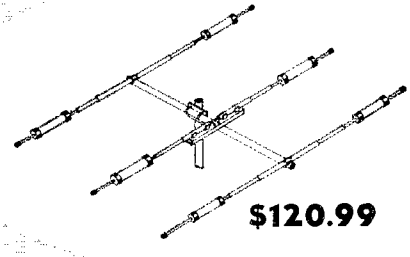

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- 225 Rte. 46, Totowa, N.J. 201 – 256-8555

Field Day—1968

(Continued from page 60)

11) The c.w. expert of the group will be sleeping when the rarest high-speed DX comes through.
12) The rarest c.w. DX will be gone before the c.w. man is fully awake.
13) The 2-meter receiver will receive the 50 Mc. position with Q5 copy.
14) Any and all major guy lines will be run into at least once.
15) An immovable object supporting a critical guy line isn't.
16. Every v.f.o. will shift frequency 5% for each 2000 ft. of elevation.
17) The truck that pulls the house trailer doesn't.
18) Spare oil for generators can be found in crankcase of any car on site.
19) An open band before contest insures poor conditions during contest.
20) Longest DX occurs 10 minutes before official start of any contest.
21) Any spare part on hand will not be needed.

Amatuer Radio—Present & Future

(Continued from page 77)

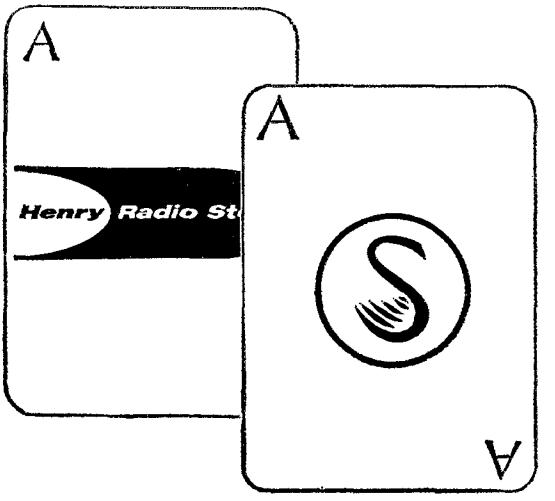
of the League over the years are by no means the work of just our dedicated crew in Newington. They result from all kinds of input from — and participation by — our members throughout Canada and the United States. This is as it should be, and indeed the continuing effectiveness of the League depends almost entirely upon the personal involvement of members and clubs in our affairs. The task of your Board of Directors and Headquarters staff is to sort and evaluate the ideas, proposals and suggestions, and come up with what — in our best judgement — is the most appropriate course for amateur radio to follow.

In that way, therefore, the leadership is a joint endeavor. You in QCWA share with ARRL the responsibility for our future.

It's been a good many years since the first faltering ham signals came on the air about the turn of the century, and some of us are old enough to have witnessed — if not actually participated in — many of the changes which have taken place since. We went from crude spark to rotary gaps . . . vacuum tubes and continuous wave . . . crystal control and 100% modulation . . . single-signal reception, frequency modulation and sideband . . . teleprinter, amateur satellites and moonbounce.

We have grown from a handful of attic experimenters to nearly 300,000 enthusiasts from all walks of life, and with varying interests in different aspects of our avocation. It is indeed this variety of interests, as well as our growth, which is both our strength and the root of many of our problems today. Early antagonists were the die-hard spark men versus users of the new-fangled continuous wave transmission yet rapid technical progress was made. A later era saw much dissension between phone fanatics and the c.w. forever group — again, amateur radio still made forward strides. Today the lines are not as

STILL A WINNING PAIR



Year after year Swan and Henry Radio have proven to be tops with amateurs the world over. Why? Because Swan manufactures fine reliable equipment that gives you the most for your money. Because Henry Radio gives you the best deal . . . generous trades, easy payments and the kind of responsible merchandising that amateurs have learned to depend on. That's why we are number one . . . the world's largest distributor of amateur radio equipment.

Attention World Amateurs: Henry Radio makes it simple and easy for you to own the finest American radio equipment. Write for details.

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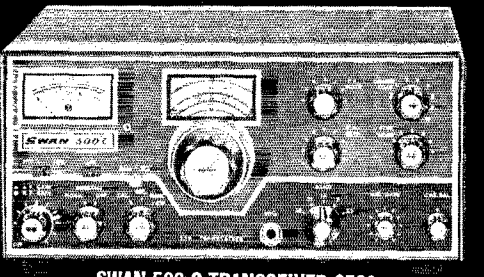
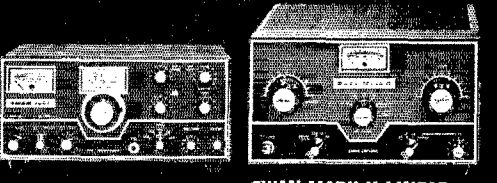


SWAN 500-C TRANSCEIVER $520.



SWAN 350-C TRANSCEIVER $420.

SWAN MARK II LINEAR AMPLIFIER $395 (with tubes) With Power Supply $630.

Accessories: 12 volt DC supply, Model 14-117 $130. Matching AC supply, Model 117XC $95.

While you're in, check the improved Swan model 250-C six meter UHF transceiver . . . it's a beauty.

Our reconditioned equipment carries a 15 day trial, 90 day warranty and may be traded back within 90 days for full credit toward the purchase of NEW equipment. Write for bulletin.

TED HENRY (W6UOU) **BOB HENRY** (WØARA) **WALT HENRY** (W6NRV)

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"World's Largest Distributor of Amateur Radio Equipment"

sharply drawn nor the discussions as heated. Rather, each of our interest groups — RTTY, DX, traffic, contesters, ragchewers, builders — goes pretty much its own separate way.

Yet we all have in common the bond of mutual interest in personal, two-way short-wave communication and experimentation. This is what has held us together in our sixty-year history. It is what will continue to produce an effective amateur service in the public interest — vital communications in time of emergency, advancement of the electronics art, a national reservoir of trained operators, technicians and engineers, and of the amateur's unique ability to enhance international good will.

And so as amateur radio moves forward, the future looks very bright indeed.

Thank you and 73.

QST

Armed Forces Day

(Continued from page 61)

AIR (Air Force Radio) Wash., D.C.	3347	RTTY	3.5–3.8
	3397.5	c.w.	3.5–3.8
	4025	s.s.b.	3.8–4.0
	6997.5	c.w.	7.0–7.2
	7305	s.s.b.	7.2–7.3
	7315	RTTY	7.0–7.2
	13995	c.w.	14.0–14.2
	14397	s.s.b.	14.2–14.35
	20994	c.w.	21.0–21.1

C.W. Receiving Contest

A c.w. receiving contest will be conducted for any person capable of copying International Morse Code at 25 words per minute. The c.w. broadcast will consist of a special Armed Forces Day message from the Secretary of Defense addressed to all radio amateurs and other participants. The schedule for this broadcast is as follows:

Time	*Transmitting Station*	*Frequencies (kHz.)*
18 May 1968		
190300 GMT	WAR — Army	3347, 6992.5, 14405
(182300 EDST)		
(181900 PST)	NSS — Navy	3357, 4015, 7301, 14480
	NPG — Navy	4005, 4016.5, 7375, 13975.5
	AIR — Air Force	3397.5, 7315, 13995
	A6USA — Army Radio San Francisco	6997.5

RTTY Received Contest

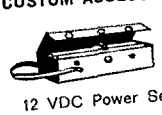
A radioteletypewriter RTTY receiving contest will be conducted for any individual amateur or station possessing the required equipment. This is a test of the operator's technical skill in aligning and adjusting his equipment, and serves to demonstrate the growing number of amateurs becoming skilled in this method of rapid communications. The RTTY broadcast will consist of a special Armed Forces Day message from the

No, we're not lazy! It's just that "Popular Electronics" (Dec. 1967) tells the DX-150 story so well.

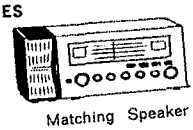
Reprinted Without Editing

"What may be the first really noteworthy advancement in communications receivers is wrapped up in the new Radio Shack imported DX-150. Featuring continuous coverage from the top of the AM broadcast band (535 kHz) to the bottom of the 10-meter band (30 MHz), the DX-150 is a single-conversion superhet with a tuned r.f. stage, two i.f. stages, full-wave product detector for SSB/CW reception — and it's 100% solid state. Selling at $119.95, the DX-150 has the flexibility of a communications receiver that a ham or SWL is used to buying for $175-plus. To rattle off a few more "features": there is a front panel antenna trimmer, fast or slow a.v.c. attack, a cleverly concealed built-in monitor speaker, plenty of calibrated bandspread, and noise limiting in both the i.f. and audio stages. Because of the solid state circuitry, the usual warm-up drift expected with a tube-type receiver is virtually absent here. And, although the DX-150 is primarily a base station receiver with a 117-volt a.c. power connection, it can be operated from an outboard d.c. power supply consisting of only 8 D-cells. Radio Shack claims that the receiver will operate for 100 hours — continuously — using only the d.c. supply. Ideal for Field Day and emergency work! The proof of the pudding so far as any communications receiver is concerned is how well it works "on the air" At POPULAR ELECTRONICS, the DX-150 was hooked up to a 125-foot long-wire antenna and tuned across the AM broadcast band. Needless to say, the S-meter was pinned on just about every single channel, and the audio quality with Radio Shack's voice-selective speaker (extra, $7.95) was crystal-clear. Tuning the band between 1.55 and 4.5 MHz, your reviewer got a chance to appreciate the comfortable handling on SSB reception. Going a little higher (4.5-13.0 MHz), the 25- and 31-meter bands were "alive" and signals appeared to leap out of the air — possibly due to the very quiet background of the DX-150. While quietness is usually regarded as a lack of sensitivity, that wasn't the case with the DX-150. On the top band (13-30 MHz), the sensitivity still seemed high; and on the CB frequencies, the DX-150 could hold its own against a dual-conversion receiver built just for CB work. **Summary:** Radio Shack has the Model DX-150 in most of its 160 retail outlets. Take a look at it, and get the "feel" of this unusual receiver."

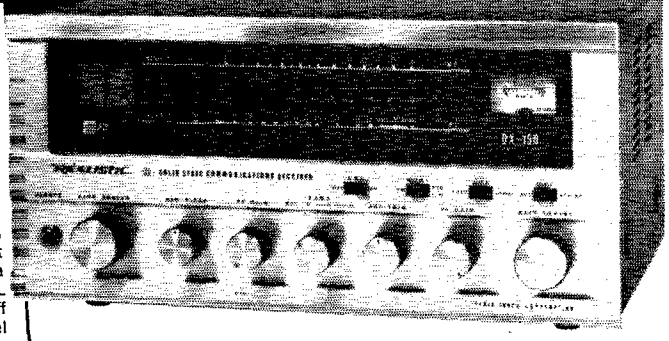
CUSTOM ACCESSORIES



12 VDC Power Set



Matching Speaker



And only Radio Shack has this 119.95 receiver!

Thousands of hams and swl's have discovered that Radio Shack's Realistic DX-150 is truly the "breakthrough" full coverage receiver of 1968. It's the 100% solid state receiver that *banishes forever* tube failure, tube heat, tube drift, and — thanks to its built-in 117V/12V supply — your dependence upon AC current when power fails or on field day. The brilliant DX-150 is NOW IN STOCK in every one of Radio Shack's over 200 stores.

CAVEAT EMPTOR

Since DX-150 is certain to be the world's most imitated communications product, we advise our readers that "solid state" on a receiver is not necessarily indicative of selectivity, sensitivity and "feel." The DX-150 is built to $200-$300 performance specifications; its modest $119.95 price tag simply designates the extent to which we have sacrificed traditional markup to establish REALISTIC as a quality line! P.S. — DX-150 is a hefty 14 lbs., with a 12¼" dial, extruded 11-control front panel, and 14¼x8¼x6½" in size. It's just the picture that's little! Our no money down policy makes the pain little, too!

FILL IN AND MAIL ORDER TODAY!

