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November 1969

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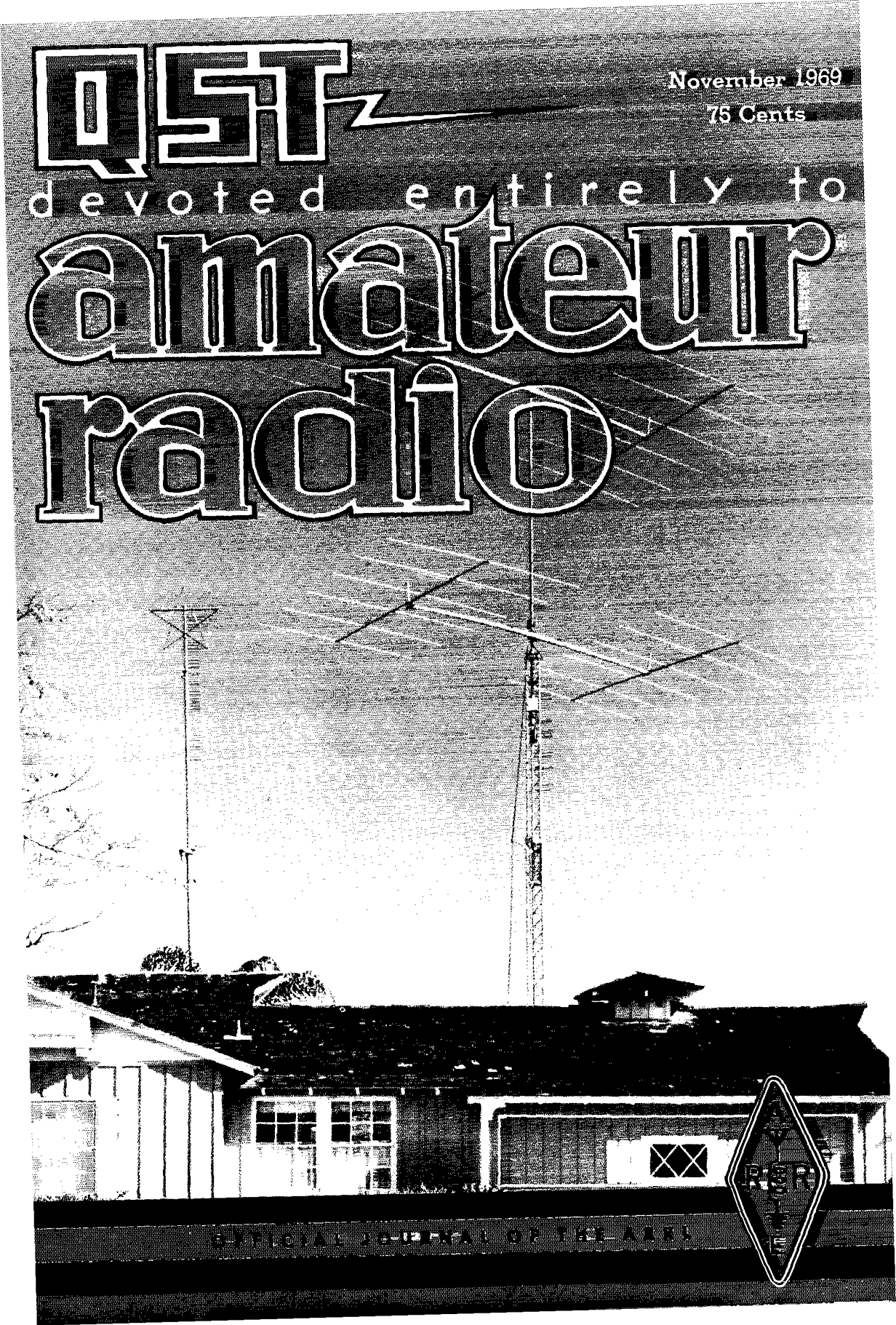

OFFICIAL JOURNAL OF THE ARRL

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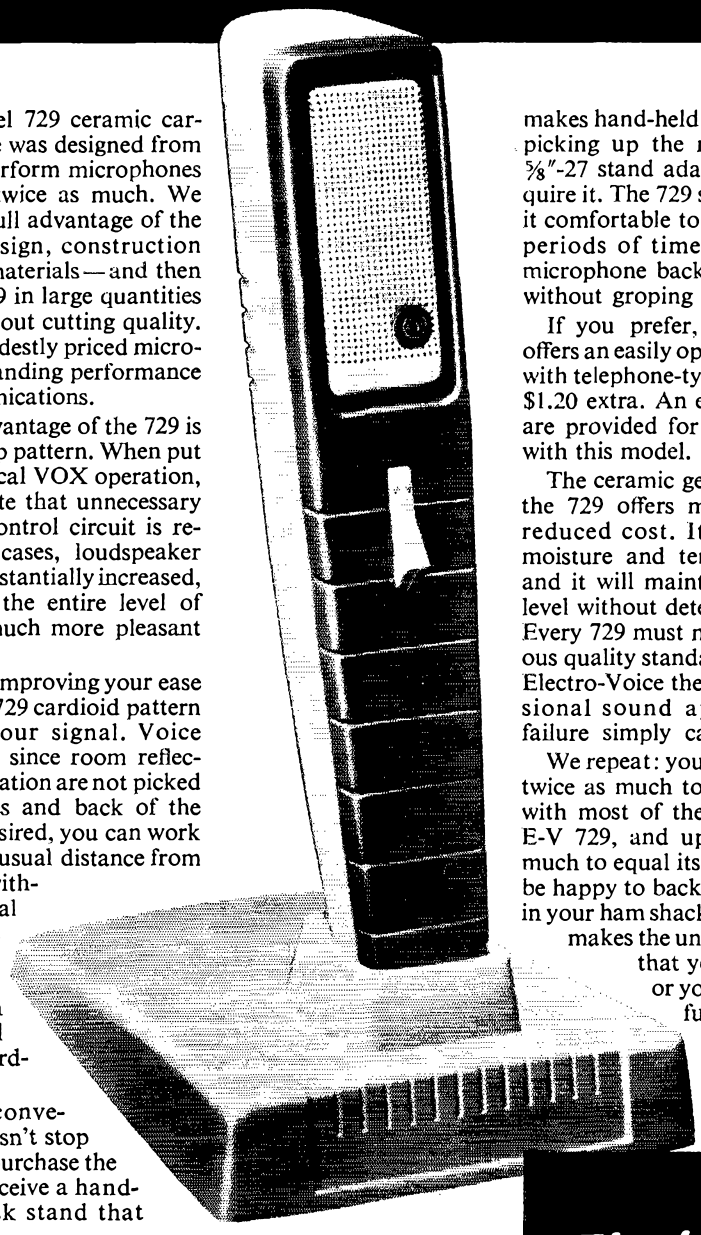

The E-V Model 729 ceramic cardioid microphone was designed from the start to outperform microphones selling for over twice as much. We did it by taking full advantage of the most modern design, construction techniques, and materials—and then producing the 729 in large quantities that cut cost without cutting quality. The result is a modestly priced microphone with outstanding performance for voice communications.

The biggest advantage of the 729 is its cardioid pickup pattern. When put to the test of critical VOX operation, you'll quickly note that unnecessary tripping of the control circuit is reduced. In most cases, loudspeaker volume can be substantially increased, as well, making the entire level of your operation much more pleasant and effective.

But more than improving your ease of operation, the 729 cardioid pattern also improves your signal. Voice quality is crisper, since room reflections and reverberation are not picked up from the sides and back of the microphone. If desired, you can work at up to twice the usual distance from the microphone without losing essential audio clarity. This working flexibility simply cannot be matched by an omnidirectional microphone, regardless of price.

And the 729 convenience story doesn't stop there. When you purchase the Model 729 you receive a handsome slip-in desk stand that makes hand-held operation as easy as picking up the microphone, plus a ⅝"-27 stand adapter should you require it. The 729 shape and size make it comfortable to hold, even for long periods of time. And putting the microphone back in its base is done without groping or fumbling.

If you prefer, the Model 729SR offers an easily operated rocker switch with telephone-type contacts for only $1.20 extra. An extra set of contacts are provided for controlling a relay with this model.

The ceramic generating element of the 729 offers many advantages at reduced cost. It is impervious to moisture and temperature changes, and it will maintain its high output level without deterioration for years. Every 729 must meet the same rigorous quality standards that have made Electro-Voice the standard in professional sound applications where failure simply cannot be tolerated.

We repeat: you have to pay at least twice as much to find a microphone with most of the advantages of the E-V 729, and up to three times as much to equal its performance. We'll be happy to back up our claims right in your ham shack. For Electro-Voice makes the unequivocal guarantee that you must be satisfied or your money will be refunded. Write for free E-V catalog and list of the E-V distributor nearest you.

*Model 729 amateur net. Model 729SR (illustrated) $16.80 amateur net.

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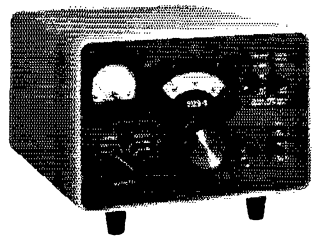
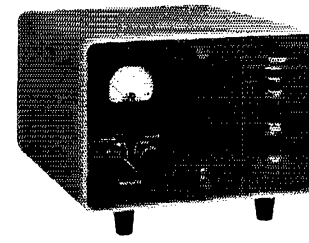
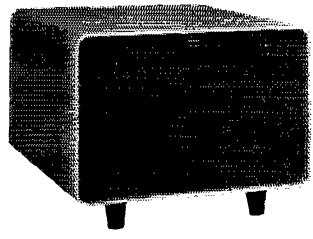


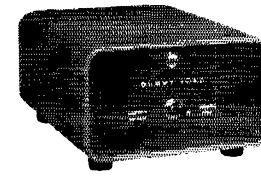
312B-5 VFO Console



312B-4 Speaker Console



516F-2 AC Power Supply



DL-1 Dummy Load

S-Line Components and Collins Systems

Adding Collins S-Line components to a Collins system gives you ham radio at its best.

The 312B-4 Speaker Console lets you control your S-Line with the flip of a switch. Another feature is directional watt meter.

Make your KWM-2 fixed station more versatile with the 312B-5 VFO Console. Get all 312B-4 features, plus the capability of limited separation of transmitter and receiver frequencies.

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Fixed station, portable or mobile, Collins has a complete line of system components to put more enjoyment into ham radio. And all components, including the power supply, are styled with S-Line eye appeal.

COLLINS

QST — NOVEMBER 1969

VOLUME LIII NUMBER 11

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OUR COVER

A bit of photographic trickery was necessary to fit W6KPC's antenna within the limits of our cover. For an accurate representation and full details of the antenna, see page 11.

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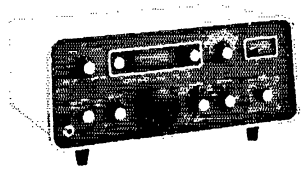

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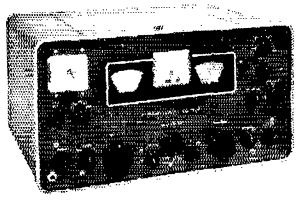

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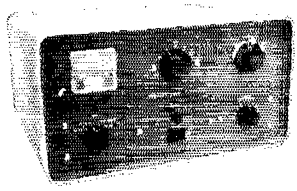

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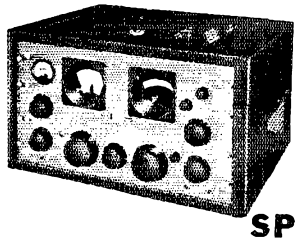

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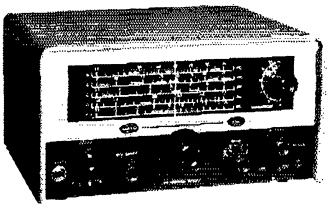
Model R-5A Allwave Receiver



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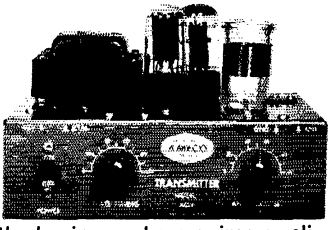

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Section Communications Managers of the ARRL

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

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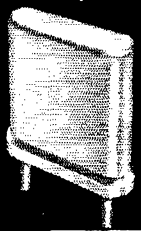

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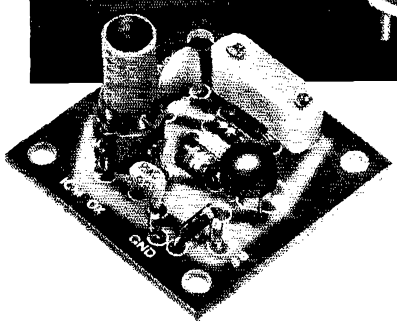

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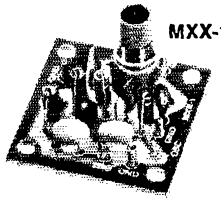

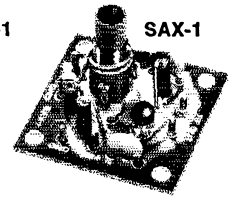

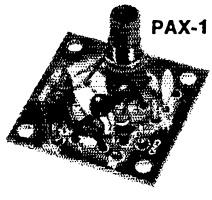

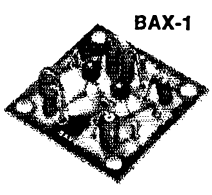

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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors.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

"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.

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"It Seems to Us..."

ARRL FILM COVERAGE

LIKE that at our own conventions, initial reaction to the first public showings of the new ARRL p.r. film, "Ham's Wide World," has been quite favorable. A print is now in the hands of each division director, as a central distribution point to fill requests in his area. These are for the moment largely TV stations where amateurs have sold management on providing a free half-hour of time. (Or, like W5VA, who *are* the management!).

Yet, to attain the fundamental objectives of exposure to a substantial portion of the public, especially youth, it is obvious the effort must be expanded. We have paid for the creation and production of the film; that money will have been poorly invested if we do not obtain reasonably widespread distribution of its message.

The film will have a useful life of at least five years, perhaps ten — not because of physical deterioration, but rather its content. Dress habits, style of cars which happen to be in the scenes, etc., will eventually become dated. We need a considerable amount of exposure the first few years. And we cannot expect volunteers to do the entire job for us.

Considering this situation during its late-September meeting, the Executive Committee authorized the procurement of 50 additional prints and approved plans for their distribution. Half the reels will be initially earmarked for school showings — high-school and colleges. The other half will be reserved for additional TV outlets — the smaller ones, for the most part, where program chiefs are looking for good, non-commercial material. As TV outlets are satisfied and requests diminish — perhaps in six months — the full stable of prints will be used for the school distribution. The agency specializing in this service will make our film the subject of special flyers, and of course list it in the catalogs of free-loan materials.

All this takes quite a bit of doing, especially in the financial area — something on the order of $15,000 is involved. There will be additional amounts in later years. It is a job that needs to be done. And there is no group other than your ARRL with the resources to do it.

LIFE MEMBERS

Two years ago the Board adopted new bylaws providing for Life Membership at twenty times the annual dues rate ($130) to Full Members in Canada and the U. S. It has proved a popular measure — the 76 additional LMs elected at the Executive Committee meeting in September brought the total to nearly 600; more than 200 other members are at one stage or another on the eight-payment plan. It is almost certain that by the end of 1970 there will be 1000 or more hams displaying Life Membership ceramic wall plaques and wearing the special lapel pins.

Flipping through the names on the master record cards produces some interesting facts and impressions. We spotted 113 who are more-than-ordinarily active in League affairs, or are prominent in the business end of amateur radio, or writers of ham radio articles, or known nationally for their accomplishments. This of course is no real surprise. But the other, nearly 700 names in the file are from the whole broad spectrum of hams — bankers and grade-schoolers, sergeants and colonels, college professors and college students, girls in the early teens and men past 70. And there are at least three husband-and-wife teams (at $130 per person — no quantity discount!). All good hams and true — but not necessarily deeply involved in leadership or other prominent spots in our organizational structure.

The point? Simply that it underscores the solid, grass-roots support of ARRL. It takes much of the squish out of the overripe word-tomatoes occasionally tossed claiming the League is a clique of professional engineers (or whatever is the critics' favorite phrase at the moment). It is evidence of — as one ham put it in *QST*'s Correspondence Section a couple of months ago — the often-silent majority. Together with more-active participation such as the hotly-contested elections now in process in six divisions (e.g., 6 candidates for director in the Atlantic, 4 in the Delta Division), it shows the League is indeed a healthy, useful, democratic organization that has a broad base of support. And that's just as it should be.

QST

League Lines . . .

A late-September decision of FCC left the incentive-licensing cw sub-bands at 25 kHz. rather than expand them to 50; and the 6-meter band as is rather than impose the further license-class restrictions previously announced. At press time the remaining changes are still on the schedule to become effective November 22, as illustrated in the chart on page 64A. Any last-minute modifications will be bulletined by W1AW and the OBS system.

Never knew we had so many swing-shifters! The morning trial of W1AW code practice has met with enthusiastic response from such a wide audience that starting December 10 (and at suitable intervals thereafter) a morning qualifying run will be transmitted. Info in next issue. If you like it, please tell us so.

K7UGA now has 21 fellow-Senators co-sponsoring his S-1466 bill to grant amateur license eligibility to aliens intending to become citizens (without having to wait five years for the usual process). Assuming amateurs everywhere share such a view, a letter to your own senator supporting the bill would be very helpful at this time.

A series in "Telephone Engineer & Management" on basics of transistors was recommended to us as ideal for amateur consumption as well; we agreed, and with permission -- plus a few changes for more amateur orientation -- the first installment appears on page 17.

Amsat continues to pursue a launch commitment for Australis-Oscar 5; mid- to late-November is likely. The orbit is expected to be essentially the same as the example used in the October QST tracking article (page 54); thus, all data in the article will apply. Listen to W1AW bulletins for further information on the launch.

Within a period of just a few days in September, 3 ardent DXers qualified for the first of the 5BDXCC awards -- W4QCW, DL7AA, W1EVT. QCW worked 'em all during the first three months of the year; getting the cards took the rest of the time.

Stripped of the legal language in our Articles & by-laws, a feature (page 66) in this issue describes in simpler words the League's organizational structure and in general how things function. As the diagram there shows, members hold the driver reins.

If you run across an AX prefix after the first of the year, contain your ecstasy -- it's not the mysterious east, but rather Australia, with a special prefix in commemoration of the 200th anniversary of Captain Cook's journey.

FCC figures indicate that not only has CB finally stopped its rapid growth, but is static and possibly decreasing. With only 20% of licensees renewing, must be a lot of used gear around somewhere.

Mexico now has its own version of incentive licensing. All hams licensed since 1951 must pass a code test -- 10 wpm for 10 minutes for second class, 15 wpm for 15 minutes for first class, with a passing mark of 91%! Already we've received several requests from XEs for W1AW practice schedules.

Washington sources indicate FCC has the word from above to recoup from license application fees even more of its operating costs. We may soon see an upped schedule of fees for all radio services.

The Collinear Yagi Quartet

A Super Rotary for 10-Meter DX

BY A. J. F. CLEMENT,* W6KPC

THIS will be the third sunspot cycle in which the author has built experimental high-performance arrays for use on the 28-MHz. band.[1,2] The data collected on the arrays built during the 1948 and 1958 sunspot maxima was carefully studied and analyzed. Considerable weight was given to actual DX operating results achieved on a month-to-month basis during good and poor propagation conditions. All the while, over many years, a watchful eye was kept on what kind of antennas the v.h.f. boys were building for maximum DX results.

Out of all this, a germ of an idea began to take shape: a collinear arrangement of high-performance antennas to form a large-aperture array. As the idea grew, a number of objectives were listed:

1) The antenna should be a rotary beam.

2) It should show at least 15-db. gain over a dipole.

3) To reduce QRM, the azimuth pattern width should be less than 35 degrees.

4) The vertical angle of the main lobe should not exceed 8 degrees.

5) The array should be supportable by readily-available commercial towers of best design.

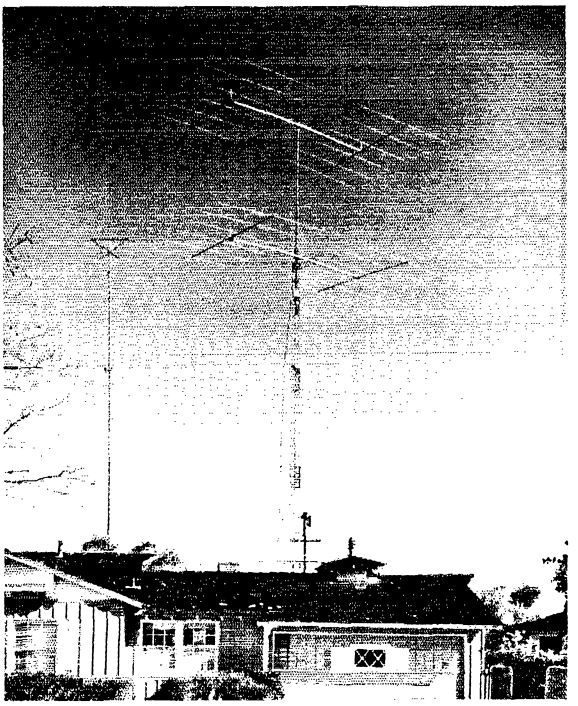
The writer's experience has shown, rather conclusively, that the Yagi antenna achieves greater performance *for a given wind resistance and weight* than any other antenna design. It was decided, therefore, that a high-performance Yagi would become the basic element of the large-aperture, high-gain array.

*17171 Gresham St., Northridge, Calif. 91324.

[1]Clement, "The Yagi-Dagi," *QST*, September, 1951.

[2]Clement, "The Driven Beast," *QST*, May, 1958.

This wouldn't be an unusual structure on 2 meters. But on 10. . . !! Needless to say, it has paid off in results.



The Collinear Yagi Quartet outlined against the sky. The top pair of elements is 108 feet above the ground. Round cross booms are made of Sitka spruce, 3½ inches in diameter at the center, tapering to 2½ inches at the ends, and are 25 feet long. The short vertical members at the ends of these booms each support a wire truss (broken up by insulators) that prevents droop in the Yagi boom.

A fairly close-spaced 6-element Yagi with balanced high-impedance feed was built and tested. It was anticipated that four of these 6-element Yagis would then be assembled into the final array. The Yagi's basic dimensions are shown in Fig. 1.

The reason for the rather close spacing was mainly mechanical; it was imperative to make all parts of the Yagi as light and thin as possible in order to cut down the wind resistance and total weight of the four that would make up the final array. It would have been better to have used a boom length of about 30 feet instead of the 25 feet shown, although close spacing can yield excellent results if great care is exercised in tuning all elements for maximum forward gain. Close spacing is bothersome, however, in that it lowers the feed-point impedance drastically; also, an unwanted amount of reactance shows up at the feed point of the driven dipole. These two irksome problems were dealt with as follows:

1) "T" matching was used to raise the feed-point impedance. The hope had been for 200 ohms, but the best that could be squeezed out of many experiments was 150 ohms. Several T-bars of various diameters, spacing and lengths were tried. Smith-chart plots were laboriously run on each try. Had a boom length of 20 feet

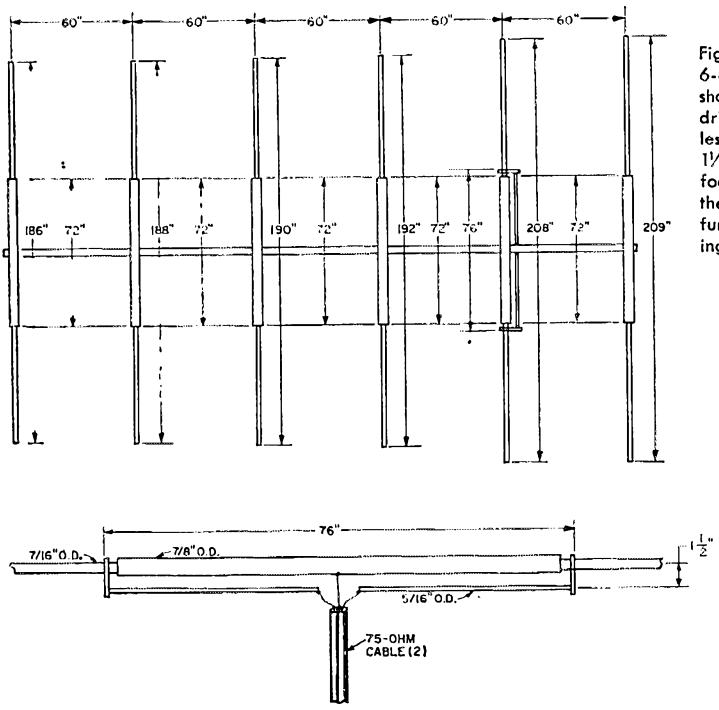


Fig. 1—Dimensional layout of the 6-element Yagi. Lower drawing shows the method of feeding the driven element. Material is seamless Dural tubing. Boom diameter is 1½ inches, 0.050-inch wall. A 4-foot solid wood insert is placed in the center part of the boom to furnish added resistance to bending.

been used 200 ohms would have been easy to attain. The main objective, of course, was to raise the resistance and to lower the reactance.

2) The reactance at the feed point had to be dealt with very carefully. The main thing to worry about was how to be sure to end up with exactly the same reactance in all four Yagis. The reason? All four Yagis must be fed exactly in phase to perform properly as an array. A ±10-degree tolerance on phase angle was set as a limit. To achieve this accuracy in phasing, only simple linear elements were used in the feed system. Only T matching and driven-dipole length juggling were used to achieve a fairly low reactance but high resistance at the feed point. As it turned out, my driven dipole had to be lengthened somewhat to yield what was desired on the Smith chart. The test setup used is shown in Fig. 2.

It must be emphasized at this point that the use of a radio-frequency bridge, or some other *accurate* way to separate reactance from resistance over the bandwidth of the antenna, is a "must." Fiddling around with s.w.r. bridges may be OK for simple antennas, but can lead one astray when working with more complex assemblies.

After about seven months of Smith charts and on-the-air testing I had a small, light (only 24 pounds), 6-element Yagi that had an effective wind area of only 3.6 square feet (this small wind area and weight is of overpowering importance, as will be seen later) and, as determined by extensive field-strength measurements during the testing period, had an indicated gain of at least 10 db. over an ordinary horizontal dipole at the same height.[3]

The Array

The final important decision of array configuration had to meet the original criteria: It could not be too bulky, too heavy or have too much wind resistance; also, it had to have a narrow pattern in azimuth and elevation and also a very low angle of radiation.

To obtain the required narrow pattern in azimuth, collinear (side-by-side) placement of two Yagi antennas was decided upon. Fig. 3 shows the azimuthal pattern that only two ordinary collinear dipoles will produce. Fig. 4 shows the azimuthal pattern of four collinear dipoles. It was reasoned that since a single 6-element Yagi would certainly have a narrower azimuthal beam width than a pair of collinear dipoles, two 6-element Yagis placed side by side should produce about the same azimuthal pattern as shown in Fig. 4.

The optimum spacing, boom-to-boom, for two 10-db. Yagis should be about ¾ wavelength. This spacing, about 25 feet for 10 meters, should give a full 3 decibels extra gain for the two-Yagi collinear array over a single 6-element

[3]Yagi antennas of this length (about 0.7 wavelength) have shown approximately 9-db. gain over a dipole in a number of extensive sets of measurements. See *ARRL Antenna Book* (11th edition), Figs. 4-63 and 4-68. The book *Yagi-Uda Antenna*, by Uda and Mushiake, gives 7-10 db. for 4-element and 9-11 db. for 5-element antennas measured experimentally. No element spacings are stated, but presumably were in the neighborhood of 0.25 wavelength between elements as the authors found spacings of this order to be about optimum; if so, the 4-element antenna would have been 0.75 wavelength long. — *Editor.*

Yagi antenna.[4] This 12-element combination array, then, should show a pattern close to that given in Fig. 4 and have a forward gain of approximately 13 db. Such an array could be called a "Collinear Yagi Duet."

An important consideration with respect to collinear spacing is the formation of side lobes which rob energy from the main forward lobe. Collinear spacing in excess of ¾ wavelength will cause side lobes to appear in the azimuthal pattern. Vestigial side lobes will just start to be evident when ¾-wave spacing is reached. The above considerations fixed my boom-to-boom spacing at ¾ wavelength.

To achieve even more gain, it was decided to stack two collinear Yagi duets, one pair over the other pair. This would make a 24-element array made of four 6-element Yagis, hence the "Collinear Yagi Quartet."

Stacking

The general idea in stacking antennas is to increase the aperture, or intercept area, of the array. This gives more gain; however, the ground-reflected energy will modify this as compared with the free-space gain. Fig. 5 shows how the ground-reflection factor (which applies to *any* type of horizontally-polarized antenna)[5] changes as the antenna height is increased. At a height of ½ wavelength the maximum occurs at an elevation (vertical) angle of 30 degrees; at 1 wavelength there are two maxima, one at about 4 degrees and the other at 48 degrees; and so on. Note that for each ½-wavelength increase in height a new lobe appears in the pattern, but that the lowest one keeps dropping down.

A horizontal antenna having good vertical directivity, such as a multielement Yagi, will have relatively little radiation above 30 degrees or so in the vertical plane, so the amplitudes of the higher-angle maxima in the ground-reflection patterns are of minor importance. The lowest maximum is the one of interest, as it gives rise to the useful "main lobe" in the vertical-plane pattern of the actual antenna.

[4]This is based on unpublished work to which the author had access. There is relatively little in the literature on this point. One reference (Fishenden and Wiblin, "Design of Yagi Aerials," *Proc. IEEE* (London), Part III, January 1949) states that "mutual effects are usually found to be unimportant at spacings greater than 1½λ . . . and the gain of *N* units is approximately *N* times the gain of a single unit. — *Editor.*

[5]Reproduced from the *ARRL Antenna Book*, page 46. These patterns are plots of the formula 2 sin (h sin β), where h is the height in electrical degrees and B is the vertical angle in degrees above horizontal. The formula is based on the assumption that the ground is perfectly conducting. — *Editor.*

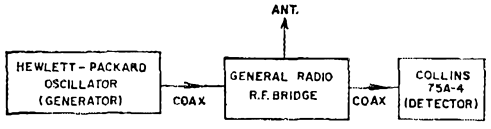


Fig. 2—Test-equipment setup for measuring antenna impedance.

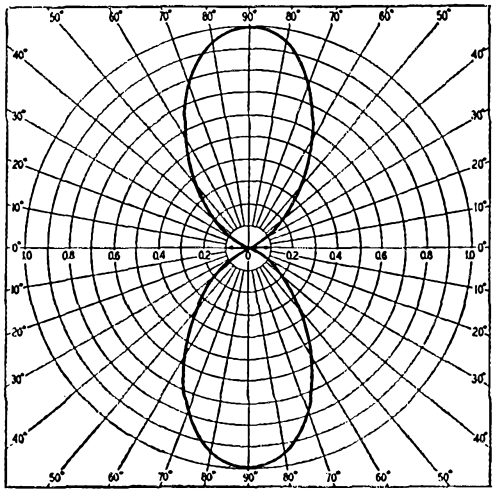


Fig. 3—E-plane pattern of two half-waves in phase, collinear.

It is obvious that two identical antennas stacked at different heights above ground cannot have their main lobes at exactly the same elevation angle. For example, if two Yagis are stacked ½ wavelength apart and the lower of the two is ½ wavelength high, its ground reflection factor will maximize at 30 degrees, while the maximum for the upper antenna, at a height of one wavelength, will occur at about 14 degrees. But as the heights are progressively increased, the main lobes will tend toward coincidence. To get really good coincidence, the upper antenna should be up about 3 wavelengths and the lower one up at, say, 2⅜ wavelengths (⅝-wavelength separation). For this case calculation shows that the theoretical ground-reflection factors are 4.75 degrees for the top antenna and 6.5 degrees for the bottom one — less than 2 degrees separation.[6]

The reader can now understand why the Collinear Yagi Quartet was designed so that the upper duet of collinear Yagi antennas was placed at a height of 3 wavelengths while the bottom duet was placed almost as high, at 2⅜ wave-lengths. This is 103 feet (at 28.6 MHz.) for the top pair and 81 feet for the bottom pair above ground. (Imagine what this would be on 20 meters — 206 and 162 feet, to be exact! One can see why stacking is, in general, less beneficial on 20 meters but very effective indeed on 10 meters when 100-foot-high antennas are used.)

[6]This helps in visualizing what is going on in the construction of the composite pattern. The customary method of calculating the overall pattern is to take the average height of the two antennas and apply the ground-reflection factor for that height. In the above example, using this method shows that the ground-reflection factor maximizes at 5.3 degrees for the composite antenna (average height = 2-11/16 wavelengths). This method is applicable at any height. However, if the factors for the individual antennas are not reasonably close to coincidence there is some sacrifice of possible gain, as the author points out. — *Editor.*

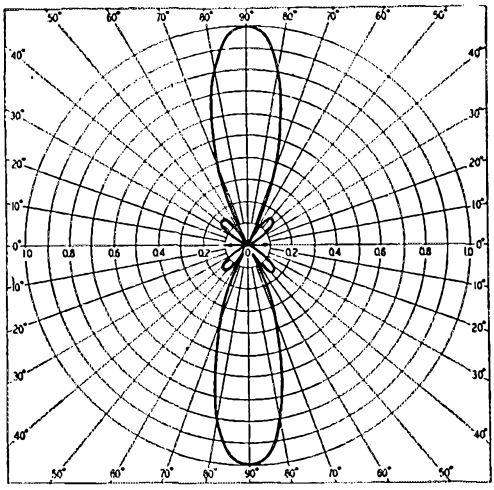


Fig. 4—E-plane pattern of four half-waves in phase, collinear.

One may wonder why $\frac{5}{8}$ wavelength was chosen as the stacking distance, vertically, between the Duets. It turns out that $\frac{5}{8}$ wavelength is not a bad compromise between the optimum distance of 1.0 wavelength[7] on one hand and a host of mechanical problems on the other hand. At 1.0 wavelength, the added gain due to stacking is in excess of 3 db., while at $\frac{5}{8}$ wavelength one can still achieve about 3 db. of gain by having lobe coincidence as described above. *General rule:* Vertical stacking distance = $\frac{3}{4}$ of boom length.[8]

Even at $\frac{5}{8}$ wavelength the upper mast becomes large and heavy. In my case the mast was made of high-strength aircraft steel tubing having a wall thickness of over $\frac{1}{4}$ inch. Imagine what this mast would have to be made of if the spacing had been 1 wavelength. The entire array ended up weighing about 700 pounds, including motor, indicator, mast, booms, feed lines, and antennas. A Tri-Ex LM470HD free-standing crank-up tower was selected to support this big array.

Phasing and Feeding

The four Yagi antennas are fed as shown in Fig. 6. Notice that double 75-ohm coax pairs go three half waves from the balun to the two upper collinear Yagis. Also, only two half waves of double 75-ohm coax pairs go from the balun to the bottom collinear Duet; also, these two lower lines are transposed at the balun. The balun transforms from a balanced 50-ohm line on the antenna side to an unbalanced 50-ohm line on the transmitter side. The 150-ohm antennas are all "transported" electrically to the unbalanced side of the balun and are then effectively paralleled.

Four 150-ohm impedances, when paralleled, give a resulting impedance of 37.5 ohms. When

[7]Kasper, "Optimum Stacking Spacings in Antenna Arrays," *QST*, April, 1958. Data from this article also is in the *ARRL Antenna Book* (Fig. 4-64 in the 11th edition). — *Editor.*

[8]Orr, *The VHF Handbook*, 1st edition, page 112. (The Uda-Mushiake book mentioned in Footnote 3 shows an experimentally-measured stacking gain of 3 db. with two 5-element antennas stacked ½ wavelength apart. For this array, the authors state that the measurements showed that the gain is maximum when this spacing "is nearly equal to a half-wavelength." — *Editor.*)

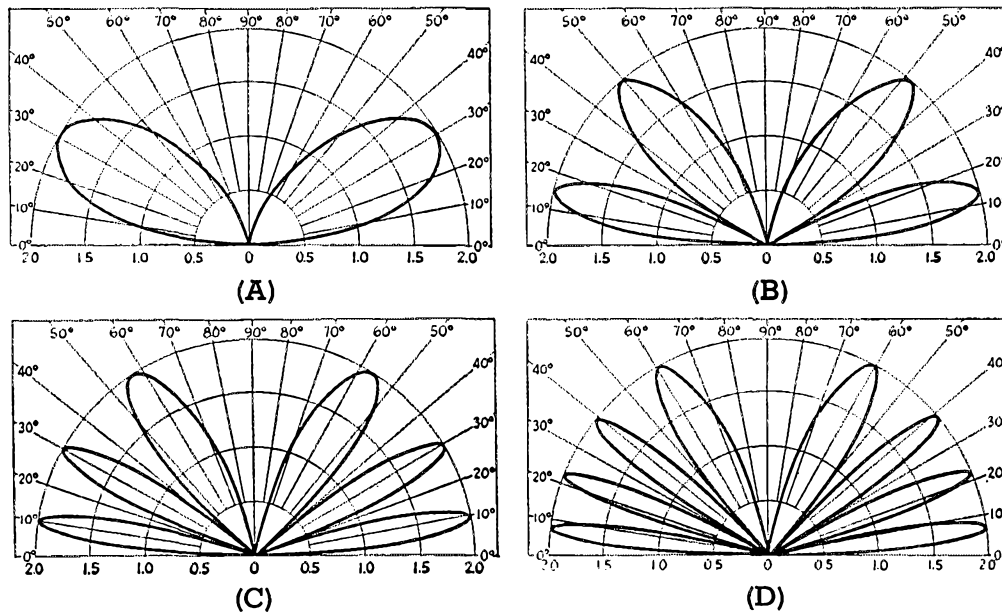


Fig. 5—Factors by which the vertical pattern of a horizontal antenna is multiplied when the antenna is above perfectly-conducting ground. A: height ½ wavelength; B: 1 wavelength; C: 1½ wavelengths; D: 2 wavelengths. See *ARRL Antenna Book*, Figs. 2-26 through 2-37, for patterns at intermediate heights.

the actual input impedance was measured it was found to be about 42 ohms. From 28.0 MHz. to 29.0 MHz. the v.s.w.r. never exceeded 1.8:1, with about 1.3:1 at 28.6 MHz.

Experimental Data
The Pattern

After the Collinear Yagi Quartet had been in use for ten months Cameron Pierce, W6QY, and I measured the azimuthal (horizontal) pattern. About ten miles away from W6KPC is a mountain range. It is a clear shot from the Collinear Yagi Quartet to the ridge of this range. Fortunately, Dale Hoppe, W6VSS, owns a QTH right on top of this mountain. Cam and Dale set up a KWM-2 and a dipole on the mountaintop.

Back at W6KPC the Collinear Yagi Quartet was pointed directly at the QTH of W6VSS and attenuator No. 1, Fig. 7, was set so that the S meter on the Collins 75S3-B at W6KPC read exactly S9 with the KWM-2 at W6VSS turned on. This No. 1 attenuator was never again touched; it was used *only* to set the received signal to S9 with the antenna head-on to the W6VSS source.

Next, the antenna array was rotated ten degrees off the line to W6VSS. The S meter dropped off slightly, so it was brought back up to S9 by cutting out resistance units in the second precision attenuation decade box. Next, the array was rotated another 10 degrees (now a total of 20 degrees off W6VSS); resistance was cut out of box No. 2. This process was repeated every 10 degrees around the whole azimuthal circle. At each 10-degree stop the amount of attenuation removed from box No. 2 was tabulated.

At this point it is important to note that what was being tabulated was *db. of attenuation*, a precise item. This attenuation table was then converted to a table of volts *vs.* angle. Field strength is, of course, measured in volts, not attenuation. In the process of conversion, the new tabulation was also "normalized;" the largest voltage being set equal to unity. This final table was then plotted on a standard azimuthal chart to yield a field-strength diagram. The resulting pattern is shown in Fig. 8. Both the forward and rear lobes show a pattern width at the half-power point (0.707 on the voltage scale) of 28 degrees. The beautiful shape of the forward lobe shows why Collinear Yagi Duets are here to stay as DX antennas.

The reason for the rather large rear lobe is simple: The individual Yagis were tuned for maximum forward gain, *not* for maximum front-to-back ratio. One will also notice, however, that the rear lobe is down 6 db. from the front lobe; this means that on the nose the power radiated to the rear is only one quarter of the power radiated in front — a cheap price to pay for a 28-degree front lobe and no side lobes.

Gain

Antenna gain can be determined approximately if one knows the horizontal and vertical field-strength patterns of the antenna's main lobe

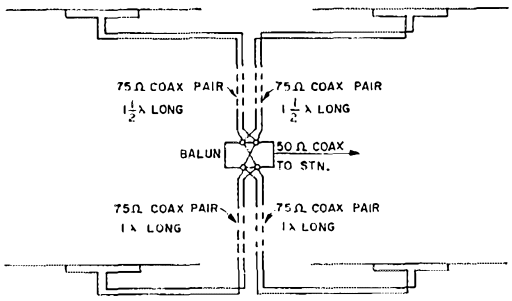


Fig. 6—Method of feeding the four Yagis in the Quartet. Note that the twin 75-ohm transmission-line lengths are not drawn to scale. Line lengths are electrical; i.e., physical length in wavelengths times velocity factor. The 50-ohm balun (made by Telrex) is connected for 1-to-1 impedance ratio.

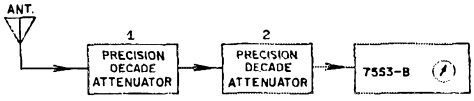


Fig. 7—Equipment setup at W6KPC for making pattern measurements. The measurements were made on a constant-output transmitter located about 10 miles away in line-of-sight.

and knows that the minor lobes are small compared with the main lobe. Based on carefully-conducted measurements of the horizontal pattern and some assumptions with respect to the main lobe's vertical pattern, the author feels confident that the Collinear Yagi Quartet has a real gain of the order of 16 db.[9] This gain is effective at an elevation angle of only 6 degrees.

Results

Results are all that really count. The Quartet's combination of high gain and low takeoff angle really produces results, making extremely long hops possible from the F_2 layer. Since the Quartet was erected last spring, I have been able to work long-haul DX stations both earlier and later than other 10-meter stations in the Los Angeles

[9]The method of calculating gain mentioned above is based on a formula in which three assumptions are inherent: (1) horizontal and vertical beam widths are approximately the same; (2) the amplitudes of secondary lobes are negligible; and (3) the beam is narrow (errors become appreciable when the beam width exceeds 20 degrees). The formula has the form Gain = $N/\theta_1\theta_2$, where θ_1 and θ_2 are the horizontal and vertical beam widths in degrees and N is a number that varies with different sources. Jasik's *Antenna Engineering Handbook*, McGraw-Hill, gives N = 30,000; Lindsay, in "Quads and Yagis," *QST*, May, 1968, used N = 40,000. In both cases the gain is over an isotropic antenna, or 2.14 db. greater than over a half-wave dipole. For a beam width of 28 degrees, N = 30,000 gives a power gain of 38 while N = 40,000 gives a gain of 51. These are, respectively, 15.8 and 17.1 db. over isotropic. A similar array using stacked collinear 6-element Yagis, but with wider element spacing and greater spacing between Yagis, described in the paper referred to in Footnote 4, was said to have a gain of 15 db. over a half-wave dipole. — *Editor.*

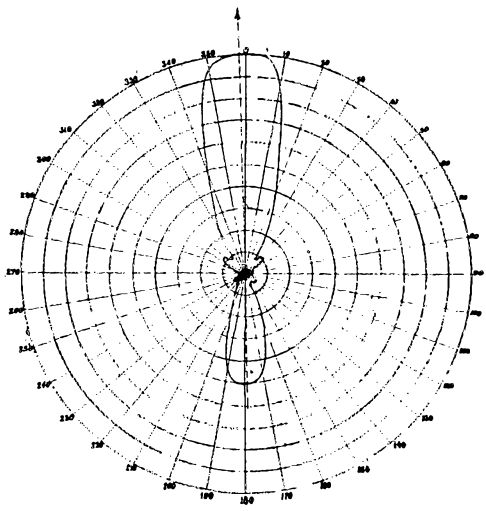


Fig.8—Measured horizontal field-strength pattern of the Collinear Yagi Quartet.

area; in other words, the array is both a band opener and a band closer. Not infrequently, W6KPC would be the only West Coast station being heard by the DX station. The most power ever used was 700 watts p.e.p. from a Collins KWS-1.

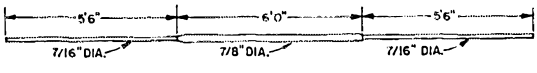
All this winter, using 600 watts p.e.p., and working at 27.820 MHz., A6KPC (Army MARS) used the Quartet (s.w.r. = 2.5:1) to handle consistently, day by day, phone-patch messages from GIs in Vietnam to their relatives here at home. So far (January 25, 1969) I have not missed contacting the Vietnam Net a single day, except for the very few week ends when I have been away from home.

DX includes such rare and choice morsels as follows:

YJ8BW	XW8BX	YO2BI/7	ZB2A
5W1AT	XW8BS	EA9AQ	OD5BZ
ZB2A	VQ8CC	ZC4MO	YO2BB
VQ9JW	UP2OV	9H1M	IT1EUR
6W8DY	ET3USA	4X4SO	CN8HD
ZD3D	ET3REL	5A4TH	UV3AAM
TU2CF	1S1SCB	UO5BZ	6W8DY
9L1KZ	HA2KRB	UV3AAE	YO9CN
SV1AE	ZD5X	LA1MB	ZD5V
LX1JW	SL3ZV	VR1P	VK9TG
9U5HI	VP8JJ	ZS3HT	ZD7DI
CR6LX	XD5V	GD3RFK	OH2SB

QST

Appendix



1) In the typical 10-meter element shown above in the drawing consider the 6' 0" center section first. The projected area is diameter × length:
= $\frac{7}{8}$" × (6 × 12") = $\frac{7}{8}$" × 72"
= 63.0 square inches.
Next, consider the tip section (on one end only):
= $\frac{7}{16}$" × (5.5 × 12") = $\frac{7}{16}$" × 66"
= 28.875 square inches.
There are two tips, so 2 × 28.875 sq. in. = 57.75 square inches.
The total area of one element is 63.0 + 57.8 = 120.8 square inches. As there are six elements, 6 × 120.8 = 724.8 square inches.

Civil-engineering codes allow the use of only $\frac{2}{3}$ of the projected area if the elements are cylindrical (which they are). This simply says that a cylinder is more streamlined, and has only $\frac{2}{3}$ the wind resistance that a flat plate, strip, or square element would have. We can, therefore, *reduce* our 724.8 square inches to two thirds of this value:
= $\frac{2}{3}$ × 724.8 = 478.37 sq in.
= 2.32 ft² effective wind area.

My real antenna has elements of different lengths, hence my effective area of 3.6 square feet. The boom, broadside, has less area, so is ignored.

The elements were stressed by me for bending and found to be good for 100 mph winds.

2) Now, consider the 25-foot-long by 3-inch-diameter wooden beam that holds the upper two 6-element Yagis apart by $\frac{3}{4}$ wavelength. The wood beam tapers from 3½-inch diameter at the center to 2½-inch diameter at each end. This gives it an average diameter of 3.0 inches.
Beam area = 3" × (12 × 25")
= 900 square inches (projected area)
$\frac{2}{3}$ × 900 = 600 square inches (effective wind area)
= 4.16 square feet.

3) Now, consider the vertical mast separating the stacks. The upper part of this mast is 2 inches in diameter (OD) and is 6 feet 0 inches long. The projected area is
(6 × 12") × 2" = 144 square inches
= 1.0 square foot.
The lower mast is 3 inches in diameter and is 16 feet 0 inches out of the tower.
(16 × 12") × 3 = 576 square inches
= 4.0 square feet projected area.
Adding the two together gives
1.0 + 4.0 = 5.0 square feet.
The effective wind area of the mast is
$\frac{2}{3}$ × 5.0 = 3.3 square feet.

4) The bending moment, M_A, at the top of the tower (bottom of the mast) for the antennas alone is
M_A = Area × Wind Pressure (40 lb per ft²) × distance.
In our case we have two antennas (we ignore the bottom bay, as it has no mast):
2 × 3.6 = 7.2 square feet of antenna up 22 feet (264 inches).
7.2 × 30 lb/ft² × 264 inches = 7.2 × 30 × 264
=5700 in. lb (contribution of two Yagis).

5) The bending moment, M_B, caused by wind drag on the 25-ft wood beam:
M_B = 4.16 ft² × 30 lb/ft² × 22 ft (264 inches)
= 4.16 × 30 × 264
= 32950 inch pounds.

6) For the contribution of the mast, assume the center of pressure to be halfway up the mast (this is conservative):
(M_M = 3.3 ft² × 30 lb/ft² × 11 ft (132 in.)
= 3.3 × 30 × 132
= 13200 in. lb.

7) The total combined moment on the mast's base is:
$M = M_A + M_B + M_M$
= 57000 + 33000 + 13000
= 103000 inch pounds.

8) From appropriate tables, one selects a mast that will withstand this amount of bending moment. My mast (SAE 4130 Aircraft Steel) is 3 inches OD, ¼-inch wall, and is good for a moment of 130000 inch pounds.

This is the first article in a nine-part series on basic semiconductor operation, written especially for readers having limited technical background. In slightly different form (and including some simple electrical fundamentals that are omitted here because an amateur must know them already in order to get his license) the series was published a few years ago in Telephone Engineer & Management, *a magazine serving the telephone industry. It was brought to our attention by one of our members who is also a telephone man, with the suggestion that probably most amateurs would find it as interesting and useful as he had. We thought so, too. The editor of* Telephone Engineer & Management, *Ray H. Smith, and the author, Robert E. Stoffels, very kindly gave us permission for reprinting, with minor changes to slant the material more toward amateurs than the telephone personnel to whom it was originally directed.*

Mr. Stoffels is in charge of the development program on the electronic automatic telephone exchange (EAX) at Automatic Electric Laboratories, Northlake, Ill. He has been with that company since 1952, except for a two-year period in the U. S. Army Signal Corps in the Army's Communication Engineering Agency. Although not an amateur, he has leanings in that direction — a few more w.p.m. in his code speed and he'll be joining us!

Robert E. Stoffels

Let's Talk Transistors

Part 1—The Structure of Matter and its Application to Transistors

BY ROBERT E. STOFFELS*

Conduction within a transistor is a function of materials in it and its atomic or subatomic composition.

THE subject of Semiconductor Physics (a fancy way of saying Structure of Matter) is little more than a review of high school chemistry, but it is necessary in order to understand the theory of internal conduction in a transistor. For a transistor is not filled with a vacuum, as is the vacuum tube, and electrons are not boiled off a filament or cathode, since there is no filament or cathode. The conduction within the transistor is rather a function of the material of which the transistor is composed, and of its composition from an atomic and subatomic standpoint.

Matter (which may be defined as any substance that has weight or occupies space) consists of some 103 basic elements. (For many years there were believed to be only 92 elements; now the scientists in this field believe there may be even more than 103.) Examples of some elements are carbon, aluminum, oxygen, hydrogen, etc. Now these elements may be combined in certain ways (e.g., by applying heat) to form what are known as compounds. These compounds have characteristics entirely different from those of the constituent elements, and can be broken down into these elements only by resorting to other chemical means. For instance, hydrogen (a gas) may be combined with oxygen (a gas) to form water (a liquid). A drop of water may be physically divided over and over again, but it still remains water. In order to once again produce the hydrogen and oxygen, chemical (as opposed to physical) means must be resorted to.

When we have repeatedly subdivided this drop of water, however, until we can no longer break it down any more, we have what is known as a molecule of water. Thus a molecule is defined as the smallest particle of matter which can exist by itself and still retain all the properties of the original substance.

If the particle of matter under discussion is a

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basic element, then this repeated division finally results in a single atom. This atom is of great importance to us in a study of transistors, since we will be dealing primarily with elements. Because an element may be subdivided into atoms, but no further, and still retain the properties of the material, it is obvious that an atom of one element is of necessity different from an atom of another element. In other words, an atom of aluminum is distinctly different from an atom of copper.

Structure of the Atom

Although an atom of a material cannot be subdivided while still retaining the properties of the material, it can be divided into various subatomic particles. We shall be concerned with three of these particles — the electron, the proton, and the neutron.

The electron, which is the lightest of these three particles, has a diameter of 0.000000000000022 inch, and bears an electric charge of −1. The proton, which is some 1850 times as heavy, bears an electric charge of +1. The neutron may be considered to be a combination of an electron and a proton; it bears no electric charge, and its weight is, of course, about the same as that of the proton.

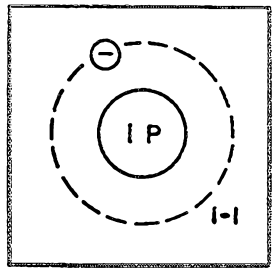

Fig. 1-1—Hydrogen atom.

These three particles, in varying quantities, make up the atoms of all 103 elements. The simplest of the elements is hydrogen (Fig. 1-1); an atom of hydrogen consists of one electron and one proton. Thus, this atom is electrically neutral — that is, it contains an equal number of electrons and protons. It is interesting to note (and really quite logical) that an atom of each and every element contains an equal number of electrons and protons, and thus is electrically neutral. For you know that a bit of aluminum, or a bit of iron, or a bit of anything else, is not electrically charged in its natural state. (Of course we can, without much difficulty, remove electrons from an atom, thus causing the material to become electrically charged. An example of this will be explained later.)

The next most complicated element is helium (Fig. 1-2). It contains two electrons, two protons, and two neutrons. And so it goes throughout the list of elements — from the very simple hydrogen to the extremely complicated "Lawrencium", which contains 103 electrons, 103 protons, and

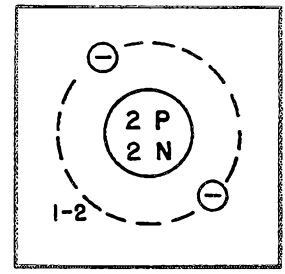

Fig. 1-2—Helium atom.

about 151 neutrons. It might be mentioned here (and you may remember from your high school chemistry) that the "atomic number" of an element is equal to the number of electrons the atom contains, and the "atomic weight" of the element is equal to the sum of the protons and the neutrons in the atom. (Because the weight of the electron is so small compared with the weight of the proton and neutron, the "weight" of the atom is very nearly simply the sum of the weights of the protons and the neutrons.)

The two elements with which we shall be most concerned in our studies of transistors are germanium and silicon. Silicon contains 14 electrons, 14 protons, and 14 neutrons (Fig. 1-3). Germanium contains 32 electrons, 32 protons, and 41 neutrons (Fig. 1-4).

Now the arrangement of these three particles (electrons, protons, neutrons) within the atom is not unlike a very miniature solar system. That is, the protons and neutrons cluster together, thus forming a "nucleus". The electrons (which, you will remember, are very light compared to the other two particles) move in approximately elliptical orbits around this nucleus. Thus the protons and neutrons forming the nucleus are similar to our sun, and the electrons rotating around the nucleus are like our planets. Just as in our solar system all planets are not equidistant from the sun, so also in the atom all electrons are

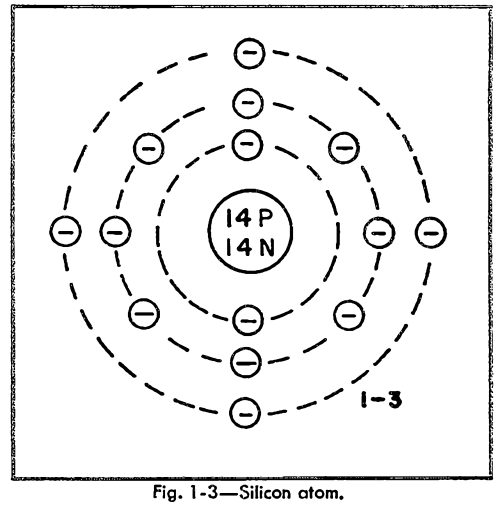

Fig. 1-3—Silicon atom.

not the same distance from the nucleus. In fact, for some very involved reasons, there are never more than two electrons in the first orbit around the nucleus, never more than eight in the second orbit, and so on.

"Valence" Electrons

To a large extent the number of electrons in the outer orbit of its atoms determines the characteristics of each particular element. For instance, helium, which has a total of two electrons (thus filling up the first orbit), and neon, with a total of ten electrons (thus filling up the first two orbits), are both chemically inert elements. They are, so to speak, completely satisfied with the present state of affairs: they strongly resist any attempt to remove electrons, and have

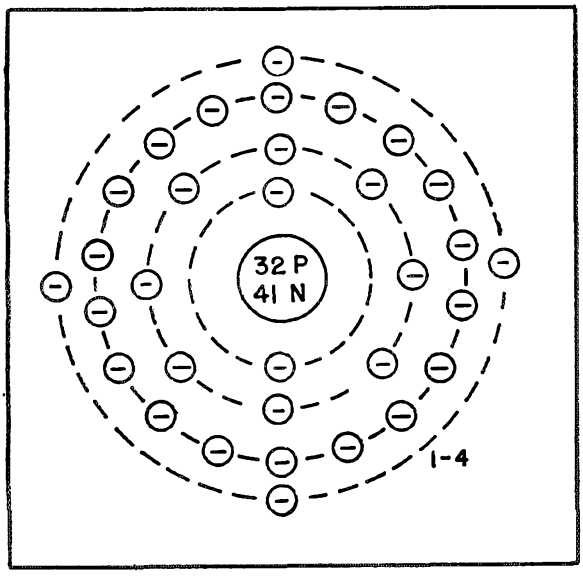

Fig. 1-4—Germanium atom.

no desire to acquire any electrons. Thus helium and neon are used where chemical combination is not desired.

However, other elements are not all so stable; their outer orbits are not completely filled, and outer-orbit electrons are free to move about and be transferred from one atom to another. Sodium, for example, has its first two orbits filled, and also has one electron in its third orbit. This last electron is something of a "lone wolf", and an atom of sodium is always on the lookout for a means of chemically combining with some other element so that it can, at least temporarily, give up this electron. On the other hand, chlorine, which is just one electron shy of filling up its outer orbit, is always on the lookout for some element which is willing to give up an electron to fill this space. Thus sodium and chlorine are "naturals" for a chemical composition, and the resultant compound, sodium chloride (NaCl), is ordinary table salt.

The electrons in this outer orbit are known as "valence" electrons, and as mentioned before they are very important in determining the characteristics of a particular element. Both germanium and silicon, the two elements normally used in the construction of semiconductors, have four electrons in their outer orbits — that is, four "valence" electrons.

Now that we have examined the structure of the atom, let us briefly consider its actual size. It has been estimated that if a copper penny could be enlarged to the size of the earth's path around the sun (diameter 186,000,000 miles) then the electrons would be the size of baseballs and would be about three miles apart. Thus it is obvious that the copper in the penny is not particularly dense — there is a great deal of space between the electrons. To take another example: if the carbon atom were expanded some million-million times, then the electrons would be the size of basketballs and the orbital spacing would be 12 miles.

We mentioned earlier that although each atom of a material was electrically neutral, it was not particularly difficult to remove an electron from an atom, thus leaving it positively charged. For example, when a glass rod is rubbed with silk, some of the loosely held electrons in the atoms within it are "rubbed off" and transferred to the silk. Thus when the two are separated these atoms — and thus the entire glass rod — will be positively charged; that is, it will have more protons (positive charge) than electrons (negative charge). This principle is used in children's toys in flying small foil airplanes.

We have now discussed, at some length, the construction of the atom, and have pointed out that its most important characteristic, at least from the standpoint of semiconductors, is the number of electrons in the outer orbit (in fact we shall completely ignore, in future discussions, everything *except* the electrons in this outer orbit). But the importance of *these* electrons, and the manner in which they move, cannot be overemphasized. It is the *uncontrolled* movement of these outer-orbit electrons that provides the current-carrying means in electrical conductors. And *it is the controlled movement of these outer-orbit electrons that provides the current-carrying means in transistors and diodes.*

Those electrons in the outer orbit of an atom that are free to move with relative ease from one atom to another are known as "free" electrons. In conductors (copper, silver, aluminum) there are a relatively large number of these "free" electrons; in insulators (glass, rubber), there are relatively few (see Fig. 1-5). And between these are a number of materials which are neither good conductors nor good insulators. Germanium and silicon are two of these materials, and they are called semiconductors. A bar of pure germanium one centimeter in thickness and 10 centimeters long will have a resistance of approximately 600 ohms; if the germanium is somewhat impure the resistance will be on the order of three or four ohms. It is obvious that germa-

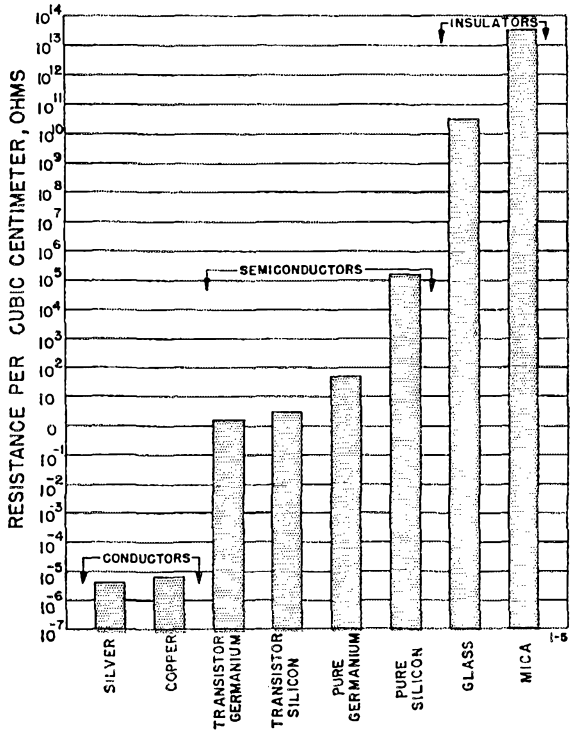

Fig. 1-5—Resistances per cubic centimeter of various conductors, semiconductors, and insulators.

nium is not nearly so good a conductor as copper (a 10-centimeter bar of which would have a resistance of 0.0001 ohm.) nor so good an insulator as glass (a 10-centimeter bar of which would have a resistance of 10 billion ohms.) Thus the name *semiconductor*.

The current-carrying characteristics of a piece of germanium (or, to put it another way, its resistance) may be varied by carefully controlling the motion of the electrons in the outer orbit of the germanium atom. This controlling function (performed by using the third wire of the transistor) is the basis for the operation of a transistor, and will be discussed in a later article.

Questions:

1. *Carbon is an example of:*
   (a.) an element (b.) a compound (c.) a mixture
2. *Sodium Chloride is an example of:*
   (a.) an element (b.) a compound (c.) a mixture
3. *Water may be broken down into its constituent hydrogen and oxygen by physical division. (True or False?)*
4. *The electric charge on the electron is:*
   (a.) minus one (b.) plus one (c.) neutral
5. *The electric charge on the neutron is:*
   (a.) minus one (b.) plus one (c.) neutral
6. *The electric charge on the proton is:*
   (a.) minus one (b.) plus one (c.) neutral
7. *The valence electrons of an atom are those electrons in: (a.) the innermost orbit (b.) the outermost orbit*
8. *How many valence electrons does germanium have?*
9. *How many valence electrons does silicon have?*
10. *The resistance of a semiconductor may be varied by special means. (True or False?)*

Answers:

1. (a); 2. (b.) 3. false (such separation is *chemical* division). 4. (a.); 5. (c.); 6. (b.); 7. (b.); 8. four; 9. four; 10. true (this is the basis of the transistor).

QST

Strays

HEADQUARTERS VISIT

The League Headquarters building is open to visitors Monday through Friday, 8:30 to 4:30 on a "drop-in" basis, and at other times by appointment. The headquarters is on Main Street (Conn. Route 176 and 176-A) about a mile north of the center of town, and about 3 miles west of Conn. 15-U. S. 5, the Wilbur Cross Highway. (For W1AW visiting hours, see the schedule on page 101).

A Solid-State Speech Processor

Compression and Clipping for Increased Voice Power

BY JOSEPH J. SPADARO,* WB2EYZ

A controlled amount of clipping added to compression gives a better overall result, in speech processing, than either alone.

THE object of this speech processor is to raise the average-to-peak power level in the speech spectrum with negligible change in audio quality. This will result in a corresponding increase in the average r.f. power, when used with a transmitter. It creates greater output from an s.s.b. transmitter, which normally is limited by the p.e.p. rating of the output tubes, and it permits much greater modulation power for a.m. rigs.

The proper use of this speech processor can *double* the d.c. power into the final of a modern s.s.b. transmitter without degradation to the audio quality.

The January 1969 issue of *QST* carried a splendid article explaining the virtues of speech processing.[1] The article treated rather thoroughly the relative merits of r.f. clipping, audio clipping, and speech amplitude compression. It showed that theoretically the average-to-peak value of a transmitted signal can be enhanced considerably by the addition of r.f. or audio clipping of high-amplitude pulses. It also showed that r.f. and audio clipping, when properly applied, result in much greater effective power increase, or punch, than can be obtained from compression alone.

This article prompted the author to develop the audio speech processor described here. Previously, he had successfully built a speech compressor,[2] but experience showed that the compressor, when used properly with a modern s.s.b. transmitter having effective a.l.c. circuits, offered only a small improvement in transmitter punch. The enhancement was primarily in maintaining a constant microphone level and was most advantageous only when the overall speech-input level was not kept reasonably constant.

The present speech processor employs two fundamental principles: level speech output through the use of automatic gain control (a.g.c.), and clipping of audio pulses at a predetermined amplitude to raise the average-to-peak level.[3]

These functions are best related when the a.g.c. (or compression) precedes the amplitude clipper. Under these conditions more consistent clipping can be achieved since the audio level fed into the clipper is comparatively constant. To translate this concept into hardware, it was decided to add a clipper circuit to the output of the speech compressor already in use.

Adding a Clipper

The typical clipping voltage for germanium diodes is about 0.2 volt. Therefore, adding diodes directly at the output of this particular compressor circuit would prove ineffective since the compressor output is about this same level. It is necessary to add another stage to the circuit to act as a voltage amplifier and raise the audio amplitude high enough for clipping by the diodes.

After careful scrutiny of the compressor circuit it was realized that the transistor stage following the output transistor Q_2 in the original compressor is, in fact, a voltage amplifier. This transistor is in the compressor feedback loop and serves as a convenient signal takeoff point for subsequent clipping.

Compressor Circuit

Several minor and one major improvement were made to the compressor circuit. Fig. 1 is a schematic of the speech processor, a portion of which includes the compressor circuit. All components used are essentially equivalent to those originally specified in August 1965 *QST*. The 1N270 diodes have very low forward resistance and are better than the 1N34s. The 20- and 25-μf. capacitors were replaced by 22 μf., 10-volt types for uniformity. The single-pole single-throw switch was replaced with a triple-pole double-throw slide switch. This enables the operator to bypass the processor without the need for disconnecting cables. Also, R_2 is now a fixed 10,000-ohm carbon resistor.

One major improvement was the addition of a 0.002-μf. ceramic capacitor directly from the base of transistor Q_1 to ground. Although great care was taken in providing a good ground for the unit, the author was plagued by r.f. feedback, detected as random clicking pulses during trans-

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[1]Collins, "Ordinary and Processed Speech in S.S.B Application," *QST*, January, 1969.