RADIO SHACK { **EAST:** 730 Commonwealth Ave., Boston, Mass. 02215 / **WEST:** 2615 West 7th St., Fort Worth, Texas 76107

Please rush me the item I've checked below. Dept. XO
I enclose $_____, plus 50¢ for postage and handling:

☐ FREE 1968 Catalog ☐ Matching Speaker, 20-1500, $7.95
☐ Receiver, 20-150, $119.95 ☐ 12 VDC Power Set, 20-1501, $7.95

Name (print) _____

Street _____

City _____ State _____ Zip _____

Secretary of Defense to all radioteletypewriter enthusiasts. The message will be transmitted at 60 words per minute in accordance with the following schedule:

Time	*Transmitting Station*	*Frequencies (kHz.)*
18 May 1968		
190335 GMT	WAR — Army	3347.6992.5,14405
(182335 EDST)		
(182135 CST)	NSS — Navy	4012.5, 7380
(181935 PST)	NPG — Navy	4001.5
	AIR — Air Force	3397.5,7315,13995
	A6USA — Army Radio San Francisco	6997.5
	A5USA — Army Radio Fort Houston, Texas	4025

Submission of Competition Entries

Transcriptions should be submitted as received. No attempt should be made to correct possible transmission errors.

Time, frequency and call sign of the station copied as well as the name, call sign (if any) and address of the individual submitting the entry must be indicated on the page containing the text. Each year a large number of perfect copies are received with insufficient information, thereby precluding the issuance of a certificate.

Completed entries should be submitted to the Armed Forces Day Contest, Room 5A522, The Pentagon, Washington, D. C. 20315 and postmarked no later than 31 May 1968. QST

World Above 50 Mc.

(Continued from page 95)

RG-8/U from J_1 to link coil L_2. Replace with RG-59/U, and use RG-59/U between the driver and final. (2) The point where C_{11} attaches to L_1 is critical. The physical center of the coil does not correspond with the electrical center. Experimentation to find the electrical center will result in improved grid drive. (3) If step 2 is completed, C_3 and C_4 can be discarded. With these modifications, K7RKH says 10 watts (well within the capacity of a varactor) will drive the amplifier adequately for class AB_1 service.

1215 MHz. and Up activity is concentrated in certain areas of the country. At Morristown, New Jersey W2CCY has 100 watts output on 1295.985 MHz. f.s.k., f.m. or a.m., feeding a 20-db. horn antenna. He wants schedules. The transmitter may be keyed automatically with "V de W2CCY." Others in the same general location operating on 1296 plus or minus 300 kc. are W2CQH, W2DYG, K2DZM, W2JBZ, W2JNG, K2PPZ and WA2VTR.

Dolph Vilardi, WA2VTR, Spring Valley, New York reports on some most interesting 1296 tests. "Through the efforts of W2CCY, the use of a sixty-foot dish was obtained at Holmdel, New Jersey. Arrangements were made to have the dish turned horizontally and schedules made with W2JBZ, K2JNG and WA2VTR. Although these stations had

worked each other during past months, signals were in most cases relatively weak or even marginal. The most power used was K2JNG's 15 watts output, but more typically the power outputs were 6 to 9 watts. Antennas varied from a 32-element collinear to a quad helix and a 4½-foot dish. During the first test the dish was stuck facing skyward, but the tests were conducted anyway, and even with the antenna in this position, phone signals from W2CCY were solid copy at WA2VTR and W2JBZ, who were in turn copied by W2CCY. Later, the dish was aimed horizontally and much stronger signals were exchanged between the same stations. The signals at both ends were about what might be expected with the same power at 432 or even 144. Several conclusions can be drawn from these tests, over a maximum distance of 56 miles: serious work must include crystal-controlled transmitters and converters. With adequate power, results comparable to those on other bands can be accomplished, providing antenna gain is on the order of 16 db. or more.

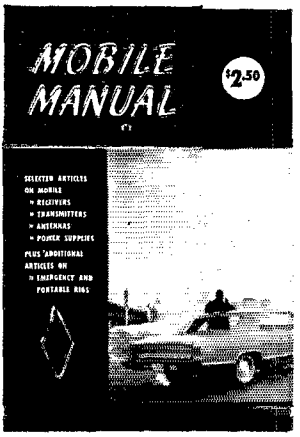
In other areas of the country, W5AJG in Dallas, Texas, is working on a 1296 s.s.b. rig. W3GKP, Spencerville, Maryland, is experimenting with varactors. In New Mexico, W5HDE and K5HMN are running schedules over a 9-mile mountain obstructed path, using APX-6s and six-foot dishes, and using a 10,000 peak for a reflecting point. Signals are well above the noise. W4HHK is experimenting with 2300-MHz. crystal-controlled converters. The San Bernardino Microwave Society is preparing for summer 3300-MHz and 22-GHz activity. Things are looking up in the world above 1000 Mc.!

Incentive Licensing and the V.H.F. Bands

I'm afraid some 50-MHz. men may have left, or are leaving, the band as the result of FCC Docket 15928, but a handful appear interested to the extent of attempting to do something about FCC's inclusion of the 6-meter band in the incentive program. Robert Cooper, Jr., K6EDX, and Robert Grimm, K6RNQ have submitted a twelve-page petition to FCC asking that the licensing authority rescind that portion of Docket 15928 relating to the 50-MHz. band, until the Commission "has had an adequate opportunity to more fully study amateur operating practices and problems uniquely related to this amateur assignment." Their petition cites possible increased co-channel interference to channel 2 when Technicians and General class licensees are forced higher in the band, and they emphasize amateur achievements in propagation and equipment development at 50 MHz. The petitioners also note that Docket 15928 in effect eliminates the 50-MHz. c.w. sub-band, leaving it for the exclusive use of Extra and Advanced class licensees.

I'll leave the conclusions to you, but perhaps the implications are not totally clear. It is possible that the 220- and 420-MHz. bands are presently, or may soon be, under the scrutiny of FCC which is under severe pressure from the land mobile services for more spectrum. We had best take a *serious* look at our apathy and use these bands, and make their use known! QST

LATEST EDITION!



Any amateur interested in mobile operation will find the new Mobile Manual a definite asset. This Fourth Edition contains more than 70 articles not only on mobile operation, but also on portable and emergency equipment. Included is a summary of the rules and regulations relating to portable and mobile operation. Articles on solid-state gear are found throughout the newest edition of this popular book.

A few of the many articles of interest:

- **FET Converters for receiving**
- **A solid-state amplifier/modulator**
- **Transistorized VOX**
- **75 and 40 meter Transceivers**
- **Power supplies**
- **Noise suppression**
- **Test accessories**
- **Portable and emergency gear**

This latest edition of the Mobile Manual is a compilation of authoritative articles from QST. No need to search through piles of back issues looking for an answer; just pick up this new edition of the Mobile Manual.

The American Radio Relay League
NEWINGTON, CONN. 06111

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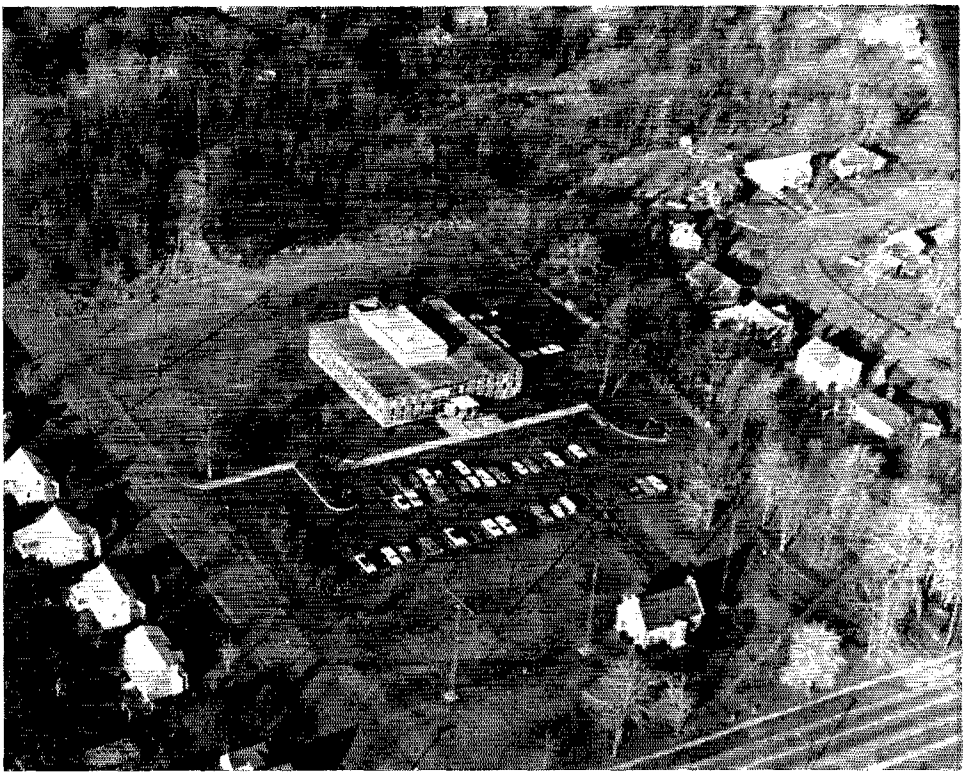

HOW TO STAY AHEAD: LET YOUR VOICE BE HEARD!

There's nothing quite like amateur radio—no other pursuit that combines space age technology, a world-wide people-to-people program without peer, *highly diversified interests, and an absolutely unique sense of fraternity.*

From the very beginning, amateurs have recognized the need for a vigorous organization to serve their special needs. Now nearly 100,000 strong, ARRL is the ham's own association. Through the League, every member has the opportunity to exert his influence in amateur radio affairs, and to play a personal part in important and satisfying field activities. In addition he gets personal benefits, not the least of which is his own copy of QST, the complete journal of amateur radio, every month. All for just $6.50. Shouldn't you be a League member?

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NEWINGTON, CONNECTICUT 06111

Please enroll me as a member of ARRL. Enclosed is $6.50 (for Canada and the U.S.; $7 elsewhere) to cover my membership dues for one year and twelve issues of QST.

NAME_____ CALL_____

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CITY_____ STATE_____ ZIP_____

(Please see other side of this page for list of available League publications.)

I would like the following League publications shipped to me postpaid. I am enclosing payment of $_____. (These prices apply only to the USA.)

Ship to this address:

NAME ..... CALL .....

STREET .....

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- ☐ **ARRL HANDBOOK** $4.00 — The standard comprehensive manual of amateur radiocommunication
- ☐ **UNDERSTANDING AMATEUR RADIO** $2.00 — Written for the beginner—theory and how-to-build it.
- ☐ **VHF MANUAL** $2.00 — A new and thorough treatment of the amateur v.h.f. field
- ☐ **LICENSE MANUAL** 50¢ — Complete text of amateur regs, plus Q&A for amateur exams
- ☐ **HOW TO BECOME A RADIO AMATEUR** $1.00 — All about amateur radio and how to get started
- ☐ **A COURSE IN RADIO FUNDAMENTALS** $1.00 — Use this in conjunction with the Handbook
- ☐ **ANTENNA BOOK** $2.00 — Theory and construction of antennas
- ☐ **SINGLE SIDEBAND FOR THE RADIO AMATEUR** $2.50 — The best s.s.b. articles from QST
- ☐ **THE MOBILE MANUAL** $2.50 — The best mobile articles from QST
- ☐ **HINTS AND KINKS** $1.00 — 300 practical ideas for your hamshack
- ☐ **OPERATING MANUAL** $1.00 — The techniques of operating your amateur station—DXing, ragchewing, traffic, emergencies, etc.

(Please see the other side of this page for an application for membership in ARRL and 12 issues of QST)

THE AMERICAN RADIO RELAY LEAGUE, INC., NEWINGTON, CONN. 06111

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That's right! Your tape recorder is ready to help your code study. The CODEMASTER tapes give you professional instruction via your own tape machine. Now generated by digital computer, the CODEMASTER tapes are unsurpassed for timing accuracy. Whether you're just starting, going for your Amateur Extra, or somewhere in between, the CODEMASTER tapes are your best code-learning buy! Find your CODEMASTER tape below!

CM-1: For the beginner. A complete course of instruction is on the tape. Practice material at 5, 7, 9 WPM. Prepares you for Novice exam. Includes code groups and punctuation.

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CODEMASTER tapes are 2-track monaural; available in two sizes: 7-inch reel (3¾ IPS) and 3¼-inch reel (1⅞ IPS). Will play on any but full-track machine. **SPECIFY both type and size** of tape you want. Any tape, $5.95 postpaid USA 4th class. Any two tapes, *$11.00*; all three, *$15.00 PPD.* Immediate delivery. CODEMASTER tapes are made only by Pickering Radio Company, P. O. Box 29, Portsmouth, R. I. 02871. Satisfaction guaranteed. Dealers: inquire.

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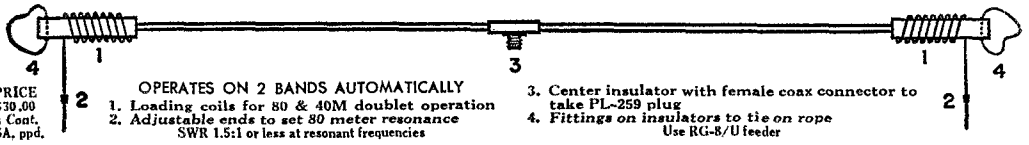

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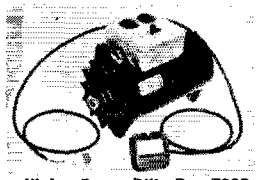

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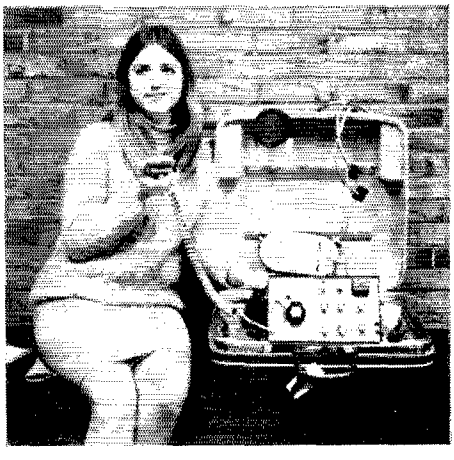
Virden Perma-Blit, Box 7066 QST, Amarillo, Tex. 79109

For the Ham with SPACE PROBLEMS...

America's most complete line of Free Standing & Guyed Crank-up Towers. Write for FREE Catalog.

TRISTAO TOWER CO. P. O. Box 115, Hanford, California 93230



Your headquarters in Central New York for new and used ham gear — sales and service. Mail orders welcomed.

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Hours: 9:00 A.M. to 5:30 P.M. Monday through Friday 9:00 A.M. to 5:00 P.M. Saturday

Hello there. My name is Romey and I'm here to give you a preview of STELLAR'S *Suitcase station.* It's just in the experimental stage now, but if you hams want it and will tell me what features you'd like in it, we plan to make it available as a package at a later date. If you send me your ideas, I'll see that you get a merchandise certificate for each one we use. Write me at Department Q for further information. 73 es 88.

stellar industries
DIV. OF STELLAR I, Inc.
SALES AND SERVICE

Your headquarters in Central New York for new and used ham gear — sales and service. Mail orders welcomed.

ELECTRONIC COMMUNICATIONS EQUIPMENT
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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 box number without identifying signature cannot be accepted.

(3) The Ham-Ad rate is 35¢ per word, except as noted in paragraph (6) below.

(4) **Remittance in full must accompany copy, since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.**

(5) Closing date for Ham-Ads is the 20th of the second month preceding publication date.

(6) **A special rate of 10¢ per word will apply to advertising which, in our judgment, is obviously noncommercial in nature.** Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 10¢ rate. Address and signatures are charged for, except there is **no charge for zipcode, which is essential you furnish. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising so classified takes the 35¢ rate.** Provisions of paragraphs (1), (2) and (5), apply to all advertising in this column regardless of which rate may apply.

(7) **Because error is more easily avoided, it is requested copy, signature and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signature must accompany all authorized insertions. No checking-copies can be supplied.**

(8) **No advertiser may use more than 100 words in any one advertisement, nor more than one ad in one issue.**

(9) Due to the tightness of production schedules, cancellation of a Ham-Ad already accepted cannot be guaranteed beyond the deadline noted in paragraph (5) above.

Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

HAMFEST: Annual SRRC Hamfest, June 2. Same place as last year. See May Hamfest calendar in QST for details or write G. E. Keith, W9QLZ/W9MKS, RFD #1, Box 171, Oglesby, Illinois 61348.

LOUISVILLE Ham Kenvention, Saturday, August 31 at the Executive Inn, featuring Dealers and Manufacturers; Technical Forums; contests, fashions for the ladies. 648 South Fourth St. 40202.

THE Astro Amateur Radio Club Swapfest Sunday May 19, Humphreys Park, Lipton, Indiana. Free lunch. No charge. Information Jr. Barnard, WA9RUU, Rte. 2, Linton, Indiana 47441.

INVITATION: New York Radio Club invites New York Area hams and SWLs to its regular monthly meetings the second Monday of each month, thru June 1968 at the Hotel George Washington, Lexington Ave. and 23rd Street at 8 P.M., W2ATT, New York Radio Club.

BREAKFAST Club Hamfest July 20 and 21, Palmyra, Illinois. Errol Workman, K9CIL.

A.W.A. Historical Radio Meet for old time amateur and commercial operators, historians and collectors. Smithsonian, Washington, D.C. Oct. 5th. Write to W2OY, Lincoln Cundall, A.W.A. Treas., for details.

ROCHESTER, N.Y headquarters again for the big Western New York Hamfest and VHF Conference, Saturday, May 11. For free copy of program of tickets, write P.O. Box 1388, Rochester, N.Y. 14603.

MOTOROLA used FM communication equipment bought and sold. W5BCO, Ralph Hicks, 813B No. Federal Hiway, Fort Lauderdale, Florida.

PRE-WORLD WAR I operators will find many of their old buddies are members of the Old Old Timers Club. We welcome all applicants whose first wireless contact was more than 40 years ago but give special consideration to those pre-World War I Pioneers, including Charter Membership. Write to W5VA, Secretary of the Old Old Timers Club, P. O. Box 840, Corpus Christi, Texas 78403.

WELCOME To Maritime Mobile service net. 14317 Khz, daily 2130Z. Amateur Radio's service to the Fleet. Vic Barry, RDC USS Corry, DD817 FPO, N.Y., N.Y. 0950.

ROCHESTER, N.Y. Headquarters again for the big Western New York Hamfest and VHF Conference Saturday, May 11. See Hamfest Calendar on page 76 for complete details.

TRADE ARRL 1968 Handbook for one of 15 old Handbooks not in W4AA historical library. Need govt. Amateur Callbooks 1922 through 1926, early wireless magazines and catalogs. Wayne Nelson, Concord, N.C. 28025.

TUBES, Diodes and Transistors wanted. Astral Electronics Corp., 150 Miller St., Elizabeth, N.J. 07207.

SELL swap and buy ancient radio set and parts magazines. Laverty, 118 N. Wycomb, Landsdowne, Penna. 19050.

TUBES Wanted. All types higher prices paid. Write or phone Ceco Communications, 120 West 18th St., N.Y., N Y. 10011. Tel: 242-7359.

DUMMY Loads. 1 KW, all-band, $7.95; wired, $12.95. Ham Kits, P. O. Box 175, Cranford, N.J. 07016.

WANTED: 2 to 12 304TL tubes. Callanan, W9AU, 118 S. Clinton. Chicago 6, Ill.

MANUALS for surplus electronics. List 10¢. S. Consalvo, 4905 Roanne Drive, Washington, D.C. 20021.

QSL cards?? America's finest. Personalized made-to-order! Samples 25¢. DeLuxe 35¢, Religious 25¢, (refunded). Sakkers, W8DED, Box 218, Holland, Michigan 49423.

QSLS "Brownie" W3CJI. 3111 Lehigh, Allentown, Penna. 18103. *Samples 10¢. Catalog 25¢.*

QSLS stamp and call brings samples. Eddie Scott, W3CSX, Fairplay, Md. 21733.

C. FRITZ—QSLs that you're proud to send, bring greater returns! Samples 25¢ deductible. Box 1684, Scottsdale, Arizona 85252 formerly Joliet, Illinois.

QSLS—SMS. Samples 10¢. Malgo Press, Box 373, M.O., Toledo, Ohio 43601.

DELUXE QSLS Petty, W2HAZ, P.O. Box 5237, Trenton, N.J. 08638. *Samples, 10¢.*

10¢ Brings free samples. Harry R. Sims, 3227 Missouri Ave., St. Louis, Mo. 63118.

QSL, SWL, cards that are different. Quality Card stock. Samples 10¢. Home Print, 2416 Elmo Ave., Hamilton, Ohio 45015.

CREATIVE QSL Cards. Personal attention. Imaginative new designs. Send 25¢. Receive catalog, samples, and 50¢ refund coupon. *Wilkins Printing, Box 787-1, Atascadero, Calif. 93422.*

RUBBER Stamps $1.15 includes tax and postage. Clints' Radio, W2UDO, 32 Cumberland Ave., Verona, N.J. 07044.

QSLS, finest YLRL's. OMs samples 10¢. W2DJH Press, Warrensburg, N.Y. 12885.

QSLS. Professional, neat. 10¢. Filmcrafters, Box 304, Martins Ferry, Ohio 43935.

David Rogers, son, regrets to announce death of QSL printer Warren Rogers KØAAB, and is winding up unfinished business.

3-D QSL cards, recognized leader among raised designs. Compliments aplenty! Prized collector's item. Samples 25¢ (refundable). 3-D QSL Co., Monson, Mass. 01057.

QSLS, SWLS, WPE. Samples 15¢ in adv. Nicholas & Son Printery, P.O. Box 11184, Phoenix, Ariz. 85017.

QSLS, samples, 20¢. Fred Leyden, W1NCZ, 454 Proctor Ave., Revere, Massachusetts 02151.

QSLS 300 for $4.35, samples 10¢. W9SKR, George Vesely, Rte. #1, 100 Wilson Road, Ingleside, Ill. 60041.

QSLS 3-color glossy 100, $4.50. Rutgers Vari-Typing Service. Free samples. Thomas St., Riegel Ridge, Milford, N.J. 08848.

QSLS-100 3-color glossy $3.00; silver globe on front, report form on back. Free samples. Rusprint, Box 7575, Kansas City, Mo. 64116.

ORIGINAL EZ-IN double holders display 20 cards each in plastic, 3 for $1.00 or 10 for $3.00 prepaid and guaranteed. Free sample to Dealers or Clubs. Tepabco, John, K4NMT, Box 198T, Gallatin, Tenn. 37066.

QSLS: 3-color glossy: 200, $6.99 postpaid. Samples, 10¢. Gates Print, 317 11th Avenue, Juniata, Altoona, Penna. 16601.

QUALITY QSLS: Samples 25¢ (refundable). R. A. Larson Press, Box 45, Fairport, N. N 14450.

QSLS's. Free samples, attractive designs. Fast return. W7IIZ Press, Box 2387, Eugene, Ore. 97402.

QSLS. 100, $1.25 and up, postpaid. Samples, dime. Holland, R3, Box 649, Duluth, Minnesota 55803.

QSLS. Kromkote glossy 2 & 3 colors, attractive, distinctive, different. Choice of colors 100-$3.00 up. Samples 15¢. Agent for Call-D-Cals. K2VOB Press, 240 West Kinney St., Newark, New Jersey 07103.

QSLS. Glossy coated, 100, $2.00. 3 and 4 colors. Samples, dime. Bob Garra, Leighton, Penna. 18235.