[2]Moate, "An Audio Peak Limiter for Voice Transmission," *QST*, August, 1965.

[3]The only previous design using this combination of which the author is aware was described by J. L. Tonne, W5SUC, in September 1956 *QST*. Appropriately, the article was titled "Compression *and* Clipping."

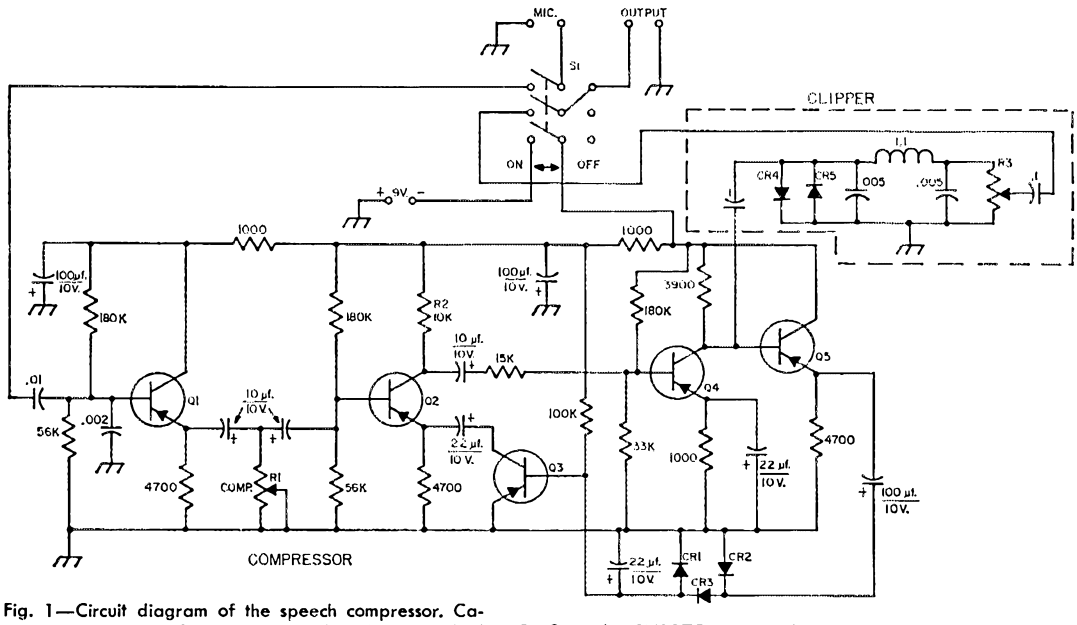


Fig. 1—Circuit diagram of the speech compressor. Capacitances are in µf.; capacitors with polarity marked are electrolytic, others are ceramic. Resistances are in ohms (K = 1000); fixed resistors are ½-watt composition.
CR_1-CR_5 incl.—1N270 or equivalent.
L_1—3-3.5 henrys, miniature type desirable.
Q_1-Q_5, incl.—2N1375 or equivalent.
R_1—10,000-ohm control, audio taper.
R_2—For text reference.
R_3—50,000-ohm control, linear taper.
S_1—3-pole double-throw slide switch.

mission. The capacitor completely stopped the feedback.

A single 9-volt transistor radio battery serves as the power supply, and will last a reasonably long time even for the most ambitious operator.

Clipper Circuit

The clipper, which is coupled to the collector of Q_4 through a 0.1-µf. capacitor, consists of two diodes back-to-back followed by a constant-k filter which cuts off all frequencies above 2500 to 3000 Hz. A 50,000-ohm shunt resistor is added, the object of which is to provide a relatively constant high-impedance termination for the filter under varying load conditions. The use of a 50,000-ohm linear potentiometer for the termination permits adjusting the output level to the transmitter. The output of the processor can then be matched to the microphone output so that switching from one to the other will not require readjustment of the transmitter microphone gain control. The output range of the processor is greater than that of the original compressor.

The filter includes a UTC DOT-8 choke, which has proved very effective. However, any choke having an inductance of about 3 henrys should perform satisfactorily.

The compression and clipping levels could be independently adjusted by using a 50,000-ohm potentiometer between Q_4 and the clipper. However, the additional control is not necessary nor is it recommended, as the processor works extremely well without it.

Observations of the audio output on an oscilloscope verified that the clipping is "soft." That is, when the amplitude is clipped it does not result in a sharply-squared-off wave-form, but rather a compressed or shortened version of the original pulse. This feature is considered to be the result of the combination of a.g.c. (compression) and clipping, together with the low-pass filter, and the final result is an audio output essentially free of harmonics above the filter cutoff frequency.

Construction

As in the construction of most audio devices, layout of components is not critical. For example, the circuit components can be laid out physically just as they are depicted in the schematic, with satisfactory results. Layout details are left to the reader. Other than good construction practices there are no restrictions about component placement.

In the original version the author, having had previously constructed the compressor, merely added the clipper circuit on a separate 4-prong tie-point standoff. The processor was combined with a phone patch, being housed in a 3 × 4 × 5-inch Minibox. (Incidentally, phone-patch quality is considerably enhanced when channeled through the processor.) A later version, built on prepunched board using flea clips as tie-points, is shown in Fig. 2.

The most important point to remember during construction is a good circuit ground solidly connected to the chassis ground.

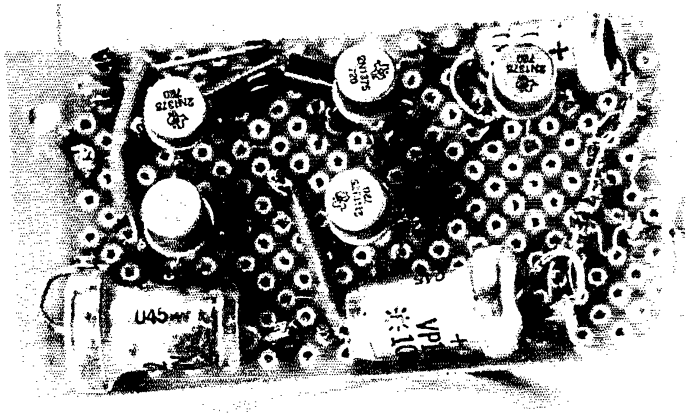


Fig. 2—One side of a punched-board assembly of the processor. The three 100-μf. electrolytic capacitors and the five transistors are visible. Other components are mounted on the reverse side.

Adjustment

The limitations of the processor must be realized. The best that it can do is double your signal strength, when using good-quality equipment that already includes such features as a.l.c. Beyond this point there will be noticeable deterioration of the voice quality and an objectionable increase in background noise. The optimum setting is just below the level where these two conditions occur.

Only one adjustment actually exists, since R_3 merely serves to set the output initially. The author's experience is that the optimum adjustment for R_1 is about ¼ to ⅓ turn (100 ohms on an audio-taper potentiometer). Once set, this adjustment should satisfy all operating conditions from armchair ragchewing to pulling out the rare ones. A condition that can justify a higher setting of R_1 is when an operator is distant from the microphone, provided that background noise is nonexistent. Tests performed on the air verified that although more d.c. plate current could be drawn, the punch power no longer increased when the limiting control R_1 reached the point of noticeable distortion.

Adjustment of the processor can be facilitated if you are equipped with a hi-fi system. By connecting the processor to the auxiliary input of the amplifier and attaching headphones to a suitable output, one can actually hear the optimum adjustment while speaking.

Performance

Due to the complexity of voice waveshapes a quantitative evaluation of the processor is beyond the scope of this article. However, certain significant observations have been made which, though qualitative, verify the claim made at the outset -- that the processor can increase the punch of your high-quality rig up to two times.

The performance of this unit has been verified by (1) significant additional heat dissipation in the power-output tubes,[4] (2) doubling of the estimated average d.c. plate current, (3) glowing reports from distant receivers, and (4) actual visual verification on an oscilloscope.

Fig. 3 shows a picture of audio signals made on a Techronix 549 storage oscilloscope. Sweep rate was set at 10 milliseconds/cm and the amplitude was set at 0.2 v./cm. The scope could independently record and store a trace on either the upper or lower half of the screen. The scope was triggered with the voice sound "eye" which was simultaneously recorded on the screen. The upper trace was made using a straight microphone and the lower trace using the processor. The increase in average-to-peak ratio is easily recognizable in the lower trace. These traces are also representative of patterns observed on the scope during conversational speech. The amplitude variation was always much more uniform when using the processor and the observed average-to-peak ratio was always higher. All scope patterns were observed with the processor adjusted just below the point where distortion or background noise are objectionable, as discussed earlier.

Acknowledgments

Thanks to Mr. Alfred Jorysz, electrical engineer, for assistance in developing the circuit, to "Pappy" (H. Bohning), W2MZV, for his confirmatory tests and to B. Walsh, WB2QLR, for his assistance. QST

[4]This is an extremely important consideration in the use of any speech processor which increases the average-to-peak power ratio. Many transmitters simply are not built to stand the effects of increased average input, either in the final-amplifier tube or tubes or in the power supply. If heating in the final tube is the limiting factor, adding a cooling fan may be a satisfactory answer. The author added one in his own equipment. — *Editor.*

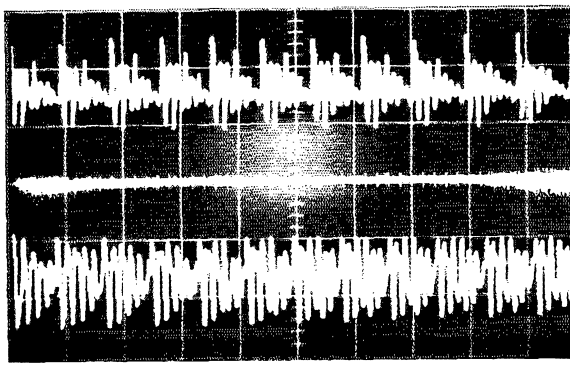
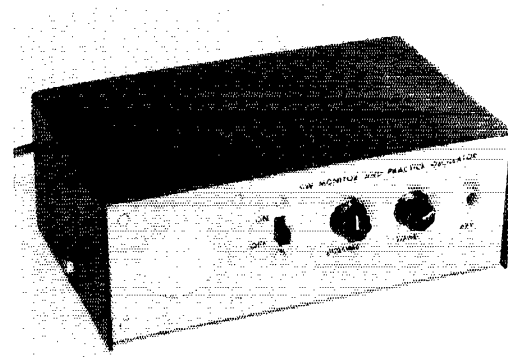


Fig. 3—Oscillograms of the word "eye" with (above) no processing and (below) processing with the adjustments made as described in the text. The more nearly constant amplitude of the peaks in the lower trace is an indication of the increase in average power.

A Code-Practice Oscillator and CW Monitor

BY KIRK BUTLER,* WB6TUM



To enhance the appearance of the oscillator/monitor, the cover of the device was covered with contact paper that looks like black grained leather.

WHEN you transmit code, do you monitor your signal by listening to it on a receiver or by copying the output of an audio oscillator that is simultaneously keyed with your transmitter? If you don't, you're probably not sending your best. The device shown in the photographs and in Fig. 1 will let you monitor your transmissions by the second method. In addition it will permit you to practice code when you are not on the air by simply plugging a key into the jack on the front panel.

The Circuit

As shown in Fig. 1, the circuit for the cw monitor and code-practice oscillator consists of a power supply, an audio oscillator, and an rf-actuated trigger.

The power supply includes filament transformer T_1, which steps down the line voltage to 12.6 volts, half-wave rectifier CR_1, and capacitor-input filter C_1. R_1, a 100-ohm resistor in series with CR_1, protects the rectifier by limiting the surge of current which occurs when the filter capacitor is initially charged.

A unijunction relaxation oscillator, Q_1, is used to generate the audio tone required for monitoring and for code practice. The oscillator is turned on by grounding the junction of C_2 and LS_1. For code practice this is accomplished by closing a key plugged into J_2, and for monitoring it is accomplished by forward biasing Q_2. Each time the oscillator is turned on, C_2 charges through the tone control, R_3. When the voltage developed across C_2 gets to be a half volt or so greater than the voltage between base 1 and the n side of the emitter junction, the emitter junction becomes sufficiently forward biased to conduct. This permits the charge on C_2 to flow through base 1 and the speaker, thus discharging the capacitor.

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The cycle repeats itself at an audio rate, and a tone is produced in LS_1.

Potentiometer R_3 controls the tone by establishing the rate at which C_2 charges. The greater the resistance of R_3, the longer it takes C_2 to charge, and the lower the tone becomes. R_4 provides a minimum resistance to keep the oscillator from shorting out when R_3 is set at its lowest resistance. R_2 controls the volume of the oscillator by varying the supply voltage for Q_1.

The rf-actuated trigger comes into play when the unit is used as a cw monitor. Rf developed across a pickup coil connected to J_1 is rectified by CR_2, and the resulting dc is filtered by C_3 and applied between the base and the emitter of the trigger transistor, Q_2. When sufficient forward bias is developed to cause Q_2 to conduct, the trigger acts as a virtual short and completes the ground return of the oscillator.

Construction

The selection of a chassis or box for the monitor/oscillator is not critical. To provide an attractive and economical case, a 5 × 7 × 3-inch aluminum chassis can be decorated with adhesive paper or it can be painted. A perforated board, which was bolted to ½-inch spacers attached to the case, was used to mount most of the parts. Although a board is not necessary, it does provide a simple and neat layout. Sockets were used to simplify the testing of possible substitutes for Q_1 and Q_2. Many low-leakage germanium

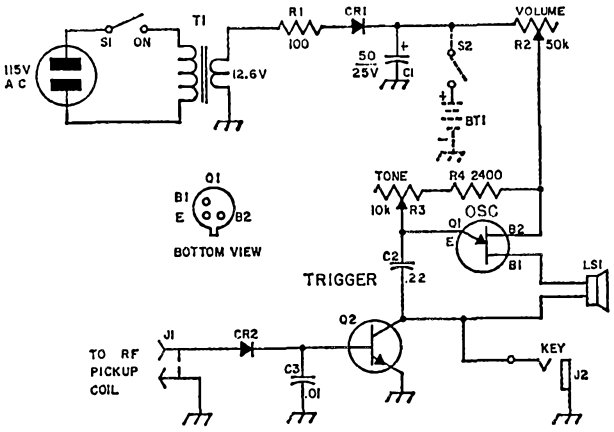
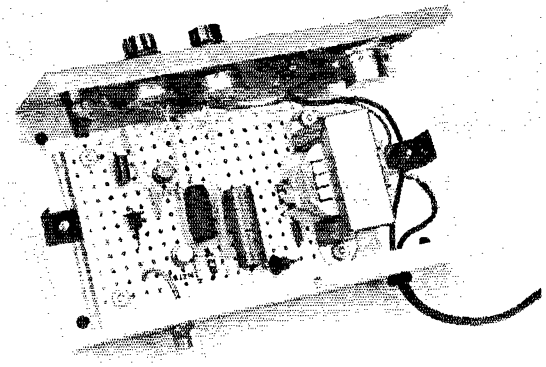


Fig. 1—Schematic of the monitor/oscillator. Resistances are in ohms, k = 1000. Capacitances are in μF.

BT_1—9-volt battery.
C_1—Electrolytic.
C_2—Tubular.
C_3—Disk ceramic.
CR_1,CR_2—1N91.
J_1—Phono jack.
J_2—Open-circuit phone jack.
LS_1—Small, 8- or 10-ohm speaker.
Q_1—2N2160.
Q_2—2N388.
R_1,R_4—½-watt composition.
R_2—Audio taper.
R_3—Linear taper.
S_1,S_2—Spst slide switch.
T_1—12.6-volt filament transformer, any current rating.

npn transistors can be used in place of the 2N388 at Q_2. (Silicon types will work, but they require a larger forward bias voltage in order to conduct.) However, if the leakage currents of the transistor are large, Q_1 will oscillate continuously because its ground return path will be effectively completed.

Any 12-volt filament transformer can be used in the power supply, and a 6-volt transformer can be used at a slight loss of volume. The current rating of the transformer is not important since the oscillator/monitor only draws 2 or 3 mA.



Underside view of the oscillator/monitor. To prevent the weight of the transformer from possibly breaking the board when the unit is moved about, the transformer was bolted to two of the spacers used to support the board.

Because of the low current drain, the entire power supply can be replaced by a 9-volt transistor radio battery. The connections for a battery and a power switch for same are shown as dotted lines in Fig. 1.

The jacks for the key and the rf pickup coil should be chosen to match existing connectors. If a phone jack is used for the key, it should be the open-circuit type so that the oscillator will not be grounded when the key is removed.

Any small, 8- or 10-ohm speaker can be used with good results at LS_1. A broken transistor radio is a good source for a speaker. If grille cloth is not to be found in your junk box, burlap can be used instead.

Operation

To use the monitor/oscillator as a code-practice oscillator, it is only necessary to plug a key in J_2 and start sending. To use the gadget as a cw monitor, it's necessary first to make an rf pickup coil. Any size insulated wire can be used. As a starter, try two turns of wire of approximately the same diameter as the tank coil. Place the pickup coil about a half inch from the p-a coil — be sure there is *no* voltage present in the rig when you are positioning the coil — and key the transmitter. If the signal from the pickup coil is insufficient, the oscillator will sound weak and distorted or it will not oscillate at all. If this is the case, the rf pickup can be increased by adding turns to the pickup coil or by moving the coil closer to the tank inductor.

The oscillator was tested with a DX-60 on 80 through 10 meters, and it worked well on all bands. The monitor easily followed signals of 40 w.p.m. QST

The transverter is built on a 7 × 11 × 2-inch chassis with bottom cover. A 6 × 4 × 5-inch utility box (LMB) houses the final amplifier. Along the chassis, from left to right, are the controls for the band switch (S_1), drive control (R_1), meter switch, and the receiving tuning capacitor (C_1). Of the two toggle switches to the right, the upper one controls the external transverter power supply, while the lower one controls the two change-over relays. The pi-network control and band switch are on the front of the amplifier compartment. The screened ventilation hole in the top cover of the box is located immediately above the 6146.

A 21/28-MHz. Transverter for 3.5-MHz. Transceivers

70 Watts P.E.P. with Simple Construction

BY DENNIS M. PETRICH,* KØEOO

MANY owners of 80-meter transceivers are interested in operating on the higher-frequency bands from time to time, but do not feel that the cost of a new five-band rig is justified. Finding myself in this position, the problem was solved by building the transverter shown on these pages. With this unit added to the monobander, I can cover both 10 and 15. With a good junk box at hand, the cost was only about thirty dollars.

Fig. 2 shows a block diagram of the transverter. On receiver it operates as a conventional converter. A 21-MHz. signal, for instance, is fed to a 6AK5 r.f. amplifier, and then to a 6J6 mixer, where it is combined with a 25-MHz. signal from the oscillator to produce a 4-MHz. signal at the input of the transceiver. For a 28-MHz. signal, the oscillator frequency is 32 MHz., which again results in 4-MHz. mixer output. On transmit, the 4-MHz. signal from the transceiver is fed to a 12AU7 mixer/Class A amplifier where it is combined with the 25-MHz. (or 32-MHz.) signal from the oscillator to produce a 21-MHz. (or 28-MHz.) signal at the input of the 6CL6 driver. The final is 6146 AB_1 linear operating at about 70 watts input. The 10-meter band is covered in steps of 500 kHz., the oscillator frequency being changed appropriately.

It should be pointed out here that the tuning of the transceiver when working into the transverter will be in a direction opposite to normal. When the transceiver is tuned to 4 MHz., the received and transmitted signals will be at the low edge of whatever 500-kHz. segment has been selected; when the transceiver is tuned to 3.5 MHz., the received and transmitted signals will be at the high-frequency end of the chosen segment. Similarly, lower-sideband transceiver operation results in upper-sideband output from the transverter, a fortunate circumstance for those having 80-meter transceivers providing only lower-sideband output.

The complete r.f. circuit is shown in Fig. 1. The input and output circuits of the receiver r.f. amplifier are gang-tuned by a dual-section capacitor, C_1. A double-tuned bandpass circuit couples the mixer to the input of the transceiver. The oscillator is crystal-controlled, the proper crystal being selected by S_1. The output circuit of the oscillator is tuned to twice the crystal frequency in all cases.

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If you are stuck with a monoband transceiver for the 80-meter band, this article shows how you can get on 10 and 15 with relatively little trouble and expense.

On transmitting, the 3.5-MHz. signal from the transceiver is fed to the mixer cathode through an attenuating network that reduces the drive to a suitable level. The 50-ohm resistor provides a proper load for the transceiver. The mixer circuit may be a bit unorthodox, but it proved to be the best of several tried.

The output circuits of the transmitter mixer and driver are individually tuned by C_3 and C_4. The capacitors in these circuits, as well as those in the receiver r.f. amplifier stage, have sufficient range to cover both 21 MHz. and 28 MHz., so coil switching is required only in the oscillator. The final-amplifier output circuit is a pi network suitable for matching 50-ohm antenna systems. The 6146 is neutralized by the capacitive bridge method. C_5 is the neutralizing capacitor. Drive to the final amplifier can be adjusted by means of R_2 in the cathode circuit of the driver.

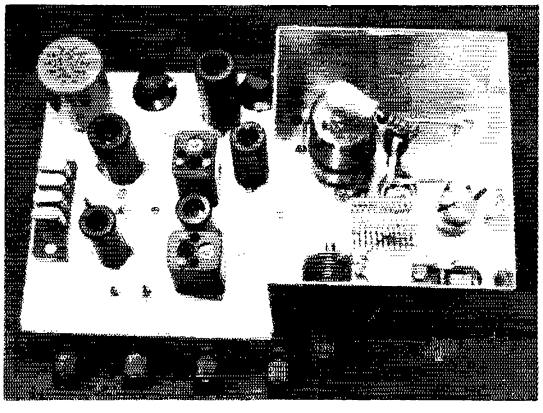
Final-amplifier grid, screen, or plate current can be monitored by meter M_1. The multiplying resistances shown result in full-scale readings of 5, 25 and 200 ma., respectively, with 1000 ohms in series with the meter.

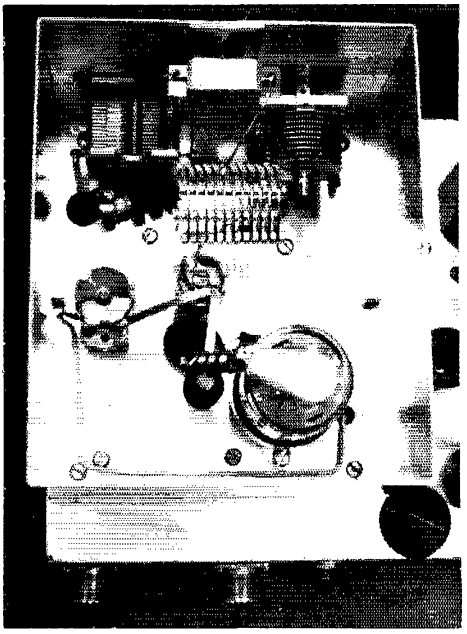
The transmit-receive change-over functions are performed by two relays, K_1 and K_2. K_1 shifts the input and output r.f. connections. K_2 applies 180 volts regulated to the receiving mixer and r.f. amplifier, and cutoff bias to the grid of the final amplifier on receive. On transmit, the relay applies 325 volts to the transmitter mixer/amplifier and driver, and cutoff bias to the receiver r.f. amplifier and mixer.

The power-supply diagram is shown in Fig. 3. A silicon-diode bridge rectifier with center tap provides 700 volts for the final-amplifier plate, and 325 volts for the transmitter mixer and driver. A pair of VR tubes in series, operating from the center tap, supply 180 volts, regulated, for the oscillator and receiving tubes, and the screen of the final. A filament transformer in reverse, T_2, driven by the filament winding on T_1, provides -120 volts for biasing purposes.

Construction

Most of the necessary constructional details will be found in the photographs and their captions. However, one or two special precautions were found to be necessary. The only difficulty





Components of the output pi network are mounted on the front wall of the amplifier compartment, C_8 to the left, C_6 to the right, with the coil and its band switch in between. The neutralizing capacitor is at left center.

encountered in obtaining satisfactory results from the unit when it was first put into operation was in stabilizing the receiving r.f. amplifier stage. The trouble was finally eliminated by adding pigtails of flexible wire to ground the center of the rotor shaft, between the two sections of the dual tuning capacitor. It seems probable that this would be unnecessary if two separate capacitors, each with its front- and rear-bearing wiper contacts, were ganged.

The box that I used for the amplifier compartment had a hammertone finish. If this type of box is used, the finish should be scraped way in the appropriate areas to allow good electrical contact between the box walls and the covers, and between the bottom cover and the chassis. R.f. input and output connections were made using RG-58/U to provide a shielded conductor. Aside from these precautions, only the usual practice of keeping r.f. connecting leads as short as possible, and keeping low-potential leads down flat against the chassis was followed.

The receiving r.f. amplifier input and output coils (L_5/L_6 and L_4) are in shielding cans mounted directly above their tuning capacitors, which are below chassis. The 6AK5 is between the two coils. The tube to the left of the forward shield can is the receiving mixer. The slugs of the bandpass coils (L_1/L_2 and L_3) are in front of this tube. To the rear of this tube are the tuning slugs of the crystal-oscillator coils, and the oscillator tube. The tube to the left of the rear shield can is the transmitting mixer. Along the rear edge of the chassis are the power-control relay (K_2), and the driver tube (between the input and output tuning controls of this stage).

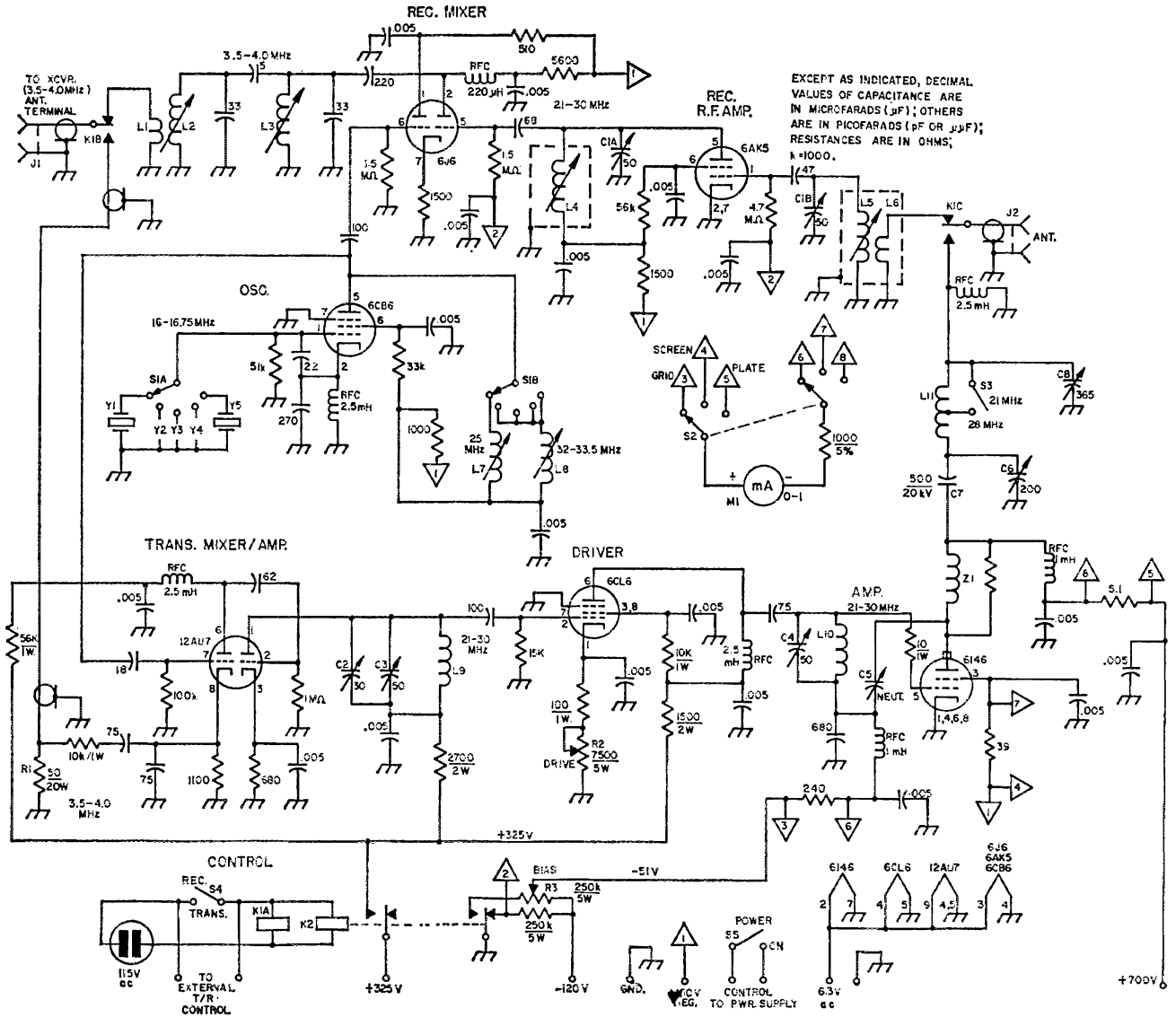

REC. MIXER
REC. R.F. AMP.
OSC.
TRANS. MIXER/AMP.
DRIVER
AMP. 21-30 MHz
CONTROL
EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μF); OTHERS ARE IN PICOFARADS (pF OR μμF); RESISTANCES ARE IN OHMS; k=1000.
TO XCVR. (3.5-4.0MHz) ANT. TERMINAL
3.5-4.0 MHz
16-16.75MHz
32-33.5 MHz
21-30 MHz
25 MHz
28 MHz
21 MHz
+325V
-51V
-120V
+700V
6.3V ac
115V ac
TO EXTERNAL T/R CONTROL
SCREEN
GRID
PLATE
mA
0-1
BIAS
DRIVE
NEUT.
POWER
CONTROL TO PWR SUPPLY
6J6 6AK5 6CB6
6146 6CL6 12AU7
ANT.

Fig. 1—Circuit diagram of the 15- and 10-meter transverter. All resistors are ½-watt composition, unless indicated otherwise. All 0.005-μf. capacitors are 1000-volt disk ceramic. Other fixed capacitors are mica, preferably silver mica.

C_1—Dual 50-pf. variable.
C_2—6–30-pf. ceramic trimmer.
C_3, C_4—50-pf. air trimmer.
C_5—10-pf. air trimmer.
C_6—200-pf. variable, 0.02-inch plate spacing (Hammarlund MC-200M, or similar).
C_7—Doorknob ceramic.
C_8—325-pf. variable (broadcast receiver t.r.f. type).
J_1, J_2—Chassis-mounting coaxial receptacle.
K_1—D.p.d.t. relay, 115 v.a.c.
K_2—Three-pole double-throw relay, 115 v.a.c.
L_1—6 turns over ground end of L_2.
L_2, L_3—Approx. 46 μh. slug-tuned (Miller 4408).
L_4, L_5—Approx. 1.4 μh., slug-tuned (Miller 4403).
L_6—3 turns over ground end of L_5.
L_7—Approx. 3 μh., slug-tuned (Miller 4404).
L_8—Approx. 2.5 μh., slug-tuned (Miller 4404).
L_9—8¼ turns No. 20, ¾ inch diameter, 16 turns per inch (AirDux 616T).
L_{10}—6½ turns similar to L_9.
L_{11}—11 turns No. 18, 1-inch diameter, 10 turns per inch, tapped at 7 turns from C_8 end (AirDux 810T).
M_1—0–1-ma. d.c. meter.
R_1—Ten 470-ohm 2-watt resistors in parallel.
R_2, R_3—Linear-taper controls.
S_1—2-pole single-section 5-position ceramic rotary switch.
S_2—Similar to S_1, 3 positions.
S_3, S_4, S_5—S.p.s.t. toggle switch.
Y_1—12.5-MHz. crystal (for 21 to 21.5-MHz. output).
Y_2—16-MHz. crystal (for 28 to 28.5-MHz. output).
Y_3—16.25-MHz. crystal (for 28.5 to 29-MHz. output).
Y_4—16.5-MHz. crystal (for 29 to 29.5-MHz. output).
Y_5—16.75-MHz. crystal (for 29.5 to 29.7-MHz. output).
Z_1—5 turns No. 16 wound on and connected across a 100-ohm 1-watt resistor.

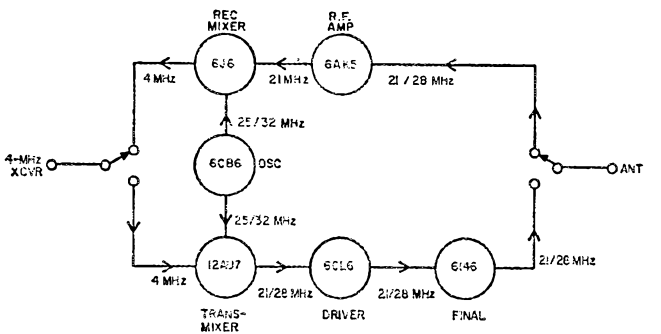


Fig. 2—Block diagram of the transverter. A common oscillator drives both transmitting and receiving mixers. The receiving mixer and r.f. stages are biased off on transmit.

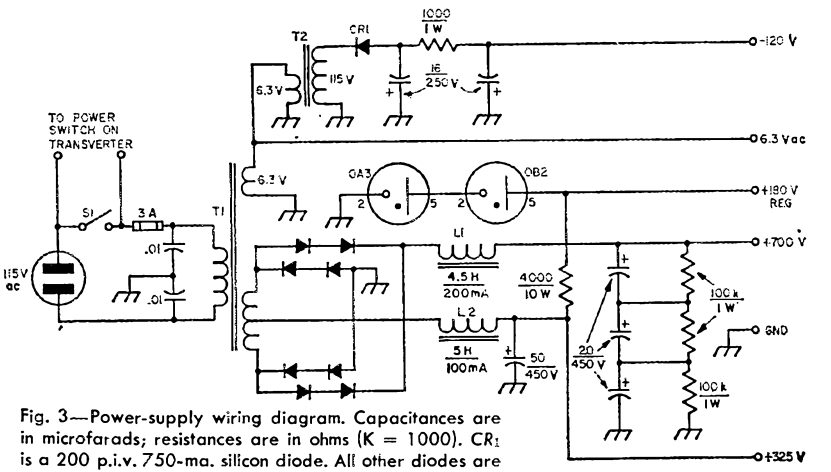
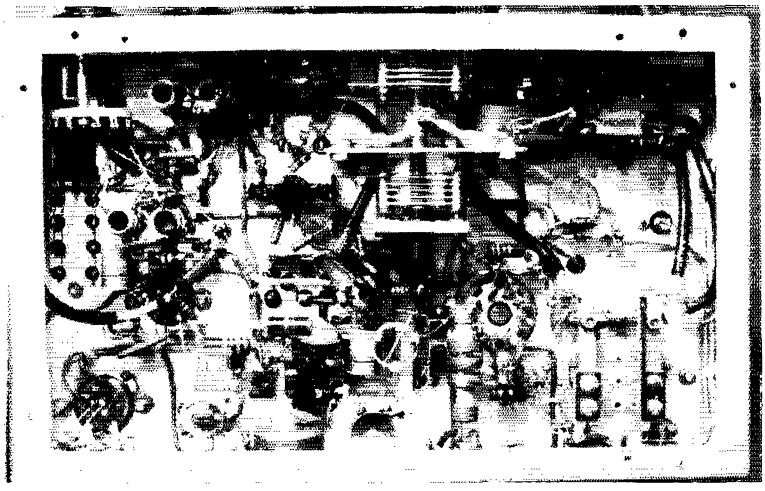


Fig. 3—Power-supply wiring diagram. Capacitances are in microfarads; resistances are in ohms (K = 1000). CR_1 is a 200 p.i.v. 750-ma. silicon diode. All other diodes are silicon, rated at 800 p.i.v. 750 ma. All capacitors are electrolytic, except the 0.01-μf. capacitors which are 1000-volt ceramic disks.

L_1, L_2—Filter choke.
S_1—S.p.s.t. toggle switch.
T_1—Power transformer: 800 volts, center-tapped, 200 ma.; 6.3 volts, 6 amperes; 5-volt winding not used.
T_2—6.3-volt 1-ampere filament transformer.



Under-chassis view. The dual receiving tuning capacitor is near upper center, with a shield running between the two sections. At the upper left is the crystal-oscillator switch. The pair of coils below the switch are the oscillator coils. Those above the switch are in the receiving output bandpass coupler. The driver input and output coils are below and to the left of the dual capacitor, at right angles to each other. The antenna change-over relay is in the lower right-hand corner.

Receiving Adjustment

The wiring should checked thoroughly before applying power to the transverter. The crystal oscillator should be checked first with power applied, and S_4 in the receiving position. Turn S_1 to the Y_1 position (12.5-MHz. crystal). Using the g.d.o. as an r.f. indicator, adjust the slug of L_7 for maximum response at 25 MHz. Then turn S_1 to the Y_3 position (16.25-MHz. crystal), and adjust L_8 for maximum response at 32.5 MHz. This single adjustment should be satisfactory for all 10-meter crystals.

Next, connect the transverter to your transceiver or receiver, and feed the signal generator to the transverter antenna jack. Tune the generator to 21 MHz., and adjust the receiver to 4 MHz. Turn S_1 to the Y_1 position, and C_1 to maximum capacitance. Adjust L_4 and L_5 to peak the generator signal on the receiver S meter. Be sure to reduce the signal-generator output as the coils are adjusted closer to resonance to avoid overloading the receiver input circuits. Then adjust L_3 for maximum response.

Now move the receiver tuning down to 3.5 MHz., and change the signal-generator frequency to 21.5 MHz. Retune C_1 for maximum signal, and peak L_2. Repeat the adjustments of L_2 and L_3 once again to make sure that the bandpass coupler is working properly. With an input signal of constant level, there should be no appreciable change in response as the generator is swept across the band.

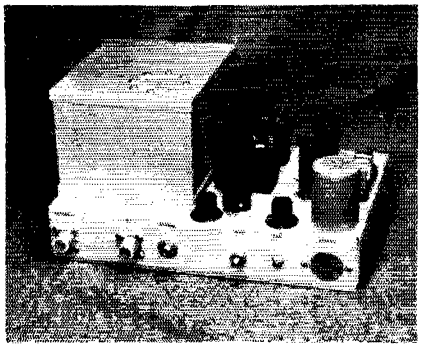
Now retune the signal generator to 29.5 MHz., and adjust your transceiver or receiver to 3.5 MHz. Adjust C_1 of the transverter for maximum receiver signal. Some slight readjustment of L_4 may improve the response at 29.5 MHz. without significant change in the response at 21 MHz.

At this point, the receiver section should be completely aligned, and connecting an antenna to the transverter should yield a barrage of 15- or 10-meter signals when the bands are open.

Transmitter Alignment

To align the transmitting section, place S_1 in the Y_1 position and connect the signal generator, through a 0.005-μf. capacitor to the cathode (Pin 8) of the 12AU7 mixer. Set the signal generator to 4 MHz., and switch the transverter to transmit. With the signal generator turned off, adjust the final-amplifier bias voltage (by means of R_3) to -51 volts, or for an idling current of 16 ma. Turn the signal generator on, and adjust it for its fullest output at 4 MHz. Advance the drive control to maximum (R_2 shorted out), and peak C_3 for maximum amplifier plate current. This should occur with C_3 near maximum capacitance (with C_2 adjusted appropriately to make this occur). Next, dip the plate meter with the amplifier tuning capacitor, C_6. Peaking C_4 should now result in a marked increased in plate current.

Next, shut the transverter off, and disconnect the 700-volt and 180-volt leads from the final. Connect your receiver input to the transverter's antenna connector, and tune the receiver to 21 MHz. At this time, turn the transverter back



Along the rear apron of the chassis, from left to right, are input and output r.f. connectors, a phone jack for external power-control connections, the bias-adjusting control, ground terminal and power-supply connector. The phone jack has two insulated terminals, requiring a 3-circuit plug. (For safety, the power connector should be a male type.—*Editor*)

The power supply is assembled on a 7 × 7 × 2-inch chassis. The bias transformer is between the 0A3 voltage regulator and the low-voltage filter choke. Diodes, filter capacitors, and resistors are inside the chassis.

on, and peak the receiver on the signal being generated by the signal generator, and amplified by the driver. With C_3 and C_4 peaked, and the final-amplifier output circuit tuned to resonance, adjust the neutralizing capacitor, C_5, for minimum signal on your receiver S meter. The gain of the receiver should be set quite low for this adjustment. The final is now neutralized, and no further adjustment of C_5 should be necessary.

Care should be taken, when peaking C_3 and C_4 to make sure that you aren't tuning up on the crystal-oscillator signal rather than the generator signal. A quick check can be made by turning the signal-generator's output level down. If no change in plate current results, you are tuning up on the wrong signal. Readjusting C_3 and C_4 will solve the problem.

Disconnect the receiver from the antenna terminals of the transverter, and replace it with a 50-ohm dummy load. Reconnect the 700-volt and 180-volt leads to the final amplifier. With the signal generator still feeding the transmitting mixer, as before, you should now be able to load the final to a plate current of 115 ma., representing an input of 70 watts. Check the screen current to make sure that it's running under 15 ma. The meter should show no grid current for AB_1 operation.

Next, turn S_1 to the Y_4 position (16.5-MHz. crystal), and turn S_3 to the 10-meter position. Adjust the signal generator to 3.5 MHz., and peak C_3, C_4 and the pi-network tuning capacitor as before. Maximum amplifier plate current should result with C_3 and C_4 near minimum capacitance. Now adjust the pi-network controls for proper loading of the final amplifier. You should now be ready to drive the unit with your transceiver, and the signal generator can be disconnected.

To use the transverter with a transceiver, connect the output of the transceiver to the input of the transverter through a length of coax line, and connect the antenna to the output of the transverter. The transverter requires very little driving power. Most of the transceiver power will be absorbed by the 50-ohm resistor at the input of the transverter. Since this resistor has a rating of only 20 watts, the input to the driving transceiver should be limited by keeping the microphone gain down. If full input to the transceiver is necessary for tuning up, the transceiver should be adjusted first while working into a dummy load, or 80-meter antenna, before applying the signal to the transverter. I use an NCX-3 transceiver, and I have found it satisfactory simply to tune the transceiver by peaking it up on a 21- or 28-MHz. signal on receive, since this operation also tunes the transmitter stages. For the low power required to drive the transverter, accurate tuning isn't necessary.

Now, apply power to the transverter (S_4 in the transmit position). Switch the transceiver to c.w. and back off the carrier insertion. Adjust C_3 and C_4 for a peak in final-amplifier grid current, increasing the carrier insertion if necessary to obtain a small reading. As soon as the driver circuits have been peaked, back off on the carrier insertion until the grid current just disappears. Then adjust the transverter pi network for an input of 70 watts. Then switch to s.s.b., and adjust the microphone gain control until the meter shows a slight flicker on the loudest voice peaks.

When loaded to a plate current of 115 ma., measurement with a Bird wattmeter showed an output of 38 watts. On the first try, several JAs and UAßs were worked with reports of excellent quality on both bands. The transverter is now being used to drive a Thunderbolt linear, and no problems have arisen. QST

Atmospheric Noise and Receiver Sensitivity

BY HARRY R. HYDER,* W7IV

In an earlier article[1] the point was made that the limiting factor in reception at frequencies below 30 MHz is atmospheric noise rather than receiver sensitivity.

It is interesting to try to find out just how much atmospheric noise is likely to be present on the bands below 30 MHz. This will help us in judging just how much receiver sensitivity is really worthwhile. There are some interesting bypaths to this question. But first we had better define the nature of the phenomenon.

Atmospheric noise is the result of electrical discharges occurring in the atmosphere all over the world. Since it is the summation of an extremely large number of random sources, at any specific time and place it tends to have a fairly smooth value — except, of course, when there is a local electrical disturbance, at which time the individual discharges can be unpleasantly heard.

While hf atmospheric noise can be somewhat directional, the directional properties are neither marked nor predictable, so this factor is usually not considered. The same is true of polarization.

Our only knowledge of the level of atmospheric noise is statistical. For many years, scientists have been measuring the level of atmospheric noise at various locations, seasons, times of day, and frequencies. The data compilations show average values, but variations from the average can be large. Some general conclusions can be drawn, though.

1) Noise levels are generally higher in the summer than in the winter.

2) Noise levels are generally higher at night than during the day.

3) Noise levels generally decrease the farther one gets from the equator.

4) Noise levels are generally higher at lower frequencies.

The "bible" on atmospheric noise is Report No. 322 of the International Radio Consultative Committee (CCIR), published in 1964 by the International Telecommunications Union, Geneva. This is obtainable through the Environmental Sciences Service Administration (ESSA) of the U.S. Department of Commerce. It is a 77-page booklet devoted mostly to three types of graph, plus some explanatory material.

Each two pages contains three graphs. The first is a noise "weather map" of the world, for a particular season and four-hour time block. The contours on the map represent lines of constant noise field strength, although the numbers actually refer to "antenna noise factor" at 1.0 MHz; we will explain that later. The second graph of the set relates the lines on the map to frequency, from 10 kHz to 100 MHz. The third graph, not reproduced here, shows the variability of the noise in statistical terms. Examples of the first two graphs are given in Figs. 1 and 2.

One interesting thing that the curves show is that the noise appears to dip around 1 MHz and peak around 10 MHz. This is because of propagation effects. Atmospheric noise would continue to decrease above 1 MHz if it were not for sky-wave transmission, which brings in atmospheric noise from great distances. This effect is most marked on the 7- and 14-MHz bands.

The second graph also shows levels of man-made and galactic noise. Man-made noise we are all familiar with. Galactic noise is radiated by the sun and a large number of other sources outside the atmosphere. Sometimes on 21 MHz and usually on 28 MHz it is the principal source of noise. It is somewhat more directional than atmospheric noise, and also has some short- and long-term variations.

Before we explain these curves, we must examine the matter of how much noise is present in a receiver when there are no other noise sources.

Receiver Noise

The two noise sources present in the absence of atmospheric noise are noise generated in the antenna and noise generated within the receiver itself.

Any resistance has a noise energy that is independent of anything but its temperature. This is true of the radiation resistance of an antenna and it is true of the resistance of a dummy load or the internal resistance of a signal generator.

The noise power delivered by any resistance to a matched load will be equal to

$P_N = kT$ watts per hertz of bandwidth

where k is Boltzmann's constant, 1.38×10^{-23} joules per degree Kelvin, and T is the temperature in degrees Kelvin. Kelvin degrees are the

* 2523 N. 57th St., Scottsdale, Arizona 85257.

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

The statement is often made that receiver noise figure tends to unimportance (extreme cases excepted, of course) as the frequency goes lower in the spectrum. Here are the figures that demonstrate it.

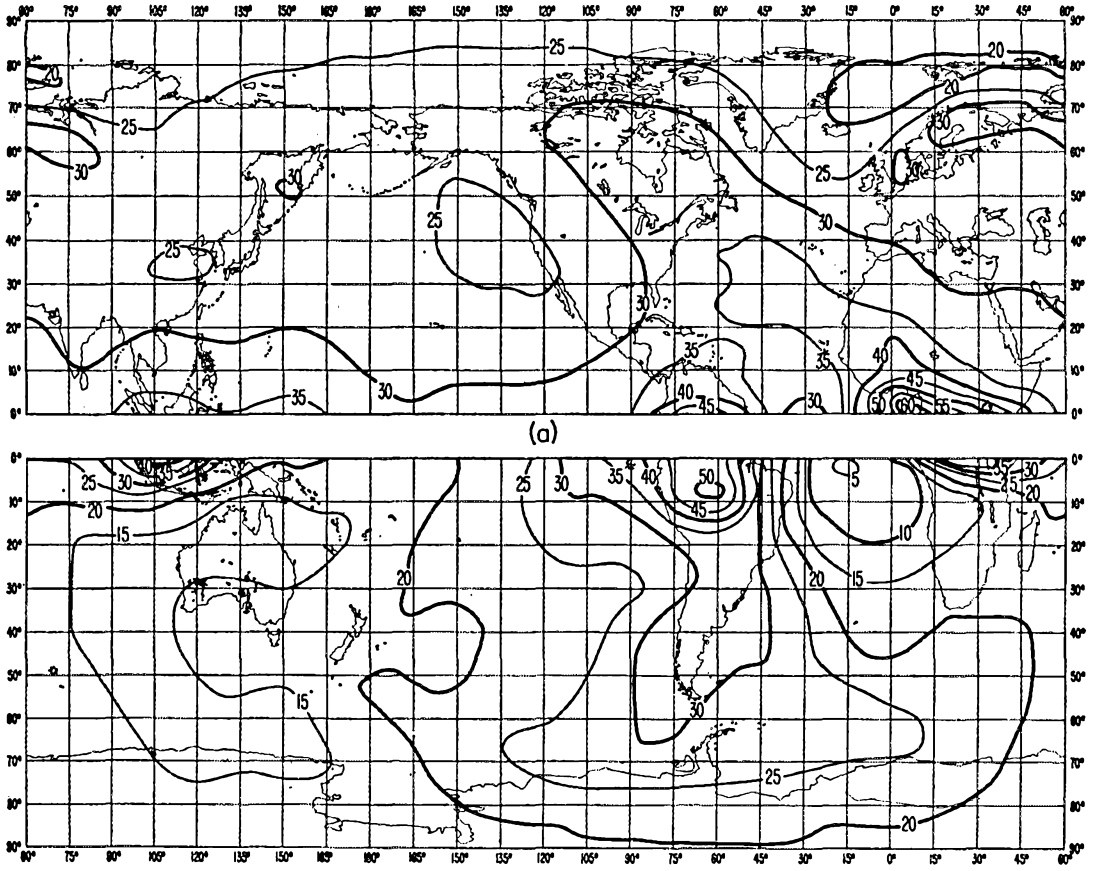


Fig. 1—Contours of mean values of atmospheric noise. Figures are in decibels above thermal noise at 290 degrees Kelvin at 1 MHz. This is one of a series of similar charts prepared for different seasons (winter, in this case) of the year, and time blocks (1200-1600 in this case).

same as Centigrade (or Celsius) degrees, except that the reference point is absolute zero rather than the freezing point of water. Since absolute zero is −273° C, 0° C (+32° F) is 273° Kelvin. Most noise calculations are referenced to a "normal" temperature of 290° K (17° C, 63° F).[2] This makes the thermal noise power 4×10^{-21} watts per hertz of bandwidth, which is a good figure to remember.

The second noise source is the receiver itself. Noise generated within the receiver has two major points of origin. The first is the resistive component of the input tuning network, and the second is the first stage of amplification. Other noise sources within the receiver also contribute, but usually only to a minor degree.

All receiver noise sources are lumped together in what is called the "noise factor", which can be defined as the number by which the receiver effectively multiplies the noise power generated by an antenna at 290° K. "Noise figure" is the noise factor in decibels. Thus if we have an antenna temperature of 63° F, which is 290° K, we have an antenna noise power of 4×10^{-21} watts per hertz. If we have a receiver noise factor of 10 (10 dB noise figure), we have a total equivalent noise power input (to a noiseless receiver) of 4×10^{-20} watts per hertz.

"Watts per hertz of bandwidth" may require a little explanation.

If we were to feed a cw signal into a receiver, the audio output would not change as we varied the bandwidth, as long as the receiver gain remained constant. This is because a cw signal is a single, discrete frequency that can be completely bracketed within the narrowest bandwidth position we have. Noise, however, has no distinct frequency; it is spread over a wide band. Thus the wider the bandwidth of our receiver, the more noise it will let in. In fact, the noise power the receiver accepts is directly proportional to the bandwidth.[3] If the antenna noise power is 4×10^{-21} watts per hertz and the receiver bandwidth is 2.1 kHz, the equivalent noise input power is $4 \times 10^{-21} \times 2.1 \times 10^{3} = 8.4 \times 10^{-18}$ watts or 8.4 micromicromicrowatts.

True thermal noise, due to temperature alone, and caused by random motion of electrons, has

[2] CCIR 322 uses 288° K; the difference is trifling.

[3] The "noise bandwidth" of a receiver is not exactly the same as the measured "3-dB bandwidth," but the difference can usually be neglected.

a constant power per hertz at all frequencies from zero to essentially infinity. Atmospheric noise power is frequency-dependent, but over the width of a receiver passband it is uniform in amplitude, so it is legitimate to assume that the atmospheric noise power accepted by a receiver is directly proportional to bandwidth also.

And this brings us to an important point: If atmospheric noise has most of the characteristics of thermal noise, there is no reason why its effect can not be viewed as a noise factor applied to the antenna. The noise curves in CCIR 322 view it in just this way. The contours on the noise map and the ordinate on the noise-vs-frequency graph are in "F_a in dB above kTB", where "F_a" is the antenna noise factor. Since it is in dB, it is a noise figure.

This is very convenient, because it eliminates most of the arithmetic. Starting from a reference temperature of 290° K, the atmospheric noise merely raises the antenna temperature by a certain number of degrees, and makes the antenna noise input power a certain number of dB higher. The number of dB that you can *expect* atmospheric noise to add can be found from the maps and curves in CCIR 322, for any location, season, four-hour time block, and frequency band. The word "expect" is used in its mathematical sense; that is, the value one would expect F_a to have if the results of a long series of measurements were averaged. The measurements actually were made at certain spot locations during certain time periods, and extrapolated to the whole world by elaborate computer techniques. There has, however, been quite good correlation with measurements made at other times and places.

Antenna Characteristics

Do the characteristics of the antenna have an effect on the reception of atmospheric and galactic noise? Mostly, no.

Atmospheric noise is generally considered to be "isotropic"; that is, coming essentially from all directions. An antenna can have gain in one direction only because it has loss in others; the sum of the gains in *all* directions for *any* antenna is unity, 0 dB. The amount of atmospheric noise picked up by an antenna is therefore independent of its directivity characteristics. This is why it is possible to specify an antenna noise figure without regard to the type of antenna. The effective value of F_a is a function of the overall efficiency of the antenna and transmission line, but most high-frequency systems are quite efficient and this factor can be neglected.

Galactic noise is somewhat directional, and this fact can be taken advantage of in commmunication between specific points. However, in the random type of communication engaged in by amateurs, using relatively low-gain antennas (less than 12 dB), the directionality of galactic noise has no predictable benefits, and it too should be assumed to be isotropic.

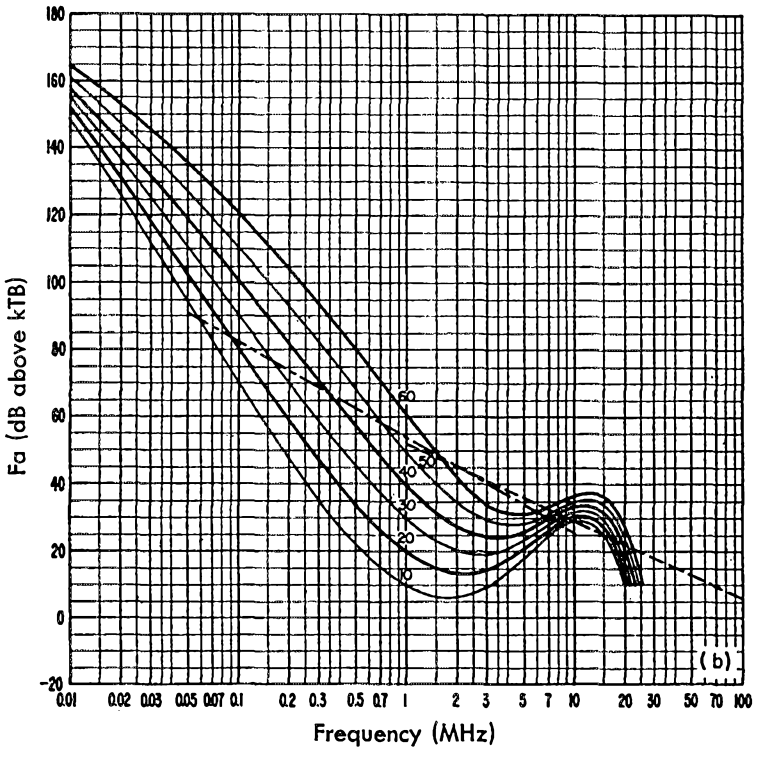


Fig. 2—Variation of radio noise with frequency, winter season, 1200-1600 hours. Solid lines, expected values of atmospheric noise; dashed line, expected values of galactic noise; dot-dash line, expected values of man-made noise at a quiet location.

Receiver Characteristics

You cannot calculate exactly the noise figure of your receiver, but you can make a good approximation from advertised characteristics. The manufacturer usually tells you the number of microvolts it takes to produce standard audio output at some specified signal-to-noise ratio, and sometimes even specifies the bandwidth at which this measurement was made. If he has not done the latter, we will give him the benefit of the doubt and assume that it was 2.1 kHz.[4] He has also specified that the receiver was designed to work from a 50-ohm antenna system.

In giving us these figures, he has really specified an input signal-to-noise ratio and an output signal-to-noise ratio. Since a rather loose definition of noise factor is input signal-to-noise ratio divided by output signal-to-noise ratio, he has indirectly told us the approximate noise factor also.

Let's take a hypothetical but typical set of receiver specifications and work our way through them.

Design source resistance	50 ohms
Sensitivity for 10 dB S/N	0.5 μV
Bandwidth	2.1 kHz

While thermal noise power is independent of resistance, noise voltage is not. Voltage is always equal to $\sqrt{PR}$, whether it is noise or dc. The rms noise voltage *across* a matched 50-ohm source resistance is therefore

$$= \sqrt{4 \times 10^{-21} \times 2.1 \times 10^{3} \times 50}$$
$$= 2 \times 10^{-8} \text{ volts}$$

= 0.02 microvolt at 290°K in 2.1-kHz bandwidth.

To put this in the same frame of reference as the microvolt sensitivity number, we have to convert it to an equivalent noise voltage *in series* with the 50-ohm source resistance, which we do by multiplying the noise voltage by two,[5] resulting in 0.04 microvolt. The input signal-to-noise ratio is therefore (in dB)

$$= 20 \log_{10} \frac{0.5 \text{ microvolt}}{0.04 \text{ microvolt}}$$
$$= 20 \log_{10} 12.5$$
$$= 22 \text{ dB}$$

The specified output signal-to-noise ratio is 10 dB, so the approximate noise figure of the receiver is 22 dB − 10 dB, or 12 dB. This figure includes the effects, beneficial or adverse, of any mismatches between the antenna and the receiver.

Adding in the Noise

Determining the degradation of signal-to-noise ratio due to atmospheric noise is merely a matter of picking appropriate numbers from the graphs and applying them to the receiver characteristics.

To do this with the least confusion, it is best to assume that receiver noise can be represented by the equivalent noise power input to a noiseless receiver. Antenna noise power and receiver noise power can then be added directly.

For our hypothetical receiver with a 12-dB noise figure (noise factor, $f = 16$), the total equivalent noise input power is

$$= kTBf$$
$$= (4)\ (10^{-21})\ (2.1)\ (10^{3})\ (16)$$
$$= 134 \times 10^{-18} \text{ watts}$$

Of this, 8.4×10^{-18} is due to the antenna at 290°K. Receiver-generated noise alone is therefore $(134 - 8.4)\ (10^{-18}) = 1.26 \times 10^{-16}$ watts.

The signal power is obtained by assuming that the receiver is matched to 50 ohms (it usually isn't) and calculating what power the receiver would absorb when supplied with the specified signal voltage in series with 50 ohms.[6] This is

$$P = \frac{E^2}{4R}$$
$$= \frac{(0.5 \times 10^{-6})^2}{4 \times 50}$$
$$= 1.25 \times 10^{-15} \text{ watts}$$

Now let's say that from the curves in CCIR 322 we have found that the "expected" value of F_a for a particular location, season, time block, and frequency is 20 dB, a power ratio of 100. This makes antenna noise

$$8.4 \times 10^{-18} \times 100 = 8.4 \times 10^{-16} \text{ watts}$$

Receiver noise and signal power have stayed the same. What is the signal-to-noise ratio? As before, we divide signal power by the sum of antenna and receiver noise power.

$$\frac{S}{N} = \frac{1.25 \times 10^{-15}}{(8.4 \times 10^{-16}) + (1.34 \times 10^{-16})}$$
$$= 1.3$$
$$= 1.0 \text{ dB}$$

This ratio would represent an extremely marginal signal. Tests have shown that for voice, a 1.0-dB signal-to-noise ratio gives a little better than 50 percent intelligibility.[7] It would hardly be an enjoyable QSO.

Next we will find the signal voltage necessary to produce a 10-dB signal-to-noise ratio when F_a is 20 dB.

The required signal power is ten times the sum of antenna and receiver noise powers.

$$= 10\ [(8.4 \times 10^{-16}) + (1.34 \times 10^{-16})]$$
$$= 9.7 \times 10^{-15} \text{ watts}$$

The equivalent signal voltage is

$$= \sqrt{4PR}$$
$$= \sqrt{(4)\ (9.7)\ (10^{-15})\ (50)}$$
$$= 1.4\ \mu\text{V}$$

[4] Most receiver manufacturers appear to have adopted this bandwidth for ssb reception.

[5] See earlier article (footnote 1).

[6] Definitions of sensitivity and noise figure do not require that the receiver be matched to the source resistance. The power being calculated is the "available" power, which the receiver might not avail itself of (see article referred to in footnote 1).

[7] These particular tests were based on intelligibility of "nonsense syllables", wherein the listener could not in any way guess, by a mental filtering process, what he was supposed to be hearing. With actual speech patterns, the intelligibility would undoubtedly be higher. Of course, some people claim that all ham conversations consist of nonsense syllables.

Now suppose that our hypothetical receiver had a specified sensitivity of 1.4 μV for a 10-dB signal-to-noise ratio, rather than 0.5 μV. This is 9 dB worse. Would the output signal-to-noise ratio be 9 dB worse for the same atmospheric noise conditions? Let's see.

Since the specified signal-to-noise ratio is 10 dB, the equivalent total noise input power is equal to one tenth the available signal power produced by 1.4 μV in series with 50 ohms. We previously calculated this signal power to be 9.7×10^{-15} watts, so total noise is 9.7×10^{-15} watts. Of this, thermal noise at 290°K is 8.4×10^{-18} watts, an insignificant amount, so we will consider that all of the input noise (when the antenna is at 290°K) is due to the receiver. When F_a is 20 dB, however, antenna noise becomes 8.4×10^{-16} watts. Adding this to the receiver niose results in a total equivalent noise input of 1.8×10^{-15} watts. The resulting signal-to-noise ratio is

$$\frac{S}{N} = \frac{\textit{Signal Power}}{\textit{Total equvialent noise input power}}$$
$$= \frac{9.7 \times 10^{-15}}{1.8 \times 10^{-15}}$$
$$= 5.4$$
$$= 7.3 \text{ dB}$$

In other words, a decrease of 9 dB in rated receiver sensitivity has resulted in a signal-to-noise ratio degradation of less than 3 dB. Furthermore, as F_a increases, the degradation becomes even less. If F_a had been 30 dB the difference between a 0.5-μV receiver and a 1.4-μV receiver would have been less than 1.0 dB. And F_a = 30 dB is not a high value for antenna noise; on some bands it is a low value.

Here are some typical values of F_a: Two sets of conditions have been chosen; a low-noise (Duluth, Minn., in winter daylight) and a high-noise (Miami, Fla., on a summer night).

Band	F_a, *Low Noise*	F_a, *High Noise*
1.8 MHz	45 dB*	75 dB
3.5	40*	65
7	30	55
14	30	35
21	22	25
28	18**	22**

* Man-made noise in a quiet rural location
** Galactic noise

These figures show quite graphically that only on 28 MHz, and possibly 21 MHz, is there any justification for striving for extremely high sensitivity. And even here, the gain in output signal-to-noise ratio is only a fraction of a dB for each dB reduction in noise figure.

Finally, let's compare two receivers. Brand A's maker proudly claims that every receiver he ships has at least 0.5 μV sensitivity for 10 dB signal-to-noise ratio. Brand X's producer just says "High Sensitivity" in his ads. To cut the cost, he has eliminated the rf amplifier; signals go directly to a fairly low-noise mixer. His sensitivity is actually 2 μV, but he doesn't dare advertise this figure. Just how much worse is Brand X?

We will use the "quiet" values of F_a listed previously, and find the output signal-to-noise ratio for Brand X when it is supplied with the same signal that would produce a 10-dB ratio in Brand A. Here are the figures:

Band	F_a	*Brand X S/N*
1.8 MHz	45 dB	9.96 dB
3.5	40	9.9
7	30	9.1
14	30	9.1
21	22	6.4
28	18	4.2

Under these conditions, Brand X is within 1 dB of being as good as Brand A on all bands from 1.8 to 14 MHz, even though its sensitivity is 12 dB lower. On 21 and 28 MHz, the losses are 3.6 and 5.8 dB, respectively.

If sensitivity were the only receiver characteristic of importance, and if Brand X cost much less than Brand A, it would be worth while to buy Brand X and use a simple single-stage preamplifier on the 21 and 28 MHz bands. Brand X could easily be made better than Brand A on these two bands.

Of course, sensitivity is not the only receiver characteristic of importance. Stability, selectivity, and freedom from spurious responses and cross-modulation are probably more important, and cost a lot more to design into a receiver than does mere sensitivity.

While it should be obvious that a low-noise receiver will *always* produce a better signal-to-noise ratio than one of moderate performance, in real life the difference is likely to be insignificant.

QST

Strays

Interested in the phenomena of Unidentified Flying Objects? Data-Net is an association of radio amateur and others interested in the subject. For information on Data-Net's on-the-air activities and membership, including issues of the *Data-Net Report*, contact Michel M. Jaffe, WB6RPL, 624 Farley St., Mountain View, California 94040.

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Stolen Equipment

The following equipment was stolen from the National Guard Armory in Melrose, Mass.: R.F. Communications Co. Pilot ssb transceiver S/N 1552 and 12 V dc battery eliminator S/N 406. Two microphones were also taken At the time of the theft, the equipment contained a crystal for 4640 kHz operation. Contact Col. Joseph Salidino, National Guard Armory, Commonwealth Avenue, Boston, Mass. Tel.: 617-782-9544.

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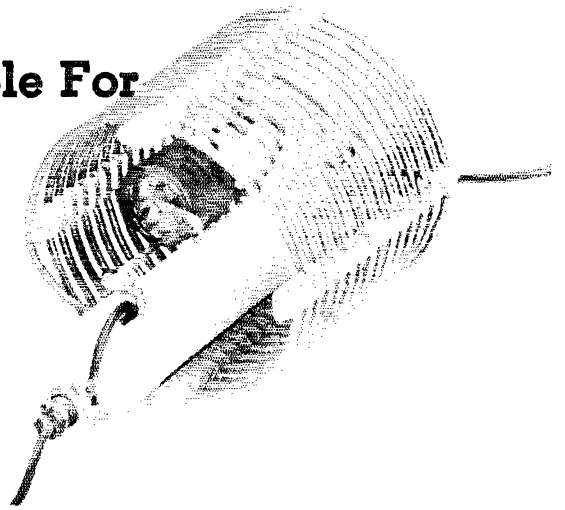
The Post Office Department promises faster mail service with the Zip codes. Use yours when you write Headquarters. Use ours, too. It's 06111.

● *Beginner and Novice*

A Coax-Fed Trap-Dipole For 80 Through 10-Meters

BY LEWIS G. McCOY,* W1ICP



The coils consist of 15 turns each, and the capacitors are 50 pF each. Be sure to allow enough coil lead lengths for attaching to the insulator ends.

As pointed out many years ago in *QST*[1], it is possible to design a coax-fed antenna, using traps, that will present a fairly good match for coaxial feed lines across the 80- through 10-meter bands. This article describes the construction of such an antenna. The antenna is simple to construct and can be used in either a horizontal or inverted V configuration if space is a problem. Before describing the construction of the antenna, let's see how it works.

Trap Antennas

Whenever coaxial feed lines are used to feed an antenna it is important that the lines be matched at the antenna to keep the SWR as low as possible. The SWR on a feed line is always dependent on the impedance of the antenna. If we use 50-ohm line, and the antenna impedance is 50 ohms, then the coax will be "matched" and the SWR will be 1 to 1. If the antenna impedance were 100 ohms, the SWR would be 2 to 1. The worse the mismatch, the higher the SWR will be. And, the higher the SWR, the more losses you will have in the feed system. Even more important, the SWR may be too high to allow proper tuning and loading of the final amplifier stage in the transmitter. For this reason, we want the antenna to have an impedance as close as possible to that of the coax.

Shown in Fig. 1 at A is a half-wave dipole. The impedance of this antenna will depend on several factors but probably the most important is the height of the antenna above ground. Fig. 2 is a graph showing just how much an antenna's impedance will vary in relation to its height above a perfectly-conducting ground. If we were to take an average of how high amateurs install antennas we would probably find that the average height of 80-meter antennas would be about 30 feet. This would put the "average" impedance somewhere between 40 to 70 ohms. This being the case, you could feed the antenna with either 50- or 70-ohm coaxial cable and have a reasonably good match on 80 meters.

Let's suppose we switch our rig to 40 meters, and attempt to use the 80-meter dipole for the antenna. What happens to the impedance of the antenna on 40 meters? Instead of a value of 40 to 70 ohms, the impedance will be on the order of 4000 ohms! With 50-ohm coaxial feed, the mismatch would be about 80 to 1 — quite a bad mismatch, you'll admit. If we want to use the 50-ohm coax, and use the antenna on both 80 and 40, our problem boils down to making the antenna look like a match on both bands.

One method of doing the job is to insert traps in antenna as shown in Fig. 1 at B. The traps are parallel tuned circuits. When a 80-meter signal is fed to the antenna, the overall electrical length works out to be a one-half wavelength and be a good match for the 50-ohm coax.

* Novice Editor

[1] Buchanan, "The Multimatch Antenna System," *QST*, March 1955.

Here is a coax-fed, multiband antenna for either General or Novice class operation. The antenna is easy to make and get working and can be used either horizontally or as an inverted V.

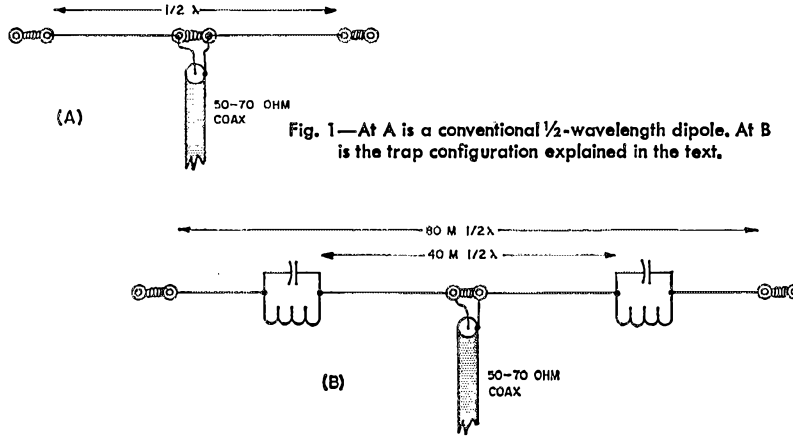


Fig. 1—At A is a conventional ½-wavelength dipole. At B is the trap configuration explained in the text.

When a 40-meter signal is fed to the antenna, the traps act to divorce the outer parts of the antenna and the antenna looks like one-half wavelength on 40 meters, and also is a fairly good match for the coax.

On the 20- through 10-meter bands, the antenna works out to be close to odd multiples of half wavelengths and has a low impedance, providing a fairly good match on these bands also.

Of course, the question in the builder's mind would be: How efficient the trap antenna would be compared to a plain dipole? If the traps are made with low-loss capacitors and a reasonably large wire diameter in the coil, the ohmic losses can be held to a minimum. Under such conditions, *this type of trap dipole* can be a fairly efficient antenna. The reason we emphasize "this type" of trap antenna is that it shouldn't be compared to trap beams, where a severe compromise on element spacing can take place. In any event, this type trap antenna can be a fairly good one for single coax feed, plus the advantages of multiband operation.

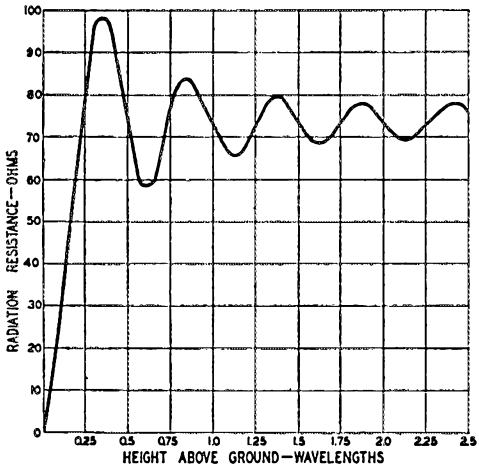


Fig. 2—This graph shows the variation in the impedance of a dipole for different heights above a perfectly conducting ground.

However, we must point out that the antenna has one drawback, particularly as far as the Novice who operates 80 meters is concerned. Whenever a multiband antenna of this type is used, it must be remembered that the antenna will radiate harmonics *equally* as well as the fundamental signal. While *any* antenna will accept harmonics and radiate them, some will radiate harmonics better than others, and the trap dipole is of the latter type. An 80-meter dipole is a more selective antenna than a trap dipole so there is always some harmonic rejection on the part of the antenna.

The reason we emphasize 80-meter Novice operation is because this is the band that gives rise to harmonic problems for the Novice. Not that a ham transmitter should radiate *any* harmonics, but in 80-meter Novice operation the second harmonic falls in commercial-service bands and many hams are cited by the FCC each year.

Getting back to the trap dipole, while it will radiate harmonics, this is not a serious drawback since the problem can be eliminated by installing a filter[2] or a transmatch[3] in the feed line. The transmatch is preferable because it will add additional selectivity to your receiving setup.

Making The Trap Antenna

Fig. 3 is a circuit drawing of the trap dipole. These dimensions will provide a good match for either 50- or 70-ohm coax cable in the Novice portions of the 80- and 40 meter bands. For General Class operation, the antenna as shown will provide a reasonably good match on any of the bands from 40-meters down. However, for 80-meter operation, it is best to change the outer lengths of the antenna (those portions

[2] *Understanding Amateur Radio*, p. 213.
[3] *The Radio Amateurs Handbook*, 1969 ed., page 353.

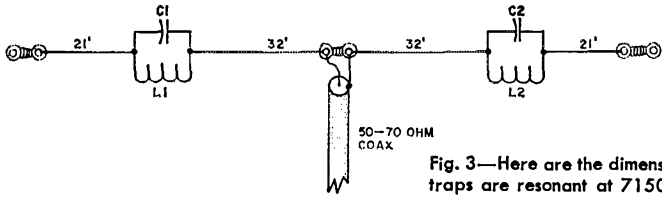


Fig. 3—Here are the dimensions for the Novice bands. The traps are resonant at 7150 kHz. For details on the trap construction see the text and photograph.

from the traps out) to make the antenna resonant in the desired section of 80 meters. As shown, the antenna will provide a good match from 3700 to 3750 kHz with the SWR rising sharply toward either band edge. More about this in a moment.

The traps are made from Air Dux coil stock; a single length of the 2006T will be adequate for both traps. The coil stock has 6 turns per inch, is 2½-inches in diameter, and comes in 10-inch lengths (World Radio Labs Cat. No. 20 F 105). The capacitors are a transmitting type, Centralab 850S-50Z (Allied Radio Cat. No. 43 F 1101). Using this type coil stock and capacitors the traps will easily handle the amateur legal power limit.

The photographs of one of the traps shows the construction method. Allow several inches of lead length at each coil end so that the wires can be fed through the support insulator. This will take any strain off the coil ends. Of course the antenna wire should also be fed through the insulator ends. Use No. 12 or 14 solid copper wire for the antenna because if the antenna is supported at the ends it must also support the weight of the coax feed line. In order to reduce the strain on the coax at the center insulator, the coax end should be mounted as shown in Fig. 4. Wrap the coax around the insulator as shown and clamp the two sections together and also tape the exposed end of the coax to prevent moisture accumulation inside the coax. Be sure to clean any enamel away from the antenna wires before soldering the coil and capacitor leads to the antenna wires.

As mentioned earlier, the antenna shown is cut for the Novice band on 80. For General Class operation, the amateur should select that portion of 80 he plans to use more than others and cut the antenna accordingly. The inner portions of the antenna, up to and including the traps, should be the same dimensions as shown in Fig. 3. For operation on the low end of 80, near 3500 kHz, make the outside lengths 30 feet long. Insert an SWR bridge in the line and then "prune" the ends for the lowest SWR reading.

One trick that some hams use is to feed the ends of the antenna through the end insulators, put a clip on the antenna ends, and then adjust the lengths by clipping the ends back on themselves as shown in Fig. 5. If the antenna is used in an inverted-V configuration, it is a fairly simple matter to determine the best match for

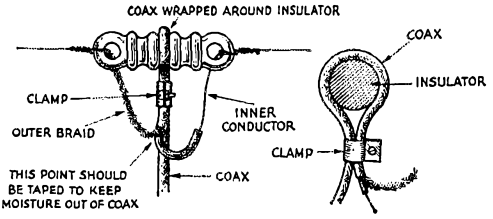


Fig. 4—To provide adequate support for coax at antenna feed point, the coax should be installed as shown in this drawing.

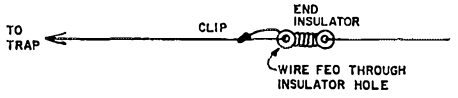


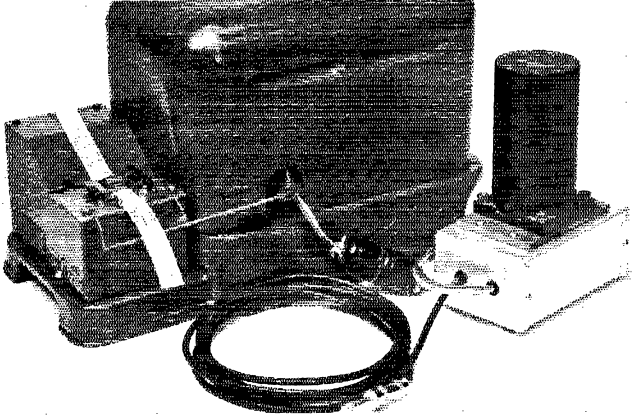
Fig. 5—This trick, used by many hams, allows the antenna to be adjusted for resonance anywhere within the 80-meter band. Be sure to have the clip short at the same point on each end of the antenna to insure balance.

any portion of the 80-meter band and then change the overall length accordingly. In the inverted-V method of installation it is an easy matter to get at the end clips and change them. This method eliminates pruning the antenna wire.

Installing The Antenna

As already stated, the antenna can be mounted either horizontally or as an inverted V. If at all possible, try to get the antenna up at least 30 feet above ground in the horizontal mounting, in fact, the higher you get the antenna, the better it will perform. If you don't have a long enough span, the ends of the antenna can be dropped down but be sure the ends are clear of the ground.

For the inverted V you'll only need a center support. Again, get the antenna as high as possible. While the angle of the inverted V isn't too critical, the ends should be kept out towards the horizontal as much as possible. Also, keep in mind our caution about harmonics and use a filter or transmatch, particularly for 80-meter operation. QST



The transmitter-distributor and polar relay interconnected for keying Morse code from teleprinter tape. Octal socket and plug fittings on the interconnecting cable facilitate easy separation. Should it be desired to remove the relay from the circuit, a plug with appropriately jumpered pins restores the connections required for RTTY operation of the TD.

Perfect Morse Code from Teletype Tape—Inexpensively

BY JERRY HALL,* K1PLP

THE use of a teleprinter transmitter-distributor or TD and perforated RTTY tape for sending Morse code has probably been a dream of almost every ham who owns such equipment. After all, both cw and RTTY signals are based on constant band rates — only the type of coding changes. The uses for such a scheme could be numerous: cw identification for repeaters or while operating RTTY, call-up tapes for many types of cw operation such as nets, schedules and contests, as well as cw bulletin transmissions, code practice, and so on. The advantages would be that tapes can be prepared in advance and stored indefinitely, used many more times than just once, and that the operator is not required to focus his full attention on the information actually being sent.

Indeed, all cw bulletin and code-practice transmissions from W1AW are made from teleprinter tapes — the same tapes which are used for the transmission of RTTY, in the case of official bulletins. At W1AW the conversion from RTTY tape to Morse signals is performed in a Frederick Electronics Corp. model 1402 tape reader and a Frederick model 660A teleprinter-to-Morse-code converter. However, this set-up has more resemblance to a small computer than it does to a piece of amateur equipment, and would be difficult for the average ham to duplicate without great expense.

A few years ago W4AWY presented a simple method of obtaining Morse code characters from teleprinter tape.[1,2] The tape was to be punched with a particular RTTY letter combination for each Morse letter or figure, for the best timing results. When the tape was played through the TD, the resulting fsk signal resembled Morse keying. The necessity to add a switch to the TD to change from RTTY to Morse operation, and the compromise in code element timing with resulting less-than-perfect code by that method, though, may have discouraged a number of operators.

CW from the TD

The TD, however, can be used to generate perfectly proportioned Morse code, sounding like a very well adjusted electronic keyer or like the W1AW code practice and bulletin tapes. A simple modification to the TD is required, but the modification can be completely removed in a few minutes time. The modification has no effect on normal use of the TD for RTTY operation.

The scheme requires the addition of a polar relay, the contacts of which do the actual cw keying. (The relay can be one relegated to the junk box after changing to electronic keying, or might be acquired through surplus channels for a few dollars — see *QST* Ham-Ads.) One winding of the relay is used to close its keying contacts upon command from the TD, starting a dot or a dash element. The second winding of the relay, upon a separate command from the TD, opens the contacts and ends the Morse code element. The duration of the dots or dashes is controlled by altering the times between turn-on and turn-off commands, through appropriate RTTY letter combinations on the tape.

In operation for cw keying by this method, one teleprinter character (163 milliseconds in duration for a 60-wpm TD) is used for a Morse dot and its succeeding space. Thus, a string of dots will occur at the rate of 6.13 per second. A dash and its succeeding space is equal in

* Assistant Technical Editor, *QST*.

[1] Sapp, "CW Without Hands," *RTTY*, June, 1963.

[2] Sapp, "C.W. Sign-Off with RTTY Tape," *QST*, March, 1964.

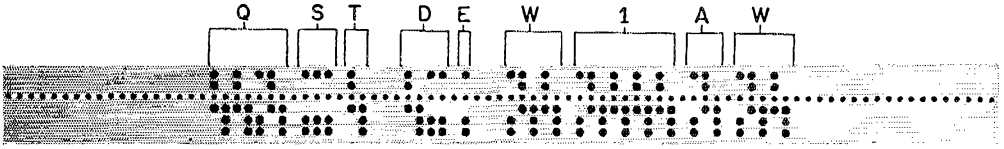


Fig. 1—Teleprinter tape perforated for the cw message QST DE W1AW. A blank separates the cw letters; three blanks separate the words.

duration to two teleprinter characters, so a string of dashes will occur at the rate of slightly more than three per second. One can determine the code speed by multiplying 2.4 times the number of free-running dots per second,[3] and for a 60 wpm TD this equates to a maximum cw keying rate of 14.7 wpm. Of course by allowing more time between turn-on and turn-off commands or using long spaces between cw letters, slower cw speeds can be sent.

Installation

Fig. 2 shows a typical wiring diagram for installing the relay. The contact-closing winding of the relay is placed in series with the TD commutator segment for the first selector pulse. As a perforated tape is played through the TD, any character containing a mark in the first selector pulse position will energize this winding, which will close the keying contacts. Because of the nature of the relay, the contacts will stay closed even after the current through this winding is removed. They will remain closed either until a current of the opposite polarity is passed through this winding, or until a current of the proper polarity is passed through the second winding. In effect, the relay latches itself closed.

The contact-opening winding of the relay is placed in series with either the fourth or the fifth selector-pulse commutator segment, at the operator's preference. The fifth position gives almost a perfect 1:1 dot-to-space ratio for 60-wpm. TDs (dot ON time equals 54 percent), but for Western Union and other TDs set for 65 or 67 wpm the fourth position might give a more pleasing weighting.

Be sure to observe the correct polarity for connecting the relay windings. If either winding is reversed, no keying will result. If both windings or the polarity of the power supply voltage is reversed, contacts 1 and 4 of the relay will close during the "key up" period, but to correct this situation it might be easier merely to use contacts 1 and 5 of the relay for the cw keying, rather than to rewire the two windings or to change the power supply connections.

Operation

To prepare a tape for transmission of cw, simply punch the teleprinter letter "B" for each dot and punch "UM" for each dash. Although other characters will also yield the desired results, the Bs and UMs have short and long sounds, making it convenient to say "B UM B" to yourself when you might ordinarily say "dit dah dit" for the cw letter R, for example. Use either a blank or a space-bar function for spacing between cw letters and use three blanks between cw words. These spacings will result in a perfect 1:3:7 ratio for element, letter, and word spacing. Use five spaces for the separation of paragraphs or the equivalent.

A tape punched for the cw identification QST DE W1AW would read like this, occupying about five inches of perforated tape: UMUMBUM BBB UM UMBB B BUMUM BUMUMUMUM BUM BUMUM. In the above example, spaces are shown where

(*Continued on page 82*)

[3] ARRL, *The Radio Amateur's Handbook*, code transmission chapter.

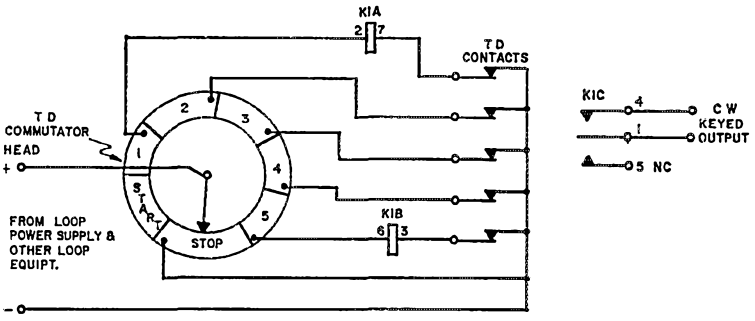


Fig. 2—Typical polar keying relay installation with a Teletype Corp. model 14 transmitter-distributor. Satisfactory operation of the relay will result with loop currents ranging from 60 mA down to 2 or 3 mA, depending on how well the relay is adjusted. See text regarding connection polarity of relay windings. K1—Polar relay, Western Electric 255A or 314A or equivalent (see QST Ham-Ads).

Hints and Kinks For the Experimenter

AN RF-ACTUATED BREAK-IN SYSTEM

Most of my operation has been in 40- and 80-meter cw networks and round tables. Because operating without fast break-in became frustrating at times, I put together a simple rf-actuated break-in system. The results have been most gratifying.

Fig. 1 shows the system in schematic form. When there is no signal input, the positive end of BT_1 effectively floats because Q_1 is not conducting. At this time, because of the positive bias voltage supplied by R_1, Q_2 conducts heavily and shorts out the 10,000-ohm control, R_2. When the transmitter is operated, the signal from a pickup loop is fed to J_1 and rectified by CR_1, and the resulting positive voltage is used to drive Q_1 into conduction. This effectively connects the plus end of BT_1 to ground. As a result, BT_1 applies to the base of Q_2 a negative voltage that overcomes the positive bias supplied by R_1. This turns off Q_2, thus allowing the transistor to act like an open or nearly open circuit. With the transistor short removed, the resistance of R_2 is added to that of the rf gain control in the receiver, and the sensitivity of the receiver is reduced during transmitting periods.

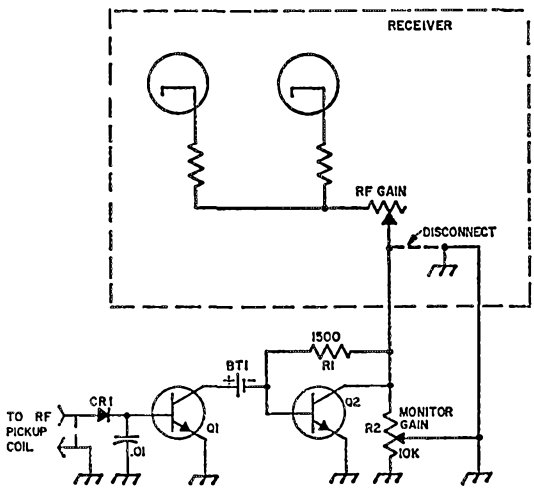


Fig. 1—WA6HDX's rf-actuated break-in system. Resistances are in ohms, k = 1000. Capacitance is in μF; the capacitor is disk ceramic. Details of the pickup coil are given in the text.

BT_1—1.5-volt cell.
CR_1—1N34A.
Q_1,Q_2—2N388. See text.
R_1—½-watt composition.
R_2—Wire-wound.

When installing this break-in system, only one receiver connection — the one between the rf gain control and ground — needs to be opened. If the gain control is well bypassed, the leads going to the break-in device can be any convenient length.

The pickup coil can be several turns of insulated wire loosely coupled to the transmitter output coil. Caution should be observed that there are *no* voltages present when the loop is installed and its position adjusted.

Type 2N388 transistors were used at Q_1 and Q_2 because they happened to be in the junk box. Any 100- to 200-milliwatt transistors with a collector-to-emitter voltage rating of 20 volts or more can be used instead.

When the receiver gain control was set wide open, 0.8 volt dc was measured between the collector of Q_2 and ground, and 22 mA was found to be flowing in the lead going to the arm of the receiver gain control. When a signal from the transmitter keyed the system at the same gain-control setting, 11.6 volts dc and 8 mA were measured. As the rf gain control was turned down, these voltage and current readings became correspondingly less.

The circuit does have one disadvantage: Because the output impedance of Q_2 is not zero ohms when the transistor is conducting, there is some loss of gain — estimated to be 3 dB — when the receiver is running wide open. This is of no importance here. If desired, a spst switch may be used to short out the device, so that the full gain of the receiver may be restored for the reception of weak signals. — *Raymond B. Brightman, WA6HDX*

SIMPLIFIED CIRCUIT BOARD CONSTRUCTION

Here is a circuit board construction technique that is simple and easy to duplicate. I use Vectorbord that is copper clad on only one side and has holes for small push-in terminals (T28) on a 0.2-inch grid. To insulate a push-in terminal from the copper I use a ¼-inch diameter twist drill to rout out the copper around each hole where a terminal is to be used. A couple of twists with a hand-held bit is usually sufficient for each hole.

Wiring is done on the non-foil side of the board, and all grounds are made by soldering push-in terminals to the foil side of the board. This provides an excellent ground path for all frequencies up to and including uhf. The results are neat and reproducible, and it's easy to make a compact parts arrangement. I prefer this method to standard printed circuit board con-

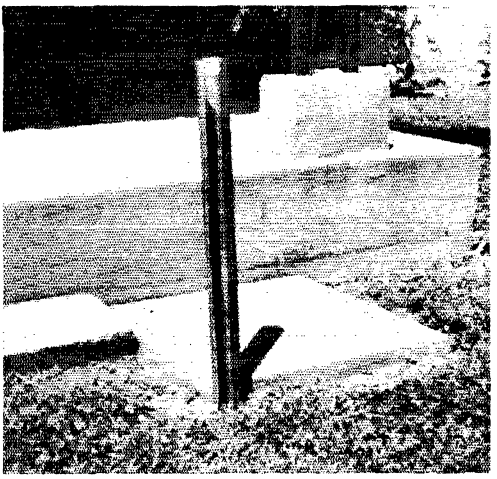


Fig. 2—A cut section ready for installation.

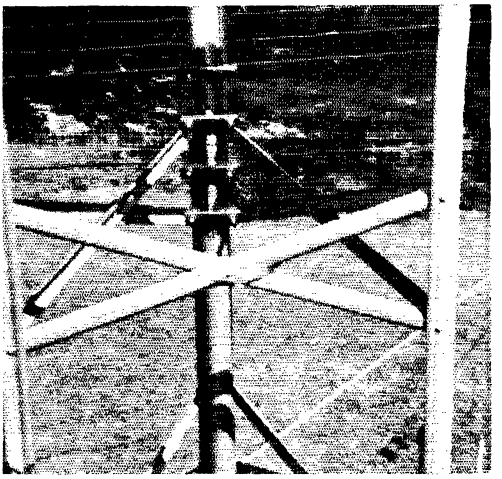


Fig. 3—One of the completed couplings.

struction. It eliminates the need for etching, and permits the breadboard circuit to be used as the final product. Circuit changes are easy to make with this method — not so with etched-circuit boards.

The Vector P-91 insertion tool, which costs only 50 cents, can be used to install the T28 terminals. — *Dick Preiss, WA6VCG*

A DRIVE-SHAFT COUPLING SCHEME FOR A BASE-MOUNTED ROTATOR

IN order to simplify rotator servicing, some hams locate a rotator at the bottom of a tower and use several sections of TV mast to turn a beam on top. However, if a few strong winds come up after such an arrangement has been installed, the keyed TV masts may develop a large amount of play. If this is the case, usually the next step is to install bolts at the joints. However, after a few more windy days, it's likely that the bolts will be damaged and the bolt holes will be chewed out.

I discussed this problem with several hams, and we came up with a better coupling scheme. The result is an antenna system that is in good condition with practically no play, even though it has gone through several bad winter storms.

To stand the amount of pressure necessary to insure no slippages, and to keep backlash at a minimum, 1½-inch outside diameter steel masts should be used to support the antenna, and steel parts — cut sections from an extra TV mast of the same diameter, and 1⅝-inch muffler clamps — should be used to make the couplings. Before their installation, all the steel pieces, except the threads on the clamps, should be given a heavy coat of paint. Once the clamps are secured, it's a simple matter to paint the clamp threads.

Begin the installation by obtaining the necessary masts to support the antenna, one mast to make the couplings, and four muffler clamps for each mast-to-mast joint. (At some auto supply stores muffler clamps can be bought for thirty cents or less apiece.) For each joint cut off a ten- to twenty-inch section from the extra TV mast. Then, borrow a saber saw — a heavy duty type if you can — and cut the sections of TV mast lengthwise on only one side. For this job use a jig of some sort to hold the work steady, and to prevent the saw blade from running into the far side of the inner wall of the tubing and breaking. Although a slight departure from a straight line is okay, for best results try to cut the mast sections as straight as possible. Next, with whatever means you have available, open up the slit pieces so that they will slip with ease over the 1½-inch outside diameter antenna masts. The cut sections should look like the one shown in Fig. 2.

Install the masts and rotator inside the framework of your tower. Then, take the bottom mast section loose from the rotator and slip on one of the prepared pieces. Slide the slit section up to the top joint. As shown in Fig. 3, install one of the muffler clamps about an inch below the joint, and another an inch above the joint. Then install two more, one, two or three inches above the joint, and the other the same distance below the joint. In the beginning, finger tighten each clamp. Then, using a wrench, tighten each clamp a little at a time until all are reasonably tight. The splicing section should be pulled in until it provides a snug fit around the junction of the two masts. Take care not to overtighten the clamps; otherwise, you might collapse the masts or the coupling. Finally, repeat the coupling-installation procedure for the remaining joints.

In a variation of this coupling scheme, a local ham uses two-inch galvanized water pipe as the drive shaft. With pipe of this size and thickness it was necessary to cut the splicing sections in two and use three muffler clamps above and three clamps below each mast-to-mast joint. — *Gene Ferguson, W8NPF*

Technical Correspondence

DIRECTLY DRIVEN RESONANT RADIATOR ANTENNA

Technical Editor, *QST*:

I have been reading the antenna section of the 1969 edition of *The Radio Amateur's Handbook*, and would like to comment on the short paragraph on page 371 on the DDRR antenna. (See Fig. 1.)

This antenna has many features that are advantageous to radio amateurs or other users, particularly for mobile use, and it is unfortunate that the antenna is not better understood outside the professional engineering community. I think this is because no completely, or even moderately, accurate account of *how* the antenna functions has appeared outside the professional journals. Most of the discussions of this antenna for hobbyists seem to be based on the article in *Electronics*[1] or perhaps that in *Popular Electronics*.[2] These articles were excellent in their presentation of empirical performance data and design information but they did establish some misconceptions about the operation of the antenna.

The name, directional discontinuity ring radiator, is a relic of these early articles. Years ago, the Northrop Corporation redefined DDRR to stand for "directly driven resonant radiator," which reflects a better understanding of the antenna operation. There are other commonly used names. I prefer the name "transmission-line antenna."

Shortly after the appearance of the article in *Electronics*, the correct theoretical explanation of the antenna operation was given in an article by R. W. Burton and R. W. P. King in the *Microwave Journal*.[3] They pointed out that the antenna was not basically new and that its operation was adequately explained by several past theoretical articles. Since the publication of the *Microwave Journal* article, there has been no controversy on the DDRR antenna and it has been used for many purposes, although not always under the DDRR name.

In a letter to *QST* which was published in Technical Correspondence for December 1967, I commented on K1KLO's Connecticut Longhorn (*QST*, August, 1967) which turned out to be a version of the transmission-line antenna. The M.A.B.A.L. antenna by K1KLM (*QST*, July, 1968) also seems to be more appropriately explained as a transmission-line antenna than as a horizontal version of the loop antenna described by Patterson (*Electronics*, Aug. 21, 1967) and McCoy (*QST*, March, 1968).

My letter in Technical Correspondence gave all the specific references to this antenna type that I am familiar with, except for a few in some of the other ham and hobby magazines that I considered at the time I read them to be not very informative. The article by R. C. Fenwick[4] is my favorite on this antenna, since it shows the wide range of physical forms the antenna can assume with the same basic explanation still valid for its operation.

In summary, the DDRR is a well understood antenna with many features to recommend its use. Unfortunately, other than at the professional level, I know of no articles which give the correct theory for it, even though there are no difficulties in the theory. I think that continued use of the term "directional discontinuity ring radiator" is undesirable. — *Dr. Wade Blocker, K6CAF, 17221 Osborne St., Northridge, Calif. 91324.*

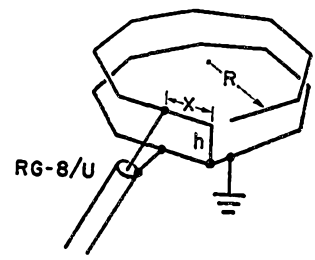


Fig. 1—The DDRR vertically polarized antenna. Length around top (open) wire or bottom (closed) wire, in feet, = 252/f (MHz), e.g., 64.7 feet for 3.9 MHz. Height, h, = 8.5/f (MHz), e.g., 2.2 feet at 3.9 MHz. The feedpoint distance, x, is given approximately by x = 28/f (MHz), e.g., 7.2 feet at 3.9 MHz. If an excellent ground is available, the bottom wire would not be required, otherwise it should be laid on the ground or the roof or whatever flat plane the DDRR is placed over. The antenna shown is the version tried by WØMOX, and is simpler to construct than the original circular configuration.

CAPACITIVE VOLTAGE DIVIDERS

Technical Editor, *QST*:

W4PPB makes an excellent point regarding the need for an rf choke at the output of a pi network.[5] However, he is also helping to perpetuate an error, that "dc voltage on series capacitors divides inversely as the capacitance of each unit." This is so widely "known" (it has appeared on page 25 of the *Handbook* for years) that it is taken for granted, yet it is incomplete. A little thought will show that *only resistors* can form a divider for dc; capacitive reactance is an open circuit at dc.

Any capacitor has leakage resistance, both internal and due to the circuitry associated with it. For typical small capacitors such as W4PPB discusses, the time constant formed by the capacitor and its leakage resistance is at most a few seconds. At the instant of switching on, the voltage will indeed divide as W4PPB says, but after the time of several time constants has elapsed, the voltage division will settle down to that determined by the leakage resistances acting as a divider. Both the initial transient and the steady-state conditions are important and must be allowed for in the design. Misunderstanding of this point can lead to errors in design and perhaps to considerable expense. — *James M. Lomasney, WA6NIL, 2501 Waverly St., Palo Alto, Calif. 94301.*

[1] Boyer, "Hula Hoop Antennas; A Coming Trend?", *Electronics*, Jan. 11, 1963.

[2] Pafenberg, "The Hula-Hoop," *Popular Electronics*, July, 1963.

[3] Burton and King, "Theoretical Considerations and Experimental Results for the Hula-Hoop Antenna," *Microwave Journal*, November, 1963.

[4] Fenwick, "A New Class of Electronically Small Antennas," *IEEE Transactions on Antennas and Propagation*, May, 1965, p. 379.

[5] Thurston, "D.C. Voltages and the Pi Network," *QST*, August, 1969.

REED RELAYS FOR CODE KEYERS

Technical Editor, *QST*:

While gathering parts to build the solid-state keyer given in the ARRL Handbook,[6] I could not find a source for the Magnecraft W102X1 reed keying relay. I have talked with a Magnecraft engineer, and he explained that the relay in question is no longer in production. The W102X1 has been replaced by the W102MX-1 relay. This relay has a release time of better than ½ ms. It has a 100-ohm 40-mA dc coil. It is better constructed and is cheaper than the one used in the Handbook. The W102MX-1 relay can be purchased through the Allied Radio Corp., 100 N. Western Ave., Chicago, Ill. 60680. It sells for $2.18 plus postage (plus a 50¢ handling charge on orders of less than $5.00). The Allied part number is 41-F-4444.

The keyer works well on most speeds. I didn't like the monitor shown, and went to my own design. All in all, I am quite satisfied with its operation. — *Ellwood E. Brem, K3YVV, 140 Frandor Rd., Lower Burrell, Pa. 15068.*

SHEET FRISKET FOR ETCHED CIRCUIT BOARDS

Technical Editor, *QST*:

The article on printed-circuit-board construction in the August issue of *QST*[7] presents one of the most practical systems I have seen for building small quantities of circuit boards. The one disadvantage of this system is that the home builder has to be skillful with a small brush. For those builders who can't draw a straight line with a ruler, much less paint "frisket" over a traced circuit outline, I would like to recommend the use of sheet frisket instead of the liquid type.

Sheet frisket (such as E-Z Frisket) comes with a special rubber-base adhesive on the back. You simply peel off the protective backing and it's ready to use. Place the frisket film over the traced circuit outline on the copper-clad board; it quickly adheres to the surface. Use an X-acto knife to cut an outline of the area to be etched and peel the frisket away from the board. After etching, the frisket film is easily removed from the board. E-Z Frisket is available in 9 × 12-inch sheets, package of 8 for $1.20. — *J. R. Fisk, W1DTY, Editor,* Ham Radio Magazine, *Greenville, N. H. 03048.*

DECADE-COUNTER ICs FOR THE WB2MEX FREQUENCY COUNTER

Technical Editor, *QST*:

WB2MEX did a good job on his frequency-counter article in the August issue of *QST*.[8] However, I would like to make a few technical comments and suggestions. Mr. Grillo probably used the SN7493N, a straight divide-by-16 binary counter, because they were readily available to him. However, anyone building this counter from scratch can save himself a batch of money and a lot of wiring if he will use the SN7490N instead. The SN7490N is designed specifically for BCD counting and, unlike the SN7493N, does not require the external diodes to reset to zero on the tenth count. Besides saving the cost of 42 diodes, the SN7490N is $1.10 cheaper than the SN7493N. A constructor could save nearly $20 by making this substitution.[9] The SN7490N pin or base diagram is exactly the same as that for the SN7493N shown in Fig. 1 of Mr. Grillo's article, and will work just as well.[10]

I've been designing with the Texas Instruments SN7400 series ICs for over two years now, and I most emphatically cannot recommend operating these units at 7 volts as the author suggests. All the data sheets specify 7 volts as the *absolute maximum* supply voltage. The normal operating voltage is 5 volts. When you've got well over $100 worth of ICs involved, as you do here, you're taking a big chance on losing some money by operating them at their limits. The 7-volt supply was specified, no doubt, to make the lamps operate brighter and present a more pleasing appearance. But I'd rather live with dimmer lamps than to have to make frequent replacements. I suggest a compromise to 6 volts. — *Louis E. Frenzel, Jr., W5TOM/3, 11287 Columbia Pike, Silver Spring, Md. 20901.*

"MEASURING" UNKNOWN INDUCTANCES

Technical Editor, *QST*:

Some time ago I had a couple of old filter chokes whose inductance I did not know. Although I searched through all of the books I had, I was unable to find any method to tell me how to find their inductance. Even the *Handbook* didn't help me!

By using Ohm's law, I was able to come up with the following method which I think may help others. By measuring the voltage drop across a known resistor in series with the unknown inductance (or capacitance), the reactance may be found. From then on, the inductance may be found by formula. The reactance is found from the formula:

$$X = R\sqrt{\frac{E^2}{E_1^2} - 1}$$

where E = supply voltage (60-Hz ac),
E_1 = voltage drop across known resistor, and
R = value of known resistor in ohms.

I reasoned that, since the current through the reactance and the known resistor are the same, the following formulas would apply.

Total impedance, Z, $= \sqrt{X^2 + R^2}$. Therefore,

$$I = \frac{E}{\sqrt{R^2 + X^2}}. \quad E_1 = IR, \text{ and by substituting}$$

$$\text{for } I,\ E_1 = \frac{ER}{\sqrt{R^2 + X^2}};\ E_1^2 = \frac{E^2R^2}{R^2 + X^2}.$$

$E_1^2R^2 + E_1^2X^2 = E^2R^2$, or $E_1^2X^2 = E^2R^2 - E_1^2R^2$.

By dividing both sides of this equation by E_1^2 and extracting the square root, we come to the final formula for X, above. — *Robert Palmer, W8PY, 6712 Cortland, Allen Park, Mich. 48101.*

[6] ARRL, *The Radio Amateur's Handbook*, p. 212 in 1968 edition, p. 214 in 1969 version. Also, Opal, "An Electronic Keyer using Integrated Circuits," *QST*, August, 1967. This same relay has been favored by other keyer builders, such as Van Cleef, "ICKEY — An Integrated-Circuit Electronic Keyer with Dot and Dash Memories," *QST*, November, 1968. — *Editor.*

[7] Schiebold, "Fast 'n' Easy Printed Circuit Boards," *QST*, August, 1969.

[8] Grillo, "A Frequency Counter with Binary-Coded Decimal Readout," *QST*, August, 1969.

[9] This information is based on mid-1969 prices. We've recently received informal word from a representative of Newark Electronics Corp., Grand Rapids, Mich., that the price of either the SN7490N or the SN7493N is $7.66 in single-lot quantities. — *Editor.*

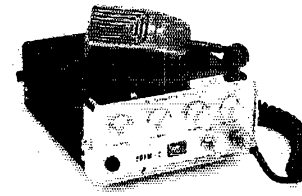
[10] When replacing the SN7493N with the SN7490N type of IC, the diodes to be omitted are those connected to pins 2 and 3 of each IC, Figs. 5 and 7 of the original article. Pins 2 and 3 are then left open for U_1 through U_7, and merely connected directly to the "reset" line for U_8 through U_{14}. The BCD readout will remain exactly as described in the original article. — *Editor.*

Recent Equipment

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

The Inoue FDFM-2

2-Meter FM Transceiver



The FDFM-2 transceiver, less battery pack, is only 3 by 6½ by 7½ in size, yet it contains a high-performance superhet with 19 transistors, and a 2-watt transmitter with 13 transistors. Crystal selector permits operation on three different repeater input and output frequencies

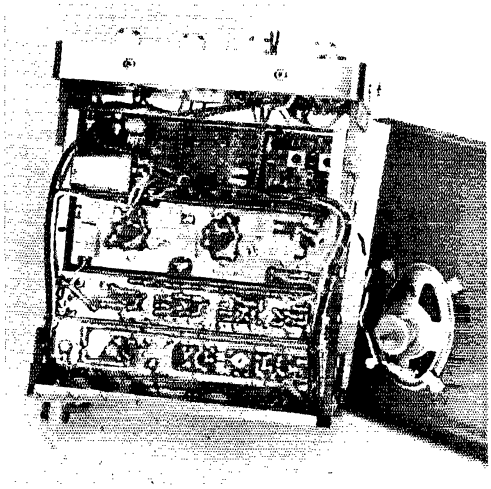
UNTIL fairly recently, getting on fm was a relatively inexpensive business, thanks to the availability of thousands of former police, fire, and commercial-service fm rigs at near give-away prices. Supply and demand have hit this happy picture now, and the price of good used gear is rising accordingly. As a result, the design and manufacture of fm equipment especially for the amateur trade is becoming more attractive all the time.

One way to shade costs to a degree is to import from other countries, notably from Japan, in the case of electronic equipment. The FDFM-2 and allied Inoue Communications Equipment for vhf fm service show the skill of the Japanese in catering to the U.S. amateur market. The transceiver shown here is little more than pocket size, yet it delivers 2 watts of quality fm, and has a receiver that will give the best modern American fm gear a good run.

The FDFM-2 can be operated from its detachable battery pack holding 8 D cells, or from the car battery with the fused cable supplied for this purpose. Use is mainly a matter of pressing the microphone push-to-talk switch. If the antenna looks like a 50-ohm load at the operating frequency, no tuning or loading adjustments are required. A 6-position channel-selector switch permits operation on three different repeater input-output frequency combinations. Position 1 normally is set up for transmitting on 146.34 MHz and listening on 146.94. Position 2 then permits direct operation on 146.94. You can set up the other two pairs of switch positions similarly for other repeater frequencies, though only the 34-94 crystals are normally supplied with the unit.

Other controls include a meter switch, for signal-strength or battery-voltage readings on the small panel meter; an audio gain control, a squelch level control, and a power on-off switch. A small screw-in whip fits into a panel socket, for hand-carried use. When you work mobile you attach a coax-fed car antenna to an SO-239 fitting on the back of the FDFM-2.

With dry batteries in fresh condition the transmitter output is in excess of one watt. On the car battery you get two watts easily. Maximum transmitter drain is about ½ ampere on the dry cells, with a receiver standby drain under 50 mA. With a signal coming in, and the audio gain turned up, receiver drain hits about 125 mA on peaks. Running in the car, transmitter drain is about 1 amp, and receiver drain is just slightly more than with the battery pack. You could leave the FDFM-2 on almost indefinitely and not have to worry about running down your battery — a far cry from the dynamotor-operated battery killers many fellows are using for fm mobile work these days!



An interior view of the FDFM-2, like that of any other compact solid-state equipment, is not very revealing. The transmitter and receiver crystal sockets are visible near the top. The bandpass filter connected in the antenna line may be seen mounted on the rear wall.

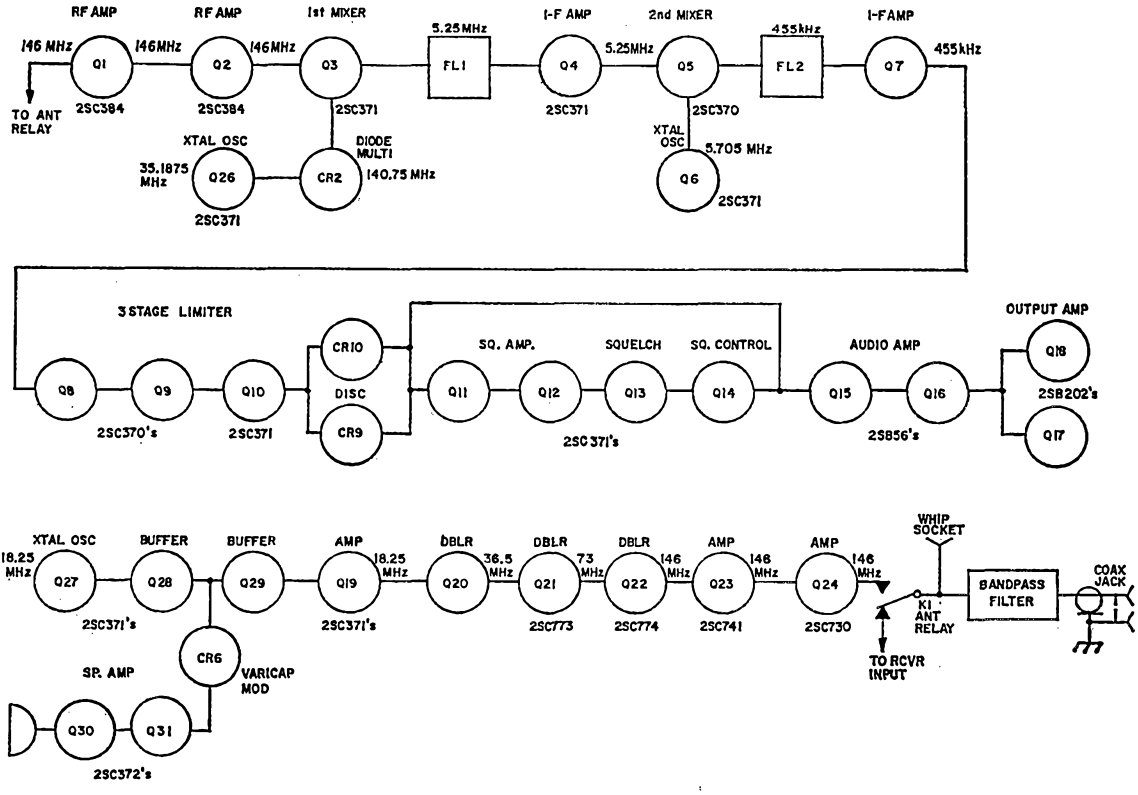


Fig. 1—Block diagram of the FDFM-2 transceiver, showing signal paths and stage functions. The power system, not shown, may be the detachable battery pack, the car battery, or an accessory a.c. supply. The battery cable has built-in fuse protection against wrong-polarity connection of the car battery.

The Line up

The FDFM-2 is all solid-state, and the transistors and other components are all-Japanese. They are mostly common types, however, for which American replacements are available. The receiver is of advanced design, with many interesting features. Two r.f. stages, Q_1 and Q_2 in Fig. 1, feed the first mixer, Q_3. Injection to this stage is from a 38-MHz crystal oscillator, Q_{26}, and a diode multiplier, CR_2. Frequencies in the first five stages depend on the signal frequency, of course, and those indicated in the block diagram are for receiving a 146-MHz signal.

Output of the first mixer, on 5.25 MHz, is link-coupled to a bandpass filter, FL_1, and thence to an i.f. amplifier, Q_4, and the second mixer, Q_5. Here a 5.705-MHz crystal oscillator, Q_6, provides the necessary beat frequency to give 455-kHz output. This is low-impedance coupled to a 4-circuit filter, FL_2, and out to a 455-kHz i.f. amplifier, Q_7. The three limiter stages, Q_8, Q_9 and Q_{10}, are untuned RC-coupled, the necessary selectivity having been determined by FL_2. The discriminator, with diodes CR_9 and CR_{10}, salvages the audio on the signal, and passes it along to the squelch stages, Q_{11} through Q_{14}, and to the audio amplifiers, Q_{15} through Q_{18}.

Receiver performance leaves little to be desired. In this writer's experience the FDFM-2 does considerably better than some of the fm gear presently in use, especially in mobile service on 146.94. We have found it possible to hear many more stations than can be worked, due partly to the lower-than-average power of the transmitter, but more, we suspect, to inattention to receiver performance on the part of many fm users. Too often, it appears that being able to receive the local repeater satisfactorily has been all that is asked of the mobile fm receiver, and coverage, other than through repeaters, is often less than it could be. You can be sure of one thing: with the FDFM-2, you're going to hear anyone who can hear you.

A 0.1-μV signal gives a plainly-audible response, and 0.3 μV gives almost complete quieting. The squelch threshold can be set so that any readable signal will break it. We still recommend listening with the squelch off, however, as this may help you to spot distant activity that might otherwise escape notice.

Crystals for the receiver are third-overtone types between 34.6875 and 35.6875 MHz. Those for the transmitter are between 18.0 and 18.5 MHz, presumably fundamental cuts. Several large crystal suppliers in this country have the

Inoue FDFM-2 2-Meter F-M Transceiver

Height: 3 inches.
Width: 6½ inches.
Depth: 7½ inches.

Weight: 4¼ pounds. Battery pack adds 0 inches to depth and 0 pounds to weight.

Power requirement: 13 volts dc, 1 A (700 mA on battery pack). Receiving drain 50 mA.

Price Class: $250.

Manufacturer: Inoue Communications Equipment Co., Japan. Importer: Varitronics, Inc., 3835 North 32nd Street, Phoenix, Arizona 85018. Distributor: Stellar Industries, 10 Graham Road West, Ithaca, N.Y. 14850.

necessary information to supply crystals within the desired tolerance, or they can be ordered from Varitronics.

Transistors in the FDFM-2 are all bipolar types, but no overloading problems have been encountered by the writer. Rejection of out-of-band signals is undoubtedly aided by the bandpass filter circuit in the antenna line.

The transmitter has four stages operating at the crystal frequency: an untuned crystal oscillator, Q_{27}; two buffer stages, Q_{28} and Q_{29}, with phase modulation applied to the output of Q_{28}; and an amplifier, Q_{19}. Three doubler stages, Q_{20}, Q_{21} and Q_{22}, all with double-tuned output circuits, multiply up to the operating frequency, and feed two amplifier stages, Q_{23} and Q_{24}. Transmitter output is fed to one terminal of the antenna relay, K_1. A bandpass filter is connected in the line to the 50-ohm coaxial output.

Accessories and Allied Items

The writer's reaction, at first sight of the FDFM-2, was that it would be nice to have a 12-volt amplifier unit permanently mounted in the car, with provision for plugging in the output of the FDFM-2 when it was not being used with its battery pack. This turned out to be something less than an original idea; you can get one, for mobile service, or another with 115-volt a.c. supply, for home use. They're the FM-20M and FM-20BM, respectively. It is also pretty well-known, by now, that the FDFM-2 has a bigger brother, the 2S. It looks like the FDFM-2, but delivers 5 watts output. There is a regulated power supply, for ac use of either transceiver, called the PS-1500. The battery pack, not shown in our photograph, is the BP-1. Extra crystals and a mobile mounting bracket round out the line of accessories.

Also now being imported is the Inoue FDAM-3, an a-m/fm transceiver for the 50-MHz band, having tunable transmitter and receiver, with separate oscillators and tuning dials. A 50-MHz version of the FDFM-2 is also available.

— *W1HDQ*

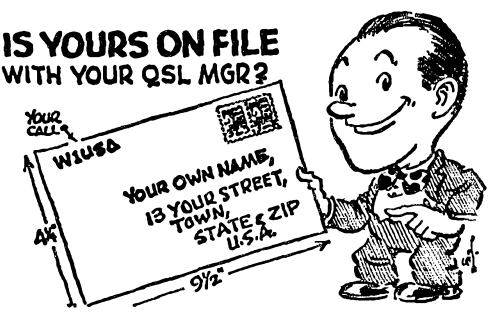
A.R.R.L. QSL Bureau

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. Recent changes are in **bold face.**

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, Balley Hill Rd., Malvern, Pennsylvania 19355.
W4, K4 — H. L. Parrish, K4HXF, RFD 5, Box 804, Hickory, North Carolina 28601.
WA4, WB4, WN4[1] — J. R. Baker, W4LR, 1402 Orange St., Melbourne Beach, Florida 32951.
W5, K5, WA5, WN5 — **Hurley O. Saxon, K5QVH, P.O. Box 31367, El Paso, Texas 79931.**
W6, K6, WA6, WB6, WN6 — **No. California DX Club, Box 11, Los Altos, California 94022.**
W7, K7, WA7, WN7 — Willamette Valley DX Club, Inc., P.O. Box 555, Portland, Oregon 97207.
W8, K8, WA8, WN8 — Paul R. Hubbard, WA8CXY, 921 Market St., Zanesville, Ohio 43701.
W9, K9, WA9, WN9 — Ray P. Birren, W9MSG, Box 519, Elmhurst, Illinois 60126.
WØ, KØ, WAØ, WNØ — Des Moines Radio Amateur Association, P.O. Box 88, Des Moines, Iowa 50301.
KP4 — Alicia Rodriguez, KP4CL, P.O. Box 1061, San Juan, P.R. 00902.
KZ5 — Gloria M. Spears, KZ5GS, Box 407, Balboa, Canal Zone.
KH6, WH6 — John H. Oka, KH6DQ, P.O. Box 101, Alea, Oahu, Hawaii 96701.
KL7, WL7 — Alaska QSL Bureau, Star Route C, Wasilla, Alaska 99687.
VE1 — L. J. Fader, VE1FQ, P.O. Box 663, Halifax, N.S.
VE2 — John Ravenscroft, VE2NV, 353 Thorncrest Ave., Montreal 780, Quebec.
VE3 — R. H. Buckley, VE3UW, 20 Almont Road, Downview, Ontario.
VE4 — D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg 9, Manitoba.
VE5[1] — A. Lloyd Jones, VE5JI, 2328 Grant Rd., Regina, Saskatchewan.
VE6 — Karel Tettelaar, VE6AAV, Sub. P.O. 55, N. Edmonton, Alberta.
VE7 — H. R. Hough, VE7HR, 1291 Simon Road, Victoria, British Columbia.
VE8 — George T. Kondo, VE8 ARRL QSL Bureau of Department of Transport, Norman Wells, N.W.T.
VO1 — Ernest Ash, VO1AA, P.O. Box 6, St. John's Newf.
VO2 — Goose Bay Amateur Radio Club, P.O. Box 232, Goose Bay, Labrador.
SWL — Leroy Waite, 39 Hannum St., Ballston Spa, New York 12020.

[1] *These bureaus prefer 5 × 8 inch or #50 manila envelopes.*



Transmission Line Sections for R.F. Chokes and Bypassing

BY GEORGE F. MOYNAHAN,* JR., W6AXT

RECENTLY, during construction of a 144-MHz. transmitter, I was faced with a requirement for a highly effective r.f. choke, and later, for an equally effective r.f. bypass capacitor. Conventional lumped components were simply not good enough, and I had thought initially of using tuned circuits. Then the thought came that a simple solution to both problems was to use quarter-wave line sections; a shorted section for a choke and an open one for a bypass capacitor.

Though both quarter- and half-wave sections of transmission lines have been used extensively for tank circuits in v.h.f. and u.h.f. gear, other applications of such line sections seem to have been neglected. It is well-known that the impedance looking into the open end of a shorted lossless line section (Fig. 1-A) is infinite. With even small flexible coax, such as RG-58 or 59, the impedance of a shorted *electrical* quarter wavelength is extremely high.

At the same time, such a short length of line provides a very low-resistance path for d.c. or low-frequency a.c. A great advantage of a choke section, Fig. 1-C, is that it is predictable, and not subject to unexpected series-resonance modes which result from distributed capacitance in conventional r.f. chokes. Another advantage is that the choke is inherently shielded, so it can be placed in regions of high field intensity, with little or no adverse effect. In contrast, when the usual lumped-inductance choke is located in a strong r.f. field, the mutual inductance resulting may make the choke virtually useless.

Just as shorted quarter-wave sections can be used as chokes, open-circuited sections (Fig. 1-B and D) are highly effective as bypass elements, in place of conventional capacitors. In practical examples the actual value of impedance at the end of an open quarter-wave line is not zero, but even with ordinary coaxial cable, lower impedance and consequently more effective bypassing can be obtained than with even high-quality capacitors.

There is no need to keep either type of line section in straight form. The cable can be wound on a small support, or it can be arranged against the chassis in any convenient place. In the 144-MHz. band and higher frequencies, line sections assume quite convient proportions.

In determining the length of the line section, the reduced propagation velocity, and consequently the reduced wavelength in the dielectric media, must be taken into account. This *velocity factor* is given in cable manufacturer's specifications, and is found in many handbook tables, including that in the ARRL *V.H.F. Manual.*[1] For solid polyethylene insulation, as used in RG-58, 59, 8 and 11 cables, the factor is 65.9. A quarter-wave section of such line is 65.9 percent of the length of a line having no insulation. For foamed polyethylene insulation the propagation factor is 75. When in doubt, the user can check the resonant frequency of a line section readily with a grid-dip meter.[2] This step is advisable, in any case, as there may be some variation in propagation velocity from one piece of cable to another.

If it is convenient to do so, the line section can be installed where it is to be used, and the length trimmed for optimum performance. This is desirable, as it then compensates for lead lengths involved in the installation as it is actually used.

Line sections used as chokes and bypass elements in the 144-MHz. transmitter mentioned earlier turned out to be a great deal more satisfactory in the critical applications than the more familiar lumped elements. QST

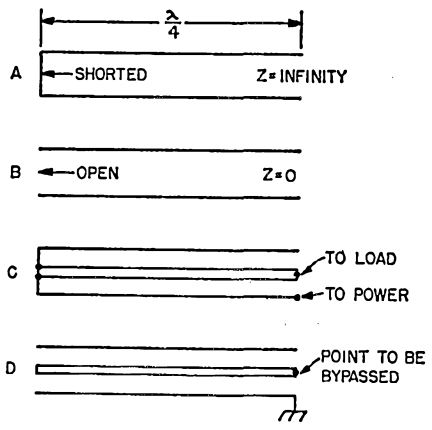


Fig. 1—Derivation of r.f. choke and bypass applications of resonant line sections. Actual length of lines used is subject to the velocity of propagation within the line.

* Professor of Electrical Engineering, San Jose State College, 125 South Seventh Street, San Jose, California 95114.

[1] *Radio Amateur's V.H.F. Manual* — Table 8-III, Characteristics of Commonly-Used Transmission Lines. P. 180, Ed. 1; 173, Ed. 2.

[2] In Fig. 8-25 of the *Radio Amateur's V.H.F. Manual* a half-wave line section is shown being checked. A quarter wavelength, with one end open, may be dipped in the same way, coupling to a small loop at the end to be shorted.

Results, Field Day 1969

W7PX/7

REPORTED BY AL NOONE,* WA1KQM/WB6SAZ

By now we hope everyone has had sufficient time to recover from what must be the most grueling of contest weekends, the June 1969 Field Day. VE2ARC/2 sums it up nicely with, "Never again . . . see you next year."

After plowing through 1255 logs in various condition; some letter-perfect, some unbelieveably confusing — we find 11,400 enthusiastic hams descending on various locations throughout the U.S. and Canada in an emergency preparedness test of incomparable magnitude.

Highlighting the results in the pages to follow are the three most popular entry classes for 1969, all record breakers. They are as follows:

Some 242 logs were received for Class 2A. Of these, W1TX/1 — the Conn. Wireless Association — comes out on top with a record 18,479 points. Second most popular was Class 3A with W5WMU/5, the Lafayette ARC of Louisiana submitting an outstanding score of 25,498. The third highest number of logs received was in Class 1B with K6YNB/6 (K6YNB, WB6CWD) breaking a long-standing record in the two-operator portable class.

* Communications Assistant, ARRL.

In addition to the above it appears the Pacifico Radio Club, K6BAG/6 has set a new high in the number of QSOs made during a Field Day with 5,298 contacts.

If your score appears to be 200 points or so lower than expected, this is undoubtedly due to the fact that credit was not allowed for Message Origination or Handling. This came about largely as a result of errors in word counting, leaving out checks, not indicating a precedence or failing to give the required information in the text. Better luck next year! My personal thanks for the hundreds of pictures submitted with your logs. I'm only sorry we couldn't use all of them.

The November Sweepstakes is approaching rapidly — see you then.

Soapbox

"Ran up the highest score on High Street, guess that's cause I'm the only op on High Street!" — **WA3EWV.** "Out of all the contacts we made on 20-meter phone, the most unusual was the one who came back to my long CQ FD saying, "WA1JQC, Avon calling. . . . !" — **WA1JQC.** "We feel FD sharpened us up for emergency situations and we plan on another worthwhile outing next Field Day." — **WA7JWC/7.** "My only complaint is that most stations

didn't indicate whether they were portable. To remedy this completely, I recommend instead of giving signal reports that aren't required, to give your station classification (Class A, B, C, or D) and possibly the number of xmtrs followed by the section." — **WA5QIQ/5.** "Several of the area Hams held a successful 27-hour emergency field day session last weekend down at Ben's Run. Perhaps their great success was due to the fact that seven days prior to the actual event the eager amateurs swooped down on the site, erected antennas, set up all their gear, and after a short period of frustration trying to find someone to talk to on the air, discovered they were a week early." — ??? "This year's FD the "wildest' 'yet. Were QRT almost 13 hours during and after the worst thunder and wind storm in area in years. The only road accessible to FD site was 2 feet under water." — **WA9QFT/9.** "We had the hardest time convincing anyone that we were in North Dakota." — **WA7GVT/ø.** "Suggest additional multiplier or bonus points for Novice QSOs to entice greater participation in this segment of our amateur bands." — **W9CSF/9.** "Someone assembled our 20 meter beam backwards and the rotor broke down. Never again, see you next year." — **VE2ARC/2.** "The only thing that didn't break down was the generator." — **WB2ZIW/2.** "Why not make it twice a year." — **WA6QKL/6.** "Had mixed assortment of Yagi's and quads on all bands except 80. Lower frequency score somewhat poor as the portable 100 foot tower would not crank higher than 20 feet." — **W5WMU/5.** "Had an intense electrical disturbance during FD and understand from a news article that we were being heard on gates and electric stoves! Is this possible???" — **KØFSK/ø.** "The only trouble we really had was pursuading a 3 inch scorpion that he really didn't want to talk on the mike at 3AM." — **W7CFJ/7.** "Despite all the rush, panic, confusion, hard rock pancakes, QRM, horses tangled in the extension cord and generator trouble; we managed to have the greatest time of our life." — **WA6TOW/6.** "Great FD, had to operate with the mobile power supply packed in ice to keep it from burning up. Boy was it hot." — **W5IUP/5.** "Score does not reflect the amount of fun I had here in Vermont, will give it another try next year." — **WA1KBZ.** "Wool socks got wet putting up antennae so they were neatly stuffed inside the Marader—dried out in no time! (Quite true!)." — **VE7BAV/7.** "Murphy's Law once again had the victory, but never giving up, next year we will sneak out again under cover of darkness to an undisclosed location to once again let the world know that W9PCS is still in there pitching." — **W9PCS/9.** "We still can't get away from signal reports on FD, some fellows demand one." — **K5LIB.** "No wonder I didn't get very good signal reports, I was asleep!" — **WA5VQK/5.** "I like the optional set-up rules this year." — **WA3BGE/3.** "We claim the FD Persistence Award for our Novice contingent for their valiant efforts to raise someone on 15 CW at 3AM local time." — **WA6GFY/6.** "With our LUC, Murphy couldn't possibly strike, and didn't!" — **K8LUC/8.** Murphy struck again when one of the members parked his new car near the tree to be used for the 80 meter antenna. You guessed it, on the first throw the lead weight, missing the tree completely, landed dead center of the roof. Second try hit a bee's nest, victims-three antenna committee members!" — **W8RTR/8.** "First couldn't start the generator starter; then couldn't start the generator. Home cooking by WN1LNG kept morale up!" — **K1RQE/1.** "A compass would have helped when raising the dipole. Next year we won't play maypole at midnight." — **K7ICY/7.** Took 3 hours off for a party when some friends dropped in." — **VE4EI/4.** "We had trouble getting people to believe we were camped in the snow, and freezing!" — **W7OBE/7.** "Perhaps a true test might be to call a Field Day without advance notice." — **WA2WVL/2.** "Strongly recommend that provisions in the rules be made to eliminate the use of any time-sharing devices." — **W1TX/1.** "This location proved to be ideal." — **KZ5AT/KZ5.** "We doubled the effort and doubled last year's score. Now if we can do it again next year." — **W9YH/9.**

1970 FIELD DAY

JUNE 27-28

SCORES

Class A stations are clubs and groups in the field with more than 2 operators. Scores are tabulated according to the number of transmitters operated simultaneously at each station. The figures and letters following each call indicate the number of valid contacts, the d.c. power inputs used, the number of participants at each station and the final score. The "power classification" used in computing the score is indicated by the letters A, B, C or D after the number of QSOs shown. A indicates power up to and including 10 watts (multiplier of 4); B indicates power over 10, up to and including 50 watts (multiplier of 3); C indicates over 50 watts, up to and including 200 watts (multiplier of 2); D indicates over 200 watts (multiplier of 1).