QSLS by K1FF, $2.00 for 100. Others at reasonable prices. Samples 25¢ deductible. K1FF QSLS, Box 33, Melrose Highlands, Mass. 03177.

QSLS. Gorgeous rainbows, cartoons, etc. Top quality! Low prices! Samples 10¢ refundable. Joe Harms. WA4FJE/W3COP, 905 Fernald, Edgewater, Fla. 32032.

EXCLUSIVE QSLS, Picture, custom, standard. Over 250 styles available. Samples dime. K1NCZ Press, 535 Walpole St., Dept. C, Norwood, Massachusetts 02062.

RAISED Lettering QSLs. Ace Printing, 6801 Clark Ave., Cleveland, Ohio 44102.

QSLS by Jansen, K2HVN, samples 25¢. 860 Atlantic St., Lindenhurst, New York 11757.

QSL Free Samples. CBM Printers, 5161 N. Hopkins, Milwaukee, Wisconsin 53209.

QSL cards. Finest quality. Economical prices. Fast service. Free samples. Little Print Shop, Drawer 9848, Austin, Texas 78757.

QSLS: Excellent quality, 100 for $2.00. SAE for samples. Owens, K4MUR, Box 926, Scottsboro, Ala. 35768

PICTURE QSL cards of your shack, etc. from your photograph. 500, $12.00, 1000 $15.25. Also unusual non-picture designs. Generous sample pack, 20¢. Half pound of samples 50¢. Raum's, 4154 Fifth St., Philadelphia 19140.

QSLS by Jansen, K2HVN, custom made, rainbows, pictures, flags. Large variety backgrounds, Special offer 300 glossy, $5.00. *Samples 25¢. 860 Atlantic St., Lindenhurst, N.Y. 11757.*

QSLS free samples. CBM Printers, 5161 N. Hopkins, Milwaukee, Wisconsin 53209.

RUBBER Stamps. Return mail delivery, postpaid. Basic price, $1.00 first line, 50¢ each additional line. Request type style chart, Fulton Rubber Stamps, Route 216-A, Fulton, Maryland 20759.

TEMPORARY employment wanted by two English university engineering students in North America during July and August. Mr. W. Watson, G3UDQ, Exeter University, England.

YOUR Call letters on beautiful desk stand. Engraved white letters on rich mahogany plastic plate 1¾" high by 6" long, mounted on clear polished acrylic base. $3.25 check or m.o. Lefor, Pond Road, Ridgefield, Conn. 06877.

WANTED: Master Mobile Master Matcher Cata. #2495 12 volts. Also Micro-Z Match cata. $925. State price and condition. VE2ADH, 75 Charleswood Dr., Beaconsfield, P.Q., Canada.

CANADIANS. Kits assembled, tested 20% Northern Electronics, Red Lake, Ont., Canada.

CANADIANS. Collins 75A-4 rcvr vernier dial. 3.1 kc. filter. In excint condx. $550.00. Prefer buyer who arranges pick-up. VE3EGO, 2444 Rector Ave., Ottawa 5, Ont., Canada.

SELL: Heathkit SB300E with all filters, plus speaker U.S. $230.00; SB-400E, U.S. $315.00. Both together for U.S. $500. VE2AJQ, 1150 Sherbrooke St. E., #601, Montreal, P.Q., Canada.

WANTED: Military, Commercial, Surplus, Airborne, Ground, Transmitters, Receivers, Testsets, Accessories. Specially Collins. We pay cash and freight. Ritco Electronics, Box 156-Q345, Annandale, Virginia 2203. Phone 703-510-5480 collect.

HAM'S Spanish-English manual $3.00 Ppd., Gabriel, K4BZY, 1329 N.E. 4th Ave., Fort Lauderdale, Florida 33304.

TUBES, test equipment, transmitters or receivers. Any and all types bought for cash or trade on new or used ham gear. Air Ground Electronics, 64 Grand Place, Kearny, New Jersey 07032.

1916 OSTS needed for personal collection. Price secondary. Ted Dames, W2KUW, 308 Hickory Street, Arlington, New Jersey 07032.

FOR Sale: SB-101 and SB-200. Wanted, kits to wire. Heath preferred. 12% of cost, some in stock. Professionally wired. Lan Richter, K3SUN, 131 Florence Drive, Harrisburg, Penna. 17112.

WE buy all types of tubes for cash, especially Eimac, subject to our test. Maritime International Co., Box 516, Hempstead, N.Y. 11552.

JOYSTICK. Variable frequency antenna systems solve space problems. Available immediately. SWL Guide, 218-S Gifford, Syracuse, N.Y. 13202.

CASH Paid for your unused Tubes and good Ham and Commercial equipment. Send list to Barry, W2LNI, Barry Electronics, 512 Broadway, N.Y., N.Y. 10012. Tel: (212) WAlker 5-7003.

GOODIES. Cash for Teletypewriters, parts. List. Typetronics, Box 8873, Ft. Lauderdale, Fla. 33312.

WANTED: Tubes and all aircraft and ground radios. Units like 17L, 51X, 618T or S. R388, R390, GRC. Any 51 series Collins unit. Test equipment, everything. URM, ARM, GRM, etc. Best offer paid. 22 years of fair dealing. Ted Dames Co., 308 Hickory St., Arlington, New Jersey 07032.

HAM Discount House. Latest amateur equipment. Factory sealed cartons. Send self-addressed stamped envelope for lowest quotation on your needs. HDH Sales Co., 170 Lockwood Ave., Stamford, Conn. 06902.

INTERESTING Sample copy free. Write: "The Ham Trader," Sycamore, Illinois 60178.

WANTED: For personal collection: Learning the Radiotelegraph Code, Edition 4; How to Become a Radio Amateur, Edition 9; The Radio Amateur's License Manual, Edition 2, 11, 12. W1CUT, 18 Mohawk Dr., Unionville, Conn. 06085.

RTTY gear for sale. List issued monthly, 88 or 44 Mhy toroids, five for $1.50 postpaid. Elliott Buchanan & Assoc., Inc. Buck. W6PVC, 1057 Mandana Blvd., Oakland, Calif. 94610.

WANTED: Used National Technical Schools FCC License Course, $3.00. Col. J. J. Moran, WB4FMZ, 4205 Arthur St., Hollywood, Fla. 33021.

WANTED: Tubes, all types, write or phone Bill Salerno, W2ONV, 243 Harrison Avenue, Garfield, N.J., Tel: GArfield Area code (201)-773-3320.

WE'RE Trying to complete our collection of Callbooks at Headquarters. Anyone have extra copies of Government Callbooks 1922-1925 and Radio Amateur Callbooks 1928-1934? ARRL, 225 Main St., Newington, Conn. 06111.

TUBES, test equipment, transmitters or receivers. Any and all types bought for cash or trade on new or used ham gear. Air Ground Electronics, 64 Grand Place, Kearny, New Jersey 07032.

WANTED: Model #28 Teletype equipment. R-388, R-390A. Cash or trade for new amateur equipment. Alltronics-Howard Co., Box 19, Boston, Mass. 02101.

SELL: CQ, QST, Handbooks, old radio magazines, any quantity. Buy old radio gear and publications. Erv Rasmussen, 164 Lowell, Redwood City, Calif. 94062.

NOVICE Crystals: 40-15M, $1.33, 80M, $1.83. Free list. Nat Stinnette, Umatilla, Fla. 32784.

TOROIDS, 88 mh uncased, 5/$2.50. Postpaid. Humphrey, WA6FKN, Box 34, Dixon, Calif. 95620.

WANTED: Military and commercial laboratory test equipment. Electronicraft, Box 13, Binghamton, N.Y. 13902.

SAVE On all makes of new and used equipment. Write or call Bob Grimes, 89 Aspen Road, Swampscott, Massachusetts, 617-598-2530 for the gear u want at the prices u want to pay.

MICHIGAN Hams! Amateur supplies, standard brands. Store hours 0830 to 1730 Monday through Saturday. Roy J. Purchase, W8RP. Purchase Radio Supply, 327 E. Hoover St., Ann Arbor, Michigan 48104. Tel. NOrmandy 8-8262.

RTTY Channel filters, octal mounted, 2125/2975, $5.95 pair. Special filters for TT/L-2. SASE for information. 88 Mh. toroids, uncased, 5 for $2.50. Herman Zachry, WA6JGI, 3232 Selby Ave., Los Angeles, Calif. 90034.

TR-4, $480.00; AC-4, $83.00; DC-3, $123.00; R4-B, $360.00; T4-XB, $360.00; MS-4, $17.50; RV-4, $83.00; L-4B, $580.00; W-4, $43.00; factory-sealed boxes, fully guaranteed. Mel Palmer, K4LGR, Box 10021, Greensboro, N.C. 27404. Tel: 919-299-8767.

1000 PIV 1.5 amp. epoxy diodes, includes by-pass capacitors and resistor. 10 for $3.75 ppd U.S.A. Fully guaranteed. East Coast Electronics, 123rd St. Boniface Road, Cheektowaga, N.Y. 14225.

ESTATE Liquidation. SSAE brings list quality equipment. Paradd Engineering, 284 Route 10, Dover, N.J. 07801.

WANT KWS-1 and/or 75A-4. Must be in excellent shape. KWS-1 must also be over serial number 1200. Also want SC-201. Name price. Henry, WB2CNA. Tel: 201-327-9090.

SELL 150W. All band AM-CW xmtr with SX-17 rcvr in rack cabinet, $45.00; Heath V7A VTVM, AV2 AC VTVM, RCA 154 audio generator, $10.00 each. Eico 460 'scope, $30.00. National Criterion AM-FM tuner, preamp, PWRamp, $50.00. Gerrard AT60, $35.00. W2BKG, 21 Aberdeen, Scotch Plains, N.J. 07076. Tel: (201)-757-3091.

COLLINS S/Line for sale: 32S-1 transmitter, 516F2 power supply, 75S-1 receiver with Waters notch filter modified by W2VCZ; Collins SM-1 microphone. This equipment like-new condx. No trades, sry. E. V. Hicks, K4HJE, 817 Charles Drive, Greensboro, N.C. 27410.

WRL'S used gear has trial-terms guarantee! 75A-1, $169.95; G66B, $39.95; 913A VHF amp., $179.95; Apache, $99.95; HA10 amp., $189.95; HW30/2'er, $44.50; AF67, $49.95; Ranger II, $149.95; 2B receiver, $179.95. Valiant, $149.95; HQ-100, $99.95. Low price on hundreds more. Free "Blue-Book" list. WRL, Box 919, Council Bluffs, Iowa 51501.

SBE-33 transceiver with DC power supply and mount, perfect, $200. HR-10 receiver with calibrator, excellent, $55.00. DX-20 transmitter excellent, $25.00. David Ruscitti, 63 Grant St., Milford, Mass. 01757.

HAMMARLUND Receiver, HQ-170A, SSB/AM/CW, 160-6 meters, large speaker, excellent condx, $250.00. Knight transmitter, T150A, 80-6 meters, VFO/crystal, output-100 watts/80-10 meters, excellent condx, $100. Frank Chalom, 1437 Ocean Parkway, Brooklyn, N.Y. 11230. Tel: DE-6-0918.

YO2BC will swap goodies for old SX, HRO, NC he can modernize for SSB. Box 22, Timisoara, Rep. Soc. Romania. Write direct or WØDAK.

WANTED: Used Gonset VFO for 2 and 6 M with NBFM capabilities. Or any other make with built-in power supply. Write to WA2WXH.

SELL: Hy-Gain traps for 40-80 meter doublet antenna. Pair $10.00, will ship express collect. Ray Dopmeyer, 1042 Mary, Opelousas, Louisiana 70570.

RTTY, SSB, CW. Selling Model 15, W2JAV converter, HT-30 FSK. All on air and in very gud condx: $200.00. Sri, no shipping. Art Trick, WA2KHD, 7 Abrew St., Bayshore, L.I., N.Y. 11706.

COMPLETE SSB Station: NCX-5, MU II, NCA power supply/speaker; Heath monitor 'scope, Knight SWR bridge, crystal calibrator, keying monitor, mike, key and cables. Best offer over $500. WA4PCC, Barry Watzman, Warren Hall 207B, RPI, Troy, N.Y. 12181.

HQ-110 receiver, $135.00; Johnson converter 6-2 meter, $35.00; Seneca VHF-1 transmitter, $95; Heathkit 'scope Model OM-3, $35.00; Eico modulator, driver model 730, $45.00. Howard Roberts, 635 Jayne Blvd., Terryville, L.I., N.Y. 11776.

SALE: Lampkin Model 105B frequency meter, $125.00 and Model 205A modulation meter, $175.00; in excellent condition with books and charts. W9LOC, Dick Rice, 1503 So. Anderson, Urbana, Illinois 61801.

ATWATER-KENT, Model 55 receiver, excellent condition. Best offer. WICFU, William T. Cushing, 142 Woodland Rd., Auburndale, Mass. 02166.

WANTED: Reasonably priced transceiver or Drake 2AB receiver and Matchbox. For sale: Viking II and VFO, $75.00; SX-140, $50.00; S-38, $25.00. Good condition. F. E. Hurtig, WA9FIW, 1129 No. Knight, Park Ridge, Ill. 60068.

HW-16. Heathkit Novice transceiver, mint condition. $90. John Hychko, K3IUN, 98 Newport Ave., Alden, Penna. 18634.

COLLINS S/Line including 30-S-1, $1600. Johnson Viking Kilowatt, $600.00. with Ranger driver, $700.00; HQ-180 with speaker, $150.00. Or will trade for land in Florida. James H. Hayes, K4RJZ. 102 Leesville St., North Charleston, S.C. 29406.

COUNSELOR. Over 19. General Class operator. Summer boys camp in Maine (July and August). Excellent salary and benefits. Write: Camp Chickawah, M. Steinberg, Director, P.O. Box 178, Carle Place, New York 11514.

VALIANT, $125.00; SB-10, $70.00; both for $175.00. RME 6900, $200.00. W8DQL, 23491 Plumbrooke, Southfield, Michigan 48075.

HAVE Equipment and parts. Will trade for Civil War items. Robert Thornton, 2182 Wellons, Memphis, Tenn. 38127.

FOR Sale: HW-12 w/o power supply; Knightkit GDO, 250-39 T-R switch, Dow-Key DPDT coax relay, 122 VFO. All in excint condx. WA1DGX. Sam Reck, Box 241, S. Wellfleet, Mass. 02663.

HALLICRAFTERS SR-160 transceiver AC and DC power supplies; Hustler 40 and 80 meter antenna bumper and dash mounts. New condx. $225.00. WA2MZQ, D. Abbott, Hospital Road, Chenango Bridge, N.Y. 13745.

FOR Sale: National NC-300 receiver with matching speaker, $125.00; Heath HX-20 with HP-20 power supply, $160.00. All are in excellent condition. K6LZQ, 1552 Garland Ave., Tustin, Calif. 92680.

FOR Sale: 75A-4, immaculate, with every extra; Apache TX-1, GSB-100, power supplies, others. SASE for list. Bill Tully, W6VPO, 9866 Helena Avenue, Montclair, California 91763.

FOR Sale: Viking Invader 2000 in fine condx. Belonged to deceased company president, practically unused: $460.00. Mark Knapp, c/o Mr. N. H. Anderson, 720½ E. 36th St., Savannah, Ga. 31401. Phone (912)-897-1780.

QSTS. Excellent complete run. Each volume in bookshelf box. First eight issues fine reproductions. Sell only as set. $1200 or consider offers over $1000 F.o.b. Albuquerque. Merideth, 3912 Anderson Ave., Albuquerque, New Mexico 87108.

SELL: Eico 720 xmtr, $50.00; 722 VFO, $30.00; 730 modulator, $40.00: Hallicrafters SX-140, $40. All in gud condx w/manuals. Paul Berthinet, WB2USM, 30 Earle Ave., Lunbrook, L.I., N.Y. 11563. Tel: (516)-599-3708 after 6 PM.

TV Transmitter plans and schematic, $1.00 each. Build from old TV. Uses only 5 tubes and transmits pictures for 25 miles on 440 Mhz. WA9EUN, D. Raddatz, RR 6, 307 Redbud, Muncie, Ind. 47302.

WANT Johnson KW Matchbox, top condition. WA3FXQ, 561 Charles Drive, King of Prussia, Penna. 19406.

FOR Sale: HQ-170C receiver, in exclnt condx. Manuals included, $165.00; Call Mark, 516-W E89070 or write WB2RYZ, 39 Marian Lane, Jericho, L.I., N.Y. 11753.

RAMECO Model CTA-1 automatic transistor curve tracer. Use with your 'scope to display family of curves for all small signal transistors. Some scratches but guaranteed electrically perfect. With book. Cost $350, sell $230 plus shipping. Ray Megirian, K4DHC, 606 SE 6 Ave., Deerfield Beach, Fla. 33441.

SELL: Harvey-Wells Bandmaster TBS-50D with manuals, power supply and VFO, Heathkit Tenner and DX-20. All work perfectly. Also Hallicrafters S-40B needing work. Prefer Miami area deal. K4SXS/4, 2126B North Carolina Ave., Homestead, Florida 33030. Tel: 257-5456.

FINCO Model A-62 GMC combination 6 and 2 meter beam. New, never used. Sells for $34.50, only $20.00. QSTs October 1948-December 1958. Best offer. Bob Eckert, 133 East 7th St., Clifton, N.J. 07011.

PROFESSIONAL Built SB-200 linear, Air-tested: $260.00. NC-300, perfect, extra clean, calib., $175.00. Harold Greene, 377 Oldham, Pembroke, Mass. 02359.

WANTED: Old oscilloscope any condition. Wanted old 'scope kit manuals, old 'scope books, old Allied catalogs before 1959. Send info, make, model, condition, cost. Billy K. Hart, 32 Best Drive, Saraland, Alabama 36571.

COMPLETE Ant. system: Tristao 60 ft. self-supporting crank-up tower with Tristao ER8 horizontal raising post. Hy-Gain TH6-DX 6-element ant., CDR Ham-M rotator, 200 ft. Times Aluminum cable: 200 ft. rotator cable, only 10 months old. New was $880. Now only $500 complete. Ron Riches, 1246 Norman Pl., Los Angeles, Calif. 90049. Tel: 270-4063.

RADIO Parts and equipment. Stamp for complete list. W6ME. Rte 1, Box 666B, Arroyo Grande, Calif. 93420.

HEATH DX-60A, $60.00: HR-10, with 100 kc. crystal cal., $60. Kenneth Cupp, 3723 Goshen Rd., Ft. Wayne, Ind. 46808.

MULTI Elmac PMR8 and AF-68 10-70 AC/DC power supply, gud, $145.00; Clegg 66'er, 1 year old, $150.00; CDR rotator, heavy duty, $30.00; w/ce and control box 6-element w.s. 6 mtr. beam, Cush Craft, $15.00. First check gets. Harvey Lawrence, WB4HNT. V.A. Hosp.tal. Eng. Div., Montgomery, Ala. 36109.

FOR Sale: 75A4, serial No. 4190, 5, 2.1, 3.1, filters with SB610, $475: HT-37, 3 xtals full 10 mtr. coverage, $250. B&W L1000A linear with input tuned circuits, $175; HX20, HR20, HP20, HP10 plus mobile mike, $250.00. Joseph Soroka, Jr., W3LGD, P.O. Box 88, Irwin, Penna. 15642.

WRITE, Phone, or visit us for the best deal on new or reconditioned Collins, Drake, Swan, National, Galaxy, Gonset, Hallicrafters, Hammarlund, Hy-Gain, Mosley Waters, SBE, Henry linear, BTI linear, towers, rotators, other equipment. We meet any advertised cash price on most equipment. We try to give you the best service, best price, best terms, best trade-in. Write for price lists. Your inquiries invited. Henry Radio, Butler, Missouri 64730.

COLLINS Mechanical filters, F455C60, F455C-31, F500B60, $20.00 each, Collins 2-channel teletype converter 706-A2 from Dew Line. Best offer. VE2BWS, 5637 Melling Ave., Montreal, Quebec P., Canada.

FOR Sale: SX-117, with 100 mkz calibrator, WWV xtal, 10 mtr. xtals, and Handbook 6 mtr. Nuvistor converter. $180.00. E. G. Schroeder, K4ZYA, 105 N.E. 19th Ave., Apt 362-D, Deerfield Beach, Fla. 33441.

FOR Sale: Hallicrafters receiver Model 53A, $50.00; Telectro tape-recorder Model 300, $50.00; Dumont 'scope Model 208-B, $50.00, All in exclnt condx. Thad Stevens, 1991-A 41 Street, Los Alamos, New Mexico 87544.

WANTED: Teletypewriter repeater—TT63A FGC. Quentin C. Smith, K8NUJ, 13045 Carter Rd., Painesville, Ohio 44077.

MY Drake 2B for sale: $160. Lampkin 105-B freq. meter, $210.00. A. L. Albright, 1524 Dean St., Sulphur, La. 70663.

SALE: Eico 720, all new tubes, $80.00. HQ-110A RX $150.00. Both in excellent condition. Ron, WB4ACQ, 415 Parkview Ave., Lexington, Ky. 40505.

SACRIFICE: Collins TCS transmitter, receiver, remote, factory ac-dc supplies, cables, $25.00. Hy-Gain roto-brake, $10.00. All exclnt condx. K6BTH, 123 Forbes Avenue, San Rafael, Calif. 94901.

V.H.F. 6 meter. Bargain! Clegg 99'er (new), VFO xtal mic, cord, plug, stand. Drake filter, (2) crystals. $125.00.W4IIS, 117 N.W. 100th St., Miami Shores, Fla. 33150.

SP-600, $300.00; Valiant, $200.00; HW-12 w/Tri-band kit (80-40-20) installed. $125.00. All in gud condx and w/manuals, etc. College calls. Make an offer! WA0QMX, 2311A Shade Valley Rd., Charlotte, N.C. 28205.

HT-44 and A.C. Supply $250.00; SX-117, $225.00; SR-42 and VFO $150.00. All like new. W4MVC, 10 Carlen Ave., Asheville, N.C. 28804.

GROUNDED Grid filament chokes, 30 amps., $4.00; plate chokes, 800 Ma., $2.00 pp. William Deane, 8831 Sovereign Road, San Diego, Calif. 92123.

SELLING Out, complete station: NCX-5 Mk II, NCXA supply, NCXD supply, UX-501 VFO package deal, $595.00; SB-200 with 2 new finals, $200.00; HD-10 electronic key, $30.00; HM-15 SWR Bridge, $10.00; EV-664 mike and stand, $25.00; U-4-8 Mosley vertical new, $75.00; H T-40, HA-5UFO package deal: $75.00. SP600JX, $175.00; Drake 1000W low-pass, $10.00. All above in perfect working order. Shipped your expense. WA2-YNS, 177 Paris Road, New Hartford, N.Y. 13413. Tel: 1-315-724-5374.

SELL Central Electronics SSB Exciter 20A, $75.00. Andy, WA9BPG, 2222 Oaklawn Ave., Waukesha, Wisconsin 53186.

T-150 xmtr, 80-6 M, VFO, 150 watts, in gud condx. WAØNSY, Mark Meyer, 1613 Highland Court, Rapid City, South Dakota 57701.

COLLEGE Expenses force my selling of professionally wired SB-401-1 less than three months old, $300. Randy Schaaf, 1605 Ridge Road, Green Bay, Wisc. 54304.

FOR Sale: In excellent condition Collins 75S-1; Waters REJ, $295.00; 32S-1, 516F2 speaker, $425.00; original cartons. Both $695. Edward Flynn, 3118N Francisco Ave., Chicago, Illinois 60618.

SIXER HW-29A and GP-11 power supply. In excellent condition. $45.00 for both. Eugene Chester, K9FOQ, 6821 W. 11th St., Indianapolis, Ind. 46224.