CLASS 1A

One Transmitter

WA3EPT/3	Hopkins ARC	849-	ABC-	9-	13,278
W8NP/8	Massilon ARC	908-	A-	15-	11,296
W7HS/7	Utah DX Association	1621-	BC-	9-	10,803
W2WS/2	Radio Amateurs of Greater Syracuse	1067-	BC-	7-	9600
K4ID/4	Capitol Hill DX Club	1292-	BC-	8-	9465
K1SMT/9	Great Lakes ARC	932-	B-	4-	8788
W7EU/7	Utah ARC	1357-	C-	20-	8342
W4JJ/4	Panama City ARC	865-	B-	22-	8185
VE2ND/2	Montreal Field Day Assn.	867-	ABC-	4-	8014
W1QI/1	Candlewood AR Assoc.	804-	AB-	16-	8012
K1KDP/1	Marlboro AR Assoc.	1194-	AC-	8-	7984
W3NNL/3	Schuylkill River Rats	430-	AB-	7-	7112
K5LIB/5	Caprock ARS	1054-	C-	25-	6724
W5YL/5	Thibodaux ARC	1053-	C-	11-	6718
W6VZT/6	Santa Clara Co. Races	696-	AB-	4-	6501
K5YAA/5	(nonclub group)	1027-	C-	6-	6362
W8RTR/8	Canton ARC	571-	AB-	15-	5940
W1OP/1	Providence Radio Association, Inc.	783-	ABC-	7-	5917
KH6RS/KH6	Maui ARC	866-	C-	8-	5796
K2BMI/2	Old Fat Albert and the Gang	744-	BC-	4-	5681
WØDEP/ø	(nonclub group)	556-	B-	4-	5604
WAØIFF/ø	(nonclub group)	603-	BC-	9-	5570
K3QBD/3	First State ARC	550-	B-	13-	5550
WAØAGM/ø	(nonclub group)	882-	C-	3-	5492
W4MVB/4	Beaches AR Society	861-	C-	11-	5376
K9LIO/9	(nonclub group)	803-	BC-	4-	5338
W4ZA/4	Richmond ARC	531-	B-	19-	5179
K7EFA/7	Yellowstone Radio Club	783-	C-	25-	5098
VE4AA/4	Winnipeg DX Club	728-	C-	13-	4968
W8TFZ/8	Aviation RC of North American Rockwell	594-	AC-	11-	4968
W7OTV/7	Tualatin Valley Emergency Radio Club	429-	ABC-	10-	4607
W6VLD/6	McDonnell Douglas Astronautics RC	486-	BC-	8-	4576
K8HHF/8	Upper Arlington ARC	720-	C-	3-	4520
K4KE/4	(nonclub group)	634-	C-	7-	4404
KZ5PA/KZ5	Crossroads ARC	647-	B-	6-	4282
W4ORF/5	(nonclub group)	663-	C-	6-	4178
WØYLC/ø	Niobrara Valley RC	596-	C-	14-	4176

W5BGE/5

Class-A Call-Area Leaders

(Calls in bold-face type represent over-all class leaders)

1A	2A	3A	4A	5A	6A	7A	8A	10A	12A
W1QI/1	**W1TX/1**	W1ARR/1	W1TA/1	**W1FW/1**	W1KWX/1	W1EKT/1	WA6GFY/6	W1NY/1	**VE3WE/3**
W2WS/2	W2HO/2	K2GQ/2	W2MU/2	W2AOH/2	K2AA/2	W2LT/2	K7AUO/7	W5ANR/5	
WA3EPT/3	W3ABT/3	K3MTK/3	K3SSC 3	K3HKK/3	**W3SK/3**	K3BKG/3	**W9SW/9**	**W6RO/6**	**15A**
K4ID/4	W4UC/4	W4IZ/4	W4SKH/4	K4IUV/4	W4CUE/4	W4BFT/4		WA9WSL/9	
K5LIB/5	KZ5AT/5	**W5WMU/5**	K5JYP/5	W5SWS/5	K5PXP/5	W5SC/5	**9A**		**W2RJ/2**
W6VZT/6	K6VKY/6	W6IOS/6	**WA6LXN/6**	W6NT/6	W6VB/6	**W6ULI/6**		**11A**	
W7HS/7	K7MNZ/7	W7GV/7	W7IO/7	W7PX/7	W7NDC/7	W7NCW/7	W3RCN/3		
W8NP/8	W8EV/8	W4FU/8	W8FY/8	W8ICS/8	W8FO/8	W8ACW/8	W6CX/6	**K6BAG/6**	
K1SMT/9	WA9LOT/9	W9AA/9	K9HZS/9	W9LM/9	WA9JYL/9	W9PCS/9	**W7DK/7**	W9YH/9	
WØDEP/Ø	WAØCJU/Ø	WAØSDC/Ø	WØEQU/Ø	WAØNPZ/Ø	WØOUI/Ø	.....	K8BYI/8		
VE2ND/2	VE3RAM/3	VE7EZ/7	VE3MRC/3	VE3JJ/3	.....	VE3NAR/3	VE3VM/3		

WAØSKH/Ø	H.P. Loveland ARC	621-	AC-	8-	4132	VE3GOG/3	Dryden ARC	349-	C-	3-	2494
K6BEP/6	(nonclub group)	528-	AC-	3-	4088	K7YMF/7	(nonclub group)	344-	C-	3-	2464
WA6AXA/6	Murphy's Lawyers	605-	C-	5-	4030	W7OBE/7	University of Wyoming Amateur Radio Club	310-	BC-	4-	2425
WAØIVU/Ø	(nonclub group)	414-	B-	3-	3926						
W4LX/4	Ft. Meyers ARC	551-	C-	6-	3906	WA7GVT/Ø	Theodore Roosevelt ARC	331-	C-	7-	2386
W8BVU/8	Cooley Electronics Club & Redford HS RC	215-	AB-	4-	3874	WA9LWJ/9	Point Radio Amateurs Ltd.	361-	C-	6-	2366
W8BE/8	K-W Society	586-	C-	11-	3716	WAØRBW/Ø	(nonclub group)	349-	C-	3-	2294
WA5REV/5	Fayetteville High ARC	378-	BC-	5-	3708	W7JHR/7	Rodeo City Radio Club	310-	C-	7-	2280
KØKYK/Ø	Tristate ARC, Inc.	532-	C-	17-	3592	WAØQFS/Ø	Albert Lee Spiderweb AR Association	313-	C-	13-	2278
WB6TWJ/6	Greater Tijuana AR and Philosophical Society	517-	C-	3-	3502	WØUPB	Thomas Brass Pounders	334-	C-	4-	2204
W9EJ/9	Society of Radio Ops.	546-	C-	33-	3476	WA5VQT/5	Little Elco Troubles, Inc.	367-	C-	-	2203
W5HTK/5	Enid Amateur Radio Club	505-	C-	15-	3430	K9MDO/9	Weyauwega Field Day Conglomeration	296-	C-	3-	2176
K4BV/4	Daytona Beach AR Assoc.	465-	AC-	28-	3402	KØKBX/Ø	Benton Co. ARC	291-	C-	5-	2146
KH6ETG/KH6	Tiki Mobile Club	492-	C-	5-	3352	WB4HPC/4	International Harvester Amateur Radio Club	323-	C-	14-	2138
W2PGS/2	Oswego AR Association.	486-	C-	18-	3316						
WA3ERJ/3	(nonclub group)	408-	ABC-	3-	3314	WA8RAA/8	Hiawatha ARC	321-	C-	4-	2126
WØDX/Ø	Newton AR Association.	300-	AB-	3-	3309	W7IDA/7	Bonner Co. ARC	285-	C-	8-	2110
WA2EIN/2	Suburban ARC	342-	B-	5-	3278	WAØAWA/Ø	Ornate Order of Blood-shot Eyeballs	316-	C-	6-	2096
VE3TM/3	(nonclub group)	544-	B-	5-	3264						
WAØPOC/Ø	The TDGS Group	469-	C-	3-	3254	WA9RPQ/9	(nonclub group)	279-	C-	3-	2074
WA7CZQ/7	(nonclub group)	506-	C-	6-	3236	VE3HK/3	Elliot Lake ARC	245-	C-	3-	2070
K7CCH/7	Coos Co. Radio Club Inc.	451-	C-	10-	3106	K8DXF/8	Mason Co. ARC	271-	BC-	12-	2032
W9GFD/9	Prairie ARC, Inc.	446-	C-	12-	3076	WB2DRG/2	Hammonton-Medford Field Day Lids	304-	C-	5-	2024
K5TLG/5	Miami ARC	439-	C-	9-	3034	WAØQIT/Ø	Hilltoppers	266-	C-	-	2006
WAØNLP/Ø	Honeywell ARC	461-	C-	9-	2966	VE7ASC/7	Chilliwack ARC	232-	C-	10-	1992
K6LDA/6	Crescent Bay Emergency Amateur Radio Net	407-	AC-	10-	2962	WØZWY/Ø	Sioux Falls ARC	292-	C-	21-	1952
						WB2ULS/2	(nonclub group)	291-	C-	7-	1946
WA7LNH/7	(nonclub group)	316-	BC-	4-	2947	WB6YNU/6	Systems Development Corp. ARC	252-	C-	12-	1912
K9TNA/9	Twin Co. Races Officers	276-	AB-	10-	2893	W8DYY/8	Mound Amateur Radio Association	252-	C-	26-	1912
K2HYQ/2	(nonclub group)	276-	B-	4-	2884						
W6BLY/6	Whittier Radio 50 Club	430-	BC-	12-	2879	W3SL/3	Delaware ARC	284-	C-	10-	1904
KØFCR/Ø	Mars ARC	408-	C-	-	2848	VE4EI/4	(nonclub group)	208-	BC-	2-	1890
W6YRA/6	U.C.L.A. Radio Club	438-	C-	8-	2828	KØOYM/Ø	Mid-Mo. ARC	248-	C-	10-	1888
K7SIK	Anaconda Radio Club	396-	C-	16-	2776	WØZWY/Ø	Sioux Falls ARC Phone Group	280-	C-	8-	1880
KØSOQ/Ø	Hastings ARC	362-	C-	10-	2772						
WA6TAP/6	(nonclub group)	414-	C-	3-	2684	W9EI/9	(nonclub group)	279-	C-	3-	1874
K6QHQ/6	South Bay AR Society	411-	C-	5-	2666	W8RCC/8	Babcock & Wilcox ARC	232-	C-	6-	1792
W7FO/7	Butte ARC	365-	C-	15-	2590	VE1AO/1	Truro ARC	217-	C-	9-	1722
WØWYV/Ø	Bellevue ARC, Inc.	363-	C-	10-	2578	W6CTH/6	So. Co. AR Society	253-	C-	2-	1718
WØAA/Ø	Minnesota Wireless Assn.	439-	CD-	10-	2541	VE5MA/5	M.J. ARC	217-	C-	4-	1702
W9OWT/9	La Salle Peru RC	390-	C-	-	2540	VE3NDR/3	No. Dorchester ARC	207-	C-	12-	1642
WA8OCG/8	Rabbit Hash FD Operators	349-	BC-	3-	2530	WA6OUX/6	Kern River Valley ARC	134-	AB-	2-	1609
W7ED/7	Gallatin ARC	351-	C-	12-	2506	WN8DCX/8	Cost-Cara Novices	127-	B-	7-	1553
						W3CDI/3	Baltimore Polytechnic Institute Radio Club	193-	C-	10-	1552
						W6CE/6	Mission San Jose HS ARC	185-	C-	12-	1510
						WAØOZP/Ø	Hiawatha ARC	179-	BC-	5-	1477
						W9OG/9	Tristate AR Society	210-	C-	15-	1460
						W1AEC/1	Southeastern Mass ARA	202-	C-	10-	1412
						W2ZJ/2	Elmira AR Association	134-	BC-	4-	1410
						W9YW/9	Rho Epsilon AR Assoc.	201-	C-	2-	1406
						W9JCL/9	Neenah-Menasha ARC	160-	AC-	5-	1402
						W6KII/6	Dunsmuir ARC, Inc.	332-	D-	4-	1396
						K3UIB/3	Naval Supply Depot and Explorer Post 681	396-	D-	7-	1388
						W7YB/7	Montana State Univ. ARC	198-	C-	4-	1388
						KL7EKZ/KL7	Muskeg Radlops	151-	C-	-	1306
						WAØTAV/Ø	Fearsome Fern Creek 4	327-	BCD-	4-	1304
						WB2VGU/2	(nonclub group)	142-	AC-	3-	1298
						KØFBF/Ø	Cedar Rapids Amateurs for Progress	121-	B-	6-	1289
						WØYHE/Ø	Elephant Club	172-	C-	4-	1238
						WA1JWG/1	(nonclub group)	81-	B-	4-	1149
						WB2ZIW/2	Outside Agitators Club	154-	C-	4-	1124
						WØAJA/Ø	Coon Valley ARC	127-	BC-	10-	1073
						KØEXN/Ø	Click & Chatter Club	105-	C-	8-	1030
						WA7FKT/7	ETS-JJL-LKY-FKT Renegades	104-	C-	4-	1024
						W4DOC/4	Atlanta Radio Club	131-	C-	6-	986
						WB2VPY/2	Chemung Co. AREC Assn.	64-	C-	12-	984
						W7YN/7	Nevada AR Association	193-	D-	4-	979
						WAØAAV/Ø	Larimar Co. ARC	115-	BC-	5-	914
						W4ABK/4	Kentuckiana Radio Club	81-	BD-	5-	873
						W1VSR/1	(nonclub group)	52-	B-	3-	868
						W4QM/5	Mid-South VHF Club	62-	BC-	5-	823
						KØEPY/Ø	(nonclub group)	198-	CD-	4-	797
						WAØQOZ/Ø	Pan-Banders Radio Club	95-	C-	3-	770
						WNØWXL/Ø	Skyline Novices	55-	C-	4-	730
						W9AML/9	Central Illinois RC	153-	D-	8-	659
						W5PYI/5	Mineral Wells ARC	70-	C-	6-	620
						WB2NTE/8	(nonclub group)	46-	B-	7-	614
						WA7KWY/7	(nonclub group)	140-	C-	4-	558

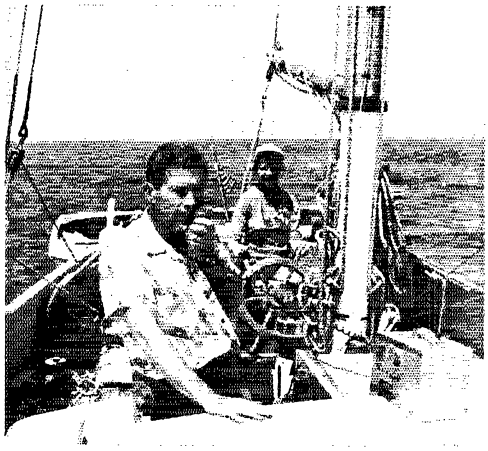
W4OZF/4

K5VVN/5	New Iberia Senior High Amateur Radio Club	25-	C-	3-	550
WNØUCZ/Ø	Hiawatha AR Novices	11-	B	-3-	499
WB8DRZ/8	Gahanna Lincoln ARC	49-	BC-	4-	497
WA9SLK/9	Waupaca ARC	77-	D-	4-	431
WA9YEM/9	Post 339 ARC	1-	C-	4-	406
WAØUIR/Ø	(nonclub group)	28-	C-	3-	368
K4JLA/4	Spartanburg ARC, Inc.	253-	D-	13-	253
WN7IWU/7	Whitford Jr. High ARC	56-	C-	4-	112
W1FWH/1	Newington AR League	26-	D-	1-	26
	Two Transmitters Operating Simultaneously				
W1TX/1	Conn. Wireless Assoc.	1981-	BC-	21-	18,479
KZ5AT/KZ5	USAFSO MARS	1875-	BC-	15-	14,196
WA9LOT/9	(nonclub group)	1171-	B-	5-	11,339
W8EV/8	Kanawha Radio Club	1595-	BC-	20-	10,414
W3ABT/3	Univ. of Pa. ARC	1355-	BC-	6-	9900
K5RWK/5	Richardson ARC	1511-	C-	22-	9866
W8UDG/8	Apricot Message Net	1004-	AC-	12-	9778
W8LT/8	Ohio State Univ. ARC	991-	BC-	18-	9776
K8HKB/8	Northern Ohio ARS	1389-	ABC-	25-	9362
K6VKY/6	So. California Amateur Network	1431-	C-	12-	8986
WAØCJU/Ø	Viking AR Society	464-	A-	8-	8982
W8DQL/8	Oak Park ARC	1386-	C-	21-	8916
W5AC/5	MSC Radio Committee	1411-	C-	9-	8866
WAØJXT/Ø	Fox ARC	1092-	BC-	10-	8814
W9HHX/9	Milwaukee School of Engineering ARC	1347-	BC-	9-	8683
W3ISE/3	TSFTFOKCSTATLC	1367-	C-	6-	8602
K3NSS/3	(nonclub group)	1259-	BC-	9-	8191
W9YT/9	Badger AR Society	1189-	C-	8-	7934
WØERH/Ø	Johnson Co. ARC	1166-	BC-	18-	7877
WA3BGE/3	(nonclub group)	943-	ABC-	4-	7703
W5GKF/5	East Texas DX Society	928-	BC-	9-	7677
W5ABD/5	Westside ARC	1165-	C-	20-	7590
WØLRN/Ø	Arapahoe Radio Club	896-	BC-	16-	7529
W2HO/2	Boiled Owls of N.Y.	1138-	C-	-	7428
W1HEB/1	Middlesex ARC	1095-	BC-	20-	7189
VE3RAM/3	Ottawa Valley Mobile Radio Club, Inc.	1059-	C-	20-	7154
K8LGS/8	Northern WV FD Assoc.	869-	ABC-	11-	7105
WØLB/Ø	Jay Hawk ARS	294-	C-	55-	7082
VE1FO/1	Halifax ARC	1069-	BC-	16-	7074
W4UC/4	Five Flags ARA, Inc.	1057-	AC-	17-	7034
W9YB/9	Purdue ARC	1061-	C-	8-	6966
W4KVK/4	Henderson (Ky.) ARC	1050-	C-	16-	6900
WA6BVL/6	Moraga Hilltoppers	719-	AB-	6-	6880
WB2SMD/2	WNY Teen Contest Club	890-	BC-	5-	6835
W6KA/6	Pasadena Radio Club	606-	AB-	16-	6834
W5HF/5	Combined NW Arkansas Amateur Radio Club	1029-	C-	20-	6774
K9BGL/9	Belleville AR Foundation	845-	BC-	5-	6754
W5PDO/5	Los Alamos ARC	1023-	C-	13-	6738
W8VA/8	Tri State ARC	972-	C-	8-	6632
W8DSO/8	(nonclub group)	971-	C-	16-	6226
K7MNZ/7	Aberdeen ARC	925-	C-	8-	6150
K2KKH/2	Walton Radio Assoc.	921-	C-	12-	6126
W8IPA/8	West Park Radiops	949-	C-	15-	6094
WØVZG/Ø	Pilot Knob ARC, Inc.	898-	C-	16-	5988
K7SKW/7	Mt. Baker ARC, Inc.	861-	C-	18-	5966
K4AF/4	Bolling AFB Support Group, MARS	596-	B-	8-	5964
K9QPJ/9	Midwest ARC, Inc.	676-	AC-	5-	5892
K7AYF/7	Shy-Wy Radio Club	913-	C-	7-	5878
K4TBN/4	Peach State Contest Operators Society	894	C-	7-	5764
VE3BSZ/3	Welland Co. ARC	385	AB-	-	5662
K6HAI/6	Northshores ARC	808	C-	12-	5648
W8IMX/8	Weirton ARC	794-	C-	6-	5564
WA9UVE/9	Nicolet HS ARC	842-	BC-	16-	5461
W9IU/9	Kokomo Firebird RC	634-	C-	32-	5375
WØMXW/Ø	Rochester ARC	793-	C-	40-	5358
WAØVTU/Ø	Pikes Peak RA Ass'n Inc.	787-	C-	25-	5322
VE3FOX/3	Independent Ontario Operators	782-	C-	6-	5292
WA9TXE/9	So. Milwaukee RC	748-	C-	17-	5288
W8IZ/8	Saginaw Valley ARA	639-	BC-	16-	5257
VE5NN/5	Regina ARA	771-	C-	17-	5226
W5VFW/5	(nonclub group)	608-	BC-	6-	5181
W6IPW/6	San Francisco RC, Inc.	747-	C-	6-	5092
VE5AA/5	Saskatoon ARC	776-	C-	25-	5056
WA4QFL/4	GLERC Radio Club	737-	C-	15-	5022
W9UDU/9	Racine Megacycle Club	730-	C-	15-	4980
W7CTX/7	(nonclub group)	546-	BC-	5-	4938
W4EXU/4	Rowan AR Society	722-	C-	15-	4932
W4AM/4	Chattanooga ARC	748-	C-	26-	4888
K3VEI/3	Hazleton HS ARC	700-	C-	8-	4800
WØHT/Ø	Flint Hills ARC	698-	C-	12-	4788
W3EKT/3	(nonclub group)	731-	C-	4-	4786
K2EVW/2	So. Counties ARA	694-	C-	7-	4764
W4NLX/4	Indian River ARC, Inc.	680-	C-	12-	4680
K9QFR/9	Sangamon Valley DX Assn.	713-	C-	6-	4678
W6MSO/6	Inglewood ARC	608-	ABC-	13-	4659
W7HWL/7	Nellis AFB MARS	675-	C-	7-	4650
WØSOE/Ø	Wichita ARC, Inc.	668-	C-	20-	4608
W4VHH/4	North Augusta-Belvedere Amateur Radio Club	658-	C-	8-	4548
WØJUI/Ø	North Iowa ARC	622-	C-	15-	4532
K2AQI/2	Maplewood Radio Unit	649-	BC-	15-	4524
WB4MZT/4	Southeastern Virginia Wireless Association	681-	C-	4-	4486
K8VNQ/8	Mountain State Transmitters, Inc.	647-	C-	-	4482
W1EDH/1	Middlesex AR Society	519-	ABC-	10-	4468
W2ZQ/2	Delaware Valley RA	573-	BC-	13-	4457
W5BQN/5	Point Comfort ARC	641-	C-	10-	4446
W5LN/5	Temple ARC	670-	C-	7-	4420
WA4ECY/4	Corry Field ARC	633-	C-	13-	4398
WAØTYL/Ø	(nonclub group)	530-	BC-	5-	4395
W8HRQ/8	(nonclub group)	628-	C-	3-	4368
WA2AQH/2	Maplecrest Mountain Marauders	635-	CD-	4-	4329
K3RTE/3	(nonclub group)	614-	C-	4-	4284
WA3DFM/3	Two Rivers ARC	888-	AC-	20-	4263
K1RQE/1	Portland Amateur Wireless Association	576-	C-	12-	4256

WN9ZJI

VE6NC/6	Northern Alberta RC	674-	C-	22-	4244
VE4DF/4	Flin Flon ARC	601-	C-	3-	4206
W5HYI/5	Carbide ARC	566-	C-	6-	4196
KØCIA/Ø	North Omaha DX Society	684-	C-	5-	4104
VE4BB/4	Winnipeg ARC	756-	CD-	20-	4093
WA5VAQ/5	Scout Explorer Post 72 Last Frontier Council	582-	C-	9-	4092
WAØRXQ/Ø	Goldfield Radio Club	515-	BC-	7-	4053
K8SJU/8	(nonclub group)	572-	C-	6-	4032
W4SGE/4	(nonclub group)	605-	C-	6-	4030
K5RVD/5	Baton Rouge ARC	1338-	D-	17-	4014
K9CJU/9	RA Megacycle Society	598-	BC-	12-	4009
WAØKSS/Ø	Bell ARC	562-	BC-	-	3975
WA2PNU/2	Larkfield ARC	489-	AC-	20-	3967
WØCIW/Ø	Fullerton RC, Inc.	561-	C-	10-	3966
VE7GG/7	Guy's Gamblers	550-	CD-	5-	3958
K9TSM/9	Goshen ARC	555-	C-	11-	3930
WAØDGW/Ø	Steele Co. ARC	555-	C-	7-	3930
W5ND/5	Orange ARC	521-	C-	10-	3926
K2LSA/2	State Line Radio Club	505-	BC-	8-	3901
VE1LC/1	Loyalist City ARC	411-	BC-	10-	3896
WA4TFZ/4	Albemarle ARC	540-	C-	-	3840
K9FEI/9	Allison ARC	523-	C-	10-	3738
W2RVK/2	IBM Owego ARC	408-	BC-	4-	3723
W9UKY/9	Chicago Radio Traffic Association	482-	AC-	9-	3714
W5GZO/5	Dallas Ten Meter Net	548-	C-	7-	3688
K8LIB/8	Ford Amateur Radio League, Tin Lizzy Club	548-	C-	20-	3688
WØBRI/Ø	Kimmswick St. Louis Contest Club	509-	C-	7-	3654
W3FT/3	Baltimore ARC, Inc.	542-	C-	20-	3652
W5GAD/5	Jefferson AR Station	519-	BC-	14-	3580
W1TKZ/1	Wellesley AR Society	491-	C-	10-	3546
VE1ZH/1	Greenwood Ham Club	490-	C-	12-	3540
W2JUG/2	West Jersey RA	428-	BC-	10-	3520
K8SAM/5	Edmond AR Society	453-	C-	12-	3518
WAØTGM/Ø	Project X Radio Club	448-	BC-	3-	3517
W8YPT/8	Chippewa ARC	438-	BC-	35-	3480
W2JTZ/2	Chaminade HS RC	468-	C-	10-	3418

VE3DOP/3

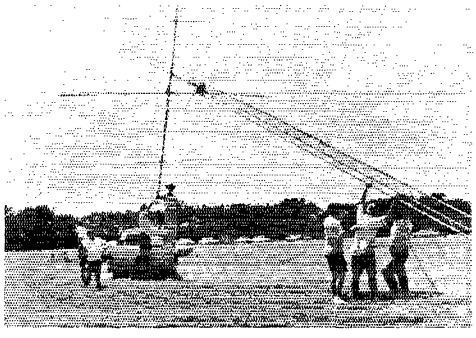


W6DO/2

WAØQYC/Ø	Bloomington AR Klub	425-	C-	7-	3416
WA9JNY/9	Electronic Explorer Post 373	450-	C-10-		3300
K9HDH/9	Elkhart Red Cross ARC	483-	C-	5-	3298
WB6XYM/6	(nonclub group)	481-	C-	6-	3286
W2BE/2	Tryon RC	420-	AC-10-		3228
W4NN/4	Eglin AR Society	468-	C-10-		3208
VE2DID/2	(nonclub group)	460-	C-10-		3160
K4GG/4	Manatee ARC	121-	C-10-		3126
W4IGW/4	(nonclub group)	420-	C-	6-	3120
WAØRAX/Ø	Albert Lea ARC	453-	C-10-		3118
WØAP/Ø	Grand Island AR Society	417-	C-	2-	3102
W9AB/8	Michiana ARC	361-	BC-12-		3066
W3AVK/3	West Branch AR Assoc.	443-	C-	6-	3058
WA4YRB/4	The Virginia Hams	364-	C-	6-	2984
W2RHM/2	Black River Valley ARC	387-	C-	-	2922
W4VMT/4	Biscayne ARC	433-	CD-13-		2922
WA88RA/8	St. Joseph HS ARC	384-	C-17-		2904
W3PSH/3	Keystone ARC	255-	B-	4-	2895
WA5PFH/5	North Arkansas ARS	418-	C-10-		2878
K7RJM/7	Polk Co. ARC	372-	BC-	4-	2838
W6UUS/6	Convair Radio Club	394-	AC-	8-	2776
W2QW/2	Raritan Valley RC	316-	BC-	7-	2757
W8VY/8	Kalamazoo ARC	275-	BC-10-		2749
K2CCP/2	WDBG RC	314-	BC-15-		2748
WA9MVP/9	Central Indiana VHF/UHF Club, Inc.	391-	CD-	8-	2707
K5SKF/5	Gaylark RC	380-	C-	6-	2680
K9VHB/9	Ottawa Radio Club	682-	D-20-		2646
WØRCH/Ø	Pioneer Radio Club	403-	C-12-		2618
WB2YTF/2	(nonclub group)	516-	CD-	-	2614
KØFSK/Ø	(nonclub group)	330-	C-	3-	2580
VE7UI/7	North & West Vancouver Amateur Radio Club	377-	BCD-17-		2565
WA8UPU/8	Hazel Park ARC	320-	BC-15-		2485
WA5KA8/5	The Three Hamskateers	314-	C-	3-	2484
WA9BRE/9	Argonne ARC	288-	BC-	4-	2469
W7IEU/7	Sno Co Key Klix	180-	AB-	3-	2453
W4BUW/4	Patrick Henry ARC	354-	ACD-11-		2451
WB8EDZ/8	Explorer Post 285 RC	402-	C-	-	2412
K5FIQ/5	Kirtland AFB ARC	335-	C-	3-	2410
WØEBE/Ø	Southwest Missouri ARC	301-	C-30-		2406
WA9PBZ/9	Pike High School RC	294-	C-12-		2384
KØGFV/Ø	Iowa-Missouri ARC	288-	C-	9-	2328
K4DXZ/4	Lee-Chambers CD	319-	C-	4-	2314
VE7ARM/7	Richmond ARC	177-	AB-	6-	2300
W9MEP/9	Sterling-Rock Falls ARS	263-	BC-	5-	2211
WØKQU/Ø	Central Kansas ARC	432-	CD-	-	2173
W9PJ/9	La Crosse ARC	262-	C-10-		2172
WAØOZB/Ø	Austin ARC	258-	C-	7-	2158
W2QYV/2	Niagara Radio Club, Inc.	255-	AC-	-	2128
VE7AWJ/7	Powell River ARC	251-	BC-	9-	2115
W2YPN/2	Albany HS ARC	280-	BC-	3-	2104
WB9ACU/9	Lincoln Amateur Wireless Society	283-	C-	5-	2098
VE7BAR/7	Burnaby ARC	282-	C-10-		2092
KØJOQ/Ø	(nonclub group)	476-	CD-	4-	2065
VE7BWI/7	Beaver Valley ARC	242-	C-	6-	2052
WA3JBE/4	St. John's College H.S. ARC	275-	BCD-	3-	2050
WAØJRE/Ø	Wichita Tec-ni-chat ARC	494-	C-10-		2040
WA5UZB/5	(nonclub group)	246-	BC-	-	2029
WAØHOU/Ø	Blue Valley RC	230-	BC-12-		2010
WA3GMV/3	McDowell HS ARC	666-	B-	9-	1998
W9EJH/9	Madison Co. ARC	264-	C-	5-	1984
WB6ZSY/6	SPUGLGN	222-	C-	3-	1932
WB4KBC/4	Jesuit ARC	221-	CD-	7-	1905
K1JFI/1	Roger Williams VHF Soc.	143-	B-12-		1897
W3NB/3	Chesapeake ARC	602-	BC-25-		1886
K8EWN/8	VHFers	163-	B-10-		1867
WAØNQA/Ø	Independence ARC	341-	BCD-	-	1867
WA9DNZ/9	MORAD	199-	BC-15-		1851
K2CT/2	Albany (NY) ARA	127-	AC-	6-	1830
W8SGT/8	Central Buckeye ARA	160-	BC-12-		1818
WA3JDV/3	Indiana Univ. of Pa. ARC	230-	C-	3-	1780
WB8AOA/8	Lawton Comm. Schools	169-	BC-	4-	1707
K9UNI/9	Valley VHF Club	144-	B-14-		1698
WA7FQD/7	Emerald AR Society	172-	C-	6-	1632
W1NRE/1	Meriden ARC, Inc.	165-	BC-20-		1623
W4WVJ/4	London Co. ARC	145-	BC-	4-	1599
W3GQY/3	Brandywine HS ARC	172-	BC-10-		1591
WA1JVL/1	Sharon HS ARC	129-	BC-	3-	1590
KØGPV/Ø	Southwest Iowa ARA	160-	C-	3-	1560
W5RIN/5	Beaumont ARC	127-	AC-	6-	1530
WA5RAA/5	Manzano HS RC	169-	BC-	4-	1504
WA9FIH/9	Elmwood Park CD	104-	BC-	7-	1467
W5AW/5	Big Spring ARC	176-	C-	6-	1456
WA3KOQ/3	(nonclub group)	519-	C-	2-	1438
WA5PFK/5	Watonga ARC	90-	B-	7-	1420
WAØTKV/Ø	Ruskin HS ARC	261-	BD-10-		1407
K9MFI/9	Big 25 Sportsman's Club	688-	C-	2-	1376
K7WYV/7	(nonclub group)	150-	C-	4-	1354
WA5IPE/5	Wheat Straw ARC	114-	BC-	6-	1326
WN6QDQ/6	West Valley ARC Novices	102-	B-	3-	1318
VE3BSQ/3	Quinte ARC	102-	BC-	7-	1236
WA5VMC/5	Moore's Mob	137-	C-	3-	1222
KØVKN/Ø	Fort Hays QSOers	68-	C-	6-	1208
WA8VDE/8	(nonclub group)	131-	C-	5-	1186
WØFHO/Ø	Winowa ARC	93-	AC-	7-	1170
WA8ZVH/8	(nonclub group)	86-	C-	3-	1116
WA2HUB/2	Meadow Island DXpedition	110-	BC-	3-	1066
WN9YUD/9	Explorer Post 366 RC	66-	C-	7-	996
WA9YCK/9	Chi Bur Ban Mobileers	188-	D-	5-	964
W9UCZH/9	Winslow ARS, Inc.	142-	CD-	6-	934
WA8ZNC/8	Eastern Ohio Contesters	366-	CD-	3-	854
WN9YXX/9	Fremd HS ARC	87-	C-	4-	822
W5KEG/5	Camden ARC	31-	C-	5-	766
WB4IDX/4	The 3 Goochs	45-	AB-	3-	775
K7ICY/7	Beaverton HS RC	133-	C-	4-	698
WB9ATL/9	Cathedral HS ARC	322-	BC-	8-	650
WN9TWK/Ø	Explorer Post 11 RC	27-	B-	4-	636
WB6KFW/6	South High ARC	176-	BC-	7-	485
WAØRXC/Ø	Cloquet HS ARC	42-	C-	4-	442
K9ONA/9	6 Meter Club of Chicago	65-	B-	5-	390
W8GQ/8	Vandalia-Butler ARC	44-	B-	1-	332
WA8JXE/8	Murphy's Subterranean Circus and the Tenn. Valley Indians	47-	BC-	3-	318
W6JAP/6	No. Hollywood Youth's Optimist Radio Club	187-	CD-	-	225
W2OYH/2	Morris Radio Club	25-	B-	4-	171
K8CQA/8	Tusco Radio Club	68-	C-	3-	136

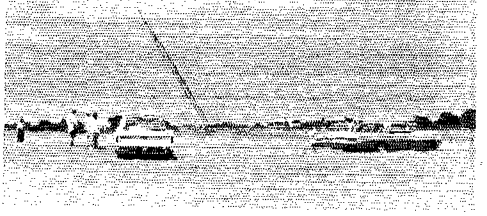
Three Transmitters Operating Simultaneously

W5WMU/5	Lafayette ARC	2776-	ABCD-	22-	25,498
W5KHB/5	Old Natchez ARC	1898-	B-	13-	17,882
WAØSDC/Ø	Silly Darn Corntesters	1749-	BC-	10-	15,257
W4FU/8	Ohio Valley AR Assoc.	2606-	CD-	20-	15,074
K3MTK/3	Suburban ARC, Inc.	1650-	BC-	23-	14,351
W4IZ/4	North Florida ARS	1902-	ABC-	50-	13,790
W4VYS/4	Louisville's Active Radio Operators	1706-	BC-	11-	13,111
WA5CKF/5	Irving Amateur RC	1428-	BC-	14-	12,890
W9AA/9	Hamfesters RC	1647-	ABC-	12-	12,789
W6IOS/6	Palisades ARC of Culver City	1417-	BC-	30-	11,954
VE7EZ.7	Victoria Short Wave Club	1751-	BC-	30-	11,471



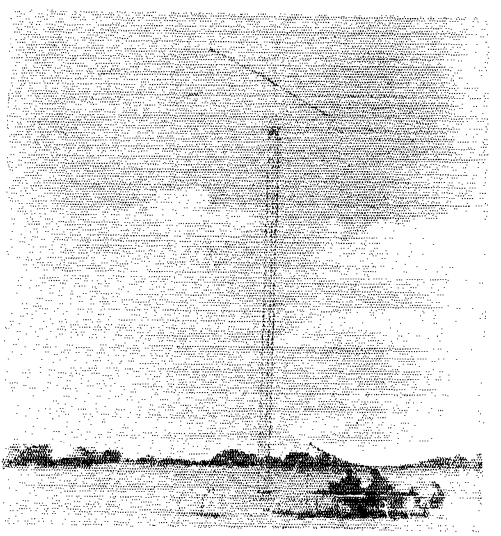
W8TO/8	Columbus AR Association	1667-	BC-23-11	1,227
K6CLZ/6	Aerojet RAC	1157-	BC-21-11	1,198
W4TRC/4	Kingsport ARC	1691-	C-31-11	1,146
W1ARR/1	Murphy's Marauders	1665-	BC-14-11	1,044
K6YA/6	Foothills AR Society	1035-	BC-26-10	0,061
W7GV/7	Old Pueblo RC	1519-	C-25-	9914
K2GQ/2	Irvington RAC	1397-	AC-25-	9872
W8DB/8	MVARCS	1990-	BCD-12-	9672
K4UWH/4	Johnson City Assn. Inc.	1104-	BC-15-	9643
WA0IOT/0	Independent ARC	1017-	BC-10-	9578
WA9ZMP/9	Naperville Central HS Amateur Radio Club)	1465-	C- 6-	9390
W9AXD/9	Rockford AR Association	1382-	C-10-	9292
W9CQQ/9	Ozaukee RC, Inc.	1088-	ABC-25-	9038
W2CXM/2	Cornell University ARC	1365-	C- 6-	9010
W7KB/7	Charlie's Clods	1351-	C- 8-	8906
WA2LQO/2	Grumman ARC	986-	ABC-32-	8623
K3HUO/3	South Community YMCA RC	1286-	BC-15-	8397
W1DC/1	1200 Radio Club	1229-	C-13-	8394
K5VOZ/5	(nonclub group)	1255-	C-32-	8330
K4BQP/4	Lee County AREC	1197-	BC-10-	8215
KH6WO/KH6	Honolulu ARC	1241-	C-30-	8186
W6HS/6	Crescenta Valley RC	912-	BC-22-	8027
W8ZHO/8	Muskegon Area Amateur Radio Council	1265-	CD-40-	7967
W4RUL/4	Greenville ARC	1155-	AC-12-	7900
W3VA/3	Tamaqua Area SSB ARA	1044-	BC-12-	7872
K4CSH/4	Kentuckiana RC	1139-	C-15-	7834
WB2RLO/2	Fair Lawn ARC	751-	AB-12-	7826
W3OK/3	Delaware Lehigh ARC	1029-	BC-16-	7519
W2DXL/2	Overlook Radio Society	1093-	BC-19-	7397
VE2ARC/2	Montreal ARC	995-	BC-14-	7104
W4FDV/4	Raleigh AR Society	1007-	AC-31-	7058
W2SE/2	New Providence ARC	975-	BC-20-	6974
WB6NVY/6	Redwood HS ARC	700-	BC-15-	6941
WA0TCO/0	(nonclub group)	983-	BC- 9-	6897
W8HLD/8	Catalpa AR Society	1045-	C-27-	6870
W5HO/5	Central Louisiana ARC	982-	BC-15-	6785
W9MJL/9	Vermillion Co. ARA	1199-	CD-21-	6701
K4BAI/4	Columbus Ga. ARC, Inc.	968-	C-12-	6608
W9BFO/9	S.E. Illinois Ham Soc	959-	C-14-	6554
W8VVL/8	Queen City Emer. Net	1151-	BCD-35	6494
WB6AUA/6	The F.O. Gypsies	980-	C- 3-	6480
W3GV/3	Radio Assn. of Erie	940:	BC-27-	6449
W3BEH/3	Bowie ARC	824-	BC- 6-	6439
W3KK/3	ARINC ARC	837-	BC-14-	6365
W8ZIP/8	CRES AREC	712-	BC-18-	6351
W7RXD/7	(nonclub group)	769-	BC-10-	6314
W9FBZ/9	U.S. Naval Avionics Facility Radio Club	928-	C-10-	6168
K7UGT/7	Sierra Nevada AR Society	750-	ABC-25-	6125
K3AER/3	Lake Shore AR Assoc	887-	C-10-	6122
WA0QJX/0	Roosevelt High School Amateur Radio Club	799-	BCD- 6-	6053
K2JD/2	(nonclub group)	905-	C-10-	6030
W2HFP/2	Unioncount AR Assoc	847-	BC-13-	5964
WA3DJQ/3	High Point HS ARC	825-	C-14-	5960
WB2SEQ/2	American Red Cross Emergency Radio Club	595-	B-13-	5955
VE3KCD/3	Kitchener-Waterloo ARC	856-	C-14-	5936
W8QK/8	Calhoun Co. Hams	819-	C-25-	5914
WØBRN/0	Three Rivers ARC	837-	BC-10-	5897
WA5RMC/5	(nonclub group)	1128-	CD-11-	5837
W1AQ/1	Assoc. Radio Amateurs of So. New England	829-	BC-14-	5805
W3DUU/3	SPARC	785-	BC-12-	5774
WA9HQB/9	Fall Creek ARC	774-	BC- -	5609
WA4LXA/4	Knox Radio Club	596-	ABC-10-	5605
W5QCN/5	Tarrant Co. 6 meter Emergency Net	771-	BC-14-	5520
K9JSI/9	Laporte AREC	726-	AC-15-	5466
VE6NQ/6	Calgary AR Association	807-	C-30-	5442
WA3EWJ/3	Montgomery ARC	798-	C-25-	5388
W6NI/6	East Whittier RC	619-	BC-12-	5240
W8GFG/8	Shenango Valley AR Field Day Group	659-	AC- 7-	5204
W9CSF/9	Michigan City ARC	651-	BC-23-	5178
W7DP/7	Walla Walla Valley RAC	719-	C-17-	5114
K4JUA/4	So. Miami Radio Club	716-	C-20-	5096
W3PGA/3	Aero ARC	738-	C- 5-	5038
W8BI/8	Dayton AR Association	722-	BC-22-	5025
W1GB/1	Hamden AR Association	696-	C-30-	4976
W6SOV/6	(nonclub group)	544-	AB- 7-	4962
K4HUF/4	Washington Co. RACES	690-	C-11-	4940
W5PFC/5	Jackson ARC	712-	CD-12-	4940
W7PXL/7	Valley RC of Eugene	643-	C-12-	4878

← K5RWK/5 →



W7OBE/7

K8WWK/8	Jacks Amateur Comm Klub	674-	BC- 7-	4869
W5NK/5	Greater New Orleans ARC	672-	C-15-	4832
W6AK/6	Sacramento ARC	805-	BCD-12-	4827
W6KBI/6	Humboldt ARC	617-	C-10-	4702
W5TSV/5	Pampa ARC	637-	C-15-	4622
WA3LOS/3	IBM Gaithersburg ARC & Comsat ARC	628-	BC-20-	4613
K3ZAC/3	Warminster ARC	548-	BC-15-	4472
W0CS/0	(nonclub group)	580-	BC-30-	4432
W7LBP/7	(nonclub group)	628-	C- 4-	4416
WA8URP/8	Fairview HS ARC	531-	BC-10-	4380
VE4JK/4	Southwestern Manitoba Amateur Radio Club	596-	CD-15-	4338
W9BZN/9	IMO VHF ARC	770-	BCD-16-	4301
K4YHB/4	Charles E. Newton Jr. Amateur Radio Club	580-	C- 7-	4280
KØLIR/0	St. Louis ARC	556-	AC-21-	4230
KP4BFF/KP4	Sabana Seca ARC	568-	C-10-	4208
W8VPV/8	Cuyahoga Falls RC	496-	ABC-15-	4201
WA2CSP/2	Chatham Swamp Patrol	507-	BC- 9-	4173
K3HDO/3	District Heights RC	558-	C- 6-	4148
W2BX/2	Cumberland RC	524-	BC- 6-	4112
W2MO/2	Livingston ARC, Inc.	466-	BC-17-	4079
K3OTY/3	Etna Radio Club	434-	BC- -	4058
WA3CCP/3	ARTICS ARC	390-	ABC-11-	4031
W9INL/9	Bloomington ARC	422-	ABC-20-	4030
W8ODJ/8	Buckeye Shortwave ARA	692-	BCD-20-	3951
WØRRE/0	Heart of America RC	505-	BC- 8-	3920
VO2AI/VO2	ARC of Western Labrador	518-	C- 7-	3908
W2FD/2	Limestone Radio Society & Fayetteville Manlius HS Radio Club	511-	BC-22-	3881
WA9MVX/9	Delaware Co. Civil Defense Unit #1	535-	CD- 4-	3863
W3VV/3	McKean Co. ARC	410-	BC- 9-	3829
W4AQL/4	Ga. Tech Radio Club	463-	BC- 9-	3786
VE3PRC/3	Peel ARC	494-	BC-11-	3770
K7ODJ/7	N.E. Washington Sevens	490-	C- 8-	3740
WA2JUM/2	Massapequa ARC	485-	BC-10-	3737

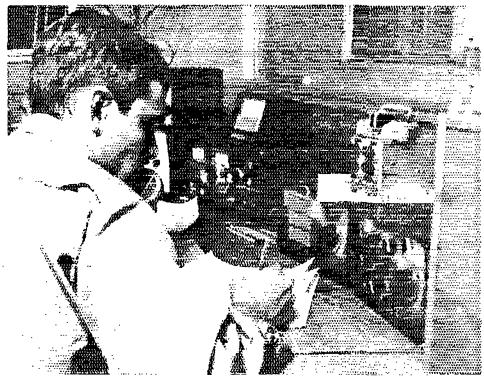


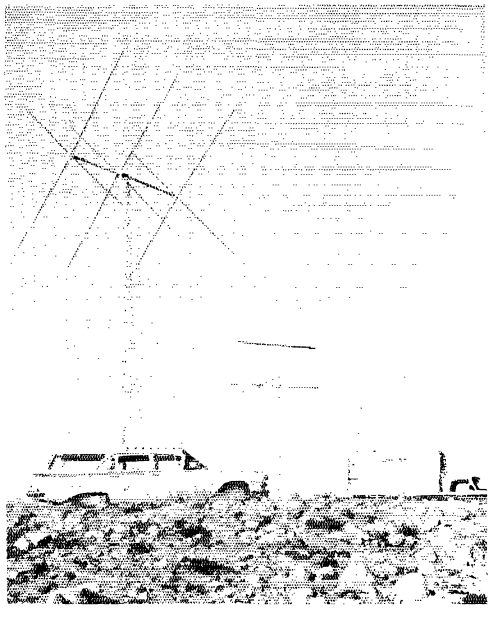
WA4YKI/4	(nonclub group)	433-	ABC- 4-	3695
VE3SRS/3	Sudbury & District ARC	401-	BC-20-	3689
W8BAP/8	Scioto Valley ARC	581-	CD-15-	3668
K9EAM/9	Green Bay Mike and Key Club	508-	C-15-	3648
WA0NNR/0	Ottumwa ARC	621-	CD- -	3608
VE3DRT/3	Skywide ARC	500-	C- -	3600
W6AR/6	Oroville AR Society	426-	C-14-	3566
W8CQK/8	Battelle-Columbus ARC	426-	C-12-	3556
K2UAN/2	North Country ARC	417-	C- 7-	3502
WA8VNU/8	AREC CD Radio Club	392-	BC-17-	3471
K2RQU/2	(nonclub group)	419-	ABC- 7-	3437
W8EQ/8	Lima Area ARC	460-	BC- 9-	3435
WA3FJY/3	North Pocono ARC	461-	AC- 6-	3402
VE3SWA/3	South Waterloo RC	373-	BC-16-	3401
W9VT/9	Tritown RC	632-	BCD-21-	3399
WB2HIW/2	East Brunswick ARC	517-	ACD-10-	3338
W0GWX/0	Lee's Summit ARC, Inc.	537-	BCD- -	3327
W0CKF/0	Minneapolis RC	450-	C-20-	3300
WA0ULB/0	Akron AR Operators	462-	BC- 4-	3285
W2YX/2	Litcom Comm. Club	431-	BC- 3-	3276
WA5BRF/5	Hot Springs RAC	443-	C-10-	3258
W8YDK/8	Milford ARC	316-	ABC-20-	3255
WA2DNR/2	Colonie Central HS RC	406-	C- 6-	3236
WB6ZLM/6	Woody's Woodpeckers	413-	C- 3-	3078
W2BFR/2	(nonclub group)	535-	BCD- 7-	3077
W8NJH/8	Stuart Rockafellow ARS	266-	ABC- 6-	3077
W5KA/5	Austin ARC	321-	BD-25-	3063
WB2DXM/2	Some of the Guys	394-	AC- 6-	3006
WA5WKP/5	Twin City Hams	307-	BC-16-	2980
WA5SIM/5	Miss. Sideband Net	633-	CD- 8-	2935
W4GG/4	Greensboro Radio Club	388-	C- -	2928
VE3CML/3	NIBS ARC	351-	C- 7-	2906
W5SRW/5	Mesilla Valley RC	349-	C- 7-	2894
K2HJY/2	Medford Wireless Ass'n	277-	BC- 8-	2877
W2GLO/2	Levittow ARC	215-	BC- 9-	2857
WA0TIR/0	Storm Lake ARC	332-	BC-10-	2849
W4BHR/4	Mike and Key Club	339-	C-12-	2834
W1ECV/1	Southington ARA, Inc.	427-	CD-14-	2805
K2EAW/2	Webster Explorer Radio Post	307-	BC-11-	2798
WA5OLS/5	(nonclub group)	333-	C- 8-	2798
KL7EKO/KL7	Moose Horn ARC	332-	C- -	2792
WA9WHV/9	Lawrence Central ARC	314-	BC- 5-	2792
W4BB/4	Delta ARC	330-	C-10-	2780
WA9IAK/9	NA-BA-GE	362-	C- 5-	2772
W6PMK/6	North Peninsula Elec. Club	360-	C- 9-	2760
W8ETA/8	(nonclub group)	360-	C- 4-	2760
W0AFG/0	West Nebr. Tech ARC	324-	C-10-	2754
K7NWS/7	Boeing Employees ARS	707-	D-45-	2721
K6ASU/6	Nevada Co. ARC	316-	BC- 9-	2714
K9FHQ/9	Clinton Co. VHF ARC	244-	ABC-16-	2709
K8CFT/8	Fayette AR Group	310-	C- 5-	2660
K0HFX/0	Page Montgomery Co	338-	CD-15-	2654
W2FWG/2	TARCOM	309-	BC-16-	2643
W0BLK/0	Black Hills ARC	339-	C-10-	2634
W8BNE/8	Almont Area AR Assn	274-	BC-19-	2612
K0BFT/0	(nonclub group)	347-	BCD- 5-	2546
W6BML/6	SIS-Q ARC	312-	C- 4-	2472
W8QLY/8	Mahoning Valley ARA	256-	BC- 7-	2352
WA3IEM/3	Explorer Post 703	993-	ABC- 5-	2346
K3LLL/3	Rocky & His Friends	183-	B- 6-	2217
W3QLP/3	Explorer Post 6 RC	241-	C- 6-	2216
WB9AWB/9	Ridgewood Radio Electronics Club	193-	BC- -	2198
W0CBL/0	Northeast Missouri ARC	369-	CD- 8-	2187
W6QFK/6	San Gabriel Valley RC	179-	ABC-16-	2172
W8GET/8	Lorain Co. AR Assoc	247-	ABC-10-	2166
K8UZW/8	Parma Radio Club	184-	BC-15-	2135
W1BCG/1	Shoreline ARC	148-	B- 6-	2132
VE1EMO/1	EMO (Kings) ARC	228-	CD-10-	2126
W0LAC/0	Blackhawk ARC	221-	C-20-	2126
W8SYP/3	(nonclub group)	254-	C- 3-	2124
W0BZN/0	Newton ARC	229-	C- 6-	2114
K9IX8/9	Elkhart HS ARC	206-	AC- 6-	2072
WA3JKH/3	Montrose Area HS ARC	237-	BC- 5-	2037
WA2FLO/2	North Shore ARC	196-	BC- 7-	2024
W6DSL/6	Barstow ARC	189-	BC- 3-	2006
K5WSP/5	White Sands ARC	163-	C- 4-	1978
K8NOW/8	Metropolitan Ragchewers Club	199-	BC- 5-	1971
K1NQG/1	Fidelity ARC	207-	BC-11-	1932
VE4QD/4	Brandon ARC	356-	BD- 8-	1904
VE3TCD/3	Elgin AR Society	169-	AC- 9-	1898
W4HFH/4	Alexandria Radio Club	190-	B-13-	1860
W1BD/1	Central Vermont ARC	285-	CD-12-	1827
K2YBN/2	Rancocas Valley ARA	157-	BC- 7-	1814
W3BMD/3	Indiana Co. ARC, Inc.	156-	C-10-	1736
VE3CQD/3	Kingston ARC	148-	BC- 4-	1703
WA7IMI/7	Queer Sounding Transmitters	146-	ABC- 3-	1697
K8SWW/8	Geyer's Kids	57-	BC- 4-	1578
W3WWI/9	Clark Co. ARC, Inc.	116-	ABC- 7-	1524
K3GYS/3	Joe's Place	720-	BC- 3-	1476
W4TJM/4	Polk Co. CD Amateur Communication Society	203-	BD- -	1459
W3LWW/3	Foothills Radio Club	232-	BCD-10-	1434
W6PMI/6	United RAC Harbor Area	631-	BCD-14-	1323
K0JWN/0	Harrisonville AR Klub	121-	BCD- 9-	1313
WA8ZJZ/8	Cardinal Mooney ARC	35-	BC- 5-	1142
W9IEK/09	Dwett Co. Radio	46-	C- 4-	1116
K4LI/4	Brightleaf ARC	340-	BC-14-	1103
WA9VYB/9	HAWKS	70-	ABC- 7-	1074
WB4DCW/4	DARC	193-	BC- 3-	627
WA9QAO/9	(nonclub group)	522-	CD- 4-	568
K1OUM/1	Somerville CD Unit	66-	BD- -	396

Four Transmitters Operated Simultaneously

WA6LXN/6	West Valley ARC	2145-	BC-13-19,186	
W4SKH/4	(nonclub group)	2008-	ABC-34-14,596	
W8FY/8	Van Wert ARC	1471-	B-32-14,239	
W2MU/2	Niagara Frontier Dx Assn.	2166-	C-13-13,996	
K5JYP/5	Keesler ARC	1900-	BC-37-13,468	
K3SSC/3	Delmont Radio Club	1652-	C-18-10,912	
W6NWG/6	Palomar Radio Club	1460-	BC-20-	9833
W2SEX/2	Arats/Rawny	1497-	BC-19-	9809
W7IO/7	Arizona ARC Inc.	1416-	BC-60-	9796
W8DC/8	Grand Rapids AR Ass'n.	1428-	C-47-	9768
K9HZS/9	Motorola Engineers	1424-	BC-24-	9521
W3BN/3	Reading Radio Club Inc.	1378-	C-30-	9268
W0EQU/0	Ak Sar Bess RC Inc.	1366-	C-30-	9236
W6ZE/6	Orange Co. ARC Inc.	1229-	BC-24-	9101
K2DNW/2	Wayne ARC	1350-	C-26-	9100
W9EE/9	(nonclub group)	1306-	C- -	8636
WA0UGU/0	P.H.D. A.R.A. Inc.	1235-	BC-47-	8629
K4KQ/4	Dade Radio Club	1108-	BC-25-	8538
W6LIC/6	Santa Barbara ARC Inc.	1236-	BC-15-	8381
WA0JBX/0	Wecomo	1324-	CD-15-	8119
W3CBJ/3	Johns Hopkins Applied Physics Lab. Radio Club	1115-	C-10-	7690
W2MMD/2	Gloucester Co. ARC	1097-	C-15-	7582
K4YKN/4	Bristol ARC	960-	ABC-20-	7576
VE3MRC/3	Metro ARC	972-	BC-12-	7529
W3CWC/3	Antietam Radio Assn Inc.	1518-	CD- -	7405
W2FL/2	Holmdel ARC	1000-	ACD-32-	7389
W2DLT/2	Key Klickers ARC	735-	ABC-18-	7161
W2YKQ/2	Lake Success RC	878-	BC-19-	6976
WB2CZN/2	North Bergen ARC	768-	ABC-11-	6964
W7CO/7	Western Wash. DX Club	1729-	BCD-15-	6905
W4CA/4	Roanoke Valley ARC	964-	C-20-	6784
W1TA/1	Nashua Mike & Key Club	711-	AC-12-	6672
W4NZS/4	Seymour Johnson AFB Mars Group	934-	C-20-	6614
W2GLQ/2	Nutley AR Society	938-	BCD-20-	6466
K2PCQ/2	No. Chautauqua ARC	898-	C-30-	6388
W6JBT/6	Citrus Belt ARC	852-	BC-25-	6361

K6YNB/6





W3CSL/3	Monessen ARC	861-	AC-15-	6322
K9VHF/9	Hamilton-Southeastern High School ARC	820-	BC- 8-	6261
WB6KQY/6	General Dynamics Pomona Division RC	924-	BCD- 9-	6203
W1SYE/1	Newport Co. RC	775-	BC-38-	6174
WA6TOW/6	Coastside ARC	817-	BC- 7-	6133
W2RP/2	Westchester AR Ass'n	841-	CD- 8-	5883
VE3ZM/3	Guelph ARC	812-	C-15-	5872
W3UU/3	Harrisburg RAC	808-	C-15-	5848
W4BFM/4	Decatur ARC Inc.	795-	C-19-	5810
W2DMM/2	QRP Chapter 1 NYC	510-	B-13-	5790
K6FB/6	H-P Radio Club	1021-	CD- 7-	5729
W7ECA/7	Electric City RC	753-	C- 9-	5718
WA7IUQ/7	(nonclub group)	654-	BC-11-	5716
W3KGN/3	Adams Co. AR Society	784-	C- 7-	5704
W5SH/5	Ft. Worth Kilocycle Club	1126-	ACD- -	5639
K1JMR/1	Norwood ARC	533-	BC-10-	5635
VE1ND/1	Fredericton ARC	1213-	CD-10-	5614
VE3NSR/3	North Shore ARC	767-	C-12-	5602
W3WK/3	Friendship ARC	735-	BC-27-	5581
WA5SOD/5	Okla. Central VHF ARC & F.A.A. Aero. Center ARC	752-	BC-20-	5554
K8LUC/8	Evendale AR Society	755-	C-10-	5530
W4PQP/4	Radio Amateur Transmitting Society	807-	BCD-20-	5509
W3EQ/3	Haverford Twp. Emergency Radio Net	679-	BC-20-	5505
VE3AJ/3	Lakehead ARC	798-	CD-13-	5464
W2CVT/2	Poughkeepsie ARC	772-	C- -	5432
K2VSU/2	Mt. Vernon H.S. RC	643-	ABC- -	5305
K3TGM/3	Wm. Penn RC	718-	BC-10-	5291
WØNH/Ø	Missouri Valley ARC Inc.	677-	BC- -	5212
WA9EDW/9	Barrington ARS	716-	BC-15-	5171
W8ID/8	Seneca RC	628-	BC-20-	4993
K5QHD/5	Garland ARC	697-	AC-15-	4988
W4VTA/4	Confederate Signal Corps Inc.	649-	BC-14-	4906
W3OI/3	Lehigh Valley ARC Inc.	635-	C-20-	4810
WAØKWK/Ø	(nonclub group)	629-	C- 8-	4774
W6SD/6	San Fernando Valley RC	712-	ABC- 9-	4757
WØYL/Ø	Story Co. ARC	591-	C-26-	4546
W6MMM/6	So. Branch of The Terrible Thirteen	610-	BC- 6-	4541
W2BMW/2	Tu-Boro RC Inc.	411-	B- 7-	4499
K2BFB/2	Auburn ARC	403-	B- 8-	4427
WA3MOI/3	Penn Jersey YL RC	535-	C-11-	4410
WA5VLG/5	Bayou-Meto	565-	C- 6-	4390
W7BB/7	Lake Washington ARC	844-	CD-20-	4382
W8VTD/8	Warren AR Ass'n Inc.	550-	BC-10-	4211
W7FEL/7	Clallam Co. ARC	535-	C- -	4210
W6SG/6	Marin ARC	536-	ABC- 8-	4199
WA8LVE/8	(nonclub group)	528-	C- -	4168
K6AGF/6	Tri-Co. ARC	664-	BCD-18-	4075
W6AB/6	Satellite ARC	541-	BC- 9-	4046
W7DZH/7	Eagle Rock RC	453-	BC-10-	4027
W8YJV/9	Allen Co.-ARTS	477-	BC-10-	3928
WA8ZGE/8	Euclid Sr. H.S. RC	534-	BCD-10-	3798
W1MV/1	Massasoit AR Ass'n	345-	BC-16-	3775
W8MOP/8	East River Radio Club	396-	BC-10-	3768
K8PBO/8	Mayhams RC	367-	ABC- -	3619
K4WCC/4	H. Belvoir ARC	450-	BC-10-	3599
WA1KTA/1	Lexington H.S. RC	385-	AC-16-	3558
VE2CLA/2	Laurentian Area RC	443-	BCD-10-	3457
W8PO/8	Intercity RC	388-	BC- -	3409
W2CHT/2	Genesee Radio Amateurs	493-	CD-27-	3403
K6CIH/6	Santa Monica HS ARC	365-	ABC- 9-	3370
WA6BAI/6	Tulare Co. ARC	360-	AC-15-	3268
VE6ASN/6	Border Area RC	371-	BCD-14-	3256
W3ZIC/3	Ft. Venango Mike & Key Club	356-	AC- 7-	3244
W9EBN/9	Sky Wire RC	334-	AC-18-	3166
W8SWS/8	Piqua RC	319-	AC-10-	3058
WB8DCC/8	Greenville Sr. HS ARA	317-	BC- 6-	2956
W6YDQ/6	Antelope Valley ARC	328-	ACD-10-	2851
K4KEI/4	Triangle ARC	338-	BC-10-	2837
WØZRT/Ø	Bismarck Area RC	333-	C-12-	2798
W9UVI/9	Peoria Area ARC	540-	CD- 6-	2795
WB6VYX/6	(nonclub group)	295-	BC- 3-	2666
KL7EGL/KL7	Northland ARC	232-	C- 9-	2192
WA8FSE/8	Opequon Radio Society	180-	BC-18-	2119
W7TYG/7	The In Laws Radio Society	209-	C- 4-	2054
WA2WHM/2	Red Bank HS ARC	145-	ABC-12-	2051
K4CPO/4	Nashville ARC	165-	AC- 9-	1964
WA9LIV/9	Waukegan VHF Society & ARC	156-	C- 6-	1736
WA4BXI/4	Teenage AR Society	718-	C-15-	1636
W5WEI/5	I Tappa Key	201-	BCD- 5-	1205
WØASM/Ø	O'Brien Co. AR Ass'n	248-	CD-13-	866
WØVMN/Ø	Pingville AR Ass'n	344-	C-11-	761
K8EEN/8	Mt. Vernon ARC Inc.	269-	BC- 7-	568

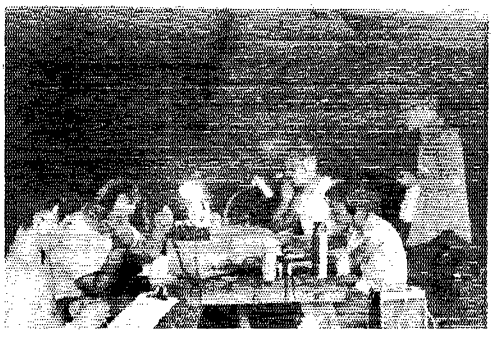
Five Transmitters Operated Simultaneously

W1FW/1	Merrimack Valley ARC	2366-	BC-17-16,461
W2AOH/2	Bergen ARA	1773-	ABC-22-15,688
W6NT/6	Newport AR Society, Inc.	2018-	BC-35-14,383
K3HKK/3	Nittany ARC, Inc.	1793-	BCD-22-14,365
W8ICS/8	Indian Hills RC	1789-	BC-30-12,763
W3NC/3	R.F. Hill ARC	1695-	BC- -11,910
W6NRY/6	East San Gabriel Valley AREC	1746-	BCD-30-11,901
W7PX/7	Hellgate ARC	1378-	BC-12-11,238
W9LM/9	The Northwest ARC, Inc.	1643-	BC-16-10,960
W6IFZ/6	Richmond ARC, Inc.	1506-	AC-22-10,554
VE3JJ/3	West Side RC	1350-	BC-17-10,353
K8BYX/8	The Mud Lake Michigan Field Day Society	1433-	BC-32- 9810
K1MUJ/1	Eastern Conn. ARA	1362-	C-23- 9392
K4IUV/4	(nonclub group)	1326-	C- 8- 9156
W7RGL/7	AR Communication Service	1046-	AC- 5- 8458
WAØNPZ/Ø	Ramsey RC	1066-	ABC-10- 7994
W2DQ/2	Suffolk County RC	1170-	BCD-18- 7959
K2USA/2	K2USA ARC	1268-	CD-18- 7941
K4HTA/4	Vienna Wireless Society	1039-	BC-27- 7881

WN2JSH/2

W3PIQ/3	South Hills Brass Pounders and Modulators	1056-	BC-12- 7779
W3SGJ/3	Beaver Valley ARA	1393-	CD-13- 7728
W9CCU/9	Wheaton Community Radio Amateurs	1089-	ABCD-20-7477
WA8MTX/8	Monroe County Radio Communications Assn.	961-	BC-16- 7149
W6PIY/6	West Valley ARA	881-	AC- - 6436
W9GYN/9	Elk Grove ARC	707-	ABC-11- 5796
W1LG/1	Hartford County ARA	649-	ABC-15- 5706
K8DEV/8	Clinton County ARA	725-	C- 9- 5550
K6GIP/6	Monterey Park ARC	702-	AC-25- 5542
WA2SCZ/2	West Jersey RC	611-	ABC-20- 5352
W9AZ/9	Kankakoo Area Radio Society, Inc.	518-	ABC-25- 5313
W3HZW/3	Kent County ARC	561-	ABC-10- 5292
K2OQJ/2	St. Peters Prep. RC	561-	BC- 9- 5286
W8NCM/8	(nonclub group)	678-	C-20- 5268
WB2ELW/2	South Towns AR Society	635-	AC-35- 5214
K1BWB/1	Bow Radio Association	658-	C-18- 5148
W4POX/4	Portsmouth RC	650-	ABC- 9- 5026
WA1AXK/1	Whitman ARC	572-	AC-15- 5004
W8BAE/8	Crawford County ARC	618-	BC-12- 4974
W5SWS/5	Chetimachi ARS	625-	C- 7- 4950
W3AD/3	Lancaster Radio Transmitter Society, Inc.	617-	AC-16- 4930
VE3AEA/3	Peterboro ARC	654-	C- 8- 4924
WØLGW/Ø	South Platte AR Society	653-	C- 9- 4918
W6ISS/6	Petaluma AR Klub	476-	C- 7- 4856
WA3IUD/3	Boeing-Vertical BEARS	554-	BC-15- 4543
WØEQO/Ø	Faribo ARC	561-	BC- 8- 4519
WØRTI/Ø	Empire RC	546-	BC- 8- 4515
WO1AA/1	SONRA	543-	BC- - 4497
W9CAF/9	Chicago ARC	504-	C-15- 4224
W4VTF/4	Catawba Valley ARC, Inc.	498-	C- 8- 4188
W3EIA/3	Lebanon Valley Society of Radio Amateurs	586-	CD-18- 3981
W9HYT/9	S.E. Wisconsin Hill-toppers RC	381-	BC- 8- 3829
WA4YNW/4	Brandon-AR-Society	388-	BC-20- 3812
W6JJ/6	Santa Cruz County ARC	475-	ACD-12- 3729
W3VPR/3	Anne Arundel RC	427-	C- 8- 3562
K6SD/6	ARC of El Cajon	380-	AC-17- 3546
WB2FFL/2	Taconic ARC	434-	BCD-20- 3498
VE3BA/3	Brantford ARC	380-	C-15- 3480
K1LOE/1	Capeway RC of Mass.	373-	C- 9- 3438
VE3HVC/3	Humber Valley ARC	390-	C- 8- 3391
WA2ANL/2	"The Group"	500-	AC- 5- 3378
K9RHH/9	Falls RAC	286-	BC-17- 3362
W2AAD/2	Harmonic Hill Radio League	506-	BCD- - 3259
W4MOE/4	Buncombe County ARC	283-	C-10- 3118
W4NV/4	(nonclub group)	297-	ABC-10- 3038
W5BTC/5	Wichita AR Society	779-	C- 7- 2758

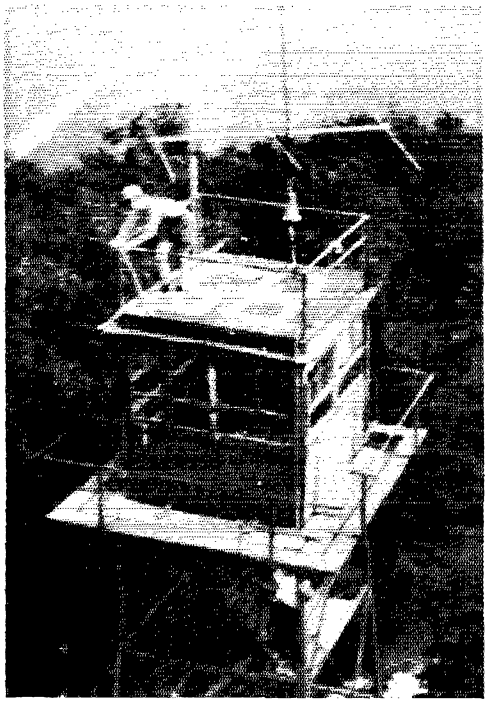
W1ARR/1



KP4BFF/KP4

WB8CBD/8	Manistee High School ARC	187-	C-	8-	2639
WB4MJV/4	Citrus Center ARC	411-	D-	-	2233
W7AIA/7	Clark County ARC	184-BCD-		15-	1818
W8KGG/8	Huron Valley ARA	92-	BC-	8-	1627
	Six Transmitters Operated Simultaneously				
W3BK/3	Penn Wireless Assn, Inc.	2381-	BC-32-17,785		
W6VB/6	TRW Systems Amateur RC	2361-	BC-35-17,368		
W6ISA/6	Southern Pacific Amateur Radio Contest Society	2560-BCD-		9-16,820	
K2AA/2	South Jersey Radio Assn.	2326-	BC-42-16,399		
K6SYU/6	Anaheim Amateur Radio Assn.	1806-ABC-30-12,836			
W1KWX/1	Western Mass. Valley Amateur Radio Club	1672-	C-23-11,432		
K6LI/6	North Bay ARA	1403-	BC-30-10,163		
W4CUE/4	Birmingham Amateur RC	1338-	C-12-	9628	
W2ZZ/2	Bergenfield Amateur Radio Klub	1281-	BC-14-	9401	
W4BBB/4	Radio Amateur Club of Knoxville	1294-	AC-18-	8706	
W4IYU/4	Middle Tennessee ARS, Inc.	1105-	C-25-	8250	

K3ZSK/3



K6DKX/6	San Carlos Civil Defense Radio Club	1102-BCD-19-			7259
W2IN/2	(nonclub group)	971-	BC-14-		7038
W6MLK/6	Hi-Frequency Amateur Mobile Society	643-ABC-16-			6869
WØQUI/Ø	Denver Radio Club, Inc.	827-ABC-16-			6698
W7NDC/7	Spokane Dialtwisters, Inc.	871-	C-20-		6626
WB4FYP/4	Limestone Amateur RC	738-	AC-12-		6056
WA9JYL/9	Greenwood Amateur RC	700-ABC-		9-	5990
W2DMC/2	Crystal Radio Club	602-	BC-13-		5841
WA2BPO/2	Airborne Instruments Laboratory ARC	691-	BC-15-		5817
W2RAK/2	Flatbush Radio Club	638-ABC-25-			5742
W8FO/8	Toledo Radio Club	669-ABCD-15-			5660
K2UQ/2	Utica Amateur RC	677-	BC-20-		5624
K6IS/6	North Hills Radio Club	718-	BC-12-		5568
WB9AMF/9	Beloit Amateur RC, Inc.	687-ACD-10			5462
K5PXP/5	Arkansas River Valley Amateur Radio Club	651-ABC-15-			5387
W8HHF/8	Toledo Mobile Radio Assn.	674-	BC-20-		5346
W8TQE/8	Adrian Amateur RC	565-	BC-35-		5153
W5QX/5	San Angelo Amateur RC	598-	BC- 6-		5016
WA3JUA/3	(nonclub group)	503-	BC- 6-		4761
W7SAA/7	Salem Amateur Radio Club	526-ABC-18-			4718
W5DPA/5	Houston Amateur RC	555-	C-19-		4530
W9UA/9	Fox River Radio League	292-	AC- 7-		3642
W8KEA/8	Midland Amateur RC	236-	BC-12-		2822
WA3GVI/3	Easton Amateur Radio Soc.	217-ABC-10-			2753
W3FQR/4	Dit-Happy Dash-Hounds	210-	BC-11-		2517
W5BJR/5	Greene County Amateur RC	351-	C-14-		902
	Seven Transmitters Operating Simultaneously				
W6ULI/6	Fullerton Radio Club	2126-	BC-30-19,380		
K6QEZ/6	Ampex Employees ARC	2216-ABC-29-16,564			
VE3NAR/3	Nortown ARC	2059-ABC-60-16,561			
W2LP/2	Ridgewood Radio Club	1529-	C-10-12,074		
K3BKG/3	So. Chester Co. ARC Inc.	1560-	AC-25-11,486		
W8ACW/8	Genesco Co. Radio Club	1578-ABC-55-11,167			
W9PCS/9	York Radio Club, Inc.	1352-	BC-20-10,051		
W8JUU/8	Van Buren Co. ARC, Inc.	1254-ABC-28-			9475
W9FK/9	West Allis RAC	1527-	CD-20-		9442
W1EKT/1	Quannapowitt Radio Ass'n	1117-ABC-30-			9071
K4BFT/4	Huntsville ARC	1080-	BC-28-		8463
W5SC/5	San Antonio Radio Club	871-	BC-30-		8143
K3ADA/5	Luzerne Co. RACES	694-	BC-22-		6307
K3IEC/3	Cumberland ARC	723-	C-13-		5938
W6CUS/6	East Bay Radio Club	685-	C-25-		5720
W1BIM/1	(nonclub group)	477-	BC-11-		4642
W7NCW/7	Lower Columbia AR Ass'n	279-	BC-15-		3316
W9YCR/9	Quad City ARC	236-BCD-13-			3019
	Eight Transmitters Operating Simultaneously				
W9SW/9	Chicago Surburban Radio Association	2125-	C-60-14,560		
WA6GFY/6	Lockheed ARC	857-	BC-37-		7897
W6BXN/6	Turlock ARC	871-BCD-25-			5379
K7AUO/7	Tektronix Employees ARC	363-ABC-12-			4057
K6QFH/6	H.F.E.A. Ham Club	426-ABCD-	9-		4028
	Nine Transmitters Operating Simultaneously				
W7DK/7	Radio Club of Tacoma	2832-	C-30-19,032		
VE3VM/3	Niagara Peninsula ARC	2209-ABC-32-15,617			
K8BYI/8	Southeastern Michigan Amateur Radio Ass'n	1479-	BC-14-12,692		
W3RCN/3	Rock Creek AR Ass'n	1661-	BC-30-11,822		
W6CX/6	Mt. Diablo ARC	1042-ABC-30-10,326			
W6DCC/6	The Corona Gang	1066-BCD-18-			8467
K3CSG/3	Abington ARC	767-	BC-22-		6997
W6UCS/6	Monterey Bay RC	430-	BC- 9-		4667
	Ten Transmitters Operating Simultaneously				
W6RO/6	Associated Radio Amateurs of Long Beach	1586-	AC-48-12,004		
W5ANR/5	Ft. Smith Area ARC	1349-	C-25-10,294		
W1NY/1	Hampden Co. Radio Assn., Inc.	1222-BCD-25-			9239
K6EAG/6	Hayward Radio Club	783-ABC-25-			8929
WA9WSL/9	Indian Hill ARC	1056-ABC-12-			8686
	Eleven Transmitters Operating Simultaneously				
K6BAG/6	Pacifico Radio Club	5298-ACD-18-22,645			
W9YH/9	Twin City ARC	3082-	AC-51-21,154		
	Twelve Transmitters Operating Simultaneously				
VE3WE/3	Scarborough ARC	2018-ABC-15-18,617			
	Fifteen Transmitters Operating Simultaneously				
W2RJ/2	Englewood AR Assn Inc.	2937-ABC-15-30,773			

CLUB AGGREGATE MOBILE SCORES

Radio Amateurs Mobile Society (Calif.)	32,816
Long Island Mobile Amateur Radio Club	12,439
Beacon Radio Amateurs (Md.)	6043
Mobile Amateur Radio Club of South Bend (Ind.)	3978
Arrowhead Radio Amateurs (Minn.)	2978
Radio Club of Tacoma, Inc. (Wash.)	1082

CLASS B

Grouped in this listing are the scores of portable stations manned by one or two operators. Where two persons participated, the call of the other operator (if known) is given below that of the amateur whose call was used. Figures following the calls indicate number of contacts, power and final score.