SB-300, AM, SSB filters, $225.00 or your best offer. Globe VHF-62, six and two meter transmitter, $60.00; Vanguard six meter converter, $9.00. All in exclnt condx. Roberts, K1FLZ, Box 111, Higganum, Conn. 06441. Tel: (203)-345-4407.

EXCELLENT HQ-110 w/speaker, dust cover, headphones, and many extras. $125.00. Twoer w/mike, crystal, 45 ft. RG-8/U, and 11-element Cush Craft beam, $40.00. Deluxe Vibro-Keyer, perf. condx, $12; B&W 5-position coax switch, $3.00. Many, many extras. Phone or write: WB2BHK, Rick, RFD 1, Westview Dr., Yorktown Heights, N.Y. 10598. Tel: (914)-962-7493. All inquiries answered.

QSTS 1941-1949 and 1956 to 1965 inclusive. Perfect. Make offer. F.o.b. W5KAK, 3432 Borreson, San Diego, Calif. 92117.

HALLICRAFTERS SX-130 receiver amateur owned and maintained. $115.00. Michael Tanner, 8234 Central Park Ave., Skokie, Ill. 60076.

SALE: TDQ, 2-meter transmitter, 45 watts outp., with crystals and instruction book, 115 to 156 Mc. Walt, K3OJA, 640 Valley View Road, Ardmore, Penna. 19003.

HQ-145C, Eico 720 for sale. Also VFO and accessories. Complete operating station. David Bantz, 915 West End Ave., NYC 10025. Tel: 222-2116.

HX-20, HR-20, HP-20, in exclnt condx: $225.00. Cam Hartford, WA8DJX, Story House, Claremont Men's College, Claremont, Calif. 91711.

TELETYPE, Model 15 receive only: $25.00. Sry, can't ship. John Penney, KL7EUZ, 410-O St., S.W., Washington, D.C. 20024.

SELL Clegg Zeus with P.S. Mod. unit. Art Horwich, WA9IQP, 811 Franklin, River Forest, Ill. 60305.

WANTED: Drake RV-3 in gud condx. W5FTW, 6085 Wildair Drive, New Orleans, Louisiana 70122.

FOR Sale: Collins 30S-1 with new 4CX1000A. $850.00. Pick up deal only. W2BJL. Tel: (516)-HT4-1149.

SELL Multi-Elmac AF-67 and PS-2V A.C. power supply, in gud condx. Make an offer. Landfield, 695 Greenbay, Winnetka, Illinois 60093.

TOOOBES—Tranzeesters: New, unused. 6146B, $4.00; 6CW4, $1.60; 811-A, $4.25; 417-A, $4.50; 6146-A, $2.95. Free catalog. Vanbar Distributors, P.O. Box 91z, Paramus, N.J. 07652.

REBUILDING Antenna? Ham hardware headquarters has fine stainless steel, brass, nylon, threaded, washer, hardware. Bargain packets, 25¢ to 47¢, postpaid. Stamp for lists. Specials. Walt, W8BLR, 29716 Briarbank, Southfield, Mich. 48075.

G.E. Used Two-Way FM equip. SASE for list. 75A4, $425.00; SR-150 transceiver AC and DC p.s. $350. QSTs 1957 through 1967. W2EQV, 25 Gladwish Road, Delmar, N.Y. 12054.

FOR Sale: New Cush Craft 3-element 20-meter beam; Knight tape recorder. K1APA, 3 Sunny Acres, Brattleboro, Vt. 05301.

SWAN 250 transceiver and 117XC power supply, excellent condition, with approximately 40 hours operating time. $325.00. Neil C. Tingsgaard, Jr., 4450 Meredeth, Lincoln, Nebraska 68506.

SELL: 160/20 Bud 500 watt coils. Make offer. Cardwell dual 210 per section condenser, $6.00 plus postage. W8KQE, 23515 Drake, Bedford, Ohio 44146.

SELL: Globe DSB-100, 100 watts DSB, 50 watts CW, 80-10 meters, $35.00; Globe LA-1 linear, 440 watts, 80-10 meters, $50.00. Hallicrafters S-85 rcvr, gen. coverage. Q-multipl., $50.00. All in exclnt condx. W8DOU, 885 DeSoto Ave., Ypsilanti, Mich. 48197.

COLLINS Equipment late series, and all like-new condx: 75S-3C receiver, 32S-3 transmitter, SM-1 mike, 516F-2 a.c. supply, 312B-4 station control. Will sell as complete station only, $1295.00. Have original shipping cartons and manuals. Two Aerotron 500D 2-meter transceivers on MARS, 143.950 frequency. Both for $95.00. Reducing duplication of ham equipment. Karl Lipscomb, KØCFD, 87 Canterbury Lane, Joplin, Missouri 64801.

HQ-170AC, perfect, 1st $200 check or best offer, you pay freight. Horner, WB4IGF, Box 100, Sanford, N. C. 27330. Tel: (919)-776-2399.

HEATH Model GD-61 reverberation unit for electronic organ, Hi-Fi, etc. $35.00. Exclnt condx. R. Napoli, 280 Main St., Center Moriches, N.Y. 11934.

SELL: Varactor frequency multiplier, 144 Mc to 432 Mc, Model 1432, VHF Associates, $30.00. Jere L. Courtney, 222 S. Dale Dr., Lima, Ohio 45805.

SALE: Clegg 99'er transceiver, 6 meters, with four crystals, $89.00. You pay shipping. E. Horne, WA1FXU, 115 Waverly, Everett, Mass. 02149.

WANTED: Collins F455FA-05 for 75S-3C or other filters, crystals, accessories for S/Line. W9GXR, 15 Kingswood Dr., Normal, Illinois 61701.

TRADE: Model 15 page printer with power supply, in exclnt condx, for SR-42A or comparable AC/DC two-meter transceiver in gud condx. K1OJQ, Mass. Tel: (617)-PR-3-0284. Paul M. O'Brien.

COLLINS 62S-1, serial 11744 for sale: $525, and (2) 4CX-1000As, in perfect condition, $40.00 each. Vince Varnas, K8REG, 4329 Renwood Drive, Dayton, Ohio 45429.

FOR Sale: BC-610F in excellent condition, extra tubes and coils. Best offer F.o.b. Denton, Texas. C. R. Sanford, WA5-TBL, 1406 Ridgecrest Circle, Denton, Texas 76201. Tel: (817)-387-3206.

GSB-100 A-1 condx: $150.00. Realigned this March by a pro, W2ZUL. Frank Ebert, 41 E. Buckingham Ave., N.J. 08059.

SELL: CV-253/ALR tuning unit, $110.00; Meissner 8c tuner, $10.00; Millen 5" monitorscope, $45.00. Robert Ireland, Pleasant Valley, N.Y. 12569.

SELL: Eico 753 ACP/S, HA-63, 729 mike, SG-31 station control, Challenger, AC-1, 810s, sonar gear. Want 2B, HX-20. Steve, tel: (914)-949-7497. WB2YBQ, 106 Hillair Circle, White Plains, N.Y. 10605.

CLEGG Interceptor B with Allbander 80-2 meters. Mint condx. Best offer over $325.00. Collins 32V-2, $150.00; C-E 20A, $100; Lakeshore Bandhopper VFO, $40.00. Both for $135.00 ARC-5 3-6 Mc. 6-9 Mc, $10 each. 4CX350 linear 15 and 10 meters w/power, $80.00. HT-32B, excint condx, $350.00. K8-VUE/2, 405 Furnace Rd., Ontario, N.Y. 14519. Tel: (315)-524-9143 after 6 PM.

SELL, Trade my surplus gear! Send SASE for list. Tubes, relays, rotators, high voltage switches, air dielectric coax, RG17/U, Ranger I, HX-500 SSB exciter; SX-71, SX-100, blower, fan, microphones, meters, capacitors, fixed and variable, and much much more. Gene Hubbell, W7DI, 6633 East Palo Verde Lane, Scottsdale, Arizona 85251.

WANTED: KWM-2A, late; KWM-1, serial no. over 1000; SB-301, 30L-1. For Sale: BT1 LK-2000 linear, new, $695; VFO-Matic, Model 80-20, $40.00; Telrex 20M326-B, $150.00; Collins mechanical filter adapter for 75A2, $30.00; For 75A1, $20.00. Capacitor, 4 mfd., 5 Kv, $10.00; Swan 250 and 117XC, $30.00; capacitor, 15 mfd., 1.5 kv., $3.00; 312B-5, $275.00; Model "B" slicer, $40.00; 351D-2 (for KWM-2), new, $75.00; new 3-400-Z, $28.00; new 4CX1000-A, $100. NCX-3 and NCX-A, $200; HD-11 Q-multiplier, $8.00. Barker & Williamson Model 426 LPF, $5.00. Bud Model LF-601-A LPF, $5.00. UTC S-45, $5.00. James Craig, 29 Sherburne Ave., Portsmouth, N.H.03801.

WANTED: HA-1 to keyer and key. WA8TNJ. Vic, 143 Laongford, Elyria, Ohio 44035.

SWAN 350, upper lower sideband, xtal calibrator, 117C power supply, excint condx, $300. Mosley TA-33 beam, best offer. Terry Garner, WB4CQH, 2122 Sera Cedar, Baton Rouge, La. 70816.

HEATH SB-300 with 6N2 meter converter and AM filter, $225.00; Viking Challenger transmitter with assorted xtals, $65.00; Viking 6N2VFO, $30.00; Vibroplex Champion key, $12.00; Knight VSWR bridge, $12.00; Drake TV1000 filter, $8.00. Take it all for $325.00. Ron Lessnick, 1338 Stony Brook Road, Stony Brook, N.Y. 11790. Tel: 516-751-5177.

CRYSTALS Airmailed: SSB,* Nets, MARS, Novice, Marine, etc. Novice .05% crystals $1.50. Custom finished etch stabilized HT-243 .01% any kilocycle or fraction 3500 to 8600 $1.90, (Five or more this range $1.75 each), (nets ten or more same frequency $1.45). 1700 to 3499 and 8601 to 10,000 $1.75 with overtones supplied above 10,000. 10,001 to 13,500 fundamentals $2.95. Add 50¢ each for .005%. Add 75¢ ea. for HC-6/u metal miniatures above 2000. QST, Handbook, SSB Manual and other ARRL builders crystals, groups and singles. Be specific. Write for order-bulletin Crystals since 1933. Airmailing 10¢/crystal, surface 6¢ C-W Crystals, Marshfield, Missouri 65706

3" scope tubes, 3AP11A, at $2.00; 3DP1A @ $2.00; 1625 @ .50. Realistic TV marker and bar generator, $25.00. G. J. Pollock, 514 Wilde Ave., Drexel Hill, Penna. 19026.

HT-37, $160.00; Drake 2B, 2BO, $190.00; Johnson 275w, Matchbox, $45.00; HW-32, less p/s, $80.00; WB2RJJ, Robert Schenck, 22 Greenwich St., Bergenfield, N.J. 07621. Tel: 384-1828 Monday nights only.

WANTED: Heath HP-13 and HP-23 power supplies. WA5ERC, 154 Ronald Boulevard, Lafayette, Louisiana 70501.

EICO 720, 722, 730 modulator, Lafayette HA-530, manuals, mint condx, $215.00. Tel: 212-776-2821. Mike Lehrman, 226-06 88 Ave., Queens Village, L.I., N.Y. 11427.

FOR Sale: Complete Heath Novice station, HR10B, DX60B, SWR meter, Hy-Gain 18AVQ 35 foot vertical, T-R switch, keys, crystals, etc. Many extras. Newly completed and in mint condition. $225.00 or best offer. Charles Grant, Box 71, Morristown, N.J. 07960. Tel: 539-2997.

IMMACULATE and perfect operating HT-37, $185.00. Very clean and perfect operating 75A-4 with 500 cycle and 3.1 Kc., recent Collins check-over, $395.00. New Emerson 4-speed tape recorder, $35.00. Clean DX-100, works perfectly, $60.00. WA7GMG, P.O. Box 6064, Tucson, Arizona 85716.

NEED higher power? Have NCL-2000 high serial number. Need Collins 30L-1 to finish out my S/Line, or will sell for $400. W1UVR, Lou Mancini, 556 Hunting Ridge Rd., Stamford, Conn. 06903. 203-322-6446.

COLLINS 75A-4 ser. 5637, 3 filters, spkr, $475.00; Hallicrafters HT-32, $250.00; HT-33A with ceramic PL-8295A, $325.00; all units one owner. In mint condx, factory cartons, manuals. W8JBI, 2573 Worchester, Orchard Lake, Michigan 48033. Tel: (313)626-0297.

COLLINS 351D-2 mobile mount, $65.00; 516E-1 heavy duty 12VDC power supply, $125.00; Super-Hustler antenna with bumper mount, 20M, 40M resonators, $30.00. $200 for all three. Mint condition. Want a used 30L-1. Will ship anywhere. Peter Kamas, K6UCK, 1186 Mary, Sunnyvale, California 94087.

TRI-EX Tower HS-471 guyed crank up with "Gave" feature Epoxy finish, 2 years old. $350. KWS-1 serial #1250 and SC-101 control, $800. Telrex 5 element 20 meter 20M536, $250.00. Local sale preferred. Will take reasonable offers, or might trade for Collins or Drake rigs. Paul Neveu, W1CKA, P.O.Box 653, Bristol, Conn. 06010. Tel: 203-582-4885.

SALE: TDQ 2 mtr. transmitter w/extra power supply, BC-375 w/TUs, IFE numerical projection readouts, UHF cavity freq. meter, HRO with coils, 60 issues Proceedings of the IRE. K. H. Paquee, K100Z, 53 Jerome Ave., Trumbull, Conn. 0611.

HEATH SB301 and SB401 with cables. New. Engineer constructed. $600. Ron Barrett, 1015 N. Cross St., Wheaton, Ill. 60187.

SR-160 mint, never mobile, $175.00; Eico 753 with Eico a.c. supply, Solid State VFO, 2 months old, $160.00, Heath Mohican mint with a.c. supply, $60.00. WA8LTJ, 131 Pepperidge Lane, Battle Creek, Mich. 49015.

SELL 6.5 KVA generator, 120-240, single-phase 60 cycle, water-cooled on trailer. 40 hours since complete rebuild. $550.00. R. Ellis, 1356 Elizabeth, Las Vegas, Nev. 89109.

VIKING Valiant, F/Wired, rugged, dependable, $180.00. HW-32, scratchless, few hours, $80.00. K. Meyers, W8IBX, 2160 E. Main St., Columbus, Ohio 43209.

WANTED Grebe CR18, Keith Olson, W7FS, Star Rte. 1, Box 398, Belfair, Wash. 98528.

CERTIFICATE will be issued by Henry Ford Museum to any station that works the Motor City Radio Club station, W8MRM, during the 24 hours prior to the Old Timers Night banquet. Work W8MRM on May 4 (GMT) on or near 3.663, 3.900, 7.070, 14.300, 50.178, 145.350, or 146.96 Mc. QSL for certificate. Peter Tippett, WA8VIF, Secretary, Motor City Radio Club, Greenfield Village, Dearborn, Michigan 48124. (Novice contacts by schedule.)

WANTED to buy: Gud clean Collins 51J4 or 51S1 receiver. Bob Anderson, W1LBA, 428 Central Ave., Milton, Mass. 02186.

WANTED: Collins S/Line, 75S3B-C, 32S1, 516F2, 312B4, 30S1, Mint condx, only. Prefer Serial Numbers and age. H. Castillo, 2323 Gatewood St., Los Angeles, Calif. 90031.

SELL Swan 350, in excellent condition. $350.00. Dr. Patrick, Box 100, Caldwell, Idaho 83605.

WANTED: Collins 30S-1 linear, Give number, year, condition and price. Bunge, Box 4099, Tucson, Arizona 85717. Tel: 296-6466.

TO settle the estate of Charles H. Ackerman, WAØISY, the following Collins equipment must be sold: best offer over $1700 will buy all. Collins transverter 625-1; Collins receiver 75S-3B, Collins transmitter 32S-3, and Collins power supply 516F2. Contact Ben Graves, 5539 N. Garfield, Kansas City, Mo. 64118. Phone Gladstone 2-5549.

FOR Sale: all in like-new condition, with manuals. Original owner. Will consider offers. Hallicrafters HT-37, $250.00; HA-2 with p/s, $175.00; SR-42 with mobile p/s kit, $150.00; Hammerlund HQ-170AC, $275.00; HX50, $250.00. Idoni, WB2OJH. Tel: (516)-CU-5-6350. Weekdays after 7 pm; Sat. and Sunday afternoons.

GALAXY V Mk II with matching calibrator, AC-35 supply, speaker, new in original factory cartons $425.00. Galaxy 2-Kw linear, new, in original factory cartons, $375.00 including power supply. Like-new Heath HW-12 with calibrator, AC supply in perfect condition, $120.00. Ron Milliman, 606 Solona, Tempe, Arizona 85281. Tel: 602-966-9921.

PROP Pitch rotors, excellent, small 10:000:1, $45.00. John Link, 1081 Aron St., Coca, Fla. 32922.

DXERS, Table of Great Circle bearings, distances, centered on your QTH. Over 300 prefixes, $3.00 airmailed, Radio Amateur Services, 400 Hillside Ct. #1, E. Lansing, Michigan 48832.

MAKE an offer: These items must be sold—SX-117 Hallicrafters rcvr, crystal-filter transmitter, exciter HX10 Marauder by Heathkit, HA1Q kilowatt linear amplifier by Heathkit. Contact D. Allen Frame, Kinsley, Kansas 67547.

BANDIT 2000B. Used about 3 hours, and in perfect condition. $285.00. John Harlin, 113 East Court, Iowa City, Iowa 52240.

COLLINS 32V-1, Hallicrafters HT-32B and SX-115, National HRO50T-1, all in excint condx, and little used (reason for selling). Handbooks and QSTs almost complete since 1937. Miscellaneous usual station gear. Send for descriptive list and details. Will accept first good offer (lot or items). K1PTU, Ex-W3DTD, 120 Montvale Rd., Weston, Mass. 02193.

VIKING Valiant I, with manual. Clean, good condition; $135.00. Call after 6:00 PM, or write WB2VBT, Jerry Hermel, 51 Barry Dr., Westbury, L.I., N.Y. 11590. Tel: (516)-334-7746.

YAESU FT-DX-400 transceiver for sale. W8AO, 2912 Riverview Boulevard, Silver Lake, Ohio 44224.

ANTENNAS For sale: Telrex 4-el., 15m yagi, 18 ft. boom, $75.00; Telex 3-el. 10m. yagi, 14 ft. boom, $50.00; 4-el. Fiberglass quad kit, commercial aluminum spiders and boom-to-mast mount, 30 ft. aluminum boom, $100.00; two Ham-M rotors, $75.00 each. RGI7AU coax, 450 ft., 20¢ per ft. Will not ship, sry. John W. Williams, 103 Midland St., Greenville, S.C. 29607.

COLLINS 75A-1 with speaker and manual. In excint condx. $140.00. WB2AXH, 94 Brittle Lane, Hicksville, L.I., N.Y. 11801. 11801.

SELL: SB200 linear, little use, excellent condition. $180. K6VJE, 10234 Vista DelaCruz, La Mesa, Calif. 92041.

HALLICRAFTERS HT-37. $225.00; SX-100, $140.00. Both in excint condx. No scratches. With manuals. K9EBL, R 4, Box 413, Wausau, Wisconsin 54401.

DRAKE R4A rcvr, $250.00; T4X xmttr and AC3 power supply, $275.00. Al Brehm, W8MFW, 5081 Sumter Avenue, Cincinnati, Ohio 45238.

SWAP: SP600-J-25C, like new condx, for equal condition SRR-13. N. K. Thompson, W1DXR, 5 Palmer, Gorham, N.H. 03581.

DRAKE 2B and 2BC combo—excellent condx. $200.00 Johnson Viking Challenger, $45.00. Hallicrafters CRX-4, low band (30-50 Mc), FM rcvr, $40.00. Doug Kane, 1213 1st, Bismarck, N.D. 58501.

TH3JR, new, $45.00; Hallicrafters S-120, $40.00; portable VHF police receiver, new, $18.00. Or you make offer. Want: Senior Tri-band beam tower. Frank Connelly, Jr., WA7GWL, Rte 7, Box 2585-A, Bremerton, Wash. 98310.

QSTS '54—'66, some missing. 813 rig from 1955 Handbook, 250 watts, all bands. Sell all or parts. Make offer or will trade for gud rcvr. W8QI, 204 Charter St., Clarksburg, W. Va. 26301.

COMPLETE SSB station. Heath DX60; HG10, SB10, and National 155 receiver, all with manuals, $230.00. AF67 M1070 ac-dc supply. Regency converter, AM-CW-SSB. You make offer. WA5DZY, Rte 2, Maysville, Okla. 73057.

UNUSED TR-44 rotor, $42.00; new 4-400A, $30.00; Lafayette bug, $5.00; Johnson KW lo-pass, $11.00; Knight SWR $11.00; 2- Dow coax relays, $8.50 each. Philco 8-tube V.R. power supply. 350 v. at 300 ma., $22.00. Mike Zakin, WA2SZM, 67-48 181 St., Flushing, L.I., N.Y. 11365.

DRAKE R-4A, T-4X, AC-4, MS-4, kilowatt LP filter, Heath SB-200, Eico keyer, Vibro-Keyer deluxe, Turner mike, Tymmeter GMT clock, in perfect condx. Used few months. Package $1000, or make offer on id individual items. F.o.b. WB2UFV, 45 Early Street, Morristown, N.J. 07960.

SELL: Facsimile FSK transmitting receiving converters extra sync motors leadscrews tuning forks, etc. Boehme siphone recorders amp. drivers tape pullers. Seven units cadre Osborne cit b. handie-talkies. All inquires answered. K2RM, 1530 Glenwood Dr., Pitscataway, N.J. 08854.

SELL: Viking 500 xmtr with power supply, 500 watts phone, 600 watts c.w., 10 to 80 m. In excint condx. Prefer local area. W2KNG. "Charlie", 408 E. 30th St., Paterson, N.J. Telephone 523-3857 local, after 5 PM weekdays. $175.00.

PREPARE For new FCC exams! You need Posi-Check. Multiple choice questions, diagrams, explained answers, IBM sheets for self-testing. Same form as FCC exams. General Class, $3.25; Advanced Class, $3.50; Extra Class, $3.75. 295 to 300 questions or diagrams in each. Each complete for a specific exam. Basic questions duplicated if they apply. Third class postage prepaid. Add 26¢ per copy for first class mail; 54¢ for air mail. Send check or money order to Posi-Check, P.O. Box 3564, Urbandale Station, Des Moines, Iowa 50322.

COMPLETE Station package: SX-117, HT-44, tubes, antennas, test equipment. Zachary Botwinick, 253-42 87th Drive, Bellerose, New York 11426

CE-100V, $325. HQ-170, $150.00. Jimmie Cross, 5523 N. Roosevelt, Fresno, Calif. 93704.

$150.00 for complete station: rcvr, National HRO-50T w/coils and matching speaker, xmtr, Johnson Viking II, low-pass filter, Matchbox, VFO, Signal Sentry, SWR bridge, key, all manuals. WB6PWV, Jack Griffin, Box 475, North Fork, California. Ph: 877-2565.

DX-100, mint condx, $70. DK-60-G2C, $8.00. Want Triband beam. WB2YOJ, 1618 Larkspur, Mountainside, N.J. 07092.

VIKING Valiant, 160-10M. In mint condition. $150.00, or your best offer. WB4BCE, 2344 Winston Avenue, Louisville, Kentucky 40205.

COLLINS PM2 power supply, in excellent condition, guaranteed. $75.00. R. E. Neumann, #75 Thrasher, New Orleans, La. 70124.