K6YNB/6 | 1141-AB-15,889
WB6CWD |
W7CFJ/7 | 1357- B-13,950
KØIJP |
K8MMM/8 | 909- B-12,663
WA8LRE |
WA5QIQ/5 | 1361- C- 8366
WA5RMF |
VE7IG/7 (2 oprs.)
519- B- 7407
K4PQL/4 794-ABC- 7406
W2FBA/2 | 485-AB- 7293
W3CSZ |
K7YUJ/7 | 708- B- 6572
WA7GWU |
K9FFA/9 | 1096- C- 5680
K9DMV |
W3YVQ/3 383- B- 5571
K9MMH/9 | 700-BCD-5533
W9YIH |
W8GEG/8 | 846- C- 5276
WA8PZA |
W6ANB/6 | 560- B- 5240
WB6TBL |
K4HAV/4 553- C- 5177
WA7DNZ/7 | 504- C- 5136
WA7EWC |
W4BRB/4 | 736- C- 4816
W4EPO |
VE6AQV/W6 453- B- 4477
KØGXC/Ø | 706-BC- 4461
WAØPIU |
WB8ANV/8 | 666- C- 4196
WB8ANW |
W6LNW (2oprs.)
203- A- 4054
K3ZSK/3 | 345-AB- 4046
WA3BGN |
WA7HEO/7 | 420- B- 3980
WA7ISN |
WA6EUZ/6 | 207- A- 3926
WB6YGX |
WA3GJU/4 | 605- C- 3830
W3YIJ |
K8VQP/8 | 379- B- 3811
W8THN |
WA9MQI/9 | 556- C- 3736
WA9TLP |
K9ORP/9 388-AB- 3711
VE1IM/1 | 547- C- 3682
VE1TG |
WA8YDJ/8 572- C- 3632
W2VE/2 | 237- B- 3401
K2SAQ |
W8SSL/8 | 434-BC- 3361
W8AJA |
WA2JJN/2 | 455- C- 3330
K8PAO |
WA8RCN/8 | 460- C 3160
WA8UDS |
WB2PJH/2 453- C- 3118
K7LTV/7 324- C- 2916
WØKBG/Ø | 482- C- 2892
WØIYH |
KH6GQF/KH6 | 434-C-2814
KH6GLU |
W8VWY/8 | 262- C- 2758
K8NGQ |
WAØRKQ/Ø | 402- C- 2612
WAØRKR |
WA1JTG/1 | 368- C- 2408
WA1IBT |
WØKJR/3 (2 oprs.)
238- B- 2342
KØEKR/Ø | 222- B- 2198
WAØQZN |
KH6GJT/KH6 | 255-C-2160
KH6GMP |
WA5VQK/5 195- B- 2155
WA2DFI/2 181-AB- 2146
K3SPX/3 | 141- B- 2134
WA3APH |
WB6VFG/6 | 320- C- 2120
WB6ZMQ |
WA8LVT/8 | 102- A- 2036
WA8LWH |
WA7EZR/7 | 305- C- 2030
WA7CPT |
WB2VQG/2 303- C- 2018
WAØJJU/Ø | 336- C- 2016
WAØVJJ |
WA9QFT/9 | 200-AB- 2009
WA9RFB |
W3LDD/3 298- C- 1988
KØKLH/Ø | 282- C- 1892
WAØOOU |
K7RNO/9 | 279- C- 1874
K5LQJ |
WAØNVZ/Ø 184- B- 1856

W6KEV/6 120- B- 1820
WB6LRV/6 | 229- C- 1774
WB6SDV |
KP4CQC/KP4
251- C- 1706
W9YAL/9 | 207-BC- 1703
W9ZAV |
KL7FJK/KL7 | 384-B-1664
KL7GDF |
VE7BAV/7 175-BC- 1656
WA7JWC/7 | 208- C- 1648
WA7JOH |
VE3CPW/3 | 199- C- 1594
VE3AVB |
W3EAN/3 | 224- C- 1544
W3EBY |
WA5MGC/5 | 221- C- 1526
WA5RES |
WB4DJO/4 345- D- 1435
W2CXV/2 (2 oprs.)
166-BC- 1429

W4IZ/4

W2PXL/2 (2 oprs.)
65- A- 1370
WA8YBV/8 161- C- 1366
WAØNDV/Ø | 310-CD-1354
WAØPWP |
WA8UPB/8 | 273- C- 1334
WA8SVE |
WA1GYZ/1 | 62-AB- 1289
K1Z8Z |
K9ENM/9 (2 oprs.)
360- D- 1280
VE3DOP/3 | 97- B- 1273
VE3FLE |
WA8SWM/5 140- C- 1240
WN8ZAC/8 (2 oprs.)
132- C- 1192
VE3IR/3 | 172-BC- 1173
VE3CKW |
W6GNJ/9 | 161- C- 1166
W9VAK |
WA6MYJ/6 154- C- 1124
WA8WWS/8 | 554- C- 1108
WA8ZOG |
WAØPLN/Ø (2 oprs.)
149- C- 1094
WB4IOJ/4 148-BC- 1091
W7CW8 355- D- 1065
WA6LTS/6 | 97- C- 982
W6QXD |
WB4JXO/4 | 121-BC- 977
WN4MNF |
K9QKA/9 | 129- C- 974
K9UJN |
K3YIJ/3 | 254- D- 962
K3PCX |

W4LKB/4 10- A- 580
WNØWVX/Ø 28- C- 568
W1GTO/1 | 39- B- 551
W1DKC |
VE7BZA/7 | 38- B- 542
VE7AAQ |
W7ZOI/7 | 19- A- 542
K7IUN |
WA6QKL/6 | 268- C- 536
WB6ZBM |
WN2GTK/3 | 20- C- 520
WN2HGJ |
WN9HJR/9 33-AB- 484
K4BEI/4 | 46- C- 476
WA4SIZ |
WB2HUP/2 | 74-AB- 426
WN2JEE |
WN8AFP/8 3- C- 418
W9ACU/9 35- C- 410
WA7FIB/6 | 33-BC- 398
K5ATT |
WB4JFW/4 141- C- 389
W2FSL/2 28- C- 368
K3QQL/3 | 140- C- 340
WA3BCM |
WN2IQF/2 95-AB- 290
WN2HVA/2 5- B- 268
W3QEI/3 121- C- 242
WA4UXD/4 77- B- 231
K7JRE/1 108- C- 216
WNØWSI/1 8- C- 216
WAØVHD/Ø 210- D- 210
WB8AYC/8 89- C- 178
WA1KBZ/1 85- C- 170
WA8YNU/8 41- B- 123
W7DRA/7 24-AB- 108

VE6PR/6 | 62- B- 958
VE6AWW |
VE1HJ/1 | 40- B- 940
VE1ATF |
WAØUAW/Ø | 336- C- 872
WAØOHO |
W4FIN/4 37- A- 866
K7BBO/7 111- C- 866
W5ELF/5 | 210- D- 830
WA5SKZ |
WB6QFA/6 364-BC- 806
VE1AAQ/1 | 96- C- 776
VE1AEA |
WN1LCO/1 96- C- 776
WAØWWI/9 | 64- B- 776
K9YCG |
WAØRKF/Ø | 93- C- 758
WAØRKE |
K4VUD/4 275- C- 750
WN8BYD/8 38- B- 742
W4UDS/4 370- C- 740
WB2UVX/2 368- C- 736
WB2ZGS/2 89- C- 734
WAØWMT/9 52- C- 712
WN8CMQ/8 85- C- 710
VE7AFJ/7 | 42- A- 704
VE7AIP |
K3LJA/3 53- B- 677
WA7IFA/7 | 79- C- 674
WA7ISQ |
WB4DJP/4 225- C- 670
WAØUAU/Ø | 23- B- 607
WNØZBQ |
WAØFLL/Ø 66- C- 596
W6HB/6 64- C- 584

WA8SOE/5 23- B- 69
WN2JSE/2 21- B- 63
WN6GQO/6 20- B- 60
WAØRBR/6 18-AB- 55
WA9UIR/9 17- B- 51
WA8YNI/8 | 25- D- 25
W8NWW |
WA7LDZ/7 1- A- 18
WN2HWG/2 | 7- C- 14
WN2HWI |
WN2HWL/2 3- B- 9

Two Transmitters

WB2GGP/2 | 905- C- 5830
WA2DVF |
WØUOW/Ø | 435-BC- 5754
WØWLO |
WA9SYD/9 | 531- B- 5179
WA9VNJ |
W6ICJ/6 | 675- C- 4650
W6FUV |
WB6ANT/6 | 483-AC- 3742
WB6WVB |
WA2BCK/2 | 529- C- 3574
WA2DHS |
WAØNBZ/Ø | 472- C- 3432
WAØKXD |
K6ELX/6 | 396-ABC-3290
WB6BAN |
WA3HYY/3 | 398- C- 2988
K3TLX |
WA5THM/5 | 513-CD- 2943
W5EJQ |
WA5KXG/5 | 369-CD- 2581
WA5UHG |
WA1JGK/1 | 235- C- 1810
WB6DJG |
WA1GOI/1 | 200- C- 1600
WA1JLD |
WB2WII/2 | 171- C- 1426
WB2ZCC |
W6KSI/6 | 105- B- 1345
WA6AKI |
W7DFO/7 | 116-AC- 1312
WA7JRY |
WA2NDN/2 | 128- C- 1276
WA2CMF |
KØBVX/Ø (2 oprs.)
326- C- 1052
WN5WTE/5 | 52- B- 858
WN5WTD |
WN3LHN/3 | 30- C- 780
WN3LLZ |
WA9QNM/9 | 284- C- 568
WA9OBP |
WA8YTL/8 | 217- C- 434
WB8BPD |
WA2FDR/2 | 212-BCD- 407
WB2YUW |
WA5JLE/5 | 122- C- 244
WA5DTK |

CLASS C

One Transmitter

W3AA/3 627- B-6043
W4OZF/4 (3 ops)
835- C-5915
WA2WVL/2 (WA2s WQG WVL) 613- C-5717
WB6HO/6 326-ABC-3757
K6ZJY/6 228- B-3278
WA3HGV/2 322- C-3098
WAØBJY/Ø (4 ops.)
428- C-2978
W6QHP/6 241- AC-2733
W2QNR/2 172- B-2722
K2DTQ/2 (K2DTQ W2AUB)
155- B-2493
WA9BVL/9 202- C-2438
K7NHV/Ø 230- C-2270
K6HJJ/6 174- BC-2038
K2JVB/2 120- B-2020
WB6KZN/6 140- AC-1910
WA6THI/6 143- AC-1885
WB6DFO/6 148- AC-1858
WA6HGH/6 184- AC-1836
W6TEE/6 115- BC-1743
WB6PHQ/6 113- BC-1735
KØWNV/Ø (KØWNV WA9VEO) 169- C-1721
W6FQF/6 (2 ops.)
111- B-1699
W6MOG/6 275- CD-1492
W2FWV/2 77- B-1440
K6SEA/6 89- AC-1399
W5IUP/5 132- C-1388
K6SBL/6 84- AC-1354
WB2ZBV/2 46- A-1228
K3GKB/3 118- A-1203
W7AEA/7 (2 ops.)
147- C-1082
WA6DKZ/6 62- AC-1066
W6FRE/6 44- AC-1048
WA6UNL/6 68- C-1022
K5AJK/3/4/8 24- C-1016
KØHUV/6 56- C- 904
WB6IAW/6 53- C- 877
W2EQZ/2 34- B- 859
W3BBD/3 71- C- 839
W6QYS/6 45- AC- 823
WA7DEQ/7 (2 ops.)
69- C- 821
K2CQM/2 31- B- 819
K6GUQ/6 38- AC- 814

WA6QGT/6	44-	C-	796
K9SFQ/9	43-	C-	787
WA9CHY/8/9	17-	C-	753
WA2EBS/2	26-	B-	751
WA7SZQ/9	60-	C-	740
K2JEF/2	24-	B-	724
WA6AEL/6	35-	C-	715
K6RIJ/6	37-	B-	700
WB8AFF/8	37-	B-	700
W2LFX/2	21-	B-	684
W2KPQ/2	20-	B-	670
W6JON/6	27-	C-	643
K3ORF/3/8/9	73-	C-	638
WA6OYF/6	23-	C-	607
WB6MLB/6	59-	A-	554
WA6TBU/6	17-	C-	553
K3FXW/4	38-	C-	542
K2PKH/2	9-	B-	522
W6LVI/6	24-	C-	416
W7AZU/7	9-	A-	362
W9BZU/9	14-	C-	326
WA7DGF/7	13-	C-	317
WA1KZU/1	12-	C-	272

Three Transmitters

W6DO/2	40-ABC-		635

CLASS D

One Transmitter

K4WAR (4 ops.)	914-	C-	5884
W3JX8/5	423-	B-	4007
K2IOJ (K2IOJ WB4IUM)	499-	C-	3194
K3MJW	485-	C-	2910
WB6LJL (2 ops.)	352-	C-	2312
W3KQE	121-	B-	1289
WA8WGX	214-	C-	1284
K4HY	138-	BC-	1054
WB6TNU	295-	B-	885
WA8IXI (K3ZYB, opr.)	442-	C-	884
WA5PPF	800-	D-	800
WA8VQL	250-	C-	700
WA1KEM	288-	BC-	683
W2LEJ	325-	C-	650
W2PA (W2s PA QH)	27-	B-	643
WA5QZH	269-	C-	538
W1AW (K6OSO, opr.)	500-	D-	500
W1OKA	244-	C-	488
W2LHL	158-	B-	474
WA2GUL	185-	BC-	459
K6SIR	214-	C-	428
WA2DHF	410-	D-	410
WA1CR8/1 (WA1s CRS JBS, WN1 KOV)	100-	BC-	408
WA9VJN	197-	C-	394
WA8HBL	190-	C-	380
VE3BKO/W1	65-	C-	374
WB2GHQ	122-	B-	366
WA5CMC	108-	CD-	361
W6RQZ	25-	C-	350
WB6AUH	116-	B-	348
WB6VCQ	165-	C-	330
WA3JKB	54-	BC-	324
W1DTY	158-	C-	316
WA2CRW	62-	CD-	310
WA2DNB	152-	C-	304
W9JUV	152-	C-	304
WA9WMW	100-	B-	300
WB6ZWH (WB6s UCK ZWH)	99-	B-	297
WA1CYK	119-	BC-	293
W1DIT	92-	B-	286
W3TNO/9	143-	C-	286
WA9SVZ	141-	C-	282
VE1AE	135-	C-	270
WA2FCJ	87-	B-	261
WN6ABP	15-	B-	245
WN1JFX	7-	C-	242
W7AGE	80-	B-	240
WA8RXM	112-	C-	224
WN5WCO	10-	BC-	221
WA7JQO	107-	BC-	216
WA9RPD	106-	C-	212
WN2HWN	68-	B-	204
W7NML (W7NML WA7IQY)	200-	D-	200
WA1KTZ	99-	BC-	199
WNØWWX (4 ops.)	44-	B-	185
W2PU (WA2VAZ, opr.)	90-	C-	180
WAØPVV	88-	C-	176
WA2ICU	64-	BC-	167
WB2TUT	41-	A-	164
K1MNT	54-	B-	162
WA1JHW	80-	C-	160
WA3GAX	78-	C-	156
WN6FOQ	52-	B-	156
WB8CLF	72-	C-	144
WA3HSE	50-	BC-	140
W3FHR	44-	B-	132
WAØVQR	44-	B-	132
W3GN	130-	D-	130
W9ZPC	64-	C-	128
WAØOIU	128-	D-	128
WA2ETO	111-	AD-	120
WA2FBI	40-	B-	120
W3ZNF	116-	BD-	118
W4FZK	115-	D-	115
WB8BSO	57-	C-	114
K1WXZ	56-	C-	112
WB8BZX	53-	C-	106
WA9WVJ	53-	C-	106
KØMGG	46-	C-	92
WA9WEN	50-	CD-	89
K9DTB	44-	C-	88
WA1KRM	42-	C-	84
WA9TRY	41-	C-	82
WA6PYS	27-	B-	81
WA6CPY	80-	D-	80
WA3EWV	39-	C-	78
WB2SIH	77-	D-	77
VE7BMM	38-	C-	76
W7LT	37-	C-	74
WN2JAE	26-	BC-	73
WA7HNL	36-	C-	72
WB4LHH	31-	C-	62
WAØTVH	21-	BC-	62
W1BDI	27-	C-	54
WB6JUC	38-	BD-	48
WA5CMZ	16-	BC-	46
K9DNW	14-	AB-	46
WN6OWL	16-	C-	32

W6VB/6

Class-B Call-Area Leaders

(Bold Face=Over-all class leaders)

1 Xmtr	2 Xmtr
WA1JTG/1	WA1JGK/1
W2FBA/2	**WB2GGP/2**
W3YVQ/3	WA3HYY/3
K4PQL/4	.....
WA5QIQ/5	WA5THM/5
K6YNB/6	W6ICJ/6
W7CFJ/7	W7DFO/7
K8MMM/8	WA8YTL/8
K9FFA/9	WA9SYD/9
KØGXC/Ø	WØUOW/Ø
VE7IG/7	.....

Class-C Call-Area Leaders

(Bold Face=Over-all class leaders

1 Xmtr

.....
WA2WVL/2
W3AA/3
W4OZF/4
W5IUP/5
WB6SHO/6
W7AEA/7
WB8AFF/8
WA9BVL/9
WAØBJY/Ø
.....

3 Xmtr

W6DO/2

Class-D Call-Area Leaders

(Bold Face=Over-all class leaders)

1 Xmtr	
WA1KEM	K7WWR
K2IOJ	W8BZ
K3MJW	W9DUA
K4WAR	**3 Xmtr**
W3JX8/5	**K3YGG**
WB6LJL	WB4FPB
W7AGE	W9KTB
WA8WGX	
WA9WMW	**4 Xmtr**
WAØVJN	**W3UDX**
VE1AE	
2 Xmtr	**5 Xmtr**
WA1JQC	**W8HH**
WB2VDX	
WA3JRA	**7 Xmtr**
WB4ICJ	**WA9SIP**
W5ES	
WB6KPR	

W4IYT	28-	D-	28
WN9ZJI	14-	C-	28
W2EWZ	25-	D-	25
W3DKL	24-	D-	24
WB6CGZ	5-	AC-	12
WN9BIF	6-	C-	12
WA8ZCO	10-	D-	10
WA2BRF	2-	B-	6
WB8ASH	2-	B-	6
W4ISS	1-	A-	4
WA3JDT	1-	B-	3

Two Transmitters

WB6KPR (3 ops.)	616-	B-	5944
K7WWR (2 ops.)	797-ABC-		5443
K7CBP (13 ops.)	552-	C-	3912
WB4ICJ (K4VTY W4GHV)	493-	C-	3558
WA1JQC (WA1s JQC JYE)	400-	C-	2910
W9DUA (10 ops.)	306-	C-	2236
W5ES (8 ops.)	311-	C-	1866
WA3JRA (3 ops.)	514-	BC-	1163
W8BZ (5 ops.)	693-	CD-	869
WB2VDX (WB2VDX WN2ITE)	71-	BCD-	350
WN6IBU (2 ops.)	51-	BC-	132

Three Transmitters

W9KTB (3 ops.)	390-	BC-	3152
K3YGG (10 ops.)	463-	CD-	2375
WB4FPB (3 ops.)	273-	C-	746

Four Transmitters

W3UDX (15 ops.)	317-BCD-		2869
W3LP (4 ops.)	330-	BC-	687

Five Transmitters

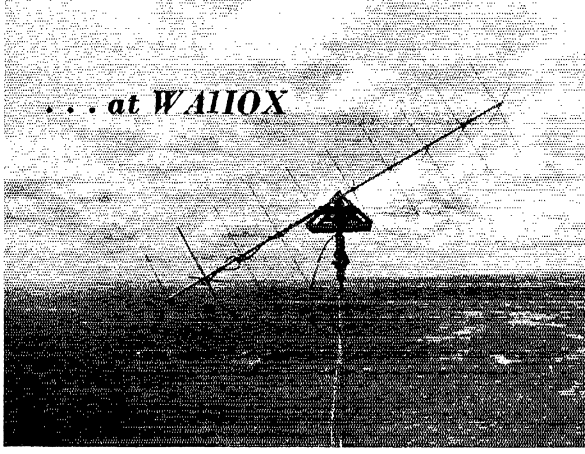
W8HH (8 ops.)	141-	C-	482

Seven Transmitters

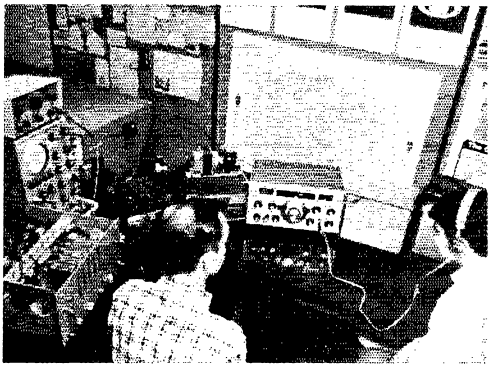
WA9SIP (13 ops.)	328-ABC-		3891

QST

Australis-Oscar 5

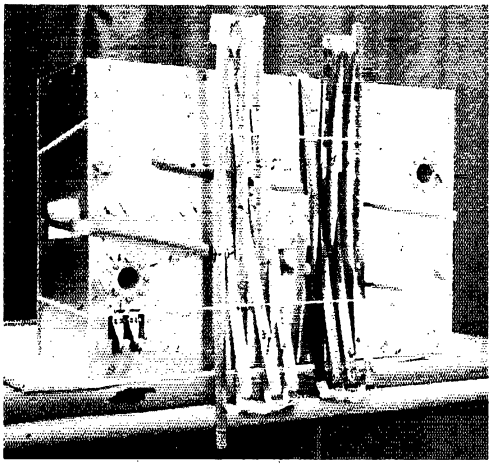


Best results from Australis-Oscar 5 tracking can be obtained if your antenna can be steered in the elevation as well as azimuth mode—as can this one shown right. The antenna also employs circular polarization to reduce fading of the satellite's signal. Plans call for expanding the antenna to a stacked array in an H configuration. That's some horizon angle at WA1IOX, eh?

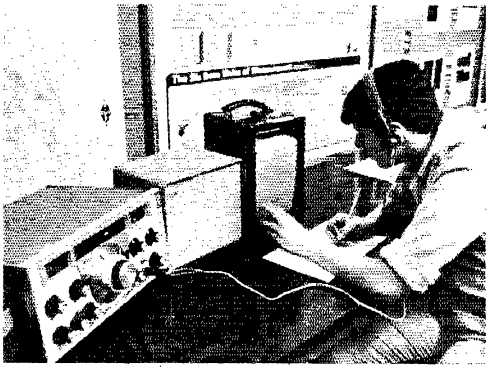


This is the station being set-up by WA1IOX for use with Australis-Oscar 5. The station belongs to the Talcott Mountain UHF Society and is located at the Talcott Mountain Science Center for Student Involvement, Avon, Connecticut. Recently, ARRL granted $1500 to the Science Center to be used in equipping the station for amateur satellite and moonbounce work.

Here is the set-up for reducing telemetry data obtained from Australis-Oscar 5. K1YON matches output of an audio oscillator with the audio tone received from the satellite. The frequency of the telemetry tone is then read from the calibrated dial of the oscillator. An alternate method uses a frequency counter to directly sample and read the telemetry audio tones of Australis-Oscar 5.



This is Australis-Oscar 5 shown with its self-erecting steel-tape measure antennas folded for launch. The electronics of the Australian-built satellite have been prepared for flight by Amsat. The satellite is designed to transmit on 29.450 and 144.050 MHz. The "hen scratches" are imperfections in the photograph.



WA1ISD checks-out the strip chart recorder for recording the signal strength of Australis-Oscar 5. Comparison will be made between the ten- and two-meter signals of Australis-Oscar 5. Under the direction of WA1IUO, this station will be in charge of orbital determination of the satellite on behalf of Amsat, and will supply W1AW with orbital predictions (obtained from K2LME of the East Coast VHF Society) for bulletin transmission.

Happenings of the Month

FCC EASES IMPACT OF INCENTIVE LICENSING

The Federal Communications Commission on September 24 adopted a further order in Docket 15928, curtailing somewhat the "Act II" restrictions scheduled to go into effect November 22, 1969.

The frequencies 50.1–54.0 MHz will remain open to all licensees (except Novices). The bottom hundred kHz, presently restricted to holders of Advanced and Extra Class licenses, continue to be restricted.

The first 25 kHz of the 80, 40, 20 and 15-meter cw bands have been restricted to Extra Class licensees since a year ago; this will continue to be true. The additional cw restrictions scheduled for November 22, 1969 have been cancelled.

Further restrictions on phone operation will go into effect as scheduled, however. The frequencies 3825-3900; 7200-7250; 14,200-14,275; and 21,275-21,350 kHz, will be restricted to holders of Advanced and Extra Class licenses on November 22 this year. The two Extra-Class-only phone segments, 3800-3825 and 21,250-21,275 kHz, are unchanged. (See chart on page 64 A)

The text of this order will be found at the end of this department.

Harold Bourell, WØAZ, was presented this plaque in appreciation of his service as Engineer-In-Charge, of the District FCC office at Kansas City. The occasion was a retirement dinner sponsored by the Mid-Continent Chapter, Quarter Century Wireless Association and the Kansas City DX Club.

ELECTION RESULTS

Three incumbent directors, one present vice director and two new vice directors have been elected without membership balloting, since they were the only candidates to be nominated for their respective offices by the members. **Noel B. Eaton, VE3CJ,** continues as director from the Canadian Division for a sixth term. Dakota Division director **Charles G. Compton, WØBUO,** was reelected, also to his sixth term. In the Pacific Division, a second term has been declared for **J. A. Doc Gmelin, W6ZRJ.** Another second-termer is **Ralph V. Anderson, KØNL,** vice director from the Midwest Division.

In Canada, incumbent vice director Colin C. Dumbrille, VE2BK, has moved to Bermuda and thus did not stand for reelection. The only candidate for the vacancy is **A. George Spencer, VE2MS,** of Beaconsfield, Quebec. George, who is 48, makes his living as a partner and chief electrical engineer for Bechtel and Company in Montreal, designing the electrical work for large industrial plants. He's been an assistant director of ARRL in the Canadian Division this year; past president, Niagara Peninsula Radio Club; past president, Buncombe County Amateur Radio Club of Asheville, N.C.; and past president, Montreal Amateur Radio Club. Previous calls were VE3BJC, VE2ASA and VE3DNU since George was first licensed in 1948.

The new vice director from the Pacific Division — replacing G. Donald Eberlein, W6YHM, who didn't run — is **Hugh Cassidy, WA6AUD,** of San Rafael, California, where he is postmaster. Hugh has been an assistant director, Pacific Division, ARRL since 1965; SCM of the San Francisco Section since 1964; past president, past secretary, Marion Radio Club; president and past secretary, Northern California DX Club; and treasurer, Amateur Radio News Service. He's a member of the Disaster Committee, Marin Chapter American Red Cross, and of RACES. Hugh is former editor of "QSA 5" published by the Marin Radio Club, and presently is editor both of the San Francisco Section Courier and the West Coast DX Bulletin.

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The remainder of the offices in the Atlantic, Dakota, Delta, Great Lakes, Midwest and Southeastern Divisions are contested. Ballots were mailed the second week in October to Full Members of record on September 20, 1969. Any Full Member of these divisions who has not received his ballot by the first week in November should immediately write to the Secretary, ARRL, Newington, Connecticut 06111. Ballots to be counted as valid must arrive at ARRL headquarters before noon, November 20, 1969.

Ray Meyers, W6MLZ, former Southwestern Division director (right) appears to be telling Andy Devine, WB6RER "If you can't find it in a League publication, it hasn't been printed." Occasion is operation of special events station K6USA during a three-week demonstration of amateur radio by the Los Angeles Council of Radio Clubs. (Photo courtesy State Mutual Savings and Loan Association.)

W6 QSL BUREAU CHANGES HANDS

The San Diego DX Club has resigned as handlers of the W6-K6-WA6-WB6-WN6 ARRL QSL Bureau after ten years of fine service to the amateurs of California. Effective November 15, the bureau will be handled by the Northern California DX Club, Post Office Box 11, Los Altos, California 94022.

—···—

The W5 QSL Bureau has a new box number and Zip code: Box 31367, El Paso, Texas 79931.

Harry M. Engwicht, W6HC
Quayle B. Smith, W3KDR

With sorrow we report the death of Harry M. Engwicht, W6HC, director from the ARRL Pacific Division from March 14, 1955 to January 1, 1968. Harry had an arm severely mangled when the inner portion of a crank-up tower dropped. Reports from the hospital indicated he was recovering, but he died suddenly on Monday morning, September 22. Harry had been professor of electrical engineering at San Jose State College; he was 66 years old.

Another September death was that of Quayle B. Smith, W3KDR, of Washington, D.C. who did a lot of the behind-scenes legal work for ARRL as a member of Paul Segal's law firm in the late 40s and the 50s.

OHIO LICENSE PLATES UP $4.00

The Ohio Legislature has raised the extra fee for special license plates — amateur, physician, initials — from $1 to $5 per year, in addition to the regular fee of $10. The change, instituted in House Bill 501, affects 1970 plates.

Strangely enough, the bill seems to have been unnoticed in amateur circles until its adoption. This points up the need for amateurs in and near state capitals to keep their eyes and ears open when the legislatures are in session.

Behind the Diamond

Number 20 of a Series

Among the career girls at headquarters, none has a greater variety of jobs to perform than Miss Marion Bayrer, a veteran of 32 years service at the Headquarters. Starting as a file clerk in 1937, Marion's efficiency and capacity for detail have led her into supervision of out-going and internal mail; overseeing individual orders for publications; ordering of office supplies; advertising for and hiring clerical help; overseeing the reception desk; trouble-shooting *QST* delivery problems and a few dozen other chores, all under the title of circulation assistant.

A charter member of the ARRL Girl's Club Marion has been its president several terms. She's been a mainstay of its fund-raising affairs, such as the picnic lunch which was offered to the other employees on a day in June for several years; the proceeds went to the Hartford *Times* farm camp and Camp Courant, a day camp sponsored by Hartford's morning newspaper. On that occasion, she usually ended up as chief hamburger chef.

Away from 225 Main Street, Marion is an active member of Immanuel Congregational Church in Hartford; its businesswomen's club; and the church choir, in which she sings.

WHO THE DEVIL IS WHO?

19th in a Series of Call Conversion Charts

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

Now	*Was*	*Now*	*Was*	*Now*	*Was*	*Now*	*Was*
K2BF	W2BYN	W5OH	W5BDV	K6PZ	W6LVF	WØLA	WØLFB
K2BK	WA2OJD	W5PP	W5BXY	K6QL	W6NUK	WØLK	WØBRP
W3LR	W3CGF	K6NW	W6BPE	W8JB	W8COK	WØLN	WØUWG
W3VT	W3LQE	K6QG	W6JGQ	W8JX	W8BIE	WØLR	WØCNX
W3YN	W3LCI	K6OU	W6JFJ	WØGV	WØCDP	WØLV	WØRHV
W5OB	W5BUK	K6RA	W6EKN	WØKX	WØZHJ		

CANADIAN FIRM SUPPORTS ARRL TARIFF VIEW

In a shift from earlier policy, Delta Electronics, Ltd., of Rexdale, Ontario, now supports the ARRL view previously filed with the Tariff Review Board that import duties on amateur equipment should be removed.

The firm's new president, J. H. Baldwin, VE3BS, said in a letter to Canadian Director Eaton:

"I am pleased to report that Delta Electronics has reconsidered its stand concerning reduction of tariffs on amateur gear. As you know, the startup of manufacturing in a limited market has always been a difficult and uneconomic job. Traditionally, import duties have been the means of protecting the small operator from large foreign competitors, thus encouraging growth of local industry at the temporary expense of the local user. It is for this reason, with full intention of manufacturing amateur gear in Canada, that Delta previously opposed the ARRL brief to the Tariff Board for relief of duty (page 78, December 1968 *QST*).

"Delta Electronics has since concluded that even with tariff protection it would not be possible to manufacture amateur gear in Canada in the foreseeable future. This being the case, Delta now supports the stand taken by the Heath Company (formerly Daystrom) that removal of tariffs will be beneficial to the amateur fraternity and ultimately to our company. It is our intention to convey this change of view to the Tariff Board . . ."

TEXT OF INCENTIVE LICENSING ORDER

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

In the Matter of Amendment of the Amateur Radio Service Rules to provide for reserved frequency bands for Amateur Extra and Advanced Class operators.	RM-1357, RM-1393 RM-1493.

ORDER

Adopted: September 24, 1969;
Released: September 26, 1969

By the Commission: Commissioner H. Rex Lee absent.

1. On August 24, 1967, the Commission adopted its Report and Order in Docket No. 15928 (FCC 67-978, 9 FCC 2d 814), which made the allocation of certain sub-bands as "incentives" exclusively to the Extra and Advanced Class amateur operator licensees. The first phase of these allocations went into effect November 22, 1968, and the second phase is scheduled to become effective November 22, 1969.

2. In its Report and Order, 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 date of the implementation schedule will necessarily be stayed in whole or in part, as appropriate." In its Order denying RM-1287, August 9, 1968, the Commission said regarding Docket No. 15928 that: ". . . it is its intention . . . to make necessary changes if the effective utilization of the frequencies involved is threatened." In the same Order, it said: "So that Commission review may be meaningful, it is planned to gauge the results following each stage of implementation."

3. Three petitions and much correspondence have been received suggesting variations and counter proposals to the current rules and the scheduled frequency reservations. RM-1357, filed October 7, 1968, by Neil W. Petlock, proposed an advanced telegraph license which would require only a high speed code test to qualify for use of the Extra Class telegraphy allocations. RM-1393, filed January 1, 1969, by John A. Attaway, proposed that the exclusive Extra Class telegraphy segments 7000–7025 and 14000–14025 kHz not be expanded on November 22, 1969, and suggests that a reservation of a 10 kHz instead of 25 or 50 kHz would provide a better balance of band usage. RM-1493, filed August 6, 1969, by Emery T. Mitton, proposed that the Extra-Advanced exclusive sub-band 50.0–50.1 MHz be reduced to 50.00–50.05 MHz and a telegraphy only segment of the band be established at 53.5–54.0 MHz so as to be available to Technician Class operators.

4. The Commission has considered the above-mentioned petitions and correspondence, occupancy

surveys of the reserved sub-bands, and license statistics which show a definite shift toward the higher classes of licenses in reaching the following conclusions:

a. The exclusive telegraphy sub-bands for the Amateur Extra Class licensees are relatively lightly used compared to the telegraphy usage of the balance of the band by the other Classes of operators. Therefore, further expansion is not justifiable as a productive incentive to qualify for the Extra Class license at this time.

b. The telephony sub-bands reserved for exclusive operation of Advanced and Extra Class licensees are so well used during periods of moderate and heavy amateur activity that the previously adopted further expansion is necessary for the purpose of providing a continuing incentive to qualify for these classes of licenses. Comparison of the current number of licensees of each class and the space available to them in each of the four amateur high frequency telephony bands under consideration confirms the need for such adjustment. Therefore, the telephony allocations in the 3.8, 7.2, 14.2, and 21.25 MHz bands will go into effect on November 22, 1969, exactly as previously adopted by the Commission on August 24, 1967.

c. The interest in, and use of, the current space reserved for Advanced and Extra Class operators between 50.0 and 50.1 MHz is so moderate that the further expansion to 50.00–50.25 MHz scheduled for November 22, 1969, is unwarranted.

5. In reaching the above conclusions, the Commission has given consideration to the proposals advanced by the petitioners. The proposal of Mr. Petlock (RM-1357) is not consistent with the Commission's intent to encourage a balanced achievement at the highest level, both in code and technical ability, and is therefor denied. As noted above, further expansion of any of the four Extra Class exclusive telegraphy sub-bands is not justified by the present level of activity. However, a reduction at this time from the present 25 kHz segments as proposed by Dr. Attaway (RM-1393) would not be consistent with the desirability of continuing an incentive to qualify for the Extra Class license. Accordingly, his petition is granted to the extent provided herein and denied in other respects. In view of Mr. Mitton's statement (RM-1439) that the 50 MHz band is very lightly occupied, and in the absence of any affirmative showing for a need to realign the frequencies in that band, his petition is denied.

6. In view of the foregoing, the Commission finds that the amendments to Part 97, Amateur Radio Service, as set forth in the attached Appendix, are in the public interest, convenience, and necessity. The authority for such amendments is contained in Section 4(i) and 303 of the Communications Act of 1934, as amended.

7. Accordingly, IT IS ORDERED, That effective November 22, 1969, Part 97 of the Commission's Rules IS AMENDED as set forth in the attached Appendix.

8. IT IS FURTHER ORDERED, That the petitions filed by Neil L. Petlock (RM-1357, John A. Attaway (RM-1393), and Emery T. Mitton (RM-1493), to the extent that they are at variance with the rule changes adopted herein, ARE DENIED.

FEDERAL COMMUNICATIONS COMMISSION

BEN F. WAPLE
Secretary

APPENDIX

Part 97 of the Commission's Rules is amended as follows:

Section 97.7(a) & table, and par (c) [Note deleted] are amended to read as follows:

§97.7 Privileges of operator licenses.

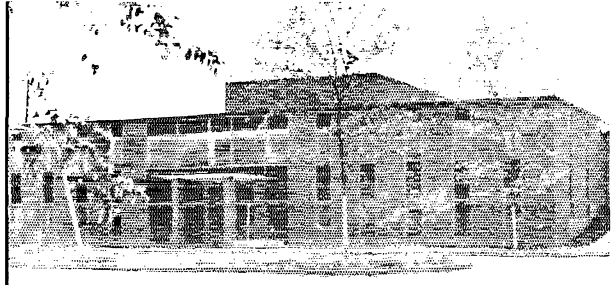
(a) *Amateur Extra Class and Advanced Class.* All authorized amateur privileges including exclusive frequency operating authority in accordance with the following table.

Frequencies	*Class of license authorized*
3500–3525 kc/s 3800–3825 kc/s 7000–7025 kc/s 14000–14025 kc/s 21000–21025 kc/s 21250–21275 kc/s	Amateur Extra Only
3825–3900 kc/s 7200–7250 kc/s 14200–14275 kc/s 21275–21350 kc/s 50–50.1 Mc/s	Amateur Extra and Advanced

(c) *Technician Class.* All authorized amateur privileges on the frequencies 50.1–54.0 Mc/s and 145–147 Mc/s and in the amateur frequency bands above 220 Mc/s. QST

RULES FOR LIFE MEMBERSHIP

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



Of, By and For the Radio Amateur

BY DON WATERS*

You can easily miss the inconspicuous sign at the long entry drive. What you spot first as you drive north a mile or so on Main Street out of the small town center of Newington, a residential suburb of Hartford, Connecticut, is the imposing array of antenna towers surrounding a small brick building. Then, if you look, you can see a sprawling, attractive building, set well back from the road on campus-like grounds.

This is the headquarters of the American Radio Relay League. The small brick building with the antennas, of course, is the Hiram Percy Maxim Memorial Station, better known to hams around the world as W1AW, the voice of ARRL. These were the call letters of Maxim, the League's co-founder and first president. The spacious main headquarters building houses the League staff — and the offices of *QST* and the other ARRL publications. The offices are attractive and efficient but essentially Spartan in furnishings and decor.

The headquarters building is the hub of a vast activity which involves the 70 full-time staffers, 16 elected directors, 16 elected vice directors, 5 officers, some 250 appointed assistant directors, 74 elected section communications managers, some 6000 appointees in the field organization, 18 members of two pilot Advisory Committees, two dozen district QSL bureaus with many helping hands, about 1300 affiliated amateur radio clubs, and nearly 100,000 members in the U.S., Canada and around the world. All of the League's "official family," except the headquarters staff itself, are volunteers, serving the League and its membership without pay in the interests of amateur radio.

Into and out of the headquarters building flow thousands of pieces of mail each week, making the League by far the largest customer (around $75,000 annually) of the Newington Post Office. The annual telephone bill (including telegraph) is more than $11,000. About 1000 visitors from all over, including patient wives and curious children, tour headquarters each year. When you add the hundreds of field trips by the staff, directors and volunteer leaders to hamfests, conventions and club meetings, the contact with the membership is continuous and very impressive indeed.

League Headquarters is also the center of what is in effect a major business enterprise, with an annual budget of about a million and a half dollars. This money — *your* dollars — goes to provide the monthly issues of *QST*, the *Radio Amateur's Handbook*, various other League publications, such membership services as the Technical Information Service and Training Aids, awards, contest sponsorship, staff salaries, travel to clubs and conventions, representation before FCC and ITU, in addition to all the miscellaneous and customary expenses of any office. League headquarters is additionally the world headquarters of the International Amateur Radio Union with its 81 member societies in as many countries in Europe, Africa, Asia, Australia, New Zealand and Latin America.

How is all this organized? Who does what to whom? How does the League function by, for and through its members? It's all spelled out in the Articles of Association, the By-Laws, and in the pamphlet, *Operating an Amateur Radio Station*. These, however, are rather formidable reading, so here is a review and rundown in what hopefully will be a more palatable form.

The Policy Makers

Let's start at the top. The League membership has vested basic policy-making authority in its Board of Directors — 16 members, one from Canada and one from each of 15 U.S. divisions. Each director is elected by the membership in a division, along with a vice director who serves a concurrent term. They all serve without compensation, although directors are reimbursed for certain out-of-pocket expenses. To qualify for nomination by any 10 Full Members, a candidate for either office must have been a licensed amateur and a full League member for four continuous years and without any direct commercial radio interests. In addition to establishing overall policy, it is a director's responsibility to keep himself informed of conditions and activities in his division, the needs and desires of the members so he may faithfully and intelligently represent their true interests. To do so, he visits clubs, hamfests and other ham gatherings as much as he can, maintains an extensive cor-

Did you know that ARRL's "official family" is more than 6000 strong? Here's a review of the League's organization and how it functions.

* Public Relations Consultant, ARRL

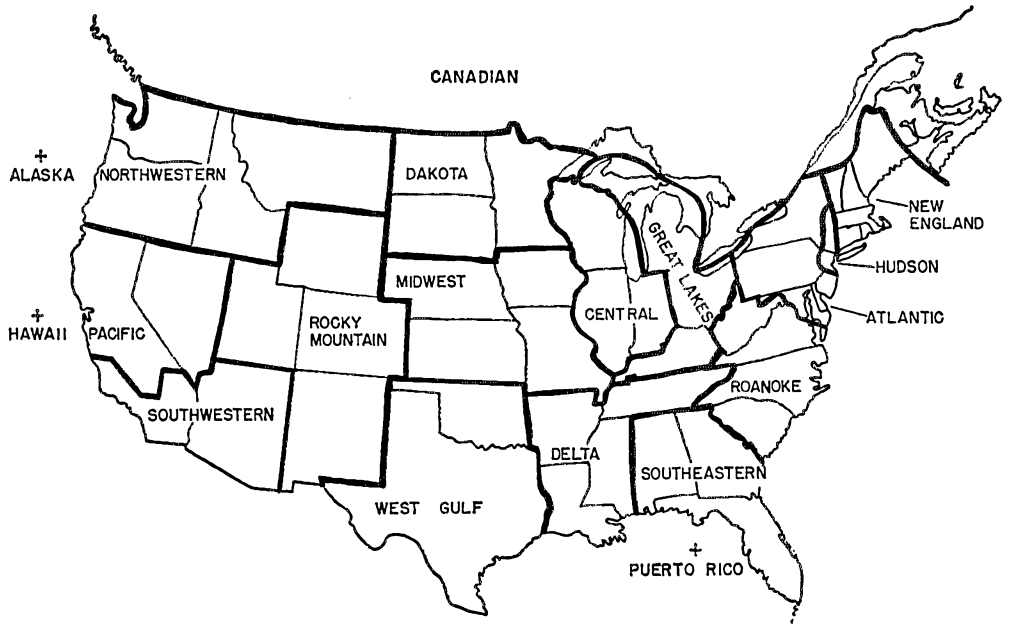


Fig. 1—Boundaries of the 16 League administrative divisions.

respondence, distributes a newsletter, and appoints assistant directors to help him maintain contact with the membership.

Half the Board comes up for election each year so there is continuity, each member serving a two-year term. The full Board meets at least once each year in May. Usually these meetings are in Hartford, but they have been held also in San Francisco, Washington, Denver, Quebec and New Orleans.

To direct affairs in the interim, an Executive Committee consisting of the President, First Vice President, General Manager, and four directors elected by the Board meets at least four times a year.

The Board has established five standing committees of directors to deal regularly with basic League functions, or with special problems as they might arise. The Finance Committee has guidance responsibilities in both investment policies and budgetary projections. The Planning Committee is a general reference body which makes studies and recommendations from time to time, as for example of band occupancy and the suitability of subband segments, as directed by the Board. The Membership & Publications Committee, as indicated by the name, concerns itself with membership promotion and the supervision of the League's family of publications. Duties of the Public Relations Committee are also evident from its name. The Merit & Awards Committee coordinates issuance of the *QST* Cover Plaque, ARRL Merit Award, and other such honors when issued.

In addition, two pilot advisory committees have been established as an experiment, aimed at closer contact with the membership in specialty areas and a source of recommendations to the Board in these areas: Contests, and VHF Repeaters. Substantially serving also as "committees" are the area staffs of the National Traffic System.

Officers and Staff

The officers of the League are elected by the Board and responsible to it. They are (with current incumbents) a President (Robert W. Denniston, WØDX), a First Vice President (Wayland M. Groves, W5NW), no more than two additional Vice Presidents (Roemer O. Best, W5QKF), a Secretary (John Huntoon, W1LVQ) and a Treasurer (David H. Houghton). There is also one Honorary Vice President, Francis E. Handy, W1BDI, who served as Communications Manager for 42 years until his retirement in 1967.

President Denniston of course presides over meetings of the Board, but basically has the responsibility to "represent the League in its relationships with the public and the various governments, governmental agencies and officials with which the League may be concerned." He also is the official spokesman of the Board of Directors in regard to all matters of League policy. Vice Presidents Groves and Best assist in these functions as required. WØDX is also president of the International Amateur Radio Union, an affiliation of 81 national amateur societies around the world.

The Secretary of the League has mostly corporate duties — recording of minutes of the Board and Executive Committee, filing of records of the corporation, and "keeper of the seal." In charge of ARRL funds is Treasurer David Houghton, who served also as Circulation Man-

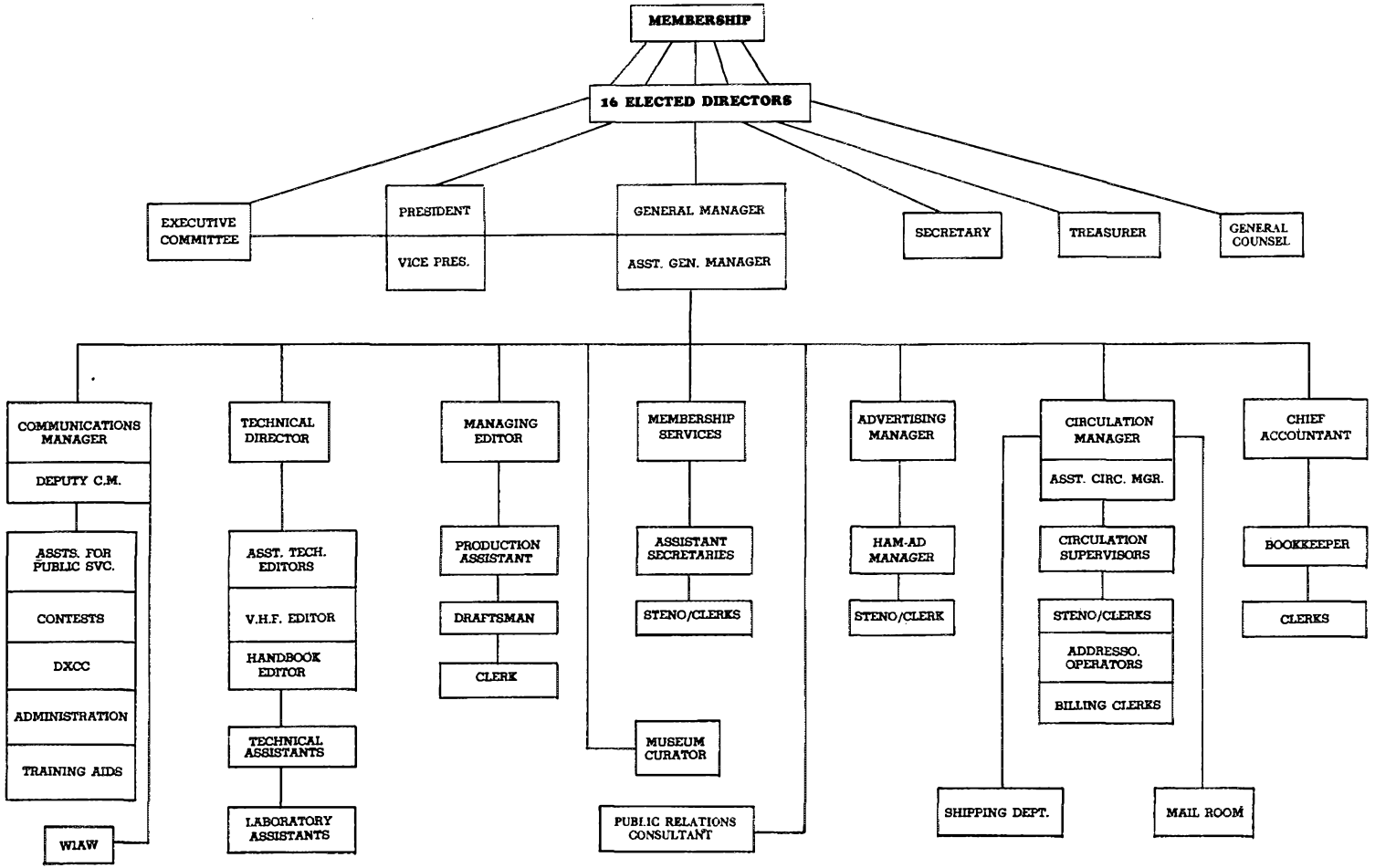


Fig. 2—The "wiring diagram" of the League's organizational structure.

ager on the Hq. staff for 43 years prior to retirement in 1965, and is primarily responsible, in consultation with the Finance Committee, for the League's fine portfolio of securities investments.

General Counsel Booth, W3PS, a Washington, D.C. attorney, represents the League in legal matters and functions as a continuing contact and "listening post" with the Federal Communications Commission, the Congress and other agencies concerned with amateur radio matters in the Federal government. The Associate Counsel, Arthur K. Meen, Q.C., VE3RX, a Toronto attorney, performs a similar function in Canada, working closely with Director VE3CJ. Public Relations Counsel Don Waters, who operates his own firm in Ridgefield, Conn., works with the General Manager, the staff, and with directors upon request, primarily on matters concerned with membership relations, communications with amateurs generally, recruiting and, to a lesser extent, on communications with the non-amateur public in behalf of amateur radio.

All directors, vice directors and officers of the League are listed in the front of each issue of *QST*. The division boundaries are shown in Figure 1.

Practical implementation of many League functions is accomplished through a Headquarters staff under the direction of the General Manager, who serves "at the pleasure of the Board." He is responsible for routine management of the affairs of the League, following policies and guidelines and pursuing objectives laid down by the Board. He hires the other employes and is responsible for their work. The organization chart, Fig. 2, illustrates these functions as well as the overall administrative structure of the League.

Field Organization

The term "field organization" can be (and sometimes is) applied to all the elected and appointed officials of the League who are unpaid, plus all the members participating in various ARRL programs outside the headquarters. Principally, however, it refers to those elected officials and appointees of the ARRL Communications Department who are active in the League's sponsored operating (i.e., on-the-air) programs.

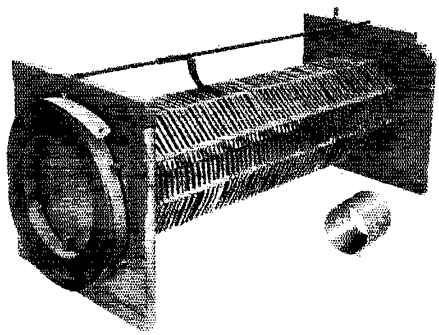
The key people in the field organization are the 74 Section Communications Managers, elected for two-year terms by the membership in each section. Most sections are defined by state boundaries and are listed in the front of each issue of *QST*. (A detailed list by counties is in the League pamphlet, *Operating an Amateur Radio Station*, free on request to any member.) The SCM is responsible for field appointments and the ARRL operating program in his section. A substantial portion of *QST* each month is devoted to sectional reports of activities.

His appointees include a Section Emergency Coordinator and community Emergency Coordinators who maintain the section emergency communications plan. Route Managers to coordinate traffic handling, Phone Activities Managers who coordinate organized voice communications activities in the section, Official Relay Stations who operate in the various established nets via cw and RTTY, the Official Phone Stations who do the same for voice, Official Bulletin Stations who transmit League bulletins on a regular schedule, Official Observers who assist in promoting compliance with government regulations by providing a cooperative monitoring service, and Official VHF Stations who provide organized services in the VHF bands.

These people, too, all serve without compensation.

—•••—

This, then, in essence, is how ARRL is organized and how it functions. To a degree that is true of few (if any) other avocations, this is the means by which radio amateurs over the past half-century have made amateur radio what it is today. Any amateur can be a part of this organization — and nearly 100,000 are. At $6.50 in dues per year or $130 for Life, it has got to be a ham's biggest bargain. Where are all the rest of you? QST



From the Museum of Amateur Radio

This monster is the oscillation transformer made and used by Charles Stewart, W3ZS, first vice-president of the ARRL to couple his fat kilowatt spark rig into the antenna. Why so big and so many turns? He had a special license to operate on 375 meters! For comparison note the low-loss transmitting coil alongside. The little fellow is four inches in diameter and five inches long. In the big one, the primary is at the left. All insulation is wood, hopefully dry.—W1ANA.

ARMED FORCES DAY 1969

Communication Test Results

ONCE again, the annual Armed Forces Day communications tests conducted by the Departments of the Army, Navy, and Air Force on 17 May 1969 conclusively demonstrated the close partnership and mutual respect prevailing between U.S. radio amateurs and the U.S. Department of Defense. With several military radio stations participating, tests included military-to-amateur crossband operations in cw, RTTY, and ssb modes and receiving contests for both cw and RTTY.

Crossband Results

Military radio stations WAR, NSS, NPG, and AIR had a combined total of 8877 QSOs during the 12 hours and 45 minutes devoted to the military-to-amateur crossband portion of the communication tests. Commemorative QSL cards have been mailed to all contacts who could be identified in the Spring 1969 issue of the *Radio Amateur Callbook Magazine*. (Any amateur who has not received a QSL card confirming his contact should address a request for clarification to Armed Forces Day Contest, Room 5A522, The Pentagon, Washington, D. C. 20315. This request must include the amateur's call sign, station worked, time of contact and frequency utilized by the military station.)