VIBROPLEX Presentation Bug and case. Brand new: $30.00. Eico wired code practice oscillator, new, $8.00. Philip Gedaly, 41-15 50 Ave., L.I.C., N.Y. 11104. Tel: ST-6-9372.

FOR Sale: NCX-5 owners: NCX-501 VFO, 6 months old in walnut cabinet. Complete with instruction manual and extra *metal cabinet, $135.00. Ship prepaid. K2AIX, 601 Waverly Avenue*, Medford Station, New York 11763.

HALLICRAFTERS SX-110 general-coverage, $75.00; 2M Gonset Communicator GC105 6/12/110V modified with additional conversion to 455 kc for selectivity, $110.00. Howard Ball, 2700 Grand Concourse, Bronx, N.Y. 10458. Tel: (212)-LU-4-0316.

HALLICRAFTERS SX-101A, with matching speaker, in excellent condx: $175.00 delivered within 100 miles. K4EED, 1946 Creek Crossing Road, Vienna, Va. 22180.

SELL Ship: HW-32, $65.00 and BC-221, calibration, supply $45.00. Sell: SX-16, $20 and BC-1004 Super Pro, $50, gud condx. C. Meyers, 2902 Markham, Maryland 20785.

CHICAGO Area, 3 bedroom ranch home on 5 acres high elevation, no power lines. 2 Rohn steel fold-over towers, $55,000. W9YSM, Dayton Nance Real Estate, Barrington, Illinois.

HT-32 6146B finals B-keying silicon rectifier. Beautiful signal. Clean rig. $225.00. F.o.b. WA5SKI, Lewis Trailer Park No. 3, Columbus, Miss. 39701.

FOR Sale: Drake 2B rcvr, with xtal calibrator, $180.00; Knight Kit R-100A with spkr, xtal cal., S-Meter, $80.00; Knight Kit T-150A xmtr, $75.00. WA8ROF. Bill Warner, 1810 W. Granville Road, Worthington, Ohio 43085.

GONSET G-50 6-meter transceiver with integral lip filter and lightning arrester. $150.00 or best offer. WA3EPB, 703-3rd Ave., Lester, Penna. 19113.

HALLICRAFTERS HT-44 less supply and SX-101A, both in *like-new condx and A-1 shape. Any reasonable offer accepted.* K9DQO, W. J. Dres, Box 273, Palos Heights, Ill. 60463.

SELLING B&W 6100 xmtr w/factory RTTY: HXL-1 L.A. RME 6900 rcvr, Heath TT1-A grn tube-tester, 0-12 scope; IP-10 isolation xfrmr, HD-10 keyer; RCA 99-A marker-adder; Gain 144S8 2m. ant. w/2B52, VMB-2. U-100 rotator; Shure 419-A, 444 mikes, A-1 condition, manuals, best reasonable offer(s). F.o.b. Sacramento, WA6NAT, 1241 Hooton Court, Carmichael, Calif. 95608.

3-1000Z, unused, for sale. Package deal includes tube, socket, chimney, 21 amp. fil xfrmr (P-6457) KW pi-coil (Air Dux #195-2) plate choke (Raypar RL-100) Johnson plate and loading capacitors. All new and unused. Will throw in homebrew Handbook fil. choke. $90.00. Money-order or cashier's check. Shipped express collect. R. Lloyd Mize, W4HUI, Rte. 4, Versailles, Kentucky 40383.

TOROIDS, 88 mhy. Center tapped, unused, 5/$1.50 ppd. RTTY page printer paper, $5.50/case. New Health DX60A, $55.00. Tecraft Criterion 6-meter converter, $30.00; Apeco photo-copier with paper and chemicals (trade?) $40.00. TT63A regenerative repeater $20. Polar relays, $3.00; sockets $1.25 postpaid. Wanted: tower, NC-300, RTTY gear, rotator. Stamp for list. Van, W2DLT, 302Z Passaic, Stirling, N.J. 07980.

FOR Sale: *Collins 516F-2 power supply, $75.00. Multiphase RF* analyzer, $30.00. A. Waack, 75 N. Highway 59, Barrington, Illinois 60010.

APACHE with SB-10, asking $125.00. K2ZRB, 6161 Genesee St., Lancaster, N.Y. 14086.

CLEGG Apollo linear. Excellent, $185.00. McCormack, 5008 *Carlyn Spring Road, Arlington, Va. 22203.*

GOING to Southeast Asia: New unused T-60, $60.00; Navy RBM-S. 2-20 Mc. rcvr w/psp, $45.00. Instructograph w/tapes and osc. $45.00, or all for $130. WA7EWY/6. AF 18975111, CMR, Box 5252, Beale AFB, Calif. 95903.

FOR Sale: 75A-2 with Collins filter, vernier dial and CE Sideband Slicer, $205.00; GSB-100 SSB exciter, $140.00; 813s GG linear final and 25/3000 volt power supply, $85.00. All for $400.00. You pay freight. W5LCI, P.O. Box 592, Wynne, Ark.

WANTED: Teletype Model 28 KSR page-printer, LPR typing reperforator, LXD transmitter distributor, ASR automatic System, LPR typing reperforator with keyboard, also model 28 replacement and spare parts. I will pay any reasonable price asked. B. Barry, 455 Craig St., West, Ste. 101, Montreal, Quebec, Canada.

WANTED: Heath QF-1 Q-multiplier, also schematic of RBB or RBC receiver. Will pay for handmade copy. Dick Foster, K3KUE, RD #2, Lewisburg, Penna. 17837.

GONSET Receiver 10-160 and BC bands. Model G66B AM, SSB, CW, 6, 12, 115v, with calibrator, $90. Gary Anderson, 301-A Talge Hall, Collegedale, Tenn. 37315.

*"HOSS-TRADER" Ed Moory has a limited supply of new equip*ment with factory warranty for cash. One to a customer, please! New NCX-200 and matching supply, regular price $434.00. Cash price $339.00: New Swan 500 in factory sealed carton, regular price $495.00. Cash price $379.00; SB-34, $449.00. Regular price. Cash price $369.00: BTI LK-2000, $669.00; displayed TR-4, $459.00; T4-XB, $359.00; new Mosley Classic-33 beam and demo Ham-M rotor, $198.00; special Rohn 50 ft. foldover tower prepaid, $188.00; Drake L-4 linear, $539.00; new FTdx-400 transceiver, regular price $599.95. Cash price, $489.00. Used equipment: TR-4, $419.00; T4-XB, $329.00; 2-A, $129.00; TR-3, $349.00:: Swan 250, $209.00: Swan 500C, $389.00; HT-37, $169.00: as is HT-32, $159.00. Ed Moory Wholesale Radio, P.O. Box 506, DeWitt, Arkansas 72042. Tel: 946-2820.

HEATHKIT HW-32 and HP-14 DC. KW power supply (never used). Best offer for both together or separate. John Permen, 18101 San Juan, Detroit, Michigan 48221.

SB-100 transceiver with H.B. power supply, 400 Hz CW filter. *Beautifully wired by professional. No scratches. $320.00. You* pay shipping. Tel: (914)-628-9606. Bob Pohorence, RFD #2, Woodland Road, Mahopac, N.Y. 10541.

COLLINS Noise Blanker for 75A-4, $49.50. New Eimac 4CX-1000A, $125.00; new power xfrmr for Drake AC-3, $12.00. Prepaid in 48 states. Clark, 1030-20th, West Des Moines, Iowa. 50265.

JOHNSON Invader 2000. In absolutely perfect condition in all modes. Used little, not a scratch! Recent 4-400s, easy cool kw. $575.00. Tel: (216)-792-7266. A. J. Kohler, 4710 Norquest Blvd., Youngstown, Ohio 44515.

WANT: Collins 30S-1, 62S-1 or 51S-1, H2K, H4K or BTI linears, or HRO-500. W1WNY, One Dew Lane, Darien, Conn. 06820.

QST, R9, Radio, CQ, 73, Issues back to 1935. SASE for list. Karl Townsend, 220 Parkview Ave., Penndel, Penna. 19047.

G-76 and DC supply; very good condition: $120.00. Homebrew *AC half-power; works, $10.00.* WA5AEK, Rte 4, Box 41, Columbus, Miss. 39701. Tel: (601)-328-4615.

SELL: Gud DX-100 $75.00; NC-173 rcvr, with Q-multiplier and SSB adapter, $85.00. Pick up. W1HNA, RFD #1, Box 232, *Willimantic, Conn. 06226. Tel: 423-2844.*

DRAKE TR-3 guaranteed just realigned at factory, plus Turner mike: $345.00. I'll pay freight (prepaid). John Topel, W6GNJ, Box 4151, San Fernando, Calif. 91342. Tel: (213)-788-7319.

HEATH DX-60; HG-10. HR-20, antenna relay, $125.00. Will split. WB6UGA. 314 W. Baltimore, Larkspur, California 94939.

WANTED: Gonset 2 meter communicator, any model. John B. Thomas, K4NMT, Box 198, Gallatin, Tenn. 37066.

HALLICRAFTERS SX-117, HT-44, PS-150, WWV, Transceiver Transceive cables, mint condition: $450.00: NCX-3, NCXA, NCXD, excellent, $300.00. W8FRJ, 5124 Mapleridge, Kalamazoo, Michigan 49001.

SELL: Hammarlund HXL-1, 1500 watts peak power input, instruction book included. First $250.00! Swedgal, 2111 Albemarle Road, Brooklyn, N.Y. 11226. Phone eve. 212-284-5808.

HISTORICAL Rare documents, and large number of QSTs from 1923 on to swap for Colin B. Kennedy longwave receiver. John Brolley, 719 41st, Los Alamos, New Mexico 87544.

COLLINS S/Line 32S3, 75S3, 62S1, 312B4 console, 516F2 a.c. *supply, mint condition, $1600 firm. SASE please.* James M. Morgan, W8UAR, 9339 Arnold Lane, Loveland, Ohio 45140.

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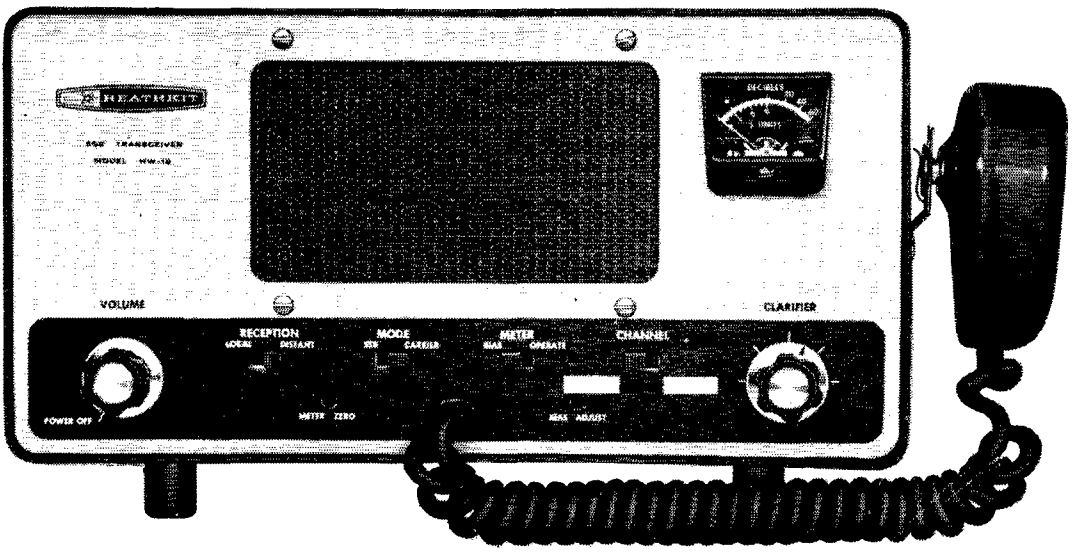

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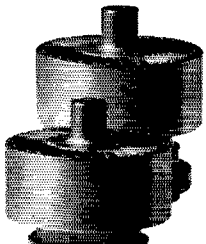

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