CW Receiving Contest Results

There were 466 perfect entries for the 25 wpm cw Broadcast Message originated by the Secretary of Defense. The complete text of the 25 word per minute Morse-Code Message is printed below followed by the call signs or names of individuals who received a Certificate of Merit for submitting a perfect contest entry:

— R — 172100Z MAY 69
— FM WASHINGTON DC
— TO ALL ARMED FORCES DAY PARTICIPANTS
GR 214 BT

ON THIS ANNUAL OBSERVANCE OF ARMED FORCES DAY I AM PLEASED TO EXTEND GREETINGS TO RADIO AMATEURS IN ALL FIELDS OF MILITARY AND CIVILIAN ENDEAVOR PD THE LONG STANDING MUTUALLY ADVANTAGEOUS RELATIONSHIP WHICH EXISTS BETWEEN THE AMATEUR RADIO FRATERNITY AND THE MILITARY COMMUNICATIONS SERVICES IS NOW REFLECTED IN A DEPARTMENT OF DEFENSE DIRECTIVE PUBLISHED IN NOVEMBER 1968 PD THAT DOCUMENT REAFFIRMS MORE THAN A HALF CENTURY OF MILITARY INTEREST AND SUPPORT OF AMATEUR RADIO PD THE MILITARY AFFILIATE RADIO SYSTEM PROGRAM SPONSORED BY THE MILITARY DEPARTMENTS IS TANGIBLE EVIDENCE OF THAT INTEREST AND SUPPORT PD FUNDAMENTALLY CMM IT SHALL BE THE POLICY OF THE DEPARTMENT OF DEFENSE TO ENCOURAGE AND COOPERATE IN THE DEVELOPMENT OF AMATEUR RADIO CMM TO AVOID ANY ACTION WHICH WOULD TEND TO JEOPARDIZE THE INDEPENDENT PREROGATIVES OF THE INDIVIDUAL RADIO AMATEUR AND TO MAINTAIN LIAISON WITH RECOGNIZED US AMATEUR RADIO ORGANIZATIONS PD THE INTERNATIONAL AMATEUR RADIO UNION AND THE AMERICAN RADIO RELAY LEAGUE ARE RECOGNIZED AS PREEMINENT SPOKESMEN FOR AMATEUR RADIO PD AS IN THE PAST CMM THE MILITARY DEPARTMENTS WILL CONTINUE TO COOPERATE WITH THOSE ORGANIZATIONS IN THE PRESERVATION AND PROMOTION OF AMATEUR RADIO IN THE PUBLIC AND MILITARY INTEREST PD MY BEST WISHES TO YOU ALL FOR EVERY FUTURE SUCCESS SGD MELVIN R LAIRD CMM SECRETARY OF DEFENSE BT
QRU AR

C.W. Certificate Winners:

WA1AAQ/5, W1ABE, W1AJK, W1BB, W1BDI, WA1BLZ, W1CZE, WA1DRS, W1ECH, W1EKB, W1ELL, K1ESG, W1EXG, WA1FGN, W1GBB, WA1GFH, W1GUP, WA1HDE, W1KKB, WN1KRP, W1LZL, W1MCG, W1MTQ, W1OMN, W1UPG, W1WPR, W1WXS, K1ZYW, W2AGH, WA2AUZ, K2AXI, VE2BTW, W2BVE, K2BVS, W2BWL, WB2CGE, WA2CKL, W2CLQ, W2COG, W2DJM, W2DRV, W2EAF, WB2EHZ, WA2EMV, WB2EVA, WB2FGQ, WB2GMN, WB2GOK, W2GQN, W2HKJ, WB2IEC, WA2IOG, K2IOJ, W2JDC, WB2JGO, WB2JWC, K2JWM, WA2KIP, W2LC, KL2LHF, W2LYH, W2MLE, WA2NDC, W2NVB, W2NRW, WB2NYK, W2OIF, WB2OUZ, W2OWP, W2RJ, WB2RKK, W2RTV, K2SEN, W2SKX, WB2SMD, W2TUK, K2UBG, K2UGZ, W2UK, W2VEH, WA2VSQ, WA2VYS, W2WH, W2YWO, W2ZCH, K2ZFM, WA2ZPR, W2UX, W3ABC, WA3ACE, W3ADE, W3BFF, W3BFP, W3CA, K3CKT, K3DYT, W3ECP, W3EOV, VE3ERU, VE3ESH, W3FA, W3FU, K3GOH, K3HNP, K3HPG, K3HTZ, W3IDO, WA3ILB/1, K3ILC, W3IVD, W3JET, W3JM, WA3JTT, W3JXK, W3KV, WA3LKH, W3MAA, K3MNT, W3NNL, W3OXS, W3SFY, W3SS, W3TRC, W3VK, W3WR, W3ZLP, W4ABY, W4ADK, W4AHQ, W4AT, K4AWY, W4BBZ, W4BD, WB4BMW, W4BN, W4BP, KL4BWR, WA4CJW, K4DR, K4DSN, WB4ECK, W4EFV, K4EID, K4EOF, W4FFF, WB4FIN, K4FN, K4FX, W4GEF, WA4GOC, W4GRG, WB4HGT, K4HOE, K4HOS, W4HYY, WB4IRV, WA4ISM, W4IYB, W4JDR, W4JJU, W4JRA, W4JXD, W4JXM, K4KHT, W4KNE, K4KR, WB4KZF, WB4KZI/4, WB4LNV, W4MKU, K4MS, W4NEI, W4NPG, W4NTE, W4PKI, W4PQL, W4PVW, WA4PWF, W4RHZ, W4SCF, K4SJH, W4UMO, WP4UW, W4VDM, W4VOL, W4VX, WB4VYZ, W4WDF, W4YOH, WA4YSX, W5AIR, W5AJG, K5BJN/6, WA5BNK, WA5BZR, W5CCF, WA5CER, WA5DEM, W5EGX, W5EJV, W5FBJ, W5FMO, W5HGT, W5HN, W5IGZ, K5JGZ, WA5JJF, W5JMP, WA5KPO, W5LLS, W5MCC, WA5MFZ, WA5MIB, WA5MML, W5MV, W5MW, W5NDV, W5NFJ, WA5GL, WA5NOM, W5NV, W5OB, K5OBO, W5OM5N ,WOVX, KVPEV, W5PVE, K5QFV, WA5QOZ, W5RCF, K5RIR, WA5RXA, WA5SHP, W5TOO, WA5VRL, W5YAJ, K5YBN, K5ZU, W6AAQ, W6AEE, W6AIG, WB6AO, K6AU, K6BA, W6BGF,

WA6DEI, W6DOU, K6DY, WB6EJU, W6ELT, WA6EPT, W6ENA, W6EY, W6FAX, W6FD, W6FLW, W6FNG, WA6FPM, W6FQ, KH6FX, W6GC, K6GPB, K6HB, W6HDJ, W6HKM, W6HTS, W6INI, W6IQ, WB6IRJ, W6ISQ, WA6JBW, W6KS, W6LIP, WB6MH, W6MMG, W6MXO, K6MV, W6NH, K6OT, W6OWP, WA6OXJ, W6PU, W6QIL, W6QQ, W6RBK, W6RDK, K6SHZ, W6TX, W6TZD, WB6URS, W6VK, WB6VLI, W6VPC, K6VYJ, W6WD, W6WJ, K6WTE, W6YFV, WB6YQS, K6YWI, WA6ZBL, WB6ZFV, WN6ZXN, WA7BEV, W7CFJ, WA7CMD, W7EA, WA7ELF, W7ETK/0, W7EU, W7EXT, W7EYF, W7FHD, K7GAQ/6, K7GXO, W7HNA, W7HRM, WA7IEJ, WA7ISA, W7JMH, W7JX, W7KN, K7KSA, W7LBK, W7MAE, W7ME, W7NGW, W7OCX, K7OFW, W7PAE, W7SJT, W7SMR, K7VJU, K7WSW, W7YOG, WB8AIF, W8AM, W8AST, W8BC, W8BE, W8BEK, W8BQ, W8BYG, K8COU, K8ENX, K8EQN, W8FB, W8FF, W8FLA, K8HLJ, W8HZA, W8IBX/2, W8IJV, K8KIR, K8KSN, WA8MRM, W8OMY, W8ORD, W8PDW, W8QLJ, W8RLR, K8RXD, W8RXH, WA8SRM, W8SS, W8SYZ, W8TCO, K8VWN, W8VYU, W8WVL, WA8WWS, W8YCP, WA8YSB, K9AAG, K9AHH, W9ANB, WA9AVM, WA9AXD, W9CB, W9CBE, WA9CCP, W9CXY, WA9DHI, W9DM, WA9EAL, W9EGR, W9FC, W9FG, W9FLB, W9GCZ, W9GWC, W9HMR, W9HTO, W9IDO, W9IZD, W9JNB, WA9LAE, WA9MHU, WA9MOP, WA9MOQ, K9OHI, K9ONI, WA9QMB, WA9QOR, WA9QOQ, K9RAA, WA9RNT, W9SUF, W9TGE, W9VHD, W9WNB, W9YAC, WA9YDS, WA9YOU, W9YPO, WA9ZAK, W9ZEN, W9ZSQ, WØAH, KØAUU, KØCOU, WØFA, WAØHHN, KØHPJ, WØKIK, WØKIS, WØLEK, WAØNJF, KØOJQ, WAØPRL, WAØQEX, WØRXD, WØUCE,

ARCHER, FRANCIS O., SR., RMNC (SS) USN (RET); BROZEK, C. J., RM2; BURLESON, DOYEL W.; CHENOWETH, CHARLES E., CWO2; CHRISHOLM, THOMAS W.; COFFEY, JAMES C.; COURTNEY, WILLIAM, RM3; COX, CLARK W., USNR (RET); CUDDINGTON, EDWARD C., RM2; DAVIS, JAMES F.; FAULK, GLEN RICARDO, RM1, USN; GREGORY, ARTHUR F., RM1; JONES, JOHN R., GYSGT; KWANT, LARENCE J.; LANGLEY, BERNARD R.; LORD, BENJAMIN P.; LUND, D. S.; MC KEETHAN, ALTON; POWERS, C. A., RMC; REID, WILLIAM; RUSSELL, CLYDE H.; SIGNORELLI, P. R.; SORENSEN, G. E., RM2; STUCKERT, ROBERT I.; TADAY, ALEXANDER A.; WATKINS, PETER H.; WATSON, JOSEPH A., RM1; WELLS, EDWARD O., RM1.

RTTY Receiving Contest Results

There were 424 perfect entries for the 60 wpm RTTY Broadcast Message originated by the Secretary of Defense. The complete text of the 60 word per minute radioteletypewriter message is printed below followed by the calls or names of the successful participants who received a Certificate of Merit for submitting a perfect contest entry:

R 172130Z MAY 69
FM WASHINGTON DC
TO ALL ARMED FORCES DAY PARTICIPANTS
BT
ON THIS 20TH ANNUAL ARMED FORCES DAY I AM PLEASED TO EXTEND GREETINGS TO RADIO AMATEURS IN ALL FIELDS OF MILITARY AND CIVILIAN ENDEAVOR. THE MUTUALLY ADVANTAGEOUS RELATIONSHIP WHICH HAS LONG EXISTED BETWEEN THE MILITARY COMMUNICATIONS SERVICES AND THE AMATEUR RADIO FRATERNITY IS NOW REFLECTED IN A DEPARTMENT OF DEFENSE DIRECTIVE PUBLISHED IN NOVEMBER 1968. THAT MILESTONE DOCUMENT IN THE MORE THAN HALF CENTURY HISTORY OF AMATEUR RADIO ATTESTS TO THE INTEREST IN AND SUPPORT OF AMATEUR RADIO BY THE DEPARTMENT OF DEFENSE. THE MILITARY SPONSORED MILITARY AFFILIATE RADIO SYSTEM PROGRAM IS TANGIBLE EVIDENCE OF THAT INTEREST AND SUPPORT. FUNDAMENTALLY, IT SHALL BE THE POLICY OF THE DEPARTMENT OF DEFENSE TO AVOID ANY ACTION WHICH WOULD TEND TO JEOPARDIZE THE INDEPENDENT PREOGATIVES OF THE INDIVIDUAL RADIO AMATEUR, TO ENCOURAGE AND COOPERATE IN THE DEVELOPMENT OF AMATEUR RADIO AND TO MAINTAIN LIAISON WITH RECOGNIZED U.S. AMATEUR RADIO ORGANIZATIONS. IN THE LATTER CONNECTION THE AMERICAN RADIO RELAY LEAGUE AND THE INTERNATIONAL AMATEUR RADIO UNION ARE RECOGNIZED AS THE PRE-EMINENT SPOKESMEN FOR AMATEUR RADIO. AS IN THE PAST, THE COMMUNICATIONS SERVICES OF THE MILITARY DEPARTMENTS WILL CONTINUE TO COOPERATE WITH THESE ORGANIZATIONS IN THE PROMOTION AND PRESERVATION OF AMATEUR RADIO IN THE MILITARY AND PUBLIC INTEREST. MY BEST WISHES TO YOU ALL FOR EVERY FUTURE SUCCESS. SIGNED MELVIN R. LAIRD, SECRETARY OF DEFENSE.
BT
QRU AR

RTTY Certificate Winners:

W5MCO, W5NKG, W5NU, K5OLU, WA5OUD, W5PVE, WA5SLC, WA5TKU, K5VOZ, K5YBN, W5YIU, K5YN, WA5ZR, WB6AAL, WA6AAY, W6ACN, W6AEE, WB6AQR, W6AWP, W6AWY, WA6BNC, W6BGH, W6BIK, W6BLV, K6BPI, WB6BRY, K6BUU, WB6BWZ, W6CJC, WB6CPL, WA6COW, W6CVV, WB6DBD, W6DOU, WA6DVH, W6DWK, WB6DWM, K6DZN, W6EGH, W6ELZ, K6EPT, W6FAX, W6FFY, W6FLW, W6FRE, KH6GKL, K6GKX, K6GUQ, WN6GVU, W6GVW, W6GY, W6GYH, W6HCQ, WA6HG, W6HKB, W6HTS, W6HVG, KH6IBI, W6JDN, W6JKY, W6JPV, W6JT, W6JWF, K6JWQ, W6JYB, WB6KLP, W6KS, WA6KZF, W6LDG, W6LFK, K6LFM, W6LGC, W6LRT, W6LSW, W6LVR, WB6MHO, WB6MMC, K6NCG, WB6ODR, WB6OGD, W6OWP, K6OYR, WA6PDR, WA6PIR, WB6PMV, K6PTP, W6QIG, WB6QJW, WC6QMJ, W6QZC, WA6RBT, WA6RZB, W6SCR, K6SHZ, WB6TFC, WB6TMQ, WA6TVL, WA6TWG, W6TX, WB6UUX, WA6VGE, W6VPC, W6VVF, WB6VYR, K6WA, WB6WRS, W7APE, WA7BEU, WA7BVN, WA7CCK, VE7CZ, W7DCR, W7DFX, WA7DTF, W7EDN, W7EZU, WA7FAB, W7FEN, K7GYH, W7IGK, W7IXD, K7JJS, W7JMH, WA7KQN, W7LBK, W7MAE, WA7MGX, K7MLO, W7NFR, WA7NHO, K7PMG, K7SPJ, K7UXK, K7WTQ, K7WWR, W7YDX, K8AN, W8AN, WA8AWU, W8BC, W8BEK, W8CWE/1, K8EQN, W8FEU, WA8FYF, K8GJL, W8GYV, WA8HCK, W8IHU, W8IJV, WA1AAQ/5, WA1BRL, WA1CBP, WA1CTR, WA1CXD, WA1DHM, K1DVI, W1EFF, W1GNV, WA1HVR, W1JPK, K1KMV, W1LLB, W1MCG, W1NPL, W1OMN, W1REK, K1RYP, K1ZKH, K2AGI, W2BLV, WA2CUB, W2CY, WB2DIV, WA2DVU, W2DWE, K2EDF, W2FAM, WB2FEL, WB2FOC, WB2HXZ, W2JAV, WB2JBH, K2KAQ, WA2LKF, W2LYH, WA2MQX, K2OEQ, W2OKO, WB2OUZ, K2RRM, W2RUT, K2SBD, K2SEV, W2SUH, W2SV, WB2TSV, W2VIK, WA2VSO, WA2VYS, WA2YFB, WA2ZVL, K3ABA, WA3BCO, WA3BFN, WA3BHX, W3CA, W3CPR, W3CRO, W3CUL, K3CYD, K3ECF, W3EEK, W3EOV, K3FJU, WA3GBK, K3GK, WA3HEN, W3IRS, W3IVD, WA3KIG, WN3KZR, WA3LKH, W3LOY, W3MHD, W3NSI, W3NST, W3PYW, K3QJO, K3RCM, K3RTR, W3SFY, K3SYM, K3UUL, K3UWJ, K3VIK, W3VR, K3YSI, K3ZDR, W4AAY, K4AOB, K4AWY, WB4BLL, W4CQI, W4CTT, K4CZ, W4DBF, W4DYE, K4EID, WB4ESM, WA4FHY, K4FPW, W4FY, K4GJW, K4GVE, WA4GZY, WB4HEW, W4HSR/5, WB4IFI, W4IRZ, W4JDR, W4JRA, W4KNE, K4KZH, WB4LNV, WA4MBQ, K4QJH, W4SKX, WA4TFB, WA4UPI, WA4UMK, WA4UNW, WA4USB, W4VBD, K4VDM, WA4WCL, WA4WTN, W4YPG, AG5AB, W5AJG, K5BJN/6, WA5BNK, K5BYF, W5CAJ, WA5CER, WA5DEM, W5DKK, W5DNH, W5EAH, W5EDZ WA5FH, K5GFV, W5HN, W5JGH, WA5JJF, WA5JQS, KZ5KR, W5LLG, W5LNG, K5MBB, K8JHA, K8KAG, WA8KPT, W8MBB, WA8MOA, W8OMY, W8PYM, W8TCO, K8TID, WA8UGA, WA8VEB, K8WQS, WA8YSB, K8ZPR, W9ATK, WA9AVM, W9AZW, K9BRL, W9BUF, W9CAV, WA9CCP, WA9CCQ, K9CCX, K9CMX, W9CUW, K9DAS, W9DRN, W9DVJ, W9DY, W9EPT, W9EWC, W9FXC,

W9GDV, K9GSC, K9GWT, W9GYL, W9HMR, WA9KEJ, K9LRO, W9LVC, W9MGV, K9OJQ, W9ONI, K9PJB, K9PJB, K9POU, W9PRO, W9QVQ, WA9RSN, W9SUF, WA9TTJ, W9TYT, K9UKH, K9UTN, W9VMG, W9WNB, W9YGN, W9ZBM, W9ZDI, W9ZGC, W9ZQE, KØATZ, WØCXT, WAØCXY, KØDYM, KØECG, WØFA, KØFLK, WØFWD, WØHFP, WAØHXA, WØIBZ, WBØILV, WØJOL, WØJUV, WØKIS, WØLDO, WØLFH, WAØPWI, KØPWZ, KØQLB, WAØRTD, WØRXD, WØSIR, WØTCK, WØTDH, WØUCE, WØUSO, WØVCM, WØVLB, WAØVQM, WØYSX, WØYYM, WØZWN

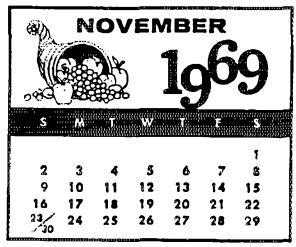
ANDREWS, CHARLES, CAPT; BADE, RAYMOND P.; BRODIE, WILLIAM H., JR.; COMBS, JAMES; CORKINS, DANIEL M.; DAVIS, F. E., M.D.; DORMAN, D. D., RM2; FOOTE, JOHN R.; GOODMAN, DAVID J.; GRAVES, JAMES R., JR.; GREGORY, ARTHUR F., RM1; HOLD, ROBERT V.; JOSEY-CHARLES C.; KAUFMAN, WALTER, 1LT (CAP), LOWE, G. F.; MARSHALL, S. B., RMSN; MEADOWS, J. R.; MENADIER, PAUL T.; MILLER, TERRY R., RM2; MUELLER, C. B.; NCOIC BASE MARS STATION BROOKS AIR FORCE BASE, TEXAS; ROBERTS, CONRAD E., JR.; SMAPLE, WESLEY J.; RMC; SCHUMACHER, LEN; SMITH, HENRY, JR., ET1; ROTH, TIMOTHY J.; TUCKER, LARRY L.; WELLS, EDWARD O., RM1; WENDLAND, W. Q.; WILHELM, DONALD L. QST

Hamfest Calendar

California — The AARU K6SYU Annual Dinner Dance will be held November 8 at Michaels' Inn, Fullerton, at 8 P.M.

Minnesota — The Faribault Area Radio Club will host the winter hamfest of the Handi-Ham System/Piconet on Saturday, December 6, from 9 A.M. to 4 P.M. Meeting will be held at the Faribault Eagles Club rooms, located on Minnesota Highway 60, 1½ miles west of Faribault. The Hamfest will consist of speakers, luncheon, Handi-Ham System meeting and Piconet meeting, and eyeball QSOs. Registration is $1.50 (includes luncheon). Write Faribault Area Radio Club, P.O. Box 772, Faribault, Minn. 55021.

Oklahoma — The Annual Texoma Hamarama will be held again this year at the beautiful Lake Texoma State Lodge, November 14, 15, and 16. Registration is $2.00 per person. There will be plenty of programs, swapping and goodies. This is a family affair for anyone interested in ham radio. Special interest to all old timers, is the annual joint meeting of the Quarter Century Wireless Association where all Chapters in this Div. will join for a grand visit. Plan a pleasant weekend for all. There is plenty of camping and trailer spaces available. For lodge or cabin accommodations, write or call directly to the Lake Texoma Lodge, Kingston, Okla. 73439. Tel.: 405-564-2311. Mail registrations for the Hamarama to Texoma Hamarama, P.O. Box 246, Kingston, Okla. 73439.



Ontario — The Skywide ARC will host the annual convention of the Radio Society of Ontario on the week end of November 14, 15 at the Holiday Inn — Don Valley (Don Valley Parkway and Eglinton Ave., East, Toronto). There will be a candlelight dinner and dance on Friday evening, an early bird buffet breakfast, a buffet luncheon, and a banquet and speaker on Saturday. All forums, demonstrations, and exhibits are free. All ladies events are included in the ladies registration fee. Registration before October 30 is $5.00 for ham and $3.00 for his lady; $6.00 and $4.00 after October 30. Dinners and buffets are extra. For more information write Skywide ARC, P.O. Box 83, Station "N", Toronto 14, Ontario, Canada. Please make your own hotel room reservation if you wish a bedroom at the hotel on November 14 or 15.

Texas — See Oklahoma (Texoma Hamarama) QST

Strays

I would like to get in touch with . . .

. . . former AACS operators who were active during World War II. W8AGQ.

. . . teenagers interested in the National Teenage Net on 7289 kHz at 2400Z. WA8YXE.

. . . radio amateurs who are also falconers. K9GED.

. . . foreign amateurs visiting the U.S. as members of musical organizations. WA4DLF.

. . . hams in Southeastern New York, Connecticut and New Jersey interested in becoming part of a weather net. WB2KDP.

. . . amateurs associated with the Norwich Pharmacal Company in Canada, U.S., Central and South America for the purpose of forming a Norwich Pharmacal Company net. WA2ZWA.

. . . radio amateurs interested in glass. K1PJW.

. . . anyone interested in a Farmers Net. W1MGP.

. . . hams interested in forming a 75- or 20-meter chess net. WA2CTQ.

. . . radio amateurs in Siracusa Province of Sicily, (IT1), on 10 and 15 meters. WA1BHM.

. . . hams who are also aircraft control-tower operators. WB8ABN.

From time to time, a number of terms descriptive of the various power of ten appear in the pages of *QST*. For future reference, here is a list along with the symbol and quantity:

Quantity	*Prefix*	*Symbol*
10^{12}	tera	T
10^{9}	giga	G
10^{6}	mega	M
10^{3}	kilo	k
10^{2}	hecto	h
10	deka	da
10^{-1}	deci	d
10^{-2}	centi	c
10^{-3}	milli	m
10^{-6}	micro	μ
10^{-9}	nano	n
10^{-12}	pico	p
10^{-15}	femto	f
10^{-18}	atto	a

Strays

The design of the new sub-allocation chart which appears on page 64A of this issue is the creation of W8UMS, to whom our thanks.

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Feedback

If you've thought the resistor values in the ATC / DTC circuit on page 30 of May 1969 *QST* should be balanced, you're right! (Fig. 1, "The Mainline TT/L-2 F.S.K. Demodulator," by Petersen.) The resistor shown erroneously in the lower portion of this stage as 6200 ohms (connected to the wiper of S_{6B}) should be 620,000 ohms. The circuit will function improperly with the value shown.

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Footnote 5 at the bottom of page 46 in September *QST* (Wetherhold, "Modern Filter Design") gave the wrong price for the toroids available from Weinschenker; the figure should be $1.50 instead of $1.00. As there have been price changes for these coils from almost all suppliers recently, *QST* Ham-Ads should be checked for the latest information before ordering.

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I regret to say that an error has been found in my article on page 42 in April 1969 *QST*, "Application of Broadband Balun Transformers." In Fig. 1A the single winding on the toroidal core is reversed in winding sense. Fig. 1 illustrates the correct winding form on the core. This error was called to my attention by Joe Bauer, W2WQ, for which I am grateful. — *W2IMU*.

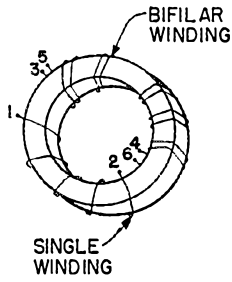
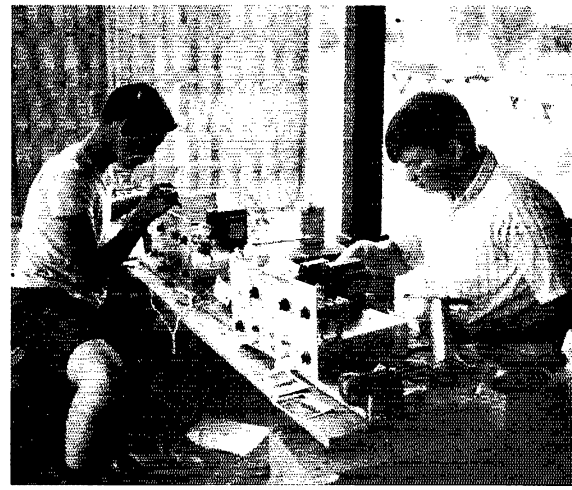


Fig. 1—Correct method of winding 1:1 balun transformer. Refer to R. H. Turrin's article in April 1969 *QST* for a discussion of the third winding.

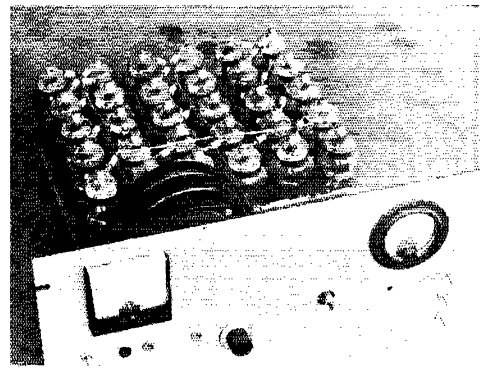
COMING A.R.R.L. CONVENTIONS

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

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



These young Novices Mark, WN4OJB (left), and Bryan WN4OGF (right), spent their long hot summer on an hf transmitter project from the ARRL *Handbook*. The rigs have General Class capabilities so the boys are studying hard for their next higher class licenses, too.



Who says you can't build a low-cost linear amplifier? This novel AB_1 amplifier uses *thirty* 1625 tubes (available for 25 cents each from some surplus houses) in parallel. They operate class AB_1, and have a combined plate impedance of 75 ohms. The designer, K6KOL, uses no impedance-matching circuit in the output. Rather, he feeds RG-11/U directly from the plate circuit—*through a dc-isolating circuit, however!* This approach makes it unnecessary to use band switching or tuning controls. No doubt he uses some harmonic-suppression device at the output so that he can remain on good terms with the FCC, and with his neighbors.

His power supply consists of six TV transformers, 400 mA each, with their secondary windings parallel-connected. Full-wave rectification is used, and the filter capacitor provides 900 μF of capacitance. Roy reports an efficiency of 60 percent on 80 meters.— *W1CER*

CONDUCTED BY GEORGE HART,* W1NJM

A Rough Summer

We write this on the last day of summer (or is it the first day of fall?). It was a real rough one. Hot and sticky weather prevailed in much of the country; just plain *hot* in much of the rest of it. Too much rain in some parts of the country, too little in others. And as fall approached, the South Atlantic spawned a number of ferocious hurricanes, sending some into the Caribbean, some up the Atlantic Coast, sowing fear and destruction and misery in their wakes.

A really destructive hurricane is a fearsome thing, a true manifestation of nature on the rampage. As it approaches, first there is increasing cloudiness, sometimes a ring of tornados with stinging rain. Then comes the churning winds as the center approaches. The calm of the storm's eye is deceptive, for it is usually followed by another episode of destructive wind and rain. Suddenly the sky clears as the eye of the storm howls on its way to wreak havoc elsewhere. The winds continue under clear skies but rapidly diminish, and soon all is calm again. The sun shines on the devasted landscape through crystal clear air, thoroughly cleansed by the rain, and all that is left is for the populace to come forth from whatever shelters in which it has taken refuge, survey the damage, bury the dead and start the long, arduous work of rehabilitation.

Hurricane Camille, which devastated parts of Mississippi and Louisiana in mid-August, was one of the worst hurricanes ever to hit the U.S. mainland, perhaps *the* worst. The story of the glorious accomplishments of radio amateurs during this storm will be written later, as soon as the reports stop coming in and the work of piecing the story together can commence. Meanwhile we amateurs, not to be fooled by our own publicity, are taking stock of ourselves. Sure, the public press sings our praises. But how did we *really* do? How prepared were we? How flawless was our overall performance in the light of lessons we learned, or should have learned, in previous emergencies? These are matters we discuss among ourselves, not in full view of the public. Most dedicated amateurs take the view that if we didn't do the absolute best of which we are capable, it wasn't good enough.

The reports being received contain much in the way of self-criticism — that is, criticism of amateurs for each other or for themselves. Do not look for this as a part of the chronicle of amateur activities during Camille; this chronicle will accentuate the positive, tell which amateurs or amateur groups did what and how they did it. The fault-finding will be kept within the fraternity, perhaps in the form of an "ARPSC Field Bulletin." We haven't put out one of these in some time.

The title for the above was suggested by a piece which appeared in the *RF Carrier*, a publication of the Dayton (Ohio) Amateur Radio Assn. It's a piece of self-appraisal worth quoting.

"Anyone for wind, rain, tornado, hurricane, flood? Who would ever think that water in an underground river at Bellevue and Norwalk would overflow? That dam at Mansfield . . . Twelve inches of rain over the whole northern part of the state . . . Winds of 160 knots at Gulfport and Biloxi . . . A twelve-foot tide on an 8-foot beach . . .

"What did you do about any of the above? Were you the one who asked the *only* station on Kelly Island to leave his station and wade through the mud and rain looking for a camper driving a yellow Camero — this in spite of the report that there were no casualties on Kelly Island? Did you promise your neighbor that you would send traffic into Mississippi to find out how Aunt Susie's half-sister's second cousin twice removed made out in the storm? Did you get on the air and break any net handling storm emergency traffic and tell them that you had health and welfare traffic? Or did you, as a good operator should, listen and listen and listen and not say a word until net control asked if there was a station for Ohio traffic?

"Did you listen to the rapid-fire manner in which the traffic stations pushed the traffic through and the fumbling that was the mark of the operator who wanted to help but had never practiced in any of the regular nets? This operator heard a W7 in Oregon spend 15 minutes breaking a station on 14,320 to see if there was any traffic for him from Gulfport. The net was handling *only* hospital and medical traffic. A station in Chicago asked a "mobile" in Gulfport (the only station on the air from there) for a fone patch — this within five minutes after the mobile told about one phone line working from the town to the airport and that he had to drive 75 miles north for a tank of gasoline and a drink of water.

"Sure, we know you want to help, and can. But please listen, *listen*, LISTEN! Wait for NCS

*Communications Manager, ARRL.

to ask for someone from your area. *Do not* originate traffic *into* an affected area unless you are an *official* Red Cross station. *Do* join the AREC or one of the traffic nets and prepare yourself for the operation."

Well said, OM, and more later. — *W1NJM.*

Traffic Talk

We must again announce a delay in getting the "Public Service Honor Roll" listing started. The reason? Well, leave us not give lame excuses, but the fact is that we are, as the saying goes, "flat out." There are just too many things to do and consider and too little time to do them.

Nevertheless, by the time you read this, things should be rolling, and we are now hoping to run the first HR column in February *QST* as a result of November data. No promises, this time!

Meanwhile, you might be interested in the tentative setup for points. These were outlined in a recent ARPSC-LO Bulletin. There hasn't been much reaction, so it is hoped they are acceptable, at least as a starter.

(1) For reporting into any ARRL-registered net but not being net control or handling a liaison function: 1 point for each phone net with a maximum of five points per month; 2 points for each CW net, with a maximum of 10 points per month.

(2) For serving as net control: 3 points for phone nets, with a maximum of 12 points per month; 4 points for CW nets with a maximum of 16 points per month.

(3) For serving as a regularly-assigned liaison station between nets, either NTS or independent, including TCC function: 3 points, with a maximum of 12 points per month.

(4) For handling a legal phone patch on the amateur bands: 1 point for each patch, regardless of length or distance, maximum of 20 points per month.

(5) For making BPL: 3 points per month, regardless of traffic total.

(6) For each record message handling in a real communications emergency: 1 point, regardless of precedence, no maximum.

(7) For serving as net manager of a registered ARRL net: 5 points per month. NTS TCC directors may also claim these points.

How many points to "make" the monthly Honor Roll? Twenty-five (25). This is not so difficult that the average amateur cannot do it in a month if he exerts a reasonable amount of effort, not so easy that he can do it without *some* effort. Also, except in an emergency situation, no one can do it by performing only one type of function. Versatility is rewarded.

Eventually there will be some kind of a form (probably a card) on which application can be made for the PSHR. This will itemize each point claim and be sent to the SCM, who will summarize the claims with his monthly report so that they can be placed in the monthly *QST* column.

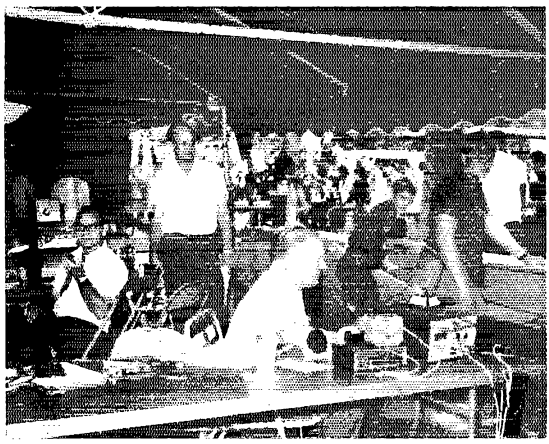
There will be many questions. If in doubt about whether or not you can claim points for any particular function, *ask*. We may have to devise some answers as we go along. No doubt the answers to some of the questions that are raised will require changes in the criteria — but we *hope* not complications. It is complicated enough; by any and all means we must keep it from becoming more so.

The Public Service Honor Roll (anyone think of a better name?) is run strictly on the honor system. Those without honor are requested not to participate. — *W1NJM.*

National Traffic System. The Central Area Staff of NTS met at Des Moines, Iowa, on Aug. 20, for approximately 4½ hours during the ARRL National Convention. Present were Chairman W9VAY, 9RN Manager W9HRY, CAN Manager WA9RAK, TCC Director WØLCX, member-at-large KØAEM, and as observers former 9RN Manager W9QLW and ARRL Communications Manager W1NJM. Absent were RN5 Manager K5IBZ and TEN Manager WØLGG.

Much of the time spent was in discussion of SET problems, such as left-over traffic, failures, extent of advance planning, frequency sharing with nets in other areas, starting and ending time of nets. The staff recommended no advance planning for future SETs, other than notification of the date(s) on which it would be held; that during the

Here are some of the members of the Albany County ARPSC that attended the picnic held at Thatcher Park, N. Y. on July 20. Left to right are WA2ETB, WA2BAH, WB2ICZ, WN2JPS, WA2EAJ, WA2OYV, WB2PUH, WB2RBG, WB2HIH, WB2DXM, WA2VQZ, WA2EAH, W2APF, WA2YBK and WB2SWB.



Members of the Columbia Amateur Radio Club sponsored a booth at the Sweeney (Texas) Pride Day Fair. WA5MFO (left), WA5LKX and K5KEI are shown operating the booth while two prospective novices man the counter.

SET EAN QNY *up* and CAN QNY *down* only; that all nets should start and end at the same time, to avoid "loose ends."

The necessity for training more good operators was discussed. Sez Chairman W9VAY: "All the savvy traffic men and women heard across the bands were not born that way." It was determined that training of operators is principally a section-level undertaking, and recommended that SCMs in the Central Area be informed of the desirability of forming novice traffic nets. At the same time, it was recommended that SCMs again be oriented regarding the existence of CAS and its functions in assisting them in any NTS inter-net problems.

W2FR has issued 2RN certificates to W2FEB, WA2BHN, WA2UWA and WB2SMD. A Third Region certificate has gone to K3ZSK according to K3MVO. K5IBZ reports that RN5 held some extra sessions during the Hurricane Camille disaster and that special commendation goes to W5RUB and K5VDA, in Mississippi, and W4FVY and W4OGG who helped with the Camille traffic from outside the stricken area. WA6ROF reports very little to complain about on RN6. WA9RAK in instituting a new method of NCS reporting on CAN aimed at getting better representation information.

August reports:

Net	Sessions	Traffic	Rate	Average	Representation (%)
1RN	62	503	.343	8.1	92.4
2RN	62	596	.723	9.6	93.9
3RN	62	528	.411	8.5	99.2
4RN	56	498	.362	8.9	83.9
RN5	62	1237	.532	19.5	86.7
RN6	62	1059	.687	17.1	100.0
RN7	62	310	.300	5.0	35.0
8RN	62	714	.436	11.5	94.1
9RN	62	895	.747	14.4	92.3
ECN	47	55	.091	1.2	73.1
TWN	44	193	.225	4.4	44.8
EAN	31	2155	1.419	69.5	94.6
CAN	31	1954	1.460	63.0	100.0
PAN	31	1242	.969	40.0	99.0
Sections[1]	1852	13961		7.4	
TCC Eastern	147[2]	965			
TCC Central	93[2]	935			
TCC Pacific	124[2]	1116			
Summary	2588	28,916	CAN	16.2	—
Record	2987	31,117	1.440	16.4	—

[1] Section and local nets reporting (52): BUN (Utah); VN, VSBN (Va.); GSN (Ga.); GBN, OQN (Ont.-Que.); PTTN, EPA, PFN, EPAEPTN (Pa.); SCN (Cal.); TN (Tenn.); CN, CPN (Conn.); WFPN, GN, VEN, FMTN, QFN, FPTN, TPTN (Fla.); AENB, AEND, AENH, AENR (Ala.); Copperstate (Ariz.); LAN (La.); NJEPTN, PVTEN (N.J.); KYN, KTN (Ky.); NCNL, NCNE (N.C.); OSSB, BN (Ohio); ILN (Ill.); QMN, WSSB (Mich.); OLZ (Okla.); WSN (Wash.); NYS, NLI (N.Y.); QIN (Ind.); OZK (Ark.); SCN (S.C.); MSN, MJN, MSPN (Minn.); RISPN (R.I.); WSSN, WIN, WSBN (Wisc.).

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

Transcontinental Corps. W3EML reports that Hurricane Camille traffic, as well as fair traffic, raised TCC traffic totals above average for August. WØLCX says traffic and conditions are inproving and that TCC Central should be back infull swing soon. TCC Pacific had a good month, but W7DZX is looking for more help.

August reports:

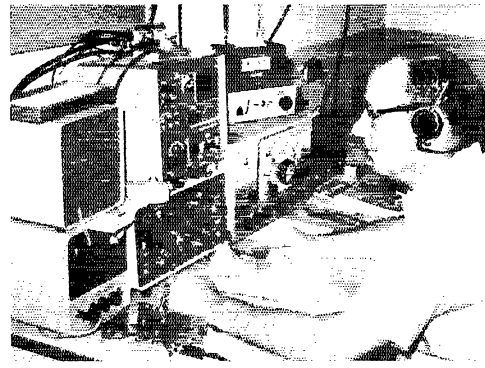
Area	Functions	% Successful	Traffic	Out-of-Net Traffic
Eastern	147	96.0	3048	965
Central	93	95.7	1994	935
Pacific	124	96.7	2232	1116
Summary	364	96.1	7274	3016

The TCC Roster: Eastern Area (W3EML, Dir.) — *W1s* BJG EJI NJM YKQ, K1ESG, *W2s* FR GKZ PU ZVW, K2RYH, *WA2s* BHN BLV CAL, WB2RKK, W3EML, K3MVO, *W4s* NLC UQ ZM, K4KNP, *W8s* AHZ CHT, K8KMQ, WA8s POS ZGC, W8UCE/3. Central Area (WØLCX, Dir.) — W4OGG, K4AT, W5MI, *W9s* CXY VAY, *WA9s* BWY RAK VZM, *WØs* HI INH LCX ZHN, KØAEM, *WAØs* IAW, MLE RVR. Pacific Area (W7DZX, Dir.) — *W6s* BGF BNX EOT IPC IPW VNQ VZT, K6DYX, *WA6s* BRG LFA ROF, WB6HVA, W7KZ, WA7CLF, KØJSP.

Public Service Diary

On April 29, VE2ZB called VE2DEA to report an automobile mishap on the Bonaventure Expressway in Montreal. The police were notified and a cruiser was dispatched while five other amateurs stood by on frequency in case additional aid was needed.

On May 5, VE2DGU discovered another accident, this time on the Decarie Expressway, and put out the call for assistance on the VE2RM repeater. Again it was VE2DEA who answered and sum-



Here is the operating position at WAØHTN. Bud is active in all phases of NTS from St. Louis, Mo., and is active in several local VHF nets and Navy MARS as well. He holds an ORS appointment, BPL Medallion and A-1 Op award. He also likes to tinker, and most of the station is homebrew or built from kits.

moned the local constabulary while three additional stations stood guard on the frequency.

VE2WP reported on May 20 that a truck was blocking rush hour traffic at exit 21 of the Decarie Expressway in Montreal. VE2AKM called the Quebec Provincial Police to clean up the mess. — *VE2ALE, SEC Quebec.*

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Extensive flooding occured along the Four Mile Run section of Alexandria, Va., on July 23, disrupting telephone service throughout the city. At the request of the civil defense coordinator, the Alexandria RACES net was activated at 0047Z. RACES stations on frequency were W4JAZ, W4KVG, W4LNT, K4GCM, WB4EIY, WB4JJE and WA5MAM/4. Arrangements were made at local hospitals to receive emergency victims and stations were set up at a fire station and police command post. Several mobile units were later used to transport displaced families to relief centers. At 0545Z normal telephone service had been restored so the RACES operation was secured at 0610. — *W4LNT, RO Alexandria, Va.*

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Flooding also caused amateurs to be mobilized on August 2 in Somerville, Mass., when after two inches of rain, EC K1DZG was advised by K1YUB that the civil defense director had requested communications aid. The AREC group went into action and established communications among the base station and several mobile and portable units. WA1KPS set up a relay post in a fire station when telephone service was interrupted. — *K1DZG, EC Somerville, Mass.*

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On August 12, the Beehive Utah Net was twice called upon to assist motorists in distress. K6QMX/7 had discovered an accident near Rawlins, Wyoming and asked BUN operators to assist in summoning an ambulance to the scene.

At approximately the same time, WA7GGV was having car trouble in a remote wilderness area along the Idaho-Montana border. WA7IZR assisted in obtaining aid. — *W7QWH, SCM Utah.*

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On April 21, it was discovered that a breakdown had occurred in the telephone system connecting Campton, N.H., and the central office in Plymouth. The trouble was such that it was impossible to dial the operator to report the breakdown.

At the request of neighbors, K1CTI fired up and contacted W1UX who was controlling the Granite State Phone Net. K1PCY of Manchester contacted his local exchange which in turn contacted the Plymouth office to report the trouble. — *W1QV.*

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The Monroe County, Mich., AREC again provided communications for the Boy Scout Canoe Races on May 17. The race course covered a distance of about ten miles and stations were set up at the start and finish lines and at three checkpoints along the path. Seven amateurs took part in the effort which lasted about two hours. — *W8NDM, EC Monroe County, Mich.*

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On May 25, eleven Wayne County, Mich., amateurs helped with parade communications for the cities of Ecorse and Melvindale using f.m. on two meters. Nine mobiles and one portable station participated in the exercise which, according to officials, was handled in a very professional and businesslike manner. — *W8BEZ, EC Wayne County, Mich.*

Radio amateurs in the Kansas City area volunteered to help with communications for a hike sponsored by the Great Frontier District of the Boy Scouts of America. WØICU/Ø is shown relaying the information that the last group of hikers has arrived at the end of the 50 mile trudge.

More than fifteen amateurs, all members of the West Valley (Calif.) Amateur Radio Association, the Santa Clara County Amateur Radio Association or the San Jose Civil Defense Organization, furnished communications for the Fiesta de los Roses, a parade viewed by 75,000 persons on June 1. Fourteen mobile and fixed stations utilizing two meter f.m. guided the 243 units of the parade over the two and one-half mile route in about four hours. — *WA6RXB.*

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On June 22, amateurs helped the SCRRRE Rallye team with communication for a sports car rally held near Chicago. WA9PPD, WA9ZGF, WA9ZNI and WA9ZYG participated during the eight hour event in which there was a heavy load of traffic to be passed. The secretary of the team said, "It makes us all rest a little easier knowing that men like these . . . are around to help — just in case."

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Thirty-eight SEC reports were received for the month of July. Again this is five reports fewer than during July, 1968. The 38 reports represent an AREC membership of 14,448; the 43 reports of last July represented 15,393 members. Thus, a decrease of 945 reported members is in evidence. Sections reporting were: Ala, Alta, Ariz, Ark, Colo, Conn, EFla, EMass, EPa, Ind, Iowa, Ky, LA, Mar, MDC, Mich, Mo, Mont, Nebr, Nev, NLI, Ohio, Ont, Org, Que, SDgo, SF, SCV, Sask, SDak, SNJ, STex, Tenn, Utah, Va, WFla, WNY, WPa.

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Independent Net Reports

Net	*Sessions*	*Check-ins*	*Traffic*
Hit & Bounce	31	319	409
Northeast Traffic	31	346	289
North American SSB	26	589	425
20 Meter ISSB	21	285	3822
Cleaning House	27	367	180
All Service	5	75	42

QST

Correspondence From Members-

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

HELP?

¶ Can a mere "schnoock" of an Associate Member get a few words in edgewise?

Back in depression days, a friend's father interested me in ham radio. With no money at the time, this interest lay dormant until recent years, when I began casting about for interests for my future retirement years, so I wouldn't die of acute boredom a couple of years later, as so many have. I then remembered the ARRL, and sent in my check.

Frankly, hamdom disappointed me. I expected a call from my nearest club inviting me to meetings and classes, a flood of advertising from various manufacturers of ham gear, and an invitation from the closest dealer to come and inspect his stock. Especially after reading so many letters and editorials in *QST* about how the number of licensed hams has been almost static of recent years, I thought I'd have to beat the would-be help off with a stick!

Hooooo boy, was I disappointed! I got my issues of *QST* and *CQ* and that was the total. Even when I wandered into a local parts store, a few blocks from my home, wanting some expert advice on why it would be better to buy one of their rebuilt receivers rather than a solid state all-wave job, I was told they have no solid state receivers in stock and was completely ignored while I wandered through the gear display rooms, wistfully reading the price tags, and wishing I had some sort of a mentor with me.

I hate to read that the ARRL is getting so hidebound that members are dropping out in disgust. To me, the organization is the soul of the hobby, and should be enthusiastically supported and helped to grow, even if it means a few changes. — *Noel Hakman, Los Angeles, California*

¶ I have been licensed only one year but I have noticed something which sort of startled me. I've found hams are the best bunch of guys I've ever met! From their own busy schedules they'll take time to help some desperate Novice.

When I started out I had a superegenerative receiver, but thanks to K1FUU, I own a BC342. Many times I've needed technical help or even my equipment worked on! WA1GRR was always there to help out.

To these men I'd like to say thank you and hope that I'll grow to be like them. — *Paul Alberghini, WN1KAH, Burlington, Vt.*

APPRECIATION

¶ I just wanted to take a moment to express my appreciation to the staff of ARRL for "being there." More specifically, I thank you for the code practice that helped me obtain my Extra Class license recently, for the articles and information in *QST* Magazine which I have enjoyed over the years, for the operating activities that add to the pleasure of being on the air, for the representation before the FCC and the international spectrum allocation conferences, and for your assistance to clubs and individuals interested in amateur radio.

Despite the fact that no one can please everyone all of the time, I'm convinced that you sincerely try to recommend, support and do what you believe will be of the greatest over-all benefit in the perpetuation of this wonderful hobby of ours, while accepting criticism and comments from those who disagree with your efforts.

Forgive me for taking your dedication for granted at times, and please accept my continued support. — *Richard P. Whitton, WØDSW, St. Louis, Mo.*

FRIVOLOUS

¶ Your editorial on Newcomers in the September issue of *QST* points up both how and how not to attract people into amateur radio. Just how you can label as frivolous anyone of any age who has television, girls, and cars is beyond any shadow of logic. Supposedly you are trying to entice these people into both amateur radio and ARRL membership. Yet, you persist with these inane remarks. What kind of nicenelly schoolmarms do you have on your staff?? — *Stanley Jaffin, WB4IRK, Arlington, Virginia.*

EARLY AVIATORS

¶ Your September issue, under "Strays," page 35, had an interesting story about Cliff Tait's attempt to fly solo round-the-world, with the aid of hams.

The tie-up between amateur radio and flying is not new. In 1912, at Cicero Field, Chicago, I flew a Wright biplane with a ham transmitter — a Ford spark-coil, some dry cells, a spark-gap, a condenser, a helix and a key — on a "breadboard" tied to the empty seat beside me. When I was directly over the Field, at about 200 feet, my signals were received on a crystal set in the Lillie-Thompson hangar.

In December, 1920, I piloted the first Maine-Florida passenger airmail flight, flying an Aeromarine 39L, with P. H. Spencer, of Hartford, as my passenger. Fellow members of ARRL aided in the success of this flight.

I was fortunate to be able to count as my good friends, H. P. Maxim, W1AW; C. D. Tuska, 1ZT; Ken Warner, W1EH; Guy Entwistle, W1AL; and Roland Bourne, W1ANA; the men who laid the foundation of ARRL.

I'm now a "ham dropout" — my last call was "1OS" — but I am studying for a comeback, with the help of ARRL books and fellow members of "The Goldcoasters," a south Florida association of ancient hams. My work, commercial aviation — with time out as a military pilot in WWI, WW II, and Korea — has, up to now, side-tracked my ham appetite. I shall return. I've maintained my commercial flying license, and use it, so I should be able to "crack" the FCC exam. — *Harry D. Copland, Fort Lauderdale, Florida.*

W Ø QSL

¶ To thank our QSL manager, WØDMA, would be impossible after 30 years of handling cards every month regular as a clock. I know everyone who had cards will give a hearty thanks to Al and wish him the very best. — *Bud Dolsberry, WØOAQ, Leavenworth, Kansas.*

¶ Having resigned as your QSL Manager, after 30½ years, I wish to take this opportunity to thank all of you for your fine cooperation, for the many expressions of appreciation, and for the many stamps you have sent me to help with my other hobby.

It has been a tremendous amount of work, but it has been fun. Every monthly mailing seemed just a little bit like Christmas time, knowing the joy that many of those "treasures" brought to you. I feel that my work has been quite rewarding, if it has been the means of adding a little more enjoyment to our great hobby for each of the hundreds of you that I served.

In 1939, when I was appointed QSL Manager, I had the area from Colorado east through Indiana. All these states comprised the Ninth District until the area was divided into the Ninth and Tenth Districts after WW II. At this time I became Manager for Zero-land. Many of those I served in the early years are still top DX men in the now Ninth District. I still hear from some of them. With more free time, I hope to get back on the air and contact all of you.

I want to wish the Des Moines Radio Amateur Association all good luck in handling the Bureau. I know they will do a good job of it.

Goodbye to all of you, good DXing and 73. It would be nice hearing from you. — *Alva A. Smith, WØDMA, Caledonia, Minn.*

PUBLICATIONS

¶ I am writing this letter to add my views on a booklet written for kids, ages nine to fifteen years, so they can easily understand the purpose of amateur radio and understand the basic amateur theory. Even though I received my first ticket at the age of 12 and my Advanced at 14, I am no brain, and I could never have made it without help the way the *License Manual* is written now. — *Bill Carnett, WB8AYH, Rochester, Michigan.*

¶ I agree with K4UVD's comments on your "Last Generation" format on publications. Take a good look at your other "competitive" publications and their clean graphics and formats. — *Don Upp, Trotwood, Ohio.*

¶ I have had much pleasure from recent copies of *QST*, which in my opinion have shown a trend toward more up-to-date techniques than has been evident for some time. I especially liked the articles on integrated circuits, counters and frequency standards. Doug DeMaw's article on transistorized gear interested me greatly as I have been working on a 30-watt unit for the 75-meter and maritime mobile frequencies for some time without too much success. Maybe he will come out with something along these lines in the future. — *Donald C. Hanna, VE2CD, Mansonville, P.Q., Canada.*

¶ Thanks for all your efforts for the ham. I know you folks don't get much thanks and a heck of a lot of moaning and groaning. But I have held an associate membership and full membership for on and off over 20 years and think you people always have done and still are doing a great job for us rank and file ham-type creatures. Don't know how you folks can sell the publications you put out for the low, low prices involved. But on their behalf and mine our sincerest thanks. — *W. Reid Ross, W7HOP/WGABE, Carson City, Nevada.*

REJOINING

¶ Enclosed is my check for another year. It is with deep pleasure that I continue my subscription and my support to an organization that has done much to improve this wonderful hobby "ham radio". I also was against "incentive licensing" to begin with, but facts and figures show that through this method the operators have increased their overall knowledge to radio communications. You've made a firm believer out of me. I strongly feel there are a lot of hams back there who are unjust in their feelings on what the ARRL is trying to do for them. Sure, there's always those individuals who seek to destroy anything that might be against their wishes, and through this selfishness have tried to sway others to their "line of thinking." But, gentlemen and fellow hams, here I sit in Vietnam just yearning for the chance to get on the air. Be thankful you can still enjoy your hobby. — *T/Sgt. William R. Mest, WA5INZ, APO San Francisco, California.*

¶ My five year "drop-out" has ended. It is time to rejoin and constructively participate in the activities of ham radio rather than criticizing or complaining from the side.

Even as an outsider at the time, the stimulation of incentive licensing prompted me to pass the Extra Class in December. It appears to be a success because the clear frequencies I anticipated are packed as ever. I also suspect the ratio of active Extras to active Generals is pretty high.

People resist change, procrastinate, and tend to be hypocritical, and hams are no exception. Therefore, the League's administration will continue to be attacked for one reason or another in the same manner as university or government administrations. This is a healthy reaction, if not carried to an extreme and if the ultimate goal of improving ham radio is kept in mind. The definition of 'improving' is subject to discussion by concerned members of the League. Therefore, I wish to rejoin the League to let my voice be heard. We may not always agree but we won't be stagnant! — *Wes Bolin, K4APL, Perry, Georgia.*

UNUSUAL EXPERIENCES

¶ I have one recommendation which you might like to consider. I feel that *QST* could devote a page or two each month to unusual experiences which have happened to hams as a result of our hobby. For example I once worked a YL who claimed she was a topless waitress in southern California. All this took place on cw, no less. On another occasion I worked a Japanese maritime mobile 2000 miles off the San Francisco coast and wound up touring his ship with him and my family the afternoon of my birthday. I am certain this list would be endless if you asked around. I would also like to see some short fiction with a radio theme in the pages of our magazine. There is more romance (not the love-in kind) and general human interest in ham radio than in any other hobby in the world. I think we lose some of it when *QST* is devoted to strictly technical articles and contests.

The last 15 months I have spent as a ham have been the most enjoyable in my life. Again, thank you for your part in this. — *Terry B. Dunham, WA6DPY, Pleasanton, California.* QST

I.A.R.U. News

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

NEW MEMBERS PROPOSED

The *Magyar Radioamator Szovetseg*, national society of radio amateurs in Hungary has made application for membership in the Union. *MRS* has a membership of 627, all of whom are licensed to transmit, and constitute the country's total amateur population. The society has two club stations, HA5KBP and HA5ML. Officers are: Jozsef Gausz, HA5BJ, President; Pal Kocze, HA5CK, Secretary; Bela Berzsenhi, HG5EB, Treasurer; and, Gyorgy Farago, HA5BG, and Gyula Csaba, HA5KAB. The society's official publication is *Radioamator QTC*. The official society address is *Magyar Radioamator Szovetseg*, Budapest, VI., Gorkij fasor 6, Hungary.

Amateur licenses are issued by the *Koslededesi es Postaugyi* who have a favorable attitude toward amateur radio. Membership in *MRS* is necessary to obtain an amateur license. There is an age limit of 14, and an annual license fee of $2.00 U.S. Operating privileges are available in the 80, 40, 20, 15, 10 and 2 meter, and 432 and higher MHz bands. A maximum power input of 500 watts is available. Separate classes of license are provided for hf, and vhf, and additionally, there is a beginners class of license. Licenses are normally only available to citizens. However alien amateurs from countries which have diplomatic relations with Hungary can receive permission to operate.

Here is a group of *Deutscher Amateur Radio Club* members during a recent visit to IARU/*ARRL* headquarters. Standing are from left, DJ5PN, DJ9KU, XYL of DJ5TL, DJ5TL, and bottom row, W2BBX (the group's escort) and DK2PG.

Application has also been received from the *Trinidad and Tobago Amateur Radio Society*, representing the islands of Trinidad and Tobago. Membership in the society is 53, including 31 licensed radio amateurs. Officers are: T. E. Tempro, 9Y4LP, President; Kenneth Robertson, 9Y5KR, Vice-President; J. M. MacDonald, 9Y4MM, Secretary-Treasurer; and, Malcolm Kerr, 9Y4GM; B. L. Lucas; Michael Petronis, 9Y4CRV; Cyril Balwah, 9Y4VT; and, Arnim Rudder, 9Y4AR. Annual membership fee is $2.50 U.S.; the society has an emergency corps, and a public relations program. The society's official address is *Trinidad and Tobago Amateur Radio Society*, P. O. Box 1167, Port of Spain, Trinidad.

The licensing authority for Trinidad and Tobago is the Comptroller of Customs and Excise. *T&TARS* maintains regular liaison with the government authority, and the Comptroller's attitude toward amateur radio is described as "improving." Only one class of amateur license exists. There is an age limit of 18, and a code test at 12 words per minute. The annual license fee is $8.20 U.S. Operating privileges are available in the 80, 40, 20, 15, 10, 6 and 2 meter bands with a maximum power input of 1000 watts. Licensing reciprocity is practiced with Commonwealth nations, and with the United States.

IARU member societies are now participating in a mail vote on the admission of *MRS* and *T&TARS*.

RADIO CLUB PARAGUAYO HONORED

The *Radio Club Paraguayo*, IARU member society in Paraguay, has received the "Honor of Merit" medal from the Ministry of Public Works and Communications of Paraguay. In presenting the medal, Minister Marcia Samaniego cited *RCP*'s services to the nation and to technology, service through emergency communications, and the fruitful social relations, domestic and international, brought about by amateur radio. *RCP* has a membership of 184 licensed amateurs; there is a total of 210 licensed ZPs. The society is in regular contact with the *Administracion Nacional de Telecomunicaciones*, the government authority in charge of amateur licensing.

EUROPEAN BAND PLAN

Since cw/phone sub-bands are not generally allocated by administrations in Region I (Europe and Africa), the amateurs have adopted a set of voluntary sub-allocations. Last May at the IARU Region I Conference in Brussels, the European Band Plan was updated to:

Frequency Band	*Types of Emission*
3.5 — 3.6 MHz	cw only
3.6 — 3.8 MHz	cw and phone
7.0 — 7.04 MHz	cw only
7.04 — 7.1 MHz	cw and phone
14.0 — 14.1 MHz	cw only
14.1 — 14.35 MHz	cw and phone
21.0 — 21.15 MHz	cw only
21.15 — 21.45 MHz	cw and phone
28.0 — 28.2 MHz	cw only
28.2 — 29.7 MHz	cw and phone

Note 1: RTTY operation is recommended to take place around 14,090 kHz.

Note 2: 3500 — 3510 and 3790 — 3800 kHz reserved for inter-continental working.

U.S. — GUATEMALAN RECIPROCITY

A reciprocal operating agreement between the United States and Guatemala became effective on October 2, 1969. There are now 42 such agreements between the U.S. and other nations; a list appears in last month's column.

COOK BI-CENTENNIAL

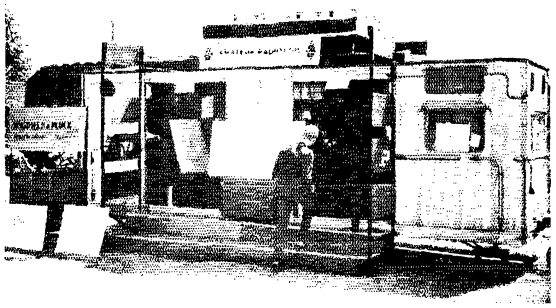
Celebrating the 200th anniversary of the arrival of British explorer James Cook to New Zealand, ZL amateurs have been authorized to use the prefix ZM for the period from October 1, 1969 to December 31, 1970.

During this same period, the *New Zealand Association of Radio Transmitters* is sponsoring a "ZM Cook Bi-Centenary Award." Applicants must contact 50 different ZM stations — at least one each from the districts ZM1-ZM4. Applicants must submit a copy of their log, certified by two other amateurs. QSL cards are not required. Endorsements will be made for cw, phone, and band of operation.

Logs, along with three IRCs to cover mailing costs, go to *NZART* Awards Manager ZL2GX, 152 Lytton Road, Gisborne, New Zealand.

CONTEST

The *Radio Club Venezolano* announces sponsorship of the "El Dorado World Wide SSB Contest," from 0000 GMT November 8, to 2400 GMT November 9. All bands from 3.5 to 28 MHz, a-m or ssb may be used. Stations should call "CQ El Dorado Contest" and exchange a 5-digit number (RS report plus contact number starting with 001). Information on scoring and awards is available from the *Radio Club Venezolano*, Apartado 2285, Caracas, Venezuela. Entries must be in the hands of *RCV* by March 15, 1970.



Commemorating the 700th anniversary of Stratford-upon-Avon, special station GB3SUA was operated July 11 through 13 on all hf bands. The station is shown above as photographed by visitor K3RDT.

WHO'S A MEMBER?

From time to time we receive inquiries asking who are the member societies of IARU. So, in response to popular demand, we present a list of the 81 national amateur radio societies who constitute the International Amateur Radio Union:

Algeria, *Amateurs Radio Algeriens;* Angola, *Liga dos Amadores de Radio de Angola;* Argentina, *Radio Club Argentino;* Australia, *Wireless Institute of Australia;* Austria, *Oesterreichischer Versuchssenderverband;* Bahamas, *The Bahamas Amateur Radio Society;* Barbados, *Amateur Radio Society of Barbados;* Belgium, *Union Belge des Amateurs Emitteurs;* Bermuda, *Radio Society of Bermuda;* Bolivia, *Radio Club Boliviano;* Brazil, *Liga de Amadores Brasileiros de Radio Emissao;* Bulgaria, *Central Radio Club of Bulgaria;* Burma, *Burma Amateur Radio Transmitting Society;* Canada, *Canadian Division ARRL;* Ceylon, *The Radio Society of Ceylon;* Chile, *Radio Club de Chile;* Colombia, *Liga Colombiana de Radio Aficionados;* Congo, *Union Congolaise des Amateurs de Radio;* Costa Rica, *Radio Club de Costa Rica;* Cyprus, *Cyprus Amateur Radio Society;* Czechoslovakia, *Central Radio Club of the Czechoslovak Socialist Republic;* Denmark, *Experimenterende Danske Radioamatorer;* Dominican Republic, *Radio Club Dominicano, Inc.;* East Africa, *Radio Society of East Africa;* Ecuador, *Guayaquil Radio Club;* El Salvador, *Club de Radio Aficionados de El Salvador;* Faroe Islands, *Foroyskir Radioamatorar;* Finland, *Suomen Radioamatooriliitto r.y.;* France, *Reseau des Emetteurs Francais;* Germany, *Deutscher Amateur Radio Club, e.V.;* Ghana, *Ghana Amateur Radio Society;* Greece, *Radio Amateur Association of Greece;* Guatemala, *Club de Radioaficionados de Guatemala;* Honduras, *Radio Club de Honduras;* HongKong, *Hongkong Amateur Radio Transmitting Society, Ltd.;* Iceland, *Islenzkir Radioamatorer;* India, *The Amateur Radio Society of India;* Ireland, *Irish Radio Transmitters Society;* Israel, *Israel Amateur Radio Club;* Italy, *Associazione Radiotecnica Italiana;* Ivory Coast, *Association des Radio-Amateurs Ivoiriens;* Jamaica, *The Jamaica Amateur Radio Association;* Japan, *The Japan Amateur Radio League;* Korea, *The Korean Amateur Radio League, Inc.;* Lebanon, *Association des Radio-Amateurs Libanais;* Liberia, *Liberian Radio Amateur Association;* Luxembourg, *Reseau Luxembourgeois des Amateurs d'Ondes Courtes;* Malaysia, *Malaysian Amateur Radio Transmitters Society;* Malta, *Malta Amateur Radio Society;* Mauritius,

Mauritius Amateur Radio Society; Mexico, *Liga Mexicana de Radio Experimentadores a.c.;* Monaco, *Association des Radio-Amateurs de la Principaute de Monaco;* Morocco, *Association Royale des Amateurs Emetteurs du Maroc;* Mozambique, *Liga dos Radio Emissores de Mocambique;* Netherlands, *Vereniging voor Experimenteel Radio Onderzoek in Nederland;* Netherlands Antilles, *Vereniging voor Experimenteel Radioonderzoek in de Nederlandse Antillen;* New Zealand, *New Zealand Association of Radio Transmitters, Inc.;* Nicaragua, *Club de Radio Experimentadores de Nicaragua;* Nigeria, *Nigerian Amateur Radio Society;* Norway, *Norsk Radio Relae Liga;* Panama, *Liga Panamena de Radio Aficionados;* Paraguay, *Radio Club Paraguayo;* Peru, *Radio Club Peruano;* Philippines, *Philippines Amateur Radio Association, Inc.;* Poland, *Polski Zwiezek Krotkofalowcow;* Portugal, *Rede dos Emissores Portuguezes;* Rhodesia, *Radio Society of Rhodesia;* South Africa, *South African Radio League;* Spain, *Union de Radioaficionados Espanoles;* Surinam, *Vereniging van Radioamateurs in Suriname;* Sweden, *Foreningen Sveriges Sandarcamatorer;* Switzerland, *Union Schweizerischer Kurzwellen-Amateure;* Syria, *Technical Institute of Radio;* United Kingdom, *Radio Society of Great Britain;* United States, *The American Radio Relay League, Inc.;* USSR, *The Radio Sports Federation of USSR;* Uruguay, *Radio Club Uruguayo;* Venezuela, *Radio Club Venezolana;* Western Samoa, *Western Samoa Amateur Radio Club;* Yugoslavia, *Savez Radioamatera Jugoslavije;* Zambia, *Radio Society of Zambia.* QST

Morse Code From Teletype Tape

(Continued from page 41)

blanks may be used while perforating the tape. Fig. 1 shows a tape punched for this cw message.

Probably the simplest method of sending slower than the maximum code speed is to use the same pattern as above for keying individual cw letters, and to use a greater number of blanks for spacing between letters and words. Using this idea, 8 blanks between cw letters and 24 blanks between cw words results in an overall code speed of 5 w.p.m. (although the individual letters are still sent at the maximum rate). To send properly proportioned code at a slower speed, punching "UM" followed by a blank for a Morse dot, "U Blank Blank Blank M" followed by a blank for a dash, and using 3 additional blanks for cw letter spacing or 9 additional blanks for word spacing will result in a code speed of 4.9 wpm with a 51.3-percent dot-to-space ratio.

Although we did not try the idea, faster speeds might be obtained with a 60-wpm TD by an arrangement of two polar relays connected to various commutator segments of the TD and with the relay keying contacts placed in parallel. Of course faster cw speeds could be achieved by using a TD geared for 75- or 100-wpm operation.

One thing is important if your fsk input is permanently wired into the transmitter — the frequency-shift keying must be disabled while playing the cw tape! Otherwise you will end up with simultaneous A1 and F1 emission, likely an invitation to hear from an FCC monitoring station. QST

November 1944

. . . Looking ahead, as he frequently does, Editor K. B. Warner is pre-occupied with post-war frequency allocations and describes the endless meetings and hearings that are going on in New York and Washington these days. There was also a lot of "tea-cupping," as well. Maybe it wasn't tea, anyway. Since this is a democracy, this kind of thing is part and parcel of it, but he is confident that the amateur will come out with adequate frequency space. He does foresee, however, a change in the technical requirements. No longer will sloppy signals and interfering signals be tolerated. Higher and higher frequencies are to be used. At present there is no allocation at all above 300 Mc for anybody. Unfortunately, these frequencies are only numbers to a lot of the negotiators, with no appreciation of practical problems or usages.

. . . Warner further comments on how lucky we were that the first transatlantic successes came at a sunspot minimum.

. . . The cover this month shows a serious GI, still in uniform, studying the *Handbook* and making plans for his new post-war rig.

. . . There is so much activity on 112 Mc. WERS in certain congested areas that Samuel J. Semel, S1C, offers a 224 Mc. rig as a sort of overflow out. Powered by a W.E. 316-a oscillator, the rig has about 24-watts input and this is ample for the service. Battery power not recommended because of the high drain.

November 1919

. . . "The Lid is Off" is the caption of the cover picture which shows an enthusiastic ham rising out of what looks something like a trash can, waving his new license. There is not too much dope on technical matters, since the magazine went to press just too early.

. . . There is great deal of enthusiasm, however, and next month should see the old ball rolling again in great shape.

. . . Hiram Percy Maxim, in a lead article writes about the importance of ARRL. It is hoped to enroll every amateur as a League member. Maxim, under the pen name of "The Old Man" writes unenthusiastically about "Rotten Impulse Excitation." These articles are gems. Maybe sometime they'll be collected and published as a book. They ought to be.

. . . The Editor foresees lots of trouble in getting our rigs to operate on 200 meters. He wants to hear from anybody who has such an outfit in successful operation. "The frequencies are so high," he laments.

. . . Spark is still with us, of course, and that old master of this technique, M. B. West, 8AEZ, has an article on "Transmitter Efficiency."

. . . Some new "hard" tubes are advertised and the prewar tubular audion has practically disappeared. What a pity! Some of those were very good indeed, even if one had to fiddle with the plate voltage a little. Storage "B" batteries also make their debut. — *WIAW.*

—···—

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

The World Above 50 Mc.

CONDUCTED BY BILL SMITH,* KØCER

Quick and Easy Antenna Matching

TUNING the vhf bands one often hears discussions on antennas. They are probably the single most popular topic. More often than not, we may hear someone say, "My SWR was a bit high so I trimmed the feedline and got it down." What the fellow means is that his antenna may now accept transmitter power more easily, but the SWR has not been lowered, or affected in *any way*. The mismatch at the antenna still exists. What has happened is that the location of the standing-wave null has been found, usually by the cut-and-try method. Standing-waves on the transmission line may be viewed as a sine wave. Trimming the feedline could have placed the SWR bridge in the null at the reference line, Fig. 1.

A mismatch may be easily and quickly found. Simply insert an electrical quarter-wave length of coax in your transmission line between the bridge and the original transmission line, making sure, of course, that they are of the same impedance. See Fig. 2. If the plate current being drawn by the transmitter or the SWR bridge reading changes (usually both will change), your antenna is not matched. The only place to correct the problem is at the antenna, by adjusting the matching device.

The ideal situation is to adjust the matching device with the antenna at its normal operating position, so that the effect on its impedance of ground, and objects simulating ground is tuned out. Usually, however, this is neither practical nor safe. There is another way.

Lower the antenna to the ground, and using a step-ladder, or some similar supporting structure, point the antenna straight up. The mast may be attached to the top of the step-ladder with a U-bolt around the mast and passed through the ladder's top platform.

The reflector should be no less than one quarter-wave above ground to minimize ground reflections. A greater distance is to be preferred Be sure the sky that the antenna is looking towards is unobstructed for several wavelengths by trees, utility lines and so forth. Even on the most crowded city lot, these objectives can usually be met.

Now we can safely reach the matching device. Disconnect the feedline and in its place, insert the SWR bridge. Reconnect the feedline to the bridge and apply some rf power. Your wife or a buddy is handy there. Note the SWR at the antenna. I'll bet you will be amazed! Now adjust the matching network for minimum SWR, either while wearing a dry pair of gloves to prevent rf burns, or while the transmitter is momentarily shut off. You should move also out of the antenna's immediate area to eliminate any body reactance. Some retuning of the transmitter also will be necessary to assure maximum rf transfer.

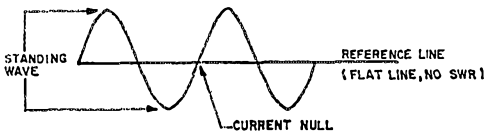


Fig. 1—A sine-wave look at standing waves.

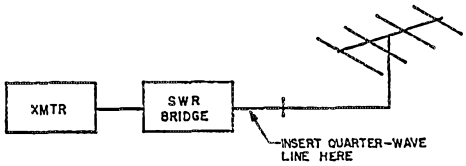


Fig. 2—Checking for SWR with a quarter-wave insert. Quarter-wave lengths by frequency, velocity factor included:

50 MHz 39 in.	220 MHz 8¾ in.
144 MHz 13½ in.	432 MHz 4½ in.

After the proper match is realized, remove the SWR bridge, reattach the feedline and seal it with some type of weather-proofing material. Spraying with Krylon, wrapping with electrical tape and spraying again is usually sufficient in most climates. Several light sprayings of Krylon is better than a single heavy application. All the metal hardware should be checked for corrosion and buffed clean with a wire brush before sealing the connection.

The antenna may now be returned atop the tower, and little change in matching will be noted. You could also again try the quarter-wave line at the transmitter before raising the antenna.

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

And while you're at it, check the feedline for signs of weathering or abrasion against the tower or house-entry location.

You probably won't notice any great change in signal reports after all this, unless you had an extremely bad mismatch before, but you will have the satisfaction of knowing your antenna is now permitting maximum signal transfer, both receiving and transmitting.

In Historical Perspective

One recent evening the vhf bands were particularly quiet. While rummaging about in my junk closet I came across some musty-smelling issues of vhf rags, none of which are any longer in print. One that caught my eye was the November, 1947, issue of *The VHF News*, written by Bill McNatt, W9NFK. I was curious just what was happening on v.h.f. 22 years ago this month. Some of those involved are still going strong, some have faded, and others have joined Silent Keys. But this is what was happening in November, 1947.

There was a front-page squabble going over what other than DX! The new 2-meter DX record was apparently claimed by WØWGZ in Iowa and W3GV, Pennsylvania. Their contact was figured to be 26,375 miles farther than the previous record. Their DX record? About 675 miles!

Then there were several pages of who worked whom, including a report from none other than Helen Harris of Lakewood, Ohio, then billed as W8UKS' XYL. Helen is now, of course, W1HOY/KP4, and Sam is working moonbounce from Puerto Rico. W4FJ, reporting on 2 meters down Richmond way, proclaims horizontal is the "most effective and certainly the most practical polarization." Ted goes on to say he will soon be experimenting with 420. He now is national leader in states worked on that band.

W1HDQ reports a new 235-MHz band record. (Remember they were *megacycles* 22 years ago, and the band was 235 to 240 Mc) W1CTW worked W2HWX over a 200-mile path.

There were articles on using the SCR-522 surplus gear, a simple coax SWR meter, and preamps built around 6J4s and 6J6s, and a lengthy discussion on what makes tropo ducting work.

So you see, there have been changes in the last 22 years, but some of the topics and some of the "doers" remain the same. Next month this column will mark its 30th anniversary, this monthly coverage of the vhf scene having been originated by W1HDQ in the December, 1939, issue of *QST*.

Author's Note

Your column conductor has returned to Sioux Falls, South Dakota after a three-year absence. I will again be signing my KØCER call and will be active on 144 MHz meteor scatter and tropo schedule requests will be honored as occupational time allows. For the next 30 days, please address all correspondence for this column to League Headquarters, from where it will be forwarded.

Wyoming Repeater News

The 2-meter repeater project of the University of Wyoming Amateur Radio Club should be completed by the time this appears in print. The site is Sherman Hill, near Laramie. The call is K7SDD, also the home-station call of the trustee, Chris Humphries. Similarly, a Downtown-Laramie repeater carries the call of the UWARC president, Bob Rule, WA7EGK. Output frequency: 146.76; input 146.16 MHz.

Originally it had been intended to use 146.34 — 146.94, but the change was made to avoid problems with the WØWYX, repeater on Squaw Mountain, west of Denver. It is hoped that participants will make provision for transmitting on 146.76, for direct work when the repeater is not in operation. Eventual plans call for a second repeater, on 146.34 — 146.94, with corner-reflector antennas aimed west. This will be set up so that signals on both input frequencies will be relayed on both output frequencies. The WØWYX repeater is not heard west of Sherman Hill, so this arrangement should provide western Wyoming coverage for users of the popular 34–94 combination.

This combination would have been useful to the undersigned, who recently spent a week in Wyoming without hearing a peep on either 34 or 94, though we did have fruitful discussions with WA7EGK in Cheyenne, and W7LVU, in Casper. The latter has applied for authorization to operate a repeater on Casper Mountain. Links on 450 MHz will tie in with the Laramie and Squaw Mountain repeaters. — *W1HDQ*.

OVS and Operating News

50-MHz DXers, having finished with the summer *E*-season, are now awaiting *TE* openings to South America and possible *F-layer* to the Pacific. There is very little six-meter news this month. However, W6ABN says XE1GE and XE1PY worked ZK1AA on September 7 around 2000 GMT. K6JYO reports that WB6KAP worked ZK1AA also, during the first week of September. HI8XDS stopped and visited W6ABN; Swany was enroute to Vancouver, B.C., where he'll be signing VE7AFL again.

Groundwork for a vhf repeater. The possibilities for a cross-state repeater were investigated by this expedition to the top of Mission Peak, Near Wenatchie, Washington, early in September. Facing the camera is Jim Hartwell, K7UDG. Jon Marcinko, W7FHZ, is looking the other way. Third member of the party, Bill Balzarini, K7MWC, was the photographer. K7WWC is VHF PAM and OVS, K7UDG an EC, and W7FHZ is Northwestern representative on the ARRL Advisory Committee on VHF Repeaters.

These are four well-known vhf men who attended the 1969 Central States Vhf Conference at Boulder, Colorado in August. Left to right, W4FJ, WØEMS, K8REG and WØLER. *(All conference photos via W4FJ)*

K7ICW reports *Es* from Las Vegas on August 2, 3, 4 and 10, and notes that a contact with K4AYO, Miami, was the only double-hop *E* during August. Constant monitoring for ZK1AA has so far proven fruitless for Al.

On August 9, WA1DFL, Mass., worked several 9s and K8CLA/Ø in Grand Forks, North Dakota. In Ohio, WA8YHN noted the same openings caught by K7ICW and WA1DFL, working 5s, 6s and Øs. WA8YHN last noted *Es* on August 16 when he worked K4UJZ, Fort Lauderdale, Florida.

John, KH6GHC, is now well settled with Motorola in Chicago and says he will be making company trips this fall to South America. He was in Aruba in August and talked with PJ3AD and PJ3AL. Both said few openings to the U.S. had been noted this year and all were poor. John says anyone he overlooked with a KH6 confirmation may write him at 950 Beau Drive, Des Plaines, Ill. 60016.

144 MHz was very active during late summer and early fall. Tropo and meteor scatter accounted for a number of additions to the states worked boxes.

W1AZK, New Hampshire, has a weekly schedule with K4GL, South Carolina. They have made contact several times this summer on random meteors. W1AZK had Perseid schedules with WØDRL and WØENC with no success, but those paths are 1500 miles. K1UGQ, who signs W2CRS when in New York, had two Perseid contacts, WA8PIE and WØNXF, bringing his total to 30 states worked from his Maine location.

W3BHG, Delaware, has added three new states, WA9DOT in Wisconsin on tropo back in July, and WØLER, Minnesota, and WØNXF, Nebraska, during the August Perseids. K4EJQ, Tenn., worked VE2DFO on Perseid meteors, and several Minneapolis stations over an 800-mile tropo path. Bunky says activity still is below what he calls "normal." In Georgia, W4ISS is active with a beefed-up 5894 and stacked 6-element Yagis. He reports an August 27 tropo contact with W8KAY, 550 miles. Frank, if your states totals equal or better the lowest total listed in your call area, you're eligible for listing in the states worked boxes. The same applies to everyone, of course.

W5UGO, Oklahoma City, says his August Perseid contact with Wyoming's K7VTM, was state number 43. Larry leads the 5th call area on 2 meters. Close behind is Larry's father, W5HFV. His total now numbers 36 states after successful Perseid exchanges with K2RTH and K3ARN.

In California, K6MYC is working on collinear designs again. Back in April, 1967, Mike described, in this column, how to add a director to the common collinear design for more gain. Now he says adding a second director, spaced 10¼ inches from the first, will yield a gain of 2.2 dB over the standard collinear design. Mike and K6HCP also are experimenting with spacing Yagi configurations during moonbounce schedules with ZL1AZR and VK3ATN.

K7ICW had several unsuccessful Perseid schedules, but listened to both ends of a contact between K6JYO and K7VTM. He called K7VTM after the contact was completed, but the Wyoming operator was talking with K6JYO on the telephone! Al notes several periods of good tropo conditions during August from Las Vegas to Phoenix and Southern California.

What happened to the 8s? But W9YYF, Illinois, caught a good midwest tropo opening August 21, working from Tennessee to Oklahoma and Nebraska. W9YYF also noted a small aurora opening August

2-METER STANDING

W1JSM	35	8	1400	W5HFV	27	10	1285
K1ABR	34	8	1478	W5MCC	25	8	1430
W1AZK	34	8	1412	K5PTK	18	6	1330
K1HTV	32	8	1310				
K1WHT	31	8	1300	W6GDO	18	5	1326
K1UGQ	30	8	1370	W6WSQ	15	4	1390
K1WHS	29	8	1300	K6HAA	13	4	1380
K1BKK	28	7	1275	W6NLZ	12	5	2540
W1VTU	26	8	1296	K6JYO	12	4	1240
W1FJH	24	7	1100	K6HMS	11	4	1258
W1HDQ	24	7	1040				
K1MTJ	20	7	1225	W7JRG	27	6	1320
K1JIX	18	6	800	K7NII	24	5	1290
K1RJH	17	7	1450	K7ICW	16	4	1246
W2NLY	37	8	1390	W8PT	41	9	1260
W2CXY	37	8	1360	K8DEO	32	8	
W2ORI	37	8	1320	W8IDT	31	8	1150
W2BLV	36	8	1150	W8IDU	27	8	1150
W2AZL	36	8	1380	W8NOH	26	8	1165
WA2FGK	33	8	1340	W8TIU	24	8	1000
K2RTH	32	8	1215	K8ZES	22	8	675
W2CRS	26	8	1270	WA8VHG	13	6	465
W2CNS	23	8	1150				
W2DWJ	23	6	860	K9SGD	42	9	1300
WA2EMB	22	8	1335	WA9DOT	41	9	1303
W2DNR	22	7	1200	K9AAJ	41	9	1200
WB2FXB	21	6	915	K9UIF	41	9	1150
K2YCO	20	7	750	W9AAG	39	9	1200
WA2PMW	19	6	1000	W9YYF	36	8	1050
				W9IFA	33	8	1060
W3RUE	36	8	1100	W9PBP	32	8	820
W3KWH	35	8	1335				
W3GKP	32	8	1108				
K3CFA	25	8	1200	KØMQS	45	10	1590
W3BHG	25	8	1140	WØBFB	45	10	1380
W3BDP	25	8	1100	WØNXF	44	10	1369
W3HB	21	8	1310	WØDQY	41	9	1300
K3OBU	21	7	930	WØLFE	40	9	1100
W3LHF	19	6	700	WØLER	36	9	1250
WA3GPL	19	6	625	WØEYE	35	9	1380
W3TFA	18	8	1342	WØENC	35	9	1380
				WØLCN	28	8	1000
W4HJQ	39	9	1150	WØDRL	25	9	1295
W4WNH	38	9	1350				
W4EHK	38	9	1280				
K4EJQ	37	8	1125	F8DO	1	1	5100
K4IXC	36	8	1403	KH6UK	2	2	2540
K4GL	36	8	1325	OH1NL	1	1	5850
K4QIF	35	8	1225				
W4CKB	34	8	1325	VE1AUC	7	2	500
W4FJ	34	8	1150	VE2DFO	19	7	1340
W4VHH	33	8	1100	VE2BGJ	17	6	975
W4AWS	29	8	1350	VE2HW	11	5	800
				VE3EZC	33	8	1283
W5UGO	43	10	1398	VE3BQN	31	7	1250
W5RCI	42	9	1289	VE3AIB	29	8	1340
K5WXZ	36	10	1450	VE3ASO	28	8	1285
W5HFV	36	10	1285	VE3EVW	25	8	1100
W5AJG	33	9	1360	VE7BQH	6	2	1248
W5UKQ	29	8	1150				
W5LO	28	7	1254	VK3ATN	3	3	10417

The figures after each call refer to states, call areas and mileage of best DX. Revised November, 1969

25 when he worked stations from Minnesota to New York and Ontario. W9IFA reports unsuccessful Perseid schedules with W3LUL and W1JSM, though complete calls were heard.

In Minneapolis, WØLER reports Perseid contacts with W3BHG, W4LSQ and VE2DFO. VE2DFO was worked on a random ssb CQ. WØLER heard K4IXC and W4CKB, both over 1400-mile paths to Florida. Several good bursts came through, but no contact was made. WØLFE, Missouri, had a successful Perseid shower, adding two new states, W1JSM and W3BDP. WØNXF added two states also. Bob worked W3BHG and K1UGQ. He says the shower was "very, very good." Remarks from others said "poor" to "average." WØENC, in western South Dakota, reached 35 states worked by exchanging meteor signals with K4GL, South Carolina. Bob also worked VE3ASO, K8LZF and W8IDT for a fine showing from South Dakota.

Canadian VE2DFO keeps extremely active. Don started meteor schedules on July 27 and between that date and August 13, he worked KØMQS, WA9DOT, WØLER twice, K4EJQ, WØLFE three times, WØBFB and W9YYF. This was his first attempt at m.s. and he came away with these suggestions for other m.s. novices: use 15-second calling sequences for shower meteors and 30 seconds for random on cw, and short calls on ssb, especially when searching for random meteor contacts. On September 1, Don completed a contact with K4IXC, 1340 miles on a random meteor burst that lasted 45 seconds! VE6MX says f-m activity continues in Alberta. He reports simplex contacts with VE6AVV and VE6WZ. VE6MX is using a 4CX250B amplifier for his f-m work.

Several letters, all pro, have been received about single-band operating nights suggested in the September column. Some of the fellows have asked for even more of this type activity. The number of reports received following the first three months or so should provide guidelines for such future activity.

220 MHz is showing signs of life again. We hope the single-band operating nights (see September column) will encourage more use of this band.

WB6NMT is scheduling KH6EEM on moonbounce, using an array of 16 ten-turn helices and a kW. WB6NMT offers 220 moonbounce schedules to anyone equipped to handle the job properly. K7ICW tried a Perseid meteor scatter schedule with W5ORH. The 15-minute try netted but two pings. WAØQLP, Rapid City, South Dakota, gave 220 meteors a try also. He ran a schedule with W6AJF and heard pings and short bursts, but made no contact. A tropo contact with WØEYE, Colorado, was WAØQLP's first state on 220. He offers schedules with anyone willing to give 220 a try.

432-MHz DXing has been exceptional this past summer. Many changes in the states worked boxes have been recorded. Competition is keen in the second call area. K2ACQ, Lockport, N. Y., has moved back into the lead, having added WA2WEB/8, West Virginia, W3CGV, Delaware and W9JIY, Illinois. K2ACQ operates nightly on 432.045. He is followed closely by K2UYH. Al added WA2WEB/8, his number 17.

It was K2UYH and WØDRL who proved during the August Perseid shower that there is a possibility of m.s. contacts at 432 MHz. Some of the details were given last month, but here are more from K2UYH. Scheduling from 0900 to 1000 GMT, WØDRL copied a 5-second K2UYH burst on August 10. Nothing was heard either way on the 11th. On the 12th, WØDRL copied one 15-second and one 5-second burst. K2UYH copied a single 5-second burst from Kansas. K2UYH says these results agree with predictions by Lovell and Brown in *Exploration of Space by Radio* and other similar radio astronomy texts. They say signal strength should decrease linearly with the frequency for *constant-sized antennas*, while duration should drop by the square of the frequency. Therefore, Al concludes that for a constant-sized antenna, such as a parabolic reflector, signals on 432 should be only 5 dB below the strength of 144-MHz signals. Since m.s. signals at 144 are generally strong, often 10 to 20 dB can be sacrificed and be still usable. Al says, however, duration is the real problem. Bursts at 432 will last only one-ninth as long as the same condition would produce on 144, leaving only the extremely long duration bursts of ionization of any value at 432. K2UYH and WØDRL will continue their schedules through the winter meteor showers.

W2BLV and W2DWJ report working new states; both adding WA2WEB/8. K3IUV also added that West Virginia portable, operated by the East Coast Vhf Society.

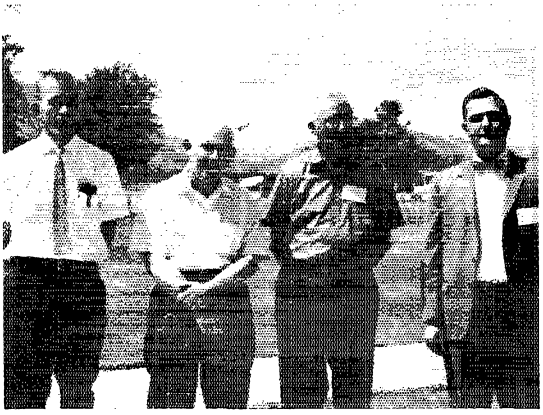
In Virginia, K4QIF closed in on W4FJ, now trailing the national leader by only one state. K4QIF clicked with W8YIO, Michigan, W9JIY, Indiana, and others during an August 25-30 tropo session. Rusty now has 19 states worked.

On August 27, W4FJ worked K9HMB, Illinois, plus numerous stations in Ohio, Michigan and New York, as a big high-pressure area slowly drifted across the upper Ohio Valley.

K8REG, Ohio, says tropo was excellent on August 27. He worked W4FJ, K4QIF, K2UYH and K2CQG. On August 26, Vince noted aurora on 432, hearing but not working W8YIO, W8HVX, WA9HUV and W9ZIH.

WA8VHG now has 8 states. WØDRL in Kansas is Brian's latest addition. He says to keep an eye on K8LZH in Michigan who is now running 500 watts and 40-element collinear.

W9JIY, Indianapolis, found good tropo on August 28. He worked WØDRL, K2ACQ and K4QIF. WA9HUV reached 17 states, contacting South Dakota's WØIT on August 23. Also on that night, and the one before, Norm worked Ohio, Michigan, Pennsylvania, Kansas and Minnesota. W9WCF likewise found WØIT, and moved to 19 states worked. That 20 state mark at 432 doesn't look so formable now, does it?



Also attending the Central States meeting were, left to right, WØDRL, K5WXZ, WØEMS and WØEYE, Chairman of this year's conference.

220- and 420-MHz. STANDING

220 MHz.

W1HDQ	13	5	450	W2CNS	7	5	525
K1JIX	12	4	600	W2SEU	6	4	220
K1BFA	8	3	225				
				W3RUE	14	7	585
K2CBA	17	5	1090	K3IUV	11	5	310
W2DWJ	15	5	740	W3UJG	9	4	400
K2DNR	13	5	600				
W2SEU	12	5	325	W4FJ	20	7	995
K2RTH	12	4	600	K4QIF	19	7	1065
W2CRS	10	4	440	K4EJQ	12	5	550
				K4SUM	11	5	420
W3UJG	14	5	460	W4HJZ	9	4	560
W3RUE	10	5	480	K4NTD	9	2	835
K3IUV	10	4	310	K4GL	5	2	—
				W4VHH	5	1	450
K4IXC	3	2	1090				
K4GL	3	2	—	W5RCI	19	6	880
				W5ORH	12	4	700
W5RCI	10	5	910	W5AJG	7	3	1010
W5AJG	3	2	1050	W5UKQ	6	2	590
W5LO	2	2	660	W5AWK	3	2	222
W6WSQ	4	4	945	W6DQJ	4	2	360
K7ICW	4	2	250				
W7JRG	2	2	959	K7ICW	4	2	225
W8PT	11	6	660	W7JRG	2	2	420
				K8DEO	17	6	625
WØEYE	8	4	910	K8REG	16	6	625
				W8HVX	15	8	660
VE3AIB	7	4	450	W8MNT	13	7	600
				W8RQI	10	6	425
				W8CVQ	10	6	400
420 MHz.				WA8VHQ	8	6	625
K3EAV/1	14	6	700	W8FWF	7	4	450
K1BFA	10	4	470				
W1QVF	10	5	400				
K1JIX	10	4	460	W9WCD	19	7	825
K1HTV	10	4	400	WA9HUV	17	7	780
W1HDQ	10	3	250	W9AAG	14	5	800
WA1JTK	9	3	490	WA9NKT	12	6	560
				K9AAJ	12	5	425
K2ACQ	19	8	925	K9CNN	12	5	—
K2UYH	17	6	840	W9JIY	10	5	550
K2CBA	16	8	2670				
K2ACQ	16	8	925	WØDRL	18	6	1185
W2CLL	15	6	693	WØLER	8	3	709
W2BLV	14	6	500	WØEYE	6	2	425
W2DWJ	13	4	330				
WA2EMB	12	6	720	VE2HW	4	3	750
K2YCO	9	6	525	VE3DKW	12	7	940
WA2EUS	9	4	260	VE3FZC	7	5	510
K2RIW	9	3	—	VE3AIB	5	4	450

During the same opening, WØLER, Minneapolis, worked Indiana, Illinois, Kansas and South Dakota. John is looking for Kentucky on 432. He is active each evening, 0300 to 0400 GMT, on 432.015.

1296 MHz reporting was exceptional this month. W2DWJ, Elizabeth, New Jersey is active with 100 watts and a 7-foot dish. Bill reports K2JNG and WB2IOE working nightly over a 65-mile path. K2DZM is running s.s.b. and a 5-foot dish. Also reported active are W2CQH, W2CCY and WA2VTR. All are hoping for some 1296 activity in New England soon.

On September 1, K2UYH worked K4SUM. K2UYH has a 3CX100A amplifier delivering 40 watts, and K4SUM was running 10 watts from a tripler. Al says the contact is significant as evidence of good tropo possibilities at 1296, if there were just more activity to make use of favorable conditions when they develop sound familiar. K4SUM heard W2DWJ on the same opening, but couldn't attract his attention. Joe lists three states in three call areas and a best DX of 215 miles on 1296. He says in addition to himself, active also in his area are W3AHQ, W3NG, W4API, W4EXS and W4UBY.

In the midwest, WA9HUV is building a 12-foot dish on a polar mount. High power and moonbounce echo tests are also in the works. W9WCD has just az-el mounted a 16-foot dish and is suffering from "a busted back and crinkled legs." W9JIY says he and WA9HUV are keeping schedules, recording signal strength correlation with weather conditions. They have found no correlation between 432 and 1296. W9JIY also reports more interest in 1296 developing around Indianapolis. Bill says W9EVD is building a converter and varactor tripler, while W9NTP is getting ready to build gear.

Late Reports

There was a rush of news after Bill's normal deadline this month, so we add these brief tidbits: W7HIX/KG6 (Guam) reports that propagation apparently associated with the *TE* mode opened the path to Japan and the Asian Mainland frequently, from late August on. He had worked all Japanese call areas by Sept. 15, and was hearing harmonics from Red China regularly in the 50-MHz band.

For the U.S. Southwest and Mexico, the *TE* season opened Sept. 20. LU6EAM worked XE1PY, 0130 to 0140 GMT. K7ICW, Las Vegas, Nev., worked CE3QG at 0240, hearing him until 0410. W5WAX and K5WVX worked XE1PY, CE3QG, LU8AHW, OA4C, LU3DCA and XE1CK in that order, between 0115 and 2230.

We'll let you name the mode on this last one, but WB6KAP reports reception of the ZK1AA beacon 5 nights in July from the 15th on, and 6 out of the first 9 nights of August. He sent a tape of a 20-minute QSO with Stewart around midnight (PDT) Aug. 9, with ZK1AA's cw running S3 to 5.

The third week of September provided some rare inland tropo on 144, 220 and 432, from South Carolina and Georgia to the Maritime Provinces. With something approximating a skip effect, never observed in the more frequent coastal inversions, most of the contacts were over 400 to 750 miles.

Some of the longer hauls worked on 144 on Sept. 22-23: VE1AFB — W3LUL, VE1ANW — W4JFU; K1BKK, Barre, Vt., and W1AZK, Chichester, N. H. — W4VHH/4, Belvedere, S. C., also worked by W1VTU, K1HTV and K1RJH in Connecticut. K4YYJ, Salisbury, N. C., and W4NUS at Charlotte seemed to be about the northern edge of this for the W1's, and stations only about down to the New York area were working the Carolina stations. All the Carolina stations, and K4GL, not mentioned above, but active in the DX picture, are in the western mountainous areas of the states, remote from coastal inversion effects.

This propagation was working on 432, as well. K1HTV, Meriden, Conn., heard W4VHH/4 every time the latter was on 432, and W4NUS, as well, though no contact was made.

The value of being active regularly was never better demonstrated than during this spell of several nights and mornings of long tropo. The usually-observed signs would not have worked, as signals from the outer edges of the normal working range were not up appreciably. Frequent CQ's and religiously-kept skeds were much more effective.

K2ACQ, Lockport, N. Y., and K4EJQ, Bristol, Tenn., had been keeping nightly 432 skeds for a long time, with no result, but on the night of Sept. 25, at 10 local time, they worked with good signals. This made K2ACQ the first in his call area over that "impossible" barrier to State No. 20 on 432! K2YCL, near Rochester, also worked K4EJQ.

Those Activity Nights

The proposed high-band activity nights, detailed in September *QST*, page 84, are still in the future as we write, but favorable comments are still coming in. The only question now remains is: "Will the *reports* come in?" Be sure to let us know who you worked on 144 Oct. 4, on 220 Oct. 11, and on 432 Oct. 18. Get details in at once, especially for the 432 nights, as that is close to our deadline. Repeat the effort in November, as follows: 144 — Nov. 1; 220 — Nov. 8; 432 — Nov. 15, 6 P.M. Saturday to 2 A.M. Sunday, your local time. Just report contacts made, and add observations about the evening's activities. QST

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

That "Impossible Dream"

THIRTY years ago W7FWB, Ethel Smith, now K4LMB, read a lace bordered advertisement in *QST* that, by its frilly appearance was designed to catch the eye of the "sugar and spice" readers. Instead of appealing to Ethel's feminine love of perfume and lace, the advertisement was a challenge to her to discover just how many YLs there were in the amateur ranks and possibly form a club of some kind. By October of 1939, the YLRL dream had become a reality with a Constitution and By-Laws, and a growing membership. The present system of District Chairmen was in effect to promote organization, and YLRL was well on its way.

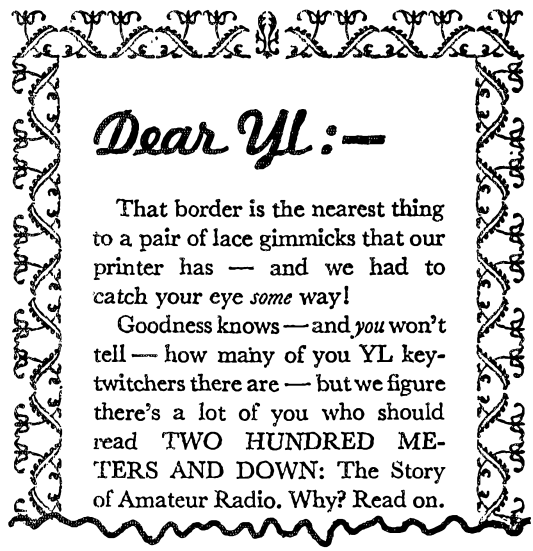
From 1939 to 1941 isn't very long but in those two years the foundations for YLRL were firmly set, and YLRL "Chapters," now known as affiliated clubs were appearing across the country. When the door slammed shut on Amateur Radio after Pearl Harbor, the women operators distinguished themselves in all phases of war work with many of them entering the armed services in the communications branches.

Although the actual organization was shelved for the duration of World War II, the lack of opportunities did not put an end to the club, for when the ban was lifted the gals picked up where they had left off and YLRL continued to grow.

A YL is simply another Amateur Radio Operator who happens to be feminine, and YLRL is an organization that maintains that feminine identity in the almost half million amateur population of the world. In contests our voices may reveal our sex when we are on fone, but on cw, or RTTY, we are hidden by the facelessness of our calls. The YLRL sponsored contests have added a hint of that lace border of 1939, with the YLAP each fall, a contest for women operators that started as a QSO party in December 1939, and has long since become the YLRL Anniversary Party. YL-OM, the other major contest has just completed its 19th year as one of the very popular activities of the amateur calendar.

The colorful certificates that are the tangible evidence of our activity include WAS-YL, WAC-YL, YLCC, which are available to any operator who meets the requirements, and that very restricted DX-YL, that is issued only to women amateur operators.

* YL Editor *QST*, Please send all news notes to WB6BBO's home address; 1036 East Boston St., Altadena, Calif. 91001.



Advertisement *QST*, May 1939, Beginning "Dear YL"

The past thirty years have seen the dream of a world-wide organization of women come into reality assisted in part by the YLRL plan of adopted YLs to help the DX gals over the stumbling blocks of international red tape. YL *Harmonics*, the club publication that began as a news sheet, as so many do, has grown into a bi-monthly magazine. Recently *Harmonics* received several citations from the Amateur Radio News Service for its illustrations, legibility of content, and general format. The membership has grown from the twelve women who answered Ethel Smith's request in 1939, to stand up and be counted to almost a thousand YLs located in all fifty states, and an equal number of countries making YLRL the largest, as well as the oldest of women's amateur radio clubs.

The average member of YLRL, according to a survey made by WA6AOE two years ago, has been licensed for 10½ years, and has been a YLRL member for 8. To make the picture a little fuller, fifty seven of the members have QCWA on their QSL cards, and several are now qualified to belong to OOTC. Membership is open to all women who hold a current Amateur Radio Operator's License, and Novices are as welcome as Extra class.

To the telegraph profession the numeral "30" *means* "The end. No more." For YLRL, this thirtieth anniversary is defined best by the old show business line "It's only the beginning."

YLRL Election Results

The officers for the year 1970 will be
President VE3EZI, Ivy Smythe
Vice-president K5PFF, Audrey Beyer
Secretary KL7FJW, Betty Marsh
Receiving Treasurer
W6YKU, Jaquelyn Van de Kamp
Disbursing Treasurer WB2JCE, Janice Fontana

District Chairmen

First District	K1QFD, Phyllis Hoffman
Second District	W2UXM, Sallie Lobenthal
Third District	WA3FWI, Zeta Morgan
Fourth District	WA4UWK, Maxine Harris
Fifth District	WA5JFZ, Jane Eastman
Sixth District	WA6OGK, Dorothy Leif
Seventh District	K7QGO, Mae Hipp
Eighth District	K8CEN, Louise Gambill
Ninth District	WA9CNV, Pauline Course
Tenth District	WAØFSK, Kay Swezey
KH6 District	KH6TI, Ardelle E. Johnson
KL7 District	KL7GFU, Trudy Hobbs
VE District	VE1AKO, Christine Weeks

TOT Memorial Week: November 22-24, 1969

The Ontario Trilliums will again hold the Trilliums' Memorial week in honor of Albert Theodor Jensen, from 0030 GMT November 22, 1969 through 0030 GMT November 24, 1969.

The Trilliums being the host club will call "CQ TMW." All others will call "CQ TOT."

Exchange signal report, name and QTH, Trilliums will give their club numbers. Cw contacts will count as 2 (two) points, fone contacts count as 1 (one) point. Low power multiplier of 1.25 for all transmitters running 150 watts cw, 150 watts am. 300 watts p.e.p. and under.

Each Trillium station may be contacted only once regardless of band or mode. Logs must show: Date, Time in GMT, RST, Band Mode, TOT Number, as well as name and address and claimed score. *All logs must be signed by the operator.*

Non member with the highest score will be presented with a plaque, and will have his name inscribed on the Albert Theodor Jensen Memorial Trophy donated for the contest by Jack and Dot Abel. Remember, there is no prize for the leading Trillium other than the fun of the contest. Only non members are able to qualify for the award.

To be sure of contacts the TOTs will be active on the following frequencies at the following times:

Frequency	Date	Time (GMT)
3.685 Mhz	Nov. 22	1900
3.685	Nov. 23	0200 and 2215
3.855	Nov. 22	1600
3.855	Nov. 23	0000 and 1945
7.103	Nov. 22	1500 and 2300
7.103	Nov. 23	1830
7.240	Nov. 22	2000
7.240	Nov. 23	1500 and 2330
14.035	Nov. 22	0200 and 2200
14.035	Nov. 23	1715
14.140	Nov. 22	1700
14.140	Nov. 23	0100 and 2100
14.240	Nov. 22	0030 and 2100
14.240	Nov. 23	1600

Send logs to Bubbles Timlick, VE4ST, 1317 Magnus Avenue, Winnipeg 14, Manitoba, Canada. Logs must be postmarked not later than December 31, 1969, and received not later than January 15, 1970.

YLAP — Windup

It still isn't too late to celebrate the 30th Annual YLRL Anniversary Party. The phone portion of the contest will be November 5, 6, 1969. See October YL News and Views for the contest rules.

Meet the Club — H.A.W.K.

Hawk came into existence October 6, 1957 when five YLs met at Purdue University. W9RTH, Adah Elliott, was appointed President, W9JYO, Thelma Zimmerman, appointed Vice president, K9IXD, Doris Singer, Secretary, and W9LYU, Betty Timberlake, Treasurer. By-laws were drawn up, and there was a club paper edited by K9IXD. In less than a year there were twenty one members. At that time one of the membership requirements was that the YL be an active member of YLRL. The club had some rather unusual members, W9RTH was the first licensed woman radio operator in Marion County; W9JYO was the first licensed woman operator in the state of Kentucky in 1932; K9FZX was the first licensed YL operator in Whitley County.

On August 1, 1958, the Montgomery AREC Club, in Illinois, heard about the H.A.W.K.s and their emblem, procured a stuffed hawk that was captured in Montgomery County, and gave it to the club. This bird is treasured by all the members and is named Bobbi. Bobbi is well known throughout Indiana and has been present at many of the amateur radio gatherings.

Club meetings are held the same day as the Indiana Radio Club Council, the second Sunday

Hawk certificate.

of April, and the second Sunday of October. The club certificate is issued to any ham who works 10 members. Custodian is K9ILK, Fran Welsh.

Members of this very active club have been honored many times. K9IVG was SCM of Indiana, and was awarded Outstanding Amateur of Indiana. K9IXD received the same award for her activity in the clubs, and this year it was again given to W9RTH.

Giselle Walls — K3WAJ

The OM, who was in the local fire company, occasionally brought receivers home to trouble shoot and it was then that Giselle discovered that there was more to communications than the telephone and broadcast radio. The great awakening came when she visited a nearby amateur, and as Giselle puts it: "After seeing the operating, and what was possible, there was no stopping me until I passed the test."

You might say that she literally got her call as a "Christmas gift" for her hard-earned license arrived on Christmas Eve 1962, and she made her first contact on Christmas Day.

Giselle was involved in scouting when she received her license so she ended up with a class in radio that was so successful that several of her students now hold General Class. Her favorite form of operating is fone on 75, 20 and 15 meters. She prefers traffic as an activity, and has been PAM for the past two years on the E.Pa. Emergency and Traffic Net, where she has also been Net Control Station.

A member of YLRL, she was 3rd District high score in the 1967 and 1968 YL-OM contests, also

K3WAJ, Giselle Walls

she holds A-1 Operator, as well as OPS appointment and belongs to ARRL, Secane Radio Club and ISSB. In her spare time Giselle enjoys painting with oils, swimming, playing the organ, and gardening.

Besides the OM, Rody, K3YPF, and a 16-year-old son, the Walls household includes one cat, one rabbit, one parakeet, and a ten-year-old turtle. QST

—•••—

Silent Keys

It is with deep regret that we record the passing of these amateurs:

W1ENF, Bernardo H. Knight, Easthampton, Mass.
W1HPJ, Stephen F. Scigulinsky, Jr., Westfield, Mass.
W1PV, ex-W1LEL, Patrick Volpe, Stoneham, Mass.
W1TLI, Frederick L. Terrien, Essex Junction, Vt.
K1VHA, Louis A. DeVaux, Shelton, Conn.
WA2CKP, William V. Kacen, Fair Haven, N. J.
K2EE, Walter B. Weber, Williamsville, N. Y.
W2KDA, John J. Danielson, North Bergen, N. J.
W2LO, Nelson Dunham, Highland Park, N. J.
W2MHK, Samuel G. Nelson, Flemington, N. J.
WB2OAW, Michael K. Daniels, Roslyn Heights, N. Y.
WA2TOA, Douglas W. Mazurek, Union, N. J.
WA3CWK, Raymond D. Bechtel, Pottstown, Pa.
W3EW, Lawrence T. Phelan, Berwyn, Pa.
W3KDR, Quayle B. Smith, Bethesda, Md.
W3QFR, William McCandless, Pittsburgh, Pa.
W3SYU, Robert B. Evans, Trevose, Pa.
K4AA, Edwin Nuttall, Boynton Beach, Fla.
K4BD, Edward O. Reid, Clearwater, Fla.
W4KBM, Robert E. Grow, Largo, Fla.
W4OMY, Robert P. Jean, Tampa, Fla.
K4RJZ, James H. Hayes, North Charleston, S. C.
W5BZ, Harry J. Dutel, New Orleans, La.
W5NEH, Olin A. Boyer, Dallas, Texas.
W5PYE, Dorothy C. McClain, Moscow, Texas.
K5ZGD, Harry H. Sandberg, Houston, Texas.
W6AD, Mon L. Webb, Sr., Folsom, Calif.
W6BUN, Alex W. Callam, Woodland Hills, Calif.
W6HC, Harry Engwicht, San Jose, Calif.
W6NMS/DJ0KB, Gustav W. Gunkel, Long Beach, Calif.
K6OX, ex-W6AIS, Edwin R. Knowles, Lancaster, Calif.
WA6SCC, ex-W6BCT, Charles G. Norton, Garden Grove, Calif.
WB6UIM, Norman K. Edgars, Whittier, Calif.
W7JX, Leonard G. Davis, Butte, Mont.
K8LCH, Eugene Gander, Columbus Grove, Ohio
K7LED/W7DXS, William T. Brown, Seattle, Wash.
K7NCK, Fred A. Barlow, Gillette, Wyo.
W8ONH, Maurice McMurry, Grand Rapids, Mich.
WA8RKF, William R. Wasson, Garden City, Mich.
K8WLX, Larry L. Paggeot, Whitehall, Mich.
W8ZCW, John Cox, Newark, Ohio.
W9ACE, Melvin J. Baer, Chicago, Ill.
K9BPA, Wilmeth K. Wills, Muncie, Ind.
K9QWV, Donald L. Weber, Evansville, Ind.
WA9TKO, Robert N. Mitchell, Arlington Heights, Ill.
W9UZU, Franklin S. Thompson, Edwardsville, Ill.
W9VIT, Kenneth A. Lane, Rolling Meadows, Ill.
W0DIY, Roswell R. Marsh, Sioux Falls, S. Dak.
W0FMU, Richard G. Nuckolls, Fairfield, Iowa.
W0GF, Paul E. Anway, Independence, Mo.
W0IGG, Dick Jannsen, Sioux Falls, S. Dak.
WA0JTA, Roger H. Ries, Pueblo, Colo.
W0KGG, William E. Gage, St. Paul, Minn.
W0LM/W0EHE, Harris F. Raley, Denver, Colo.
W0OAZ, John Holmberg, Foley, Minn.
W0UEX, H. Otto Lorenzen, Atlantic, Iowa.
W0VTT, Myron C. Scott, Larned, Kans.
W0VWV, Ferris L. Taylor, Leavenworth, Kans.
ex-KP4BI, Juan A. Wirshing, Ponce, Puerto Rico.
ex-ES3CX, V. S. Alexandersen, Palma de Mallorca, Spain.

Strays

Feedback

ARRL DX Test . . . here's how the Top Ten C.W. Operator Box should have looked: W1BPW, K1DIR, W1AX, W4KFC, W3GRF, K1ZND/8, W3WJD, W3NU, WB2CKS, W4LCP. Likewise, K1THQ should be listed as No. 9 in the Top Ten Phone Box.

Feedback

Because of a clerical error, the call of Paul N. Harrison was listed incorrectly in the Silent Keys column for September 1969. The call should be K6EMR, not W6EMR.

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

How:

Letter in the box from friend Grommethead Schultz vacationing down east. Explains why he hasn't shown on sked lately. Burned out the 6L6G final in his suitcase portable and too busy to remove 132 stripped self-tapping screws to replace it. Not too QRL to peck out a few newsy lines, fortunately. Let's see what else Grom's got to say. . . .

Dear Jeevesie:

. . . Been livin' it up, man, socializing with my go-go ham cousin, X. Cedrin Heddick. He's a big club type out here, rarely on the air but very active. Seedy, as everyone more or less affectionately calls him, was born a little too soon. All these old-fashioned years we've had to make do with instant-Utopian in describing him. Recently we discovered he's really Concerned and Dissident. He was born directly under the sign of Aquarius which must have flapped loose and lumped him.

In fact Seedy was undoubtedly born several centuries early. It always burns him up to realize that fate had the temerity to place X. Cedrin in an imperfect environment. And it galls him no end that the world doesn't immediately dismantle itself (bottom bricks first) and reassemble in shining perfection overnight, especially since he loudly offers such remarkably clear insight and snap solutions to age-old problems. Yup, if there's anything at all good about this old globe you won't get a glint of a hint from Heddick. He came to bury the world in wailing invective, not to praise it.

Like most self-styled Utopians, Seedy radiates glaring inconsistency and subjectivity. This is no better demonstrated than in his approach to amateur radio. At one club meeting he flails out against unqualified "appliance operators," their threat to the game and their heavy QRM; at the next he wrings his hands and warns that incentive licensing will throttle amateur radio's "growth" and depopulate precious frequencies. Then he rails against Techs disinclined to pursue higher grades of license, later following this with a tirade against the 20-w.p.m. code requirement for Extra-only phone slots.

In DX matters Seedy is equally ambivalent. After fretting loudly about DXCC's competitive appeal, the pile-ups, etc., he champions his own hopeless version of a certification for working this or that. He gripes mightily about various entities on ARRL's DXCC Countries List, then screams in agony because his own VK7 QSL goes only as Australia. After getting royally sucked in on a bogus DXpedition or two he denounces ARRL for letting such things happen, and now he's upset because the League wants further details on his own claimed operation from Tirana.

This noise would be harmless enough but his glib remedies for club difficulties, usually resulting in higher and higher dues, too often kick loose an avalanche of bigger troubles. These he disowns, blaming their development on the winds of change and similar jazz. Yet most of the gang can't take Seedy too much to task for mongering calamity, crisis and cash-crash programs to solve same because he *is* entertaining, and we suspect his raucous hobby within the hobby is mostly tongue-in-cheek to begin with. Trouble is, the club's younger impressionables aren't fortified with enough wisdom to fully appreciate Heddick's sport. They sometimes flinch when he hollers that the sky is falling.

Except, that is, for some new Novice members who apparently spotted his game right away. These kids, though inexperienced, are far from gullible. Poor Seedy thinks they're with him. They're busy painting up some quaint protest signs to haul around for him at the Hallowe'en night meeting. Oh, like STAMP OUT QRP . . . HAM RADIO IS FUN?? . . . SPARK LIVES . . . W1CW IS UNFAIR . . . MAKE 88 NOT QRM. Should be a memorable evening. Very 73 from your pal

— *Grommiebaby*

Grommiebaby? That *does* it. We've barely time to mail the rest of these pages and head for the airport. Memorable, indeed — gotta try to save what's left of Schultz.

What:

20 phone's turn for a tour via your "How's" Bandwagon with wagoneers **Ws** 1ARR 1BGD/2 2DY 2VOZ 3HNK 3ICQ 4YOK 6YRA 8YGR 9BF 9LNQ, **Ks** 1UHY 4TWJ 6TWT, **WAs** 1FHU 1JHQ 1JMR 2DZZ 2FOS 2YWR 4MMO 5PPZ 5RTB 6EQW 8YXE, **WBs** 2DZZ 6VVS, **VE7BST**, IICTL and Mr. P. Kilroy overflowing the tailgate. Oh, let's try it by geographic breakdown this trip, remembering that "UD6HB (185) 1" means that UD6HB was noted active near 14,185 kilo-Hertzes around 0100 hours Greenwich Mean Time. And *away* we go. . . .

ASIA — **APs** 2AD (224) 15, 2AH (262) 23, 5HQ (215) 2-3, **CR9**AK 21, **EP**2DA, **HL9s** UB UN US (294) 11, UU (225) 9, VX WJ (224) 14, WN (257) 14, WL WR (212) 15, **HM1s** CM (195) 18, FG 19, **HS3s** AM JB, **HZ1**AB (244) 1, **JAs** 1BA 1BU 1CJF 1EOD 1JDP 1KSO 1NAW 1OCA 1RA 1SEX 2BN 2BVL 2FSS 2GDF 2HAW 3AZD 3BUL 3CZY 3ILI 3KHB 3LZ 3MP/1 3MX 3USA 3YQA 4BEX 4BJI 4CX 4DGG 4SV 6AD 6BEE 6BXE 6CJI 6CNL 6CUH 6EBY 6GIG 6GW 6KYS 6YG 7AMH/1 7AMW 8BQB 8BMK 8BQB 8NU 8MS 9FS ØJXV, **JD1**-YAB, **JH1s** CDE JHH, **KAs** 2BB (201) 10, 2XE (202) 16, 5LI (207) 10-16, 8HY 8ST 9RC (237) 21, 9ZZ (201) 10, **KR6s** AI (235) 12, AU AX BC (245) 12, CI (240) 12-13, DI 11, DO DZ GF GH (243) 9, HS JV KN (240) 12-13, TA VV (285) 14, VY ZR, **MP4s** BAC (210) 16, BBA (230) 21, BBW (230) 2, BHH TCN, **TAs** 2EA (210) 10, 2SC (188) 23, 3AB 0, **UAs** 9KAI (202) 6-15, 9KOH 9KOI ØAI (225) 15, ØDG (212) 16, ØNL (201) 16, ØNS (208) 10, ØNW (204) 15, **UD6s** BR (182) 2, HB (185) 1, **UF6s** CA (207) 4-5, CW (207) 5, NZ (170) 21, **UG6**AW (202) 3-4, **UH8**BO (240) 3, **UI8**CD (180) 2, **UJ8s** AC 19, KAA, **UL7s** BF (195) 18, SG (228) 14, **UM8**FM, **UV9**PP (200) 17, **UWs** 9EA (240) 3, 9OU (200) 1, ØIX (203) 11, **VS6s** AA (215) 14, AJ (202) 13, AL (207) 13-16, BS (209) 13-16, CO DR 14, **VU2s** AJW (265) 20, BEL

VK9BM's mission location at Mendi, Papua, serves as your QTH of the Month. Capuchin Fr. Ben Madden runs a KWM-2 into that quad and is regularly workable near 14,230 kHz. around 1300 GMT. (Photo via W4TZT)

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

BX (205) 17, KV (205) 17, SY, XW8s AL 12, CS 12, CV (203) 15, YAs 1FG (216) 16, 1HD (202) 3, 1ZA (215) 16, 2HWI (340) 15, ZC4s AK CB (151) 16, 4L0CR (165) 10, 4S7s PB (210) 18, YL (190) 16-18, 4X4s AE (240) 2, HJ 4, VG (250) 23, YM 23, 4Z4AI 22, 7Z3AB (280) 18, 9K2s BV CF (203) 17, 9M2s AV (207) 14, BD (201) 16, BI 15, DQ (242) 15, DW (208) 10, DY (209) 15, FR GV (264) 14, KL (236) 15, KR (203) 14, RH (210) 16, RI (244) 15, VI 14, 9N1MM (210) 1, 9V1s AR 15, HD (205) 15, JG LG (202) 10, NQ (202) 11, NR (206) 13, OE (250) 17, OF (223) 13, OH (201) 14, OI (241) 12, OX (244) 16, PA PC (216) 17, PD (240) 16 and PP (217) 15.

AFRICA — A2CAQ (180), CN8s BB (128) 7, HD (332) 21, HL (211) 16, MJ (160) 9, CRs 4AB (206) 2, 4BR 6GA (233) 7, 6IV 23, 7BC (202) 6-15, 7CD (202) 5, 7CH (243) 14, 7CO (203) 5, 7DB 7DS 7IC 7PC (217) 14, CT3AO (240) 5, EAs 8DE (242) 7, 8FE (210) 5, 8FF (244) 8, 8FM 9AA (119) 16-17, 9ER (242) 0, EL2s AC (225) 2, AF BA (203) 8, BI (207) 1, BV, ET3s REL (238) 14, USA (300) 7, ZU, FB8s XX (213) 11, ZZ (119) 5-12, FH8CD (255) 11-12, FL8s DG (174) 15, MB (175) 5, FR7s ZG (206) 3, ZD (198) 11, ZL (223) 12, SU1IM (200) 3, TL8GL (225) 21, TT8AF, TU2s AZ (180) 7, BA 23, VQ8s AC CA CU CV (205) 14, ZDs 3K (203) 23, 5B (170) 17, 5X (205) 15, 9BM (185) 9, ZEs 1BP 1CB (201) 5, 1CU 1CW (215) 13, 1CY (202) 15, 1DB (204) 14, 1DO (227) 13-14, 3JC (208) 5, 5IU (204) 15, ZSs 1HL 1J 1JD 1PG 1TZ 1X 1YR 2AA 2BJ 3JJ (225) 7, 3LU 6, 4AJ 5BS 5PG 5RE 6ALO 6BDZ 6DP 6GH 6TW, 3V8s AA (116) 7, BZ NC (208) 3, MOL (140) 21, 5As 1TK (218) 14, 1TL (295) 5, 1TM (206) 3-4, 1TN (250) 23, 2TR (332) 19, 3TL (267) 17, 5TH (274) 4, 5H3s LV (220) 13, MB (188) 18, 5R8s AK (218) 15, AS (220) 4, 5Z4LW, 6O1KM, 6W8s AU (215) 8, DQ (210) 22, DY (180) 18, 7P8AB (215) 13, 7X2s FO MD (225) 20, 9G1s GB DY 7, GL (332) 21, 9J2s BQ (197) 16, BR (210) 18-19, JN (203) 5, 9Q5s DG (221) 5, LF (190) 0, 9U5RH (224) 3, 9X5s AA (208) 19-20 and SP (260) 21.

OCEANIA — C21JW (268) 9, CR8AI (244) 14, DUs 1AN 1AW 15, 1DBT (106) 15-17, 1MBN 1ZAE 1ZAF (265) 15, 1ZAG 2SAT 3SL 9FB (192) 14, 9FJ, DX0s BEN MR, FK8s AC 6, BC 20, BK (105) 7, FO8s AA (205) 3, BH (255) 7, BS BV 4, BW (175) 6-7, BX (206) 11, BY (150) 6, CS (100) 7, KC6s AT BW BY CI CT JC (254) 6, RT (267) 8, KG6s AKR (275) 12, AQI AQY SM, KH6s ABQ (205) 7, AH (205) 7-8, BZF 5, CKL EDY (256) 12-13, GKV (250) 7, SP (236) 7, KJ6s BZ CF (275) 8, KM6s BI (243) 9, BQ (267) 9, DQ (340) 3, KS6s BX CG (212) 8, CQ (242), CV, KW6s AA GJ (270) 8, GL, KX6s BS 10, BU DB (298) 12, DC DQ 19, FJ FR (255) 12, HE HG (300) 13, HJ HU NB VF (230) 13, VKs 1GD (245) 14, 1GU 12, 1RY (215) 18, 2ADJ 2APK 2BFI 2FU 2SA 2SF 2VA 2XT 3AD 3AJT 3AKP 3BAI 3BG 3GC 3HW 3JA 3MO 3MU 3TG 3XI 4EF 4EJ 4FA 4FC 4GZ 4IX 4MW 4OP 4UC 5FM 5GN 5LO 5MD 5NJ 5WA 5WO 6CB 6CT 6IZ 6LU 6NS 6OC 6OV 6RU 6US 6VY 7KB 7KJ 7RM YRX 8BB 8CM 9AM (245) 11-12, 9BB (270) 11-13, 9BM (230) 13, 9BS 9DJ 9JA 9KA 9KS 9KY (268) 8, 9LB (232) 16, 9MK 9TB 9UC 9WD (202) 12-13, 9XI (226) 16, 0KB (110) 7, VRs 1L (230) 9-11, 1O 1Q (212) 6, 2CC (270) 8, 2DI 2DK (175) 0, 2EK (254) 9, 2EQ (235) 5, 2FT 2FV (252) 11, 3C (265) 7, 4EL 4EZ 6TC (222) 5, VS5s PH TJ 14, W3AWU/YB6 15, YBs 1BA 1BM (165) 18, 2AJ 6IAB/0 (194) 12-13, 0AB (231) 14, 0AAB (210) 19-20, 0AF 0BM (216) 16, YJ8RG (270) 8, ZLs 1HJ 1RD 1UA 1NX 2ANR 2APZ 2NY 3AAA 3ABJ/c (270) 8, 3MN 3OH 3LE 4BX 4CU, 5W1s AD 5-6, AR and AS.

YO3RF, a DX hound for thirty years, enjoys collecting world-wide friends with 400 watts, an S-20R, crystal converter and ground-plane in Bucharest.

EUROPE — CTs 1MK 2AK (210) 16, 2AP (203) 1-2, 2AR 20, 2AS, EAs 1IO 2AW 20, 3JV 4DX (205) 18, 4LH 6AR (207) 7, 6BN (167) 8, Fs 2WS/FC (140) 18, 9RY/FC (240) 21, 9UC/FC (201) 21, GC8HT 22, GDs 3KDB (270) 6-7, 3LNS 6, 6IA (152) 8, GIs 3JM (222) 7, 4AZ 7, GM8HP (214) 6, GWs 3NWV 20, 3OYJ 4NZ (208) 20, HAs 3MB (175) 1, 5AM (220) 0-2, 5CA 5CQ (328) 23, 5KDQ 7LF (218) 4, HB0LL (242) 7, HV3SJ (190) 6-7, ISIs CS (252) 7, GF (272) 7, JWs 1CI (210) 12, 2QK (205) 2, 3XK (110) 12, 9DL (228) 6-7, JXs 4YM 5, 8IL (240) 10, LAs 1K (212) 6, 1SL 6OJ 8SJ 9OI 0AD 5, LG5LG, LX1BW (227) 5, LZ2KKZ (210) 1-3, M1D (105) 7, OE4WBW (215) 4, OH0s AA (130) 12, NI (211) 5, OK1s ADM AGQ APB (210) 17, 1NH 1NR (207) 2, OYs 2A (314) 7, 2BS 18, 9LV (227) 0, PIIGHK (206) 14, SK6AB 20, SM2s AGR CXX, SPs 1BTF 3PL 4AJ 5CJT 5CK 5WW 8AJK 9ANH 9BLF, SVs 1AD (261) 19, 1AN 1BV 23, 1BY (224) 3, 0WDD 0WMM 5, 0WN 4, TA1s MGP (208) 6, KT (210) 19, NC (276) 7, RF (205) 1, TFs 2WLS (332), 3BV (220) 2, UAs 1DZ 1KBW 2KAW (214) 21, 2KCC (205) 5, 3DR 3CT 3HH 3SM 3YK 4IF 4IS 6KOD 6LC 6XG, UB5s EO KDH KSP (235) 13, OD (225) 5-6, WE WF WJ 22, UC2BF (240) 5, UN1s KAI KAM (215) 11, UO5s BZ 3, RO (200) 20, UP2s CP (199) 20, KAB 0, KDH, UQ2s AN (205) 6, KFG (212) 5-6, KEM (203) 5, UR2s AO AR (217) 6, DL LH (210) 20, UT5s AB AM (204) 3-4, KKM (203) 5, KTH (204) 5, LE, UV3s BJ FD 3, UW3s BV 5, FD OC VT, YO2s BB (203) 4, BC (215) 3-5, BN (203) 4, YUs 2HCD (202), 2KZ 2REC 23, 3DQ 5, 3EY (209) 0, ZB2AY (210) 1, 3As 2CP (295) 9, 0CV (220) 12, 0I1 (200) 4, 4U1ITU (154) 7, 9HIs BL and M (221) 5.

SOUTH AMERICA — CEs 1AD 1LB 2HG 2PN 3ABQ (266) 10, 3ADX 3FI (190) 23, 0AC (129) 6, 0AD (170) 10, 0AE (266) 10, CPs 1GT 1HF 2IG 3BD 3BM 5, 5AY, CX7BF, FY7YM (193) 1, HCs 1NM 2JP 8FN (208) 2, HKs 1XAK (243) 4, 3AB 3AWV (195) 23, 3BAS 4, 3BED (216) 8, 3DIJ (203) 12, 3WO 4, 5BQW 7BAL 5, 0BKX (265) 8, 0BKZ (237) 6-7, KCAs AAD USB (320) 0, USN (322) 10, USV (283) 9, LUs 4ABO 6BBH (162) 23, OAs 2HC 2J (135) 5, 4BU (150) 6, 4HJ 4RH 4W (151) 6, 4WR 4ZD 6BU 4, 8BA 8CV (287) 22, PYs 1HX 1PA 2DFR 2FE 2PA 2PE 6CO 0RE (146) 21, PZIs BK BW CE 21, CF DF (160) 0, VP8s FL JG (200) 2, JT (180) 21, KD (247), KF (178) 21, KO (160) 20, KV (178) 21, YVs 1KZ 1WX 1YC 4YC 5AKT 5BCZ 5CKR 5CV 5CZO 5GL/7 7AV 2, ZPs 3AL 5BJ (180) 0-1, 5JB, 4M7AV (219) 9, 8R1U (240) 10-11, 9Y4s AA (214) 5, LO 4, PS 4, VB (175) 21-22, VT (210) 9 and VV.

HEREABOUTS — COs 1OV 5, 2DC (185) 7, 2FA (206) 1, FG7s XL (332) 21, XT, 8P6CT (197) 22, HH9DL (205) 4, HI8s LA 11, XAM 2, XEK (138) 22, XEW XPA, HPIs LV (126) 7, RC XGH (240) 6-7, HRs 1DB 1KAS (200) 7, 1WSG 1WST 1WTA 1XAP/YN 9AA, KG4s AA 5, AL (140) 6, DO (270) 9, DS (208) 3-4, KL7s BIA BJW 4, FAZ FHH 8, MF, KP4s AST DAZ DCF YD, KV4s EY FZ, KZ5s JQ KD NC NF RF WH (135) 5, OXs 3BL 5AK (170) 1, 5AP (272) 8, 5BA (209) 7, 5BK 5BL (210) 14, PJs 1AA (120) 23, 2CB 5, 2CC 4, 2CH (205) 22, 3AC (165) 22, 7JC 9HH (204) 1, 9VR, TGs 8IA 9FS 9RN 9RV (215) 4-5, 9UZ 0-1, TTs 2AD (190) 5-6, 2CAP (239) 13, 2ES 2JO 2LE 5, 5KN, VEs 7AZT/KL7 (220) 7 on Fletcher's chilly pad, 8AH 8MA (233) 2, 8MD (272) 3, 8ML (233) 2, 8RCS (265) 9, 0NU, VPs 1BW 5-6, 1RC (170) 20, 2AZ (250) 7, 2GAI (195) 22, 2GAL (198) 1-2, 2GBL 2GSM (251) 5, 2GZ (185) 1, 2KC (226) 6, 2KM 2LA 3, 2LS 2MA 2SAB (203) 20, 2SY (205) 2, 2VI (213) 15, 2VY 5AA (210) 23, 5TH (170) 23, 7AI 7NA (210) 20, 7NS (190) 7, 9BK (130) 22, 9BY (225) 19, 9CP 19, 9DB 19, 9DI 19, 9FJ (206) 6, 9FO 20, 9GD (210) 16, 9K 9L 2-12, 9WB (225) 23, XEs 1CCB 1J 8, 1KB 5-7, 1MM 5, 1TK 2IX 7, 2JB 5, 2PS 3AF, XP1AA (204) 1, YNs 1ADM (105) 7, 1GLB (265) 13, 1RST 2JS (245) 7, 2RAC 3KM 9JUL, YS1SRD, ZF1s CW (207) 5-6, DT, 6Y5s AH GB SR, 8P6s AZ (140) 22 and CC (141) 22.

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Twenty's telegraphers get the spotlight next month with the aid of Ws 1ARR 1FK 1TAT 3HNK 3JZJ/5 3KNG 4YOK 5JPC 6BAB 6EAY 7BE 7EKB 8BQV 8IBX/2 8YGR 9BF 9GX 9LNQ, Ks 1LWI 1UHY 4TWJ 5MHG/6 6GAK 6TWT 8DHT 8PYD 8TRF 9SRR/2, WAs 1FHU 1JKZ 1KEX 2BHJ 2FOS 2YWR 3GYT 5PPZ 6JVD 9SQY 9ZCP, WBs 2DZZ 4GTI 6VVS 9BUV, VEs 3GHO 3GLG 7BST, 1IER and others to file. Then we'll get back to (15 c.w.) Ws 1ARR 1DTY 3HNK 3JZJ/5 4LQC 4YOK 5BZK 7BE 7EKB 8BQV 8YGR 9BF, Ks 5MHG/6 8DHT, WAs 1FHU 1JKZ 2FOS 3GYT 3KSQ 9SQY, WBs 2DZZ 4LAL 9BUV, WNs 2DRS 2HPB 2JAM 4JYB 5YMV 8DSF 0WOW, 1IER; (15 phone) Ws 1ARR 1VRK 2DY 3HNK 4YOK 6YRA 8YGR 9BF 9LNQ, WAs 1FHU 1JHQ 1JKZ 2FOS 6EQW 9SQY, K4TWJ, WB2s BHJ DZZ; (40 c.w.) Ws 7BE 8YGR, Ks 2JWZ 8DHT, WAs 1FHU 1JKZ 2BHJ 3GYT, WBs 4LAL 6VVS, VE3GHO; (40 phone) Ws 3HNK 8YGR; (80 c.w.) W1SWX, K8DHT, WA1s FHU FNJ; (75 phone) WA5IIS; (10 c.w.) Ws 1DTY 3JZJ/5, Ks 5MHG/6 8DHT, WB4EPJ; (10 phone) W3HNK, WA6EQW and WB2DZZ. In case you didn't

notice, 28 MHz. opened a bit earlier than usual. Let's hope it doesn't close much earlier than usual. The same goes for old **160**, about which venerable band W3DPJ has this to say: "At sunrise on August 31st I worked my first 1.8-MHz. VKs, 3ACA 3APN and 5KO. Next morning I QSOd **KL7**IR for my last state and 30th country on 160." Tom and K8DHT also caught up with **VP9**GJ (G3PQA). W1BB reports W8s GDQ and ANO working **VK**s 3GU and 5KO respectively during the same period, and hears of KH6IJ top-band activity. Fire away!

Where:

ASIA — W2CTN's pasteboard processing plant continues in high gear. Jack recently added OD5BA to his list. "Logs are on hand from January 25, 1969." By the way, when patronizing QSL managers, for direct reply include self-addressed stamped envelopes, or self-addressed envelopes with International Reply Coupons when appropriate. This is only fair when seeking postal response from anyone. And do you W/K/VE/VOs have ample s.a.s.e. on file at your local ARRL QSL Bureau branch? ._._._ West Coast *DX Bulletin* learns that AP2AD goes for International Reply Coupons and mint postage but asks that enveloped currency be eschewed. High intercept loss ._._._ "I operated HL9KH in November and December of '68" testifies K2QOK. Ed welcomes QSL inquiries at his Jersey address ._._._ Turkish national TA2AE decides, "I'd like to have a QSL manager." Ali can be reached % TRAC, P.O. Box 699, Karakoy, Istanbul ._._._ WB2DZZ hears that AP5HQ now prefers all QSLs direct ._._._ Catch a JR yet? That prefix lately joined JA and JH to represent Japan.

AFRICA — "As of early September QSLs for all ZD8CS contacts have been sent through bureaus around the world via first-class mail," advises Keith, now VP5CS. "Irregular QSL size and the necessity of clearing the backlog as soon as possible made bureau handling a must. If your bureau branch fails to yield the desired ZD8CS card within a reasonable time, write me at RCA MTP. Grand Turk Comm., Patrick AFB, Fla., 32925." ._._._ YL W9VNG pens, "I'll continue to handle ZD8RK QSLs for QSOs on or before September 6, 1969, Bob's QRT date. Those who send cards without self-addressed stamped envelopes can expect replies via bureau." Dori credits the s.w.l. gang with more QSLing savvy than a good many ham applicants. She'll also take care of ex-ZD8RK's confirmations when Bob fires up from his next post, possibly in the Seychelles vicinity ._._._ "Too many fellows still send QSLs directly to us," laments ET3USA's W4EJP. VE3IG has the job ._._._ "Haven't received log shipments from 9U5DS since April 20, 1969," regrets W2LGU. "As soon as I hear from him I'll be able to answer some 300 requests for QSLs." ._._._ According to K8UDJ, FL8HM intended to zip about 900 cards Statesward in September, a bureau operation. Carl adds, "QSLs for 5Z4LW will be sent direct upon receipt of cards with s.a.s.e., otherwise eventually via bureaus." IRCs are expected from non-W/Ks, of course.

OCEANIA — W6NTQ, guest op at FO8AA over August 26–27, 1969, can confirm about 350 QSOs on those dates. "The pile-ups were fantastic," Bob tells W1CW ._._._ Geoff Watts's *D X News-Sheet* reminds us that YBØ stands for Djakarta, YB1 west Java, YB2 central Java, YB3 east Java, YB4 south Sumatra, YB5 central Sumatra, YB6 north Sumatra, YB7 Kalimantan, YB8 Celebes, and YB9 other points east of Java ._._._ West Coast *D X Bulletin* hears that ZLs may become ZMs during Captain Cook Bicentennial festivities this year and next, also that VK9 suffixes may become more geographically indicative, VK9A through VK9M going for Papua and T.N.G. stations, VK9N Norfolk isle, VK9X Christmas, and VK9Y Cocos-Keeling ._._._ New KM6BI operator Bob finds about a thousand unanswered QSLs cluttering up the place. Hope he finds logs to match! And then some spare time as well.

HEREABOUTS — After concluding negotiations with the printer VP5CS (K1BTD) expects to keep his Grand Turk QSLing current. "Hope to avoid another ZD8CS-like backlog," vows Keith ._._._ HH9DL tells W1CW of ARRL's DXCC Desk that so many cards poured in for unauthentic c.w. contacts he's unable to return them individually ._._._ "Since the first of this year I've been handling my own QSLs," says VP7BG (K4KZE) to K6KA. Bud formerly signed ZD8BC and VQ9BC. His current QTH appears in the list to follow ._._._ W9BF finds ex-KS4CA of 1966 signing WA4HIE on 20 c.w. "Phil sent us his last available QSL for that operation." Eh? ._._._ VP2VY's February splurge has been thoroughly QSLd by manager W3HNK who also intends to handle confirmations for additional future Caribbean stops by KV4EY ._._._ WA9VIH can confirm OK1FBV QSOs on or after July 1, 1969 ._._._ For unusually prompt QSL comebacks A2CAU, AP2AD, CEØAE, GM3CFS, K4IA/KC4, OHØAM, UAØYT, VQ9/A, ZD8Z, ZF1AA, 3V8NC and 7Q7WW, plus QSL aides Ws 2CTN 4ECI 6CUF, WAs 3HUP 4WIP, G3TXF and DL7FT, are enthusiastically commended as "QSLers of the Month" in

UA3KWK operator Sereva, a DX veteran at the age of six, gets around well on 20 c.w. (Photo/QSL via W1TS)

correspondence from Ws 1DTY 1SWX 4ZSH, K8DHT, WA9SQY and WB2DZZ. Worthies out your way? ._._._ *Halp!* These italicized colleagues hunt hints on budging QSLs from holdouts mentioned: *W1DMD*, EA8FF '66, EL2NE '67, EQ4CY '64, JT1s KAC KAG, 6W8AJ '64; *K5MWH*, KC6BK, PX1IK both '63; *WAØLGS*, CP1EO, JA2GDF '67, KZ5NG '67, VR6TC, ZP5ML, ZS3T and 6Y5BR ._._._ W1DMD and WAØLGS volunteer QSL managerial assistance to needful DX ops ._._._ Now a few individual recommendations via the "How's" grapevine but keep in mind that each item is necessarily neither complete, accurate nor "official". . . .

EL8RL, Box 69, Monrovia, Liberia
FK8BN, Box 352, Noumea, New Caledonia
HS3JB, Box 5917, APO, San Francisco, Calif., 96288
JWs 3KJ 7UH (via NRRL)
KA2BSA (to KA2UR via FEARL)
KX6VF, Box 444, APO, San Francisco, Calif., 96555
MP4TCQ, J. Hammond, Radio Trp., 222nd Sig. Sqdn., BFPO 64
OD5BA (via W2CTN; see text)
OK1FBV (via WA9VIH; see text)
PJ1AA, Box 879, Curacao, N.A.
ST2SA, Box 125, Madani, Sudan
SV1CH (W/K/VE/VOs via WA3KSQ)
VP2VI, P.O. Box 75, Tortola, Br. V.I.
VP7BG, C. Clabough, % RCA, Grand Bahamas, Patrick AFB, Fla., 32925
VQ8CR, R. Mills, Admiralty Office, Vacoas, Mauritius
VU2KV, K. Venkataraman, Box 182, Calcutta 1, India
WA4MMO/KC6 (to WA4MMO)
YB1BC, R. Soeprapto, P.O. Box 288, Bandung, Indonesia
YUs 2NRJ ØM (via SRJ)
ZL2AAT/k (via ZL2AFZ)
ZS3JJ, J. Slabbert, Box 5639, Windhoek, S.W. Afr.
4JØFR, via CRC, Box 88N, Moscow, U.S.S.R.
4LØCR, via CRC, Box 88N, Moscow, U.S.S.R.
6O1KM, P.O. Box 948, Mogadiscio, Somalia
ex-7P8AR, U. Dehning, 35 Bellevue St., Kloof Nek, Cape Town, S. Afr.
9VØs OE PA NR (to 9V1s OE PA NR)

ex-**CO2ZQ** (to WA4ZZG)
FØHC/FC (to DL1DA)
FØPJ/FC (to DK3LR)
FØRS/FC (via DL3LL)
FØUS (to W1PRI)
FO8AA (see text)
GB3ZET (via GM3XPQ)
GC5AET (to DJ1QP)
GC5AOK (to F6AGN)
HB9XWH (to W1PRI)
HBØXVN (to WA9LUD)
HBØXVO (to DL4CE)
HBØXVQ (to DJ4WG)
HBØXXA (to WB6SCM)
HI8DAF (via K3EST)
HK7UL (via WA9ZAK)
HL9KH (see text)
HS1CB (via DL7FT)
JD1AAH (via JA1BIR)
JD1YAB (via JARL)
JW8MI to (LA8FI)
ex-**KX6ER** (to W2GMP)
MP4TDB (via ON5MG)
OK5TOL (via OK1WC)
TF2WLQ (to WA2WIB)
TF2WLR (to K7NTW)
ex-**TN8AA** (to TR8DG)
VR1O (to G3NRA)
VR1Q (via WA3ATP)
VS6BC (via GM3JDR)
WF6NNW (to WA6AHF)
YBØAAF (to DL1SU)
ZD3D (via WA9UVE)
ex-**ZD8CS** (see text)
ZD8DB (to WØEZT)
ex-**ZD8RK** (see text)
3V8MOL (via W2GHK)
4W1BG (via F5XN)
5LØZ/mm (via DJ4SO)
9U5DS (see text)

These specs come courtesy **Ws** 1AM 1AX 1CW 1DTY 1ICP 1SWX 2CTN 3JZJ/5 3MPX 4ZSH 5BZK 9BF ØGNX, **Ks** 6KA 8DHT 8UDJ, **WAs** 1FHU 1FNJ 1JHQ 1KQM 3JBN 3KSQ 4MMO 9SQY. **WBs** 2 DZZ 4EPJ Columbus Amateur Radio Association *CARAscope*

(W8ZCQ), DARC's *DX-MB* (DL3RK), *DX News-Sheet* (G. Watts, 62 Bellmore Rd., Norwich, Nor. 72 T., England), Far East Auxiliary Radio League (M) *News* (KA2LL), Florida DX Club *DX Report* (W4BRB), International Short Wave League *Monitor* (A. Miller, 62 Warward Ln., Selly Oak, Birmingham 20, England), Long Island DX Association *DX Bulletin* (W2GKZ), Newark News Radio Club *Bulletin* (see note), North Eastern DX Association *DX Bulletin* (K1IMP), Northern California DX Club *DXer* (Box 608, Menlo Park, Calif., 94025), Southern California DX Club *Bulletin* (WA6GLD), UBA's *On the Air* (ONs 4AD 5VA), Utah DX Association *Bulletin* (K7DEQ), VERON's *DXpress* (PAßs FX LOU TO VDV WWP) and West Coast *DX Bulletin* (WA6AUD) . . . . . The Newark News Radio Club *Bulletin* amateur section now is edited by Jerry Heien, 3822 Marshall Ct., Bellwood, Ill., 60104. Former editor LeRoy Waite, still one of NNRC's *mainstays*, continues to handle the ARRL SWL Bureau at 39 Hannum St., Ballston Spa, N. Y., 12020, where he deals with the heavy spill-over of s.w.l.-addressed QSLs that appear in the Bureau's many channels. Is short-wave amateur-band listening booming? You'd better believe it — s.w.l. ranks still produce the highest grade of serious, responsible and dedicated ham.

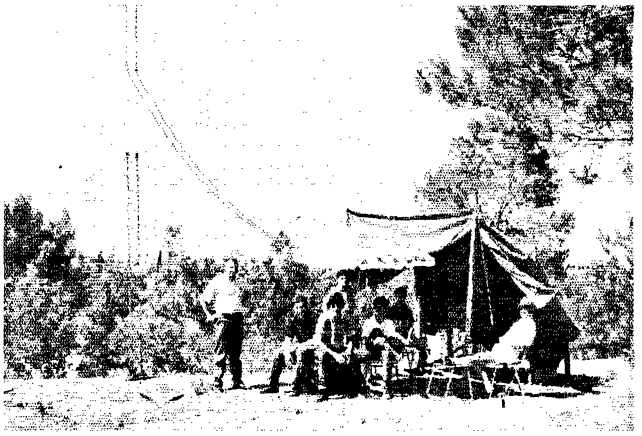
Whence:

ASIA — "I find a great deal of radio zeal among young Cypriot fellows," writes K5LMG from Nicosia. "Spent time with the boys on code and theory as well as operating procedures. The headmaster of the English School here has gained the grant of a 48-hour station permit every three months, call 5B4ES. The lads say, 'We're going to contact all the Yanks we can with this license.' Meanwhile other Cypriots, whose 5B4 tickets were pulled five years ago, are still off the air, along with the few American hams in Cyprus. It's a beginning, though, and real progress appears possible." . . . . . K1LWI relays, "UM8FM wants QSOs with Ark., Nev., Utah and Wyo. to complete WAS. He's had five thousand U.S.A. contacts and is QRV for more, 14,045-14,055 kHz. at 0000-0130 GMT." UM8FM also fires up on 20 non-s.s.b. of occasion . . . . . "I'll be very active with my homemade 150-watt c.w./a.m. transmitter and NC-200 receiver," promises TA2AE, "on 14, 21 and 28 MHz." Alli's in the Asian part of Istanbul . . . . . "Groundplane fans UL7CA and 4Z4NBS, running just 40 and 10 watts on 20 and 15 meters respectively, put fat c.w. signals into Biloxi," applauds W3JZJ/5 . . . . . "The All-Asia contest would have been a washout here on 40 c.w. but for JA3SVG and OD5LX," remarks K8DHT . . . . . KR6NL confides, "I'm looking for 40-meter contacts and will soon be on 6 as well. I'll be on Okinawa at least another year and am willing to sked. Flying duty takes me away frequently so I find it best to plan a given schedule for three consecutive week ends. My 7-MHz. rig runs 400 watts to a vertical." . . . . . Noted in aforementioned club publications: HS1CB, 21,385 kHz. around 1700 GMT, is the only Thailander available for W/K QSOs at this writing (monitor W1AW!). . . . OD5BZ hasn't given up his MP4QBR Qatar intentions but red tape is discouraging. . . . JA3UI supplants JA1DM as Japan DX Radio Club publications editor. . . . New or renewed Far East Auxiliary Radio League memberships go to KA2s CR (WB8DPL), LM (W9GMN), OO (K6YZA), QW (WA4-AQW), UR (K3FUR), WT (WA5TKP) and W3TQ. FEARL now is led by pres. KA2FL, veep KA2SF, sec. KA2UR, treas. W6VOM, gen. mgr. KA2EB, awards mgr. KA2KS and *News* ed. KA2LL. KA2UR also is custodian of KA2BSA, recently inaugurated Boy Scout affiliate.

AFRICA — K3CRC and W4NQV chorus SU1IM's offer of 5B-DXCC contacts on 3.5 through 28 MHz. Another multiband prospect is CR7BC who likes sideband, c.w. or a.m. with 150 watts and various skyhooks on 40 through 10 meters . . . . . ZS1JH runs homebrew a.m. on 10 in summer, 15 in winter, and occasionally fires up from ZD5, ZE, 7P8 and other areas . . . . . "A2CAU prefers rag chews and does not take to break-breaking," hints W4ZSH . . . . . ET3USA's W4EJP reports. "We now have a 7-MHz. three-element beam, and the W/Ks come through pretty well around 0230 GMT. We hope to be active on 40 as much as possible around that time. Our new 3.5-MHz. antenna is tied to the top of a 100-ft. water tower, so watch for us on 75 and 80, too." WØPAN has it that no new Ethiopian ham licenses are being issued while authorities there ponder aspects of the whole radio matter . . . . . Tidbits via the press of clubs and groups: XT2AA vows an early Mali venture if his TZ connections click. . . . CT1FL may give CR3KD local Portuguese Guinea QRM as CR3FL in January. . . . ZS5PG captured Utah DX Association Award No. 1 by QSOing W7s LEB LRV QWH, K7s BGU IOF ZIA, WA7s DTG GWU EVO and ICG.

OCEANIA — Wireless Institute of Australia will issue a Cook Bicentenary Award next year to DXers outside Australia who manage to work fifty Aussies in 1970 using their special AX label. S.a.e. with IRCs to Awards Mgr., WIA, P.O. Box 67, E. Melbourne, Vic., Australia, 3002, should net you full particulars. Not to be outdone by their brother society down under, New Zealand's NZART will offer their own version of the CBA based on QSOs with fifty N. Z. stations using the special ZM prefix, contacts to include at least one per call area, ZM1 through ZM4. Check with NZART awards manager ZL2GX for full scoop. Qualifying QSOs for this one may date on or between October 1, 1969, and December 31, 1970 . . . . . KX6BU haunts 3510 kHz. at 0800-0900 GMT on Tuesdays to help

DLØTD/LX, manned by DJ7KH, DK1s BN OS XS, DLs 4ER 8RH and 9WN, enjoyed a May DXcursion to the back yard of LX1SL. In view at right (l. to r.) are DK1XS, DL8RH and DJ7KH. More than a thousand QSOs with Luxembourg ensued, about half of these with W/K/VEs. (Photos via DL4ER)



5B4FD/p was top overseas scorer and a popular DX target during Radio Society of Great Britain's 1969 National Field Day. The effort resulted from ZC4PW's and K5LMG's work with Cypriot lads studying English and radio in Nicosia. Their ticket was temporary but Pat and Coy (far right and far left in the picture) hope to help gain authorization for increased 5B4 activity. Meanwhile several ZC4 stations represent Cyprus from military installations. (Photo via K5LMG)

5B-DXCC boys along ._._._ VK5DS tells W3JZJ/5 he's been getting a couple of good hours daily into the States on 28 MHz. ._._._ WA4MMO/KC6 knocked off from the Western Carolines for North Carolina in September after a lively DX spree ._._._ "CR8AI says there are three new hams in Dili," cheers WB4HJN, "but they have insufficient funds for rigs." DXers interested in rectifying this situation can join forces with WB4HJN. CR8AI has almost two years more to go but CR8AH leaves Timor come February ._._._ KH6s NR and SP may be whooping it up on Kure isle this month, sideband and c.w. on 15 and 20 meters.

EUROPE — YU4CA, whose first three months on s.s.b. brought home 196 countries, cruises 80 meters with 200 watts nowadays hunting 5B-DXCC customers ._._._ WB8ABN (FØMH-ZF1CW) commends the ham hospitality offered by F2TR, s.w.l. REF-19064, 3A2CN and others during his summer continental caper. Rick observed massive mountains blocking off the Stateside short path in Monaco where ham skywires abound ._._._ K3CUI points out that two (four for top class) QSOs with Presov, Czechoslovakia, stations between April 1 and November 30, 1969, will qualify you for 50-SRR, a commemorative certification fostered by club station OK3KPN. If you opt for the special version include one OK5-prefixed Presov type. OK3OM can supply more complete data ._._._ Geneva's International Amateur Radio Club offers WCPR-50 and WACPR diplomas, the former for confirming QSOs with stations in fifty or more "CPR" zones, the latter for catching all ninety. S.a.s.e. to W2JXH may dig the details ._._._ "OY9LV is active on 21 and 14 MHz.," notes W3HNK, "most regularly on 14,210-14,215 kHz. around zero GMT." ._._._ Yes, Virginia, there was a Bulgarian DX test on September 7th but we didn't get official word till much too late in August ._._._ Undaunted by tearful years of frustration, DL7FT and associates still tug strings for a springtime Albania breakthrough.

HEREABOUTS — "I'm signing VP5CS on c.w. at present within the lower 30 kHz. of 40, 20 and 15 meters roughly between 1000 and 2200 GMT," specifies K1BTD from Grand Turk ._._._ National Newspaper Week saw DX action by WF6NNW thanks to WA6AHF. QTH? Hayward ._._._ W3HNK says TI2JCC, after honeymooning in Spain, will attend Philadelphia's Drexel Institute ._._._ Remember ubiquitous CO2ZQ of 1957-'61? Rafael is Advanced WA4ZZG now, one of about a dozen former Cuban hams recently licensed by FCC. No operating reciprocity with CM/CO-land, of course, so our amigos had to endure a long hamming hiatus ._._._ "'QRP — Quit Running Power' in your July '69 pages aroused much interest," acknowledges K4OCE, author of the piece. "Just sent out my last diagram of that 7-watt transistor rig. I now have more than a hundred countries confirmed with it." ._._._ Hurricane Camille, the nasty wench, left W3JZJ/5 with no a.c. for five days. "No telephone, either," says Ed. "KV4EU and the gang did a fine job in the 14,320-kHz. storm net." ._._._ "Looks like another great season for 28 MHz.," hopes W1DTY of *Ham Radio*. "Ten opened with a bang in late August." ._._._ C.w. forever? DX fan W9GX has been pounding his straight key for 55 years ._._._ "Those summer DX-peditions sure spice up the game," declares W9BF ._._._ Up, *up* and UP — K8UDJ is putting his 4-el. 14-MHz. spinner atop a new 100-foot stick ._._._ WA9SQY exults, "Finally broke five of my many jinxes — the KP4 bug, the KH6 problem, the JA syndrome, VK untouchability, and the scarcity of Maine and Idaho." Dave, a high school senior, practices French on the c.w. bands with his new Extra ticket ._._._ "The DX germ bit me after seven years of hamming," admits WAØLGS. "Though lacking elaborate high power I manage some fairly rare ones on 10 and 15." ._._._ K5MWH warns, "Been inactive for the past three or four years but we're cranking up the DX machine again." ._._._ XE1HS tells us that W8s AJW and DE took first and second place for our boys in LMRE's Mexico-'68 DX contest. EAs 3FG 8FM, JA1KSO, PZ1BW, TG8IA and VK7RX won continental honors. XEs 1WS 2JZ and 3EB led home front call areas. Gee, Canadians turned out in force. VE3s RE MG BWY EWY BAP CBG EQI BMB UR ZH, VEs 4AE and 7ANB finishing in that order. Other leaders per country: CE3OE, CO2FA, CN8AP, CP6GC, CRs 4BH 6LF 7IC, CT1LN, CX1CE, DL1MM, DM2CZL, DU1FH, EL2AL, FO8BS, HB9UD, HL9TS, HR1KAS, I1ACY, KP4CL, KR6NR, LA6VL, LU8DJF, LZ2KKZ, OD5FI, OE1ZRC, OH2BBR, OK3BU, OZ8KW, PJ2CA, SM5WT, SP9DH, TI7JH, TN8AA, UA3HO, UB5WF, UC2BF, UO5PK, VP7NA, VQ9JW, YS1SRP, YV5ATK, ZL1AJU and 6Y5AH ._._._ W1AX finds Fernando de Noronha's PY7AWD a handy 5B-DXCC candidate on 40 around 0030 GMT, 80 meters at 0200 or so ._._._ Concerning Morse pioneers Swan and Leaning, MTC's W2ITQ recalls, "Like many later-day operators I discovered quite by accident that I could read the sounder by ear. Later it was no problem to copy the radio code when I was licensed in 1935." ._._._ K6JGS, TI8WPE and HK cohorts point toward more imminent TI9-Cocos QSOs ._._._ Sleeper? VP2-GB's call may be signed from time to time by Boy Scouts on Anguilla ._._._ W6NJU, K6KA and W6ANN of Southern California DX Club need only a few more 3.5-MHz. countries toward Five-Band DX Century Club membership. WA6GLD, W6s JKR EJJ and WB6UDC are short only on 40 and 80. SCDXC leadership now includes W6s EJJ pres., DQX v.p., JKR sec., CS treas., AOA FRZ DGH directors, and WA6GLD *Bulletin* ed. ._._._ Northern California DX Club's 5B-DXCC race sees K6AN and W6DZZ with 10, 15 and 20 swept clean. K6AHV, W6s AM BYB JKJ and KG aren't far from bingo, either. Pres. WA6AUD, veep WA6UFW, sec.-treas. W6CDJ, directors K6CQF, W6s CUF ERS, and *DXer* ed. K6YGS lead NCDXC to battle. K6AO administers the club's popular California Award, and the membership committee features W6DZZ, WB6s GFJ and UJO. Club station W6TI, under trustee W6RGG, emits DX bulletins at 1800 GMT Sundays and/or 0200 GMT Mondays on 14,002 kHz. QST

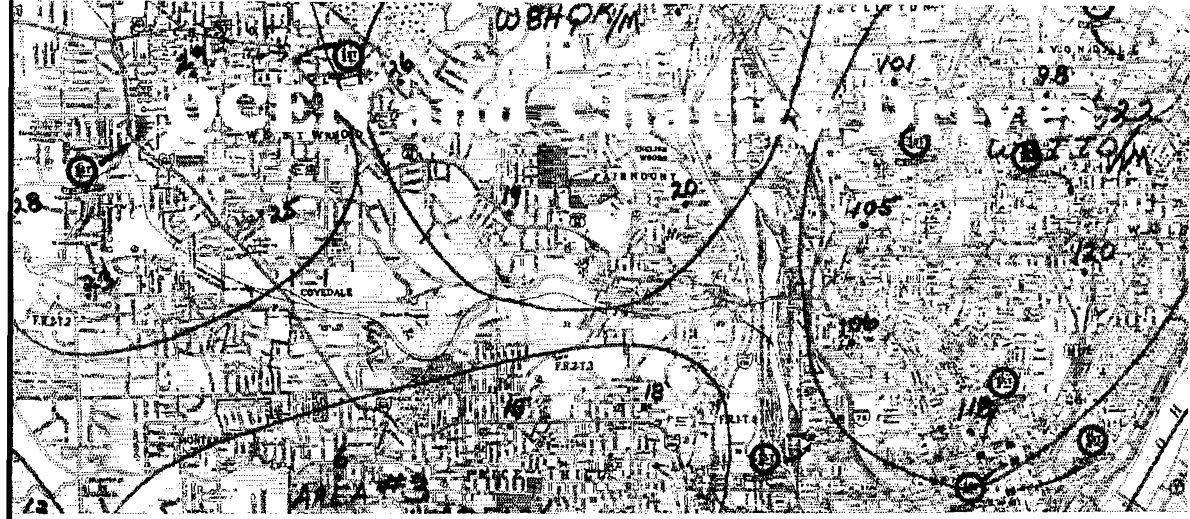
Strays

Feedback

June VHF QSO Party Results — W1EUJ should be listed as #4 in the Top Ten single-op multi-band grouping. The score of W2OW, Binghamton ARA, was inadvertently left out of the results. Should be 12,100-226-50-ABCD, WNY multi-op.

—•••—

35TH ARRL DX Test — The entry of FG7XL should be listed as multi-op.



BY JAMES E. WEAVER,* WA8COA/WA9FEW

"W8VND this is W8CHT mobile 8. We are at point 37. Will call when the pick-up is completed and we are on our way again. Over."

"W8CHT this is W8VND. Roger, Hank. Clear."

* * * * *

"W8VND from WA8DFD mobile 4. We can't find anyone at point 55. Shall we go on to the alternate point? Over."

"WA8DFD this is W8VND. Roger. Wait . . ."

"WA8DFD, headquarters advises that the point captain has just telephoned. She apparently left for her alternate location just before you got to point 55. Proceed to alternate. Over."

* * * * *

"W8VND this is W4PII mobile 4. Am at alternate for point 10. Captain appears to be here, but she will not open the door. We can see her at the window. She must be afraid to let us in. Over."

"W4PII from W8VND. Roger. I'll have the headquarters people telephone and tell her to let you in. Wait. . . ."

* * * * *

Operation of a clandestine organization? Not unless the Muscular Dystrophy Association of America and the American Cancer Society are secret societies. These transmissions are typical of the many calls made by members of the Queen City Emergency Net while assisting fund drives by these charitable groups.

According to Mr. Stanley L. Stock, recently-retired district director of the Cincinnati, Ohio, MD association, QCEN was the first amateur radio group to assist the annual Mothers March for Muscular Dystrophy. That was in 1962. The Net has participated in every March since then.

Stock reported the success of the Cincinnati ham radio experiment to national MDAA officials, and word of it spread throughout the country. Several local MD Marches in the U.S. now receive amateur assistance . . . all because of that first operation between QCEN and the Cincinnati MD Association.

Success of the MD-QCEN venture was noticed in Cincinnati, also. Several years ago the American Cancer Society requested and received Net help in its annual crusade. Assisting the Cancer Society has become an annual event.

Job of the amateurs in these fund-raising efforts is to pick up money from the several neighborhood collecting points, and to transport it to the bank. Volunteer workers take donations received through door-to-door soliciting to neighborhood captains at the collecting points before the amateurs arrive. There are more than 100 collecting points in the Greater Cincinnati area for the MD drive. The Cancer drive has nearly 75 points.

Security is the by-word. Every detail involved in making the pick-ups is thoroughly planned to ensure the safety of the mobile crews and their cargoes.

Basic operating plans are simple. A portable station is set up at MD or ACS headquarters in downtown Cincinnati. Through this station Net members at headquarters maintain continual contact with W8VND, the Net's outlying emergency communications center. W8VND operators

Several amateur radio clubs and emergency groups provide communications assistance for fund-raising drives for charity in their communities. This article describes how but one of these groups, the Queen City Emergency Net of Cincinnati, Ohio, assists the Muscular Dystrophy Association of America and the American Cancer Society.

* 11652 Hollingsworth Way, Cincinnati, Ohio 45240.

keep constant track of the location of each of the more than 20 mobiles from the time they leave their homes until they have deposited the collections in the bank. Coordination of the entire operation — relaying changes in instructions, answering questions, solving emergencies which arise — is through W8VND, as well.

Neighborhood collecting points are identified by code numbers, only, over the air. Using their actual addresses or the names of volunteer workers could be an invitation to rob mobile crews at the collecting points. Each mobile driver and rider team is given a list of collecting points they are to serve, their addresses and telephone numbers, and the names of the captains on duty at them. Addresses and telephone numbers for alternate points are included.

Driver-rider teams also receive official identification cards. At each collecting point the hams sign receipts for the money they will be given, and the point captains compare the signatures on the ID cards and on the receipts before the collections are released.

Radio transmissions are held to a minimum during the drives to ensure security still further. Several days before the pick-ups are made, drivers of mobiles and operators of base stations meet with the Net's charity drive chairman. Written, coded instructions, and coded maps of the areas to be covered by each mobile are handed out. The complete operating plan is discussed thoroughly, and questions are answered so that each amateur knows exactly what he should do. Through this briefing it is possible to restrict radio contacts to keeping track of the movements of the mobiles, and to changing the operating instructions as unforeseen emergencies arise.

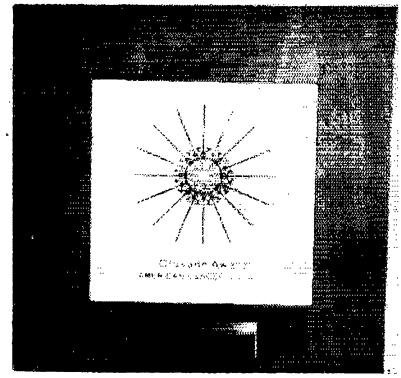
All instructions and maps are returned to the QCEN drive chairman as the mobiles return from their pick-up routes — another step to make the collections as secure as possible from year to year.

Benefits to the charity drives derived from QCEN support are two-fold. An additional supply of volunteer workers is made available, and the donations are quickly, efficiently and safely transported to the bank from locations scattered over a wide area.

In preparing for their assistance to the drives, Net chairmen become more experienced in the type of planning required to develop response plans for emergency preparedness. A lot of members must be called upon to do an important job . . . a job which requires efficient, dependable and responsible action.

With just a short time set aside for collecting the donations from neighborhood captains and getting them to the bank, the operation must be planned thoroughly. However, because unforeseen situations nearly always arise, the amateur in charge of the ham phase of the drives must be flexible, and must be prepared to react quickly to changing situations.

For QCEN, the MD Association and the Cancer Society solicitations provide valuable tools for checking the communications efficiency of its members. In these activities QCEN'ers follow



The American Cancer Society's Crusade Award was presented to the Queen City Emergency Net for its communications and collection assistance during the April 24 pick-up of the 1968 Crusade donations. Mr. Ed Momberg, program director for the Cincinnati-Hamilton County (Ohio) Unit of the Cancer Society made the presentation to Earl Nichols (W4PII), QCEN president, at the Net's October 18 meeting.

maps through the hilly, Ohio River valley terrain . . . at night . . . and thereby become acquainted with areas new to them — areas which one day may be the scenes of disasters in which QCEN will be working.

When added to its service as the emergency communications arm of the Cincinnati Area Red Cross and its affiliation with the Cincinnati Community Radio Watch[1], these annual charity drives are two more events through which the Net can assist the community. QST

[1] Weaver, "QCEN & Community Radio Watch," *QST*, September, 1968.

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That Planet Mars QSO Cup

BY FRED JOHNSON ELSER,* W6FB/W7OX

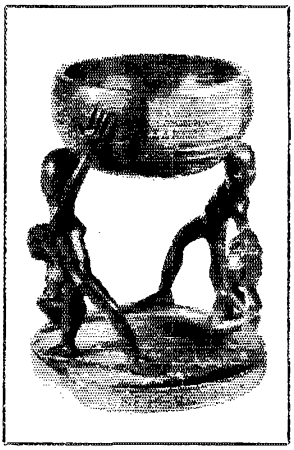
An intense wave of enthusiasm and accomplishment swept across the fraternity of amateur radio in the early 1920s. Refinement of the mighty spark, development of the regenerative vacuum-tube receiver, tube transmitters, phone, superhets came one right after another. Six-minute transcontinental relays, trans-Atlantic receiving tests, two-way work across the Atlantic, then the Pacific. 330 meters, 220 meters, 200 meters — 110, 40, 20. Record after record was set, smashed, and set again. Trophy after trophy was offered, sought after, won. It was an exciting age, almost impossible to explain to those who didn't live through it. In just five years, ham radio was completely changed, its ranks trebled, its equipment radically altered.

Toward the end of the decade, the inevitable reaction set in. For one thing, there were no new worlds to conquer, or so it seemed. For another, the generous, temporary allocations made to the U. S. amateur service by the Hoover Conferences (sample: a 20-meter band that ran from 14,000 to 16,000 kHz!) were shunted aside by the first worldwide frequency bands adopted at the 1927 International Radio Conference (sample: a 20-meter band running from 14,000 to 14,400 kHz and no 15-meter band as yet). The new bands at 5 and at ¾ meter did not present easy victories to DX hunters as 20 and 10 had done when first opened. You had to hang that funny W in front of your call for the first time. And new rules called for filtered dc power supplies and stable transmitters, which in turn required new receivers which would stay where they were put.

At this time I made my first visit to ARRL headquarters, occupying the entire top floor at 1711 Park Street in Hartford. There I met for the first time some amateur personages I had "worshipped afar off" — Ken Warner, W1EH; A. A. Hebert, W1ES; Ross Hull, Australian 3JU; a relative newcomer named Ed Handy, W1BDI whose new work, *The Radio Amateur's Handbook*, had just been published.

But most important, by rare good fortune I met Hiram Percy Maxim, W1AW, our founder and president. Mr. Maxim, in person, was just as impressive, magnetic and salty as the famous "Rotten Radio" articles he penned under the pseudonym "The Old Man." I learned of his other hobbies: automobiles, amateur movies, the cosmos — especially the planet Mars. He had, for instance, a globe of the red planet with all the markings yet discovered.

After this memorable visit, in 1928 I returned to my old home in Manila, where I'd been a pioneer ham and set a few modest early records on 200 and then on 40 meters from my stations 1ZA and K3AA. The Philippines were under U. S. jurisdiction then, and part of the ARRL field organization. Stanley M. Mathes, Lieutenant Commander USN, ex-7OE and then K1CY, was SCM in 1928–1929 — a ball of fire where amateur radio was concerned. Out of his visit to my shack high in the Igorot country came the inspiration to offer a unique trophy — knowing that the swift advance of radio technology would outdistance any ordinary goal, ours was to be for the first amateur two-way communication with Maxim's pet planet, Mars.



Elser-Mathes Cup

The award itself must be carefully chosen for it to serve as a beacon for achievement in the best Maxim tradition. Accordingly, Stan and I visited a store in Baguio where many examples of Igorot native woodcarving were on display. Our choice was a large carved bowl, about a foot high. On its base there were two seated figures; standing beside them were two more figures, supporting the bowl. The base symbolizes Earth and the seated figures its inhabitants. The bowl is Mars and the standing men are the amateurs who bridge the gap of space. A plate fastened to the bowl bears the legend: "First Amateur Radio Two-Way Communication Earth & Mars" and the spaces for names, calls and dates, not yet filled. Around the base another plate identifies the "Elser-Mathes Cup."

The trophy reached headquarters in 1929. It now has a prominent spot in the ARRL Museum, on view to a thousand visitors each year.

The moon has been broached by Man. With one more giant leap for mankind, perhaps the cup can be awarded — I hope it is in my lifetime. QST

* Colonel, USA, retired, Box 2573, Palm Springs, California 92262

Operating News

GEORGE HART, W1NJM,
Communications Manager

ELLEN WHITE, W1YYM,
Deputy Comms. Mgr.

DXCC: ROBERT L. WHITE, W1CW
Training Aids: GERALD PINARD

Administration: LILLIAN M. SALTER, W1ZJE
Public Service: WILLIAM O. REICHERT, WA9HHH

Sweepstakes Time. Yes, it's that time of year again, when hundreds of amateur stations crawl all over each other in search of those elusive contacts. Hope you're planning to get in on the fun — because that's what it is, a pile of fun.

How do we figure that out? Well, look at it this way. That new antenna of yours hasn't been really tested out. Does it have a screwy directional pattern? Will its radiation angle hit a good compromise between DX and local contacts? Will it load well all over the band? The performance in the SS will tell you these things. How about that new rig? Will it hold up under rigorous operating?

Did the talk at the last club meeting get you going? It should have, because the spirit of competition and rivalry is conducive to the most fun there is in operating. Can you beat out that guy who does all the bragging? How about racking up a sizable score anyway, so your club's aggregate can top that club in the next town? Intra-club competition can go a long way toward sharpening the competition between or among clubs.

As noted elsewhere, there are no changes in the rules this year except that for a trial, on recommendation of the Contest Advisory Committee, there will be no power multipliers this year. If you have a full gallon, use it, because you won't get any additional credit for sticking with low power.

During the FD there were blank spaces in the bands below 3525, 3825 and all the other "extra class" bands. It's easy enough to figure out why: only extra-classers operating stations of extra-class licensees (or trustees) could operate there, and the only contacts they could make (on the same frequency, anyway) were other extra-class licensees operating other extra-class stations. Made it pretty restrictive, so most avoided operating there altogether. The same situation will obtain in the SS, but it won't be quite so severe because in the SS most amateurs operate their own stations using their own calls. With all power multipliers off, the QRM up the band should be something else. Maybe the advanced and extra classers will take refuge in their restricted segments and as a result we will have more activity in these segments than we had during the FD. Would this be good or bad? Depends on your point of view.

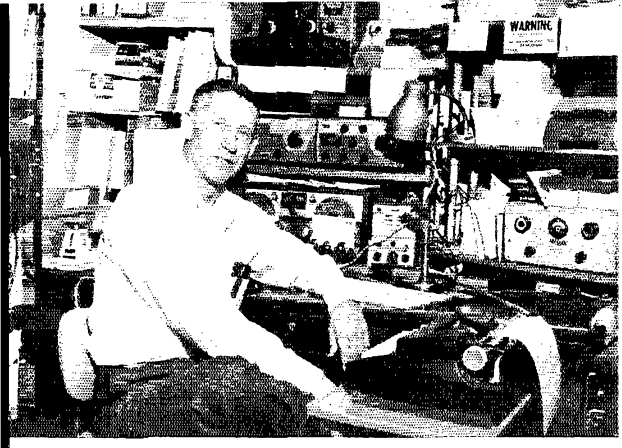
Watch out for nets and ragchews. Contests are unpopular with many amateurs because the contest QSOs are characterized by stations popping up here and there without warning and often without listening first. If you hear a net in operation, don't plop on it and call CQSS, you'll mess up the net and probably not get an answer anyway. Listen first on a frequency before you call CQSS on it.

Keep your bug or keyer under control. It's easy enough, in all the infectious excitement generated by this kind of operating, to get

OPERATING EVENTS (Dates in GMT)
ARRL-IARU-SCM-Affiliated Club-Operating Events

November	December	January
1-2 Massachusetts QSO Party (p. 122, Sept. 1968 *QST*), logs due Dec. 1, 1969	3 **Qualifying Run, W6OWP**	8 **Qualifying Run, W6OWP**
1-3 Delaware QSO Party, p. 119 Oct. Zero District QSO Party, p. 132 Oct.	6-7 Connecticut Towns 7-11 QSO Party, p. 118	10-11 VHF SS
5-6 YL/AP phone, p. 111 Oct.	6-8 Nevada QSO Party, p. 126	14 **Qualifying Run, W1AW**
6 **Qualifying Run, W6OWP**	10 **Morning Qualifying Run, W1AW**	17-18 Louisiana QSO Party
8 Frequency Measuring Test for ARRL Official Observers	16 **Qualifying Run, W1AW**	17-19 CD Party, cw*
8-9 SS phone, p. 60 Oct.		24-26 CD Party, phone *
15 **Qualifying Run, W1AW**		31-Feb. 1 Simulated Emergency Test
15-16 SS cw, p. 60 Oct.		31-Feb. 2 OOTC QSO Party
		* League officials and appointees, only.
		Feb. 7-8 DX phone
		14 FMT
		21-22 DX cw

NOTE: Possible W6OWP Qualifying Run "alternate" (same schedule) is W6ZRJ.



carried away; but you'll notice that those who run up the biggest scores don't send particularly fast. They just keep grinding away, and contacts get the exchange right the first time without repeats.

Shall we say something against the all-too-common practice of sending N for the numeral nine or O for the cipher Ø? Oh sure, it saves a smidgen of time, and there is no real harm in it, but somehow it gives us the shudders, possibly because it represents an unauthorized and really illogical substitution or abbreviation. If you use a N for nine, then O ought to stand for one, not zero. For a zero, you'd use Z, wouldn't you? If O is a substitute for zero, why not substitute a J for a 1, or other similar? On the other hand, how about taking the few extra seconds to send numerals where they are called for and your complete call as the station of origin? Don't be sloppy.

See you in the SS, gang! Good luck! — *W1NJM.*

5BDXCC NEWS

Nr. 1 W4QCW
Nr. 2 DL7AA
Nr. 3 W1EVT

Meet Your SCM

Charles Cotterell, **WØSIN,** is currently SCM (and Asst. Director) for Colorado. Chic has an extensive background as EC and SEC and is well versed in Public Service. He was first licensed under the call WØSIN in 1954, and is currently most active on 75. He is, however, well equipped for most of the bands, including 1296 MHz. WØSIN's contest activity encompasses hidden transmitter hunts, Sweepstakes, the Field Day, CD Parties, etc. Chic is active in the Empire Radio Club, Hamsters VHF/UHF Club and the Denver Radio Club. He has held the post of Director, Vice President, President and current bulletin editor for the DRC. In addition, he writes an amateur news column for the *Denver Post.* Chic enjoys hunting and fishing when time permits and is a member of B.P.O.E.

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for August Traffic:

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
W3CUL	460	2801	2446	296	6003
K6BPI	3222	648	570	78	4518
K7UDG	178	2126	2094	32	4430
K5BNH	14	963	886	36	1899
W7BA	12	916	864	46	1838
KØONK	150	763	752	33	1698
KØZZR	527	562	0	527	1616
W3VR	123	629	581	17	1350
K5TEY	2	655	631	3	1291
WA6OXE	0	572	569	24	1165
WØLCX	19	585	465	36	1105
WA4UAZ	28	523	507	16	1074
KØLJV	0	527	0	527	1054
WA5PPF	15	468	442	326	981
W9UEM	23	442	386	54	905
W3EML	31	472	365	0	868
WB4NQA	84	389	318	63	854
K4VFY	569	142	141	1	853
WA8CFT	114	349	349	5	817
W5RUB	15	355	349	5	724
WA7HKR	2	364	335	19	720
K8LNE	11	362	324	9	706
W8UPH	11	343	296	44	694
WA8OCG	4	348	311	5	668
WB4ELA	15	320	320	5	660
W6MLF	199	243	216	0	658
W6VNQ	50	317	312	2	651
WA8UPL	43	307	290	10	650
WAØRVR	55	301	285	13	634
WB2RKK	54	311	254	22	621
WB4AIW	19	301	273	28	621
WA2CAL	49	284	250	19	602
WA8WZF	14	289	285	5	593
WA9SFB	8	292	240	47	587
W6IPW	5	284	260	24	573
WØAA/Ø	562	0	0	0	562
W3MPX	82	278	184	5	549
WA8ETX	42	237	208	58	545
K8ONA	130	196	196	22	544
WB6BBO	53	91	395	2	541
W7DZX	9	279	231	2	521
W9CXY	10	252	244	8	514
W4SQQ	27	249	221	12	509
W6EOT	3	248	250	0	501

Late Reports:

K9FZX/9 (June)	5	544	538	5	1092
W9JYO (June)	432	132	117	15	696
W9FWH (June)	10	254	245	8	517

More-Than-One-Operator Station

K5CEH	620	1	1	0	622

BPL for 100 or more *originations-plus deliveries*

WA5KIV 252	K4YZU 122	W9JYO 106
WB4IOU 237	KH6GHZ 122	W2OE 105
K5FMV 227	WA3HHV 120	WB4HQW 105
W4BAZ 208	WA4VUE 120	WA2BHJ 101
WB4KPE 202	WA5UBQ 120	K2DEL 101
WA4WAR 195	W1TNL 119	Late Reports:
WA5WJP 195	W2TTN 118	WØMLP (July) 119
WA8DWL 161	VE3EMQ 117	W9EQO (June) 111
W4RZL 146	WB4HUS 115	W9QOQ (June) 110
WA6BYZ 141	WA5FII 113	W9ICU (June) 104
WA6DIL 134	WA3IUV 112	WB6PKA (July) 102
WA4AGH 127	WB2UVB 107	

More-Than-One-Operator Stations

W2AE/2 231 WA9LGQ 225

BPL Medallions (see July, 1968 QST, p. 99) have been awarded to the following amateurs since last month's listings: WA2CAL, WA5KIV, WA6DIL, K7UDG, WAØMZW, WAØTHQ

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.

Maxim Memorial Station News

With increasing demands on station time (plus an unexpected staff departure), W1AW will be readjusting its schedule, effective immediately. The readjustment will, however, mean more general operating time plus a bonus! Beginning December 10, an occasional morning qualifying run will be transmitted — in direct response to your enthusiastic comments on the new morning code practice.

We continue to be on the lookout for career-minded hams interested in working for amateur radio through employment at the Headquarters and at W1AW. Interested? Write ARRL, 225 Main Street, Newington, Connecticut 06111.

ARRL CODE PROFICIENCY PROGRAM

Qualifying Runs

Any person can apply for an ARRL code proficiency award. Neither League membership nor an amateur license is required. Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the six speeds transmitted (10-35 w.p.m.) you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m., you may try later for endorsement stickers. Each month the ARRL Activities Calendar notes the qualifying run dates for W1AW, and W6OWP (W6ZRJ, alternate) for the coming 3-month period.

W1AW will transmit a qualifying run on all listed c.w. frequencies at 0230 GMT November 15. (In converting, 0230 GMT November 15 becomes 2130 EST November 14.)

W6OWP (W6ZRJ, alternate) will transmit a qualifying run on 3590 and 7129 kHz. 0500 GMT November 6. (In converting, 0500 GMT November 6 becomes 2100 PST Nov. 5.)

Code Practice

W1AW transmits daily code practice according to the following schedule. For practice purposes, the order of words in each line may be reversed during the 5-13 w.p.m. transmissions. (Each tape carries a checking reference.)

Speeds	Local times/days	GMT times/days
10, 13, 15	7:30 P.M. EST daily 4:30 P.M. PST	0030 daily
5, 7½, 10, 13, 20, 25	9:30 P.M. EST ⎫ SnTTh 6:30 P.M. PST ⎭ Sat	0230 MWFSn
"	9:00 A.M. EST MWF	1400 MWF
"	6:00 A.M. PST	
35, 30, 25 20, 15	9:30 P.M. EST MWF 6:30 P.M. PST	0230 TThSat
"	9:00 A.M. EST TTh	1400 TTh
"	6:00 A.M. PST	

The 0230 GMT practice is omitted four times a year on designated nights when Frequency Measuring Tests are made in this period. To permit improving your fist by sending *in step with W1AW* (but not over the air!), and to allow checking the accuracy of your copy on certain tapes, note the GMT dates and texts to be sent in the 0230 GMT practice on the following dates:

Date	Subject of practice text from September *QST*
Nov. 10:	*It Seems to Us*, p. 9
Nov. 13:	*Squelch Circuits*, p. 18
Nov. 19:	*Grinding Technique for Surplus Crystals*, p. 26
Nov. 25:	*Amateur Radio Public Service*, p. 65
Date	Subject of practice text from *Understanding Amateur Radio*, First Edition
Dec. 5:	*The Receiving Antenna*, p. 115
Dec. 8:	*Types of Beams*, p. 116

W1AW SCHEDULE, NOVEMBER 1969

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 1 P.M.–1 A.M. EST, Saturday 7 P.M.–1:00 A.M. EST and Sunday 3 P.M.–11:00 P.M. EST. The station address is 225 Main Street, Newington, Conn., about 7 miles south of Hartford. A map showing local street detail will be sent upon request. If you wish to operate, you must have your *original* operator's license with you. The station will be closed November 27, in observance of Thanksgiving.

*GMT**	*Sunday*	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*	*Saturday*
0000	.....	.....	.....	.....	RTTY OBS[3,7]	.....	.....
0030	← CODE PRACTICE DAILY[1] 10-13-15 w.p.m. →						
0100	.....	← C.W. OBS[1] →					
0120-0130[4]	.....	.....	3.700[6]	7.020	3.520	7.150[6]	7.020
0130	.....	.....	3.700[6]	7.080	3.555	7.150[6]	7.080
0200	.....	← PHONE OBS[2] →					
0205-0230[4]	.....	.....	3.820	50.120	145.600	1.820	3.820
0230	← CODE PRACTICE DAILY[1] (35-15 w.p.m. TThSat), (5-25 w.p.m. MWFSn) →						
0330-0400[4]	.....	.....	3.555	.....	1.805	.....	3.555
0400	RTTY OBS[3]	← RTTY OBS[3] →					
0410-0430[4]	.....	.....	3.625	14.095	7.095	14.095	3.625
0430	PHONE OBS[2]	← PHONE OBS[2] →					
0435-0500[4]	.....	.....	7.220	3.820	7.220	3.820	7.220
0500	C.W. OBS[1]	← C.W. OBS[1] →					
0520-0530[4]	.....	.....	3.700[6]	7.020	3.945	7.150[6]	3.520
0530-0600	.....	.....	3.700[6]	7.080	3.945	7.150[6]	3.555
1400	← CODE PRACTICE[1] (5-25 w.p.m. MWF), (35-15 w.p.m. TTh) →						
1800-1900	.....	21/28[5]	21/28[5]	21/28[5]	21/28[5]	21/28[5]	.....
1900-2000	.....	14.280	7.255	14.280	7.255	14.280	.....
2000-2100	.....	14.280	21/28[5]	14.095	21/28[5]	7.080	.....
2130-2230	.....	14.100	14.280	14.100	14.280	14.100	.....
2230-2330	.....	7.255	21/28[5]	21.1[6]	21/28[5]	7.255	.....

[1] CW OBS (bulletins, 18 wpm) and the code practice on 1.805, 3.52, 7.02, 14.02, 21.02, 28.02, 50.02, and 145.6 MHz.
[2] Phone OBS (bulletins) 1.82, 3.82, 7.22, 14.22, 21.27, 28.52, 50.12, and 145.6 MHz.
[3] RTTY OBS (bulletins) 3.625, 7.095, 14.095, 21.095 and 29.015 MHz.
[4] Starting time approximate. Operating period follows conclusion of bulletin or code practice.
[5] Operation will be on one of the following frequencies: 21.02, 21.08, 21.27, 21.41, 28.02 or 28.52 MHz.
[6] W1AW will listen in the Novice segments for Novices, on the band indicated, transmitting on the frequency shown.
[7] Bulletins sent with 170-Hertz shift, repeated with 850-Hertz shift.
Maintenance Staff; W1s QIS WPR. * Times-days in GMT. Operating frequencies are approximate.

DX CENTURY CLUB AWARDS

From August 1, 1969 through August 31, 1969, DXCC certificates based on contacts with 100-or-more countries have been issued by the ARRL Headquarters to amateurs listed below.

New Members

W6GB......282	OK1APV....118	W2HGV....109	K1HDO....103	W7KE......102	LU4ECO....100
PY7VKZ...206	DK3EQ.....117	WA9SLD...109	W3CU......103	DK1YK....101	WA2COL...100
JA1EZL....177	4X4AM.....114	DJ1KE.....107	DL9MX....102	WB2DRJ...101	W4CEB.....100
G2NH......145	I1ZGA......112	WA8RIS....106	G3RUV.....102	WA3EQM...101	WA6AKN...100
OK1AMI...141	CR7HC.....111	K5FTB.....105	K1ASJ......102	W4RNL....101	WB6WQA...100
W4MBD....124	DJ2YE.....109	JA8BFI.....104	K1JDL.....102	W6JZG.....101	XE1CD.....100
WA3HTQ...120	K6HPZ.....109	K3RFB.....104	W5LNL....102	K2VJE.....100	YU3EYZ....100
YU3EY.....120	SP5BAK....109	LA1ZE.....104			

Radiotelephone

W6GB......272	PY7VKZ....146	G2NH......120	KH6AFN...107	5Z4JH......104	K8YEK....101
JA1EZL....176	K2DDK....141	W9KAS.....112	WB2QPP...107	HB9AKQ...103	WA3GYY...101
I1ZPM.....175	W6EBO....136	DJ4XA.....111	W0AUB....107	LA1ZE.....103	W01BZ.....101
W2DTK....169	K1OKW....130	WB6YHV...111	WA9SLD...105	W1KJL.....103	K2OYN....100
DL3OH.....168	VE6AGV....129	4X4AM.....111	W6HUR....104	WB4GLG...102	W0DBQ....100
W2IOO.....161	DL3VX.....126	W4MBD....108	WA8YXE...104	WA5POH...102	

Endorsements

Endorsements issued for confirmations credited from August 1, 1969 through August 31, 1969 are listed below. Endorsement listings from the 120 through the 240 level are given in increments of 20, from 250 through 300 in increments of 10 and above 300 in increments of 5. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

340
DL7AA

335
ON4NC
W6IBD

330
W5WZQ
W8YCP

325
K4TWF
W4BBR

320
DL1BO
G8JM
K4EZ
W2NQ
W8EVZ

315
K6OW
K9BGM
PY1HX
W1GL
WA2DIG
W8DE
YV5BPJ

310
DL1DC
JA1AG
K3DCP
VE3AAZ
W1RLQ
W4CKB
W4FRO
W6KTE

305
SM0KY
W2PN
W6EUF
W9WFS

300
K4RZK
SM5RK

290
DJ0PN
WA0KDI
ZL3AB

280
HK5AOH
W1YRC
W3NB
W6HVN

270
K9GZK
K0BUR
K0MAS
LA1K
W4RJL
WA6HRS
W9WNB
W0CPM

260
K1KDP
K4ADU
W1RLV
W2MZV
W3HTO
W7PK

250
OE7UD
W1QV
W2LNB
W4GYP

240
K1GUD
K2DDK
OH2SB
PY1DH
WB2PWU
WA3HUP
W4GRG
W7LZF
W0OMM

220
CR6CA
DJ4XA
K3MNJ
K6OZL
VE3MZ
VE5JS
WB2VAE
W3BK
W3IOP
W4AOU
W4ORT
W6JKR
W7TLG

200
CN8BB
F9TE
JA1LQC
JA1NLX
W2RIR
WB2OZW
WB6OLR
WB6UDC
W8AYS
W8BQV
W9YYG

180
DL1TV
K1KNQ
K4RTA
K6BAG
VE5XJ
VK9KS
VQ8CC
W2KF
WA2HLH
W6EBO

160
G3UYK
LA7QI
SM3ARE
VE3CKW
W3AIZ
W3CRE
W5HCJ
WA9UMH

140
CR6EI
F8BC
K4TWJ
OZ2X
W1ESN
W2EGI
WA3ATX
WA3EPB
W4DUQ
W4LF
WA7FFS

120
G2AYG
HH9DL
K2QBW
K5JBC
K6GAK
K8RWL
W1BB
WA1JHQ
W4CBG
WA8CUV
WA9FWY
WA9MQI

Radiotelephone

320
W4FPS

315
LU9DAH
W2ODO
WA5EFL
W7ADS
W0GAA

305
EA2HX
K4TWF
VE2WY
W6KTE
W8DE

300
SM5RK

290
I1JT
W1BHP
W8IJZ
ZL3NS

270
I1KN
K0BUR
K0MAS
W1SEB
W0CPM
WA0KDI

260
DL9OV
HP1JC
VE3AAZ
WB2WOU
YV5BPU

250
F5JA
W4ELR
W6CCB
W6ZBS
ZL3AB

240
CR6DU
I1AT
JA1BN
JA8ADQ
PY2DSQ
SM5YV
VP7DL
WB2RLK
W4RJL
W7EPA
W8JFD

220
CR6CA
SM0MC
W2VBJ
WB2VAE
WB2VZW
WA4TSP
W8ZOK

200
CT1FL
HB9ADE
K1QMV
K0YIP
LU8DB
VE5QK
W3HTO
W3UJ
W4GVE
WB6UDC
W8CFG
W8GHN

180
CN8BB
DJ2UU
K4RTA
VK9KS
W1DO
W1VRK
W5TBH
W9WFS

160
CT1UA
K3RFH
K4VYN
K7PXI
VE4JK
VS6AL
W3KVS
W4GRG
W6GRV
W9KRU

140
DJ8YQ
DL4PX
K3YBN
OE1SJ
VR1L
WB2MOI
WA9UMH

120
K4BBF
K4BKF
W1RLV
WA1JHQ
W3BK
WA8YFW
WA9FWY
WA9FZQ

Strays

Stolen Equipment

The following equipment is reported missing from the First US Army MARS station, A3USA, W3USA, Fort George G. Meade, Md.: Transceiver, Collins KWM-2A, serial No. 15513; power supply, Collins 516F-2, serial No. 23397; linear amplifier, Collins 30L-1, Serial No. 69; and crystal packet, Collins CP-1, part No. 597-040-00. Anyone with information is requested to contact the First US Army MARS Director, Headquarters First US Army, Attn.: AHACE-PT, Fort George F. Meade, Md. 20755 or telephone collect: 301 677-3316 or 677-3858.

QST congratulates . . .

Tom Miller, W4TQK, selected for promotion to Brigadier General, USMC.

Marie DeForest, widow of inventor Lee DeForest, licensed as **WB6ZJR.**

Edmund C. Tynan, W3WXW/9, appointed Assistant Editor of *Electro-Technology* magazine.

John P. LaBlonde, W9FZC, and **F. E. "Mac" McNally, W9NLA,** for receiving merit awards from Wisconsin Governor Warren P. Knowles.

Robert Ehrlich, W2NJR, named secretary of the American Telephone and Telegraph Co.

Station Activities

• All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

DELAWARE—SCM, John L. Penrod, K3NYG—SEC/PAM: W3DKX. RM: W3EEB. The 1969 Delaware Hamfest is now history, and we wish to thank the hard-working committee for making it such a success. Governor Peterson had proclaimed the week "Amateur Radio Week." Vacation took W3DEO to Alaska where he panned for gold. WA3GSM is building a homebrew transistor s.s.b. transceiver. WA3IIX is mobile with an SB 34. W3HKS reports that winter will turn on his activity again. Maine made state No. 26 for W3BDP on 2 meters. WA3DUM is college-bound but promises to be active on week ends handling traffic. K3RBU is attending college in Denver. W3CZS has taken up kit-building with an HW-100 and mobile supply. The First State ARC won the W3HC Memorial Field Day Trophy. Net reports: DEPN, QNI 63, QTC 8; KCEPN, QNI 32, QTC 2; DTMN, QNI 32, QTC 1. Traffic: W3DKX 31, WA3DUM 24, WA3GSM 11, K3NYG 2.

EASTERN PENNSYLVANIA—SCM, George S. Van Dyke, Jr., W3HK—SEC: W3ICC. RMs: W3EML, K3MVO, W3MPX, K3SLG, WA3GLI, K3MYS. V.H.F. PAM: W3FGQ. OBS reports were received from WA3AFI, WA3JKO, WA3JKB, K3WEU; OO reports from WA3IUV, WA3FBP, W3KEK, K3RDT, WA3EEC; OVS reports from WA3IOB, WA3JWL, K3WEU, WA3EEC, W3ZRR.

Net	*Freq.*	*Operates*		*QNI*	*QTC*	*RM/PAM*
EPA	3610	Daily	6:45P	308	255	W3MPX
PTTN	3610	Daily	6:00P	315	175	W3MPX
PFN	3960	Mon.-Fri.	5:30P	479	410	K3SLG
ENTN	3740	Daily	7:15P	182	102	WA3IUV
EPAEP&T	3917	Daily	6:00P	428	229	WA3GLI
VHF (6)	50.64	Mon.-Fri.	7:00P	86	35	W3FGQ
VHF (2)	145.35	Mon.-Fri.	8:00P	61	30	W3FGQ

New officers of the Central High School 807 Club are WA3JKD, pres.; WA3IMG, WA3JAP, vice-pres.; WA3IFF, secy.; WA3JJH, treas. WA3ADN did some phone patch work for KC4USB. WA3IHV went back to school. WA3IAC got a new car and a commercial license (FCC not tags!). K3NSN is busy teaching the handicapped to become hams. W3AXA is back from XE-Land. QRN and QRM don't stop K3MVO. W3EU is so busy in retirement he is considering going back to work. WA3IYC worked his first VK. WA3ATQ and many others helped with Camille traffic. OO WA3FBP says it is hard to find stations to send cards. K3WEU's Book Review Net is active again on 50.3 Mc. at 8 P.M. Tue. evenings. WA3JKB is back from a Florida and North Carolina vacation. WA3CFU reports no contacts on 6 the entire trip to and from Florida. WA3JWL got his big "G" ticket. W3EML is busy with TCC. WA3LVC got his big "G" ticket. WA3JWF is back in school. W3FPC is on a.m. awaiting repair of his s.s.b. rig. W3CUL says it took four fairs and a hurricane to keep her loaded down. K3RFB reports his 14-year-old daughter is now WN3NFH; he also finally made the DXCC after almost making it in W5-, W4- and W2-Lands! WA3JSU expects to be operating from Wesleyan University, Conn., soon. K3NPC reports that after 15 years he made WAS and WAC! Traffic: (Aug.) W3CUL 6003, W3VR 1350, W3EML 868, W3MPX 549, WA3IHV 277, K3MVO 235, WA3IUV 202, K3NSN 172, WA3EXW 141, WA3JGN 134, WA3ATQ 118, K3OIO 102, WA3JKO 89, WA3EEC 80, WA3HDI 79, K3PIE 74, WA3JWL 65, WA3GLI 53, WA3AFI 52, W3FBF 52, W3HK 41, WA3JZB 41, WA3JWF 39, K3WEU 39, WA3JRY 37, W3FGQ 34, WA3LVC 30, WA3IYC 29, W3AXA 26, WA3JKB 25, WA3CFU 23, WA3FBP 21, WA3FPM 21, WA3MKQ 17, K3VBA 16, WA3ADN 15, W3FPC 15, W3VAP 15, WA3IAC 14, W3CBH 12, W3JSX 12, WA3JSU 10, WN3LYC 10, WA3IOB 9, K3KTH 8, W3BUR 6, WA3CKA 6, K3KKO 6, W3VA 5, WA3HJQ 3, WA3IAZ 2, W3ADE 1, W3BNR 1, W3EU 1, K3FOB 1, W3ICC 1, W3KEK 1, K2NPC 1. (July) K3PIE 46.

MARYLAND-DISTRICT OF COLUMBIA—SCM, John Munholland, K3LFD—SEC: W3LDD.

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QTC*	*QNI Ave.*	*Mgr.*
MDD	3643	2300Z	Daily	29	211	9.1	W0UCE/3-RM
MDDS	3643	0030Z	Daily	12	13	3.7	W3CBG/RM
MDCTN	3920	2200Z	STTS	18	94	16.7	W3ATQ/PAM
MEPN	3920	2200Z	MWF	22	58	23.4	K3IAG
		1700Z	SS				
MSTN	50.400	0000Z	M	4	0	5.0	WA3EOP
MTMTN	145.206	0100Z	T-S	26	56	9.4	W3IFW

W3JPT reports that the call of the AMSAT Club Station is WA3NDS. W3RUN and K1PKQ/3 have joined the ranks of Extra Class ticketmen. WA3EQM had a busy summer DXing, building, hamfesting and operating in the MDDS Traffic Net. W3CBG resumed activity in c.w. traffic circles with an SP-600 receiver on the line in place of his AR-88, now retired to the status of a collector's item. WA3HEN/mobile had a ball on 2 meters in Chicago and kept in touch with the home QTH via K3OJI phone patches. WA3KTD, K3TBD, W3IFW, WA3CBC, K3QMD, W3MAH, WA1JHE/3, W3LQY, K3JOM, K3PVW and K3GZK keep things lively on the 2-meter termite frequency. W3KDD is a newcomer to the 2-meter band. W2KAN, "Sparks" on the nuclear-powered SS *Savannah*, gave the 2-meter gang around Baltimore some maritime-mobile contacts on a recent trip up the Chesapeake Bay. At the Aug. meeting of the Friendship ARC, W3EPC presented W3PG (ex-W3HEC) an award from ARRL for the technical excellence of his *QST* article on gamma matches. K3JYZ is busy, busy between business trips getting up bigger and better antenna towers for the upcoming contest season. K3LCH has retired into the mountains of Colorado with a WØ call. W3BVL and W3LDD got the first two Worked-All-Maryland-Counties certificates awarded by the Maydale ARC. W3GKP continues his moonbounce tests on 2304 Mc. and recently copied his own signals on the rebound—a "first," he thinks. Reports from club secretaries on special events are invited for publication in this column. Traffic: WA3IYS 360, W3ATQ 252, W3TN 211, W3DYA 110, WA3IAQ 87, WA3GUI 65, W3LQY 49, K3GZK 31, W3CBG 29, W3EOV 28, WA3HEN 28, WA3IRQ 24, W3ZNW 24, WA3GXN 17, WA3IHW 17, K1PKQ/3 6, WA3EQM 5, W3PRC 5, WA3AJR 1.

SOUTHERN NEW JERSEY—SCM, Edward G. Raser, W2ZI—Asst. SCM: Charles E. Travers, W2YPZ. SEC: W2LVW. RMs: WA2BLV, WA2KIP. PAMs: WA2UVB, W2ZI. Thanks for all those get-well cards and phones calls I received at the hospital. It sure bolstered my courage to pull through the two operations and hasten my recovery. CU at the NJPN Dinner in Trenton, Oct. 25. See WA2TAF for reservations. The SJRA FD score was 16,417 points, with 40 operators. W2ZQ participated in Field Day again this year; also made a nice score in the N.J. QSO Party headed by K3CPF and his crew, WB2JSS, WB2GBG, WA2BJY, WB2EWS, W2HCR and WB2BKF. This crew also made 6070 points in the V.H.F. Contest. NJPEN reports 31 sessions, QNI 467, total traffic 290. NJN reports for July/Aug. 67 sessions, QNI 732 total traffic 465. A fine NJN Bulletin was received from WB2RKK, who will enter Purdue U. this fall. W2IU put in a new buried ground system. WB2SFX is back on the air with a fine signal. W2BAY is working 2-meter portable on Cape Cod and was awarded a "Worked All Cape Cod" certificate. K2EVV will be chief operator at VFW portable station AF1N this year at the Trenton State Fair. W2RAF received a citation for last year's operation. WA2VAZ is a new operator at W2PU, Princeton U. K2ARY reports transmitting 7 Bulletins. WA2BLV has been busy working overtime. WB2DRG was high traffic man in Aug. He puts out a nice

40-Meter Training Net Bulletin. Sure sorry to lose WA9PRE/2, who moved to Denver, Colo., also W2ZVW, who is moving to Alberqueque, N.Mex. WB2APX is working lots of DX and enjoying it. WN2KKK applied for AREC membership. A new traffic man is WA2BPL. Traffic: (Aug.) WB2DRG 324, WA2BLV 210, WB2UVB 131, WB2VEJ 77, W2PU 48, K2RXB 36, WA2ANL 24, W2BLM 19, WA2BPL 15, WB2SFX 13, WA2KIP 12, W2ZI 11, W2ORS 8, W2ZQ 8, W2DNF 7, W2JI 5, WB2APX 2. (July) W2IU 17.

WESTERN NEW YORK—SCM, Richard M. Pitzeruse, K2KTK—Asst. SCM: Rudy W. Ehrhardt, W2PVI. SEC: W2RUF. PAM: WB2VSL. RMs: K2KIR, W2FR, W2MTA, W2RUF. The list of section nets appears in the June column. A new appointee is WA2AIV as OO. Renewals are K2KNV as OO, ORS and OVS, WA2GLA as OPS and W2EMW as ORS. W2RUF wishes to remind all ECs to send their reports to her by the 4th of each month. W2RUF attended the Old Timers gathering at the home of W2RN. K2UAN passed his Extra Class exam. I am very sorry to have to report the passing of K2EE. Walt was active in many traffic and emergency nets. Fortunate were those who knew the holder of the shortest call, until his passing at age 86. K2KQC is fabricating a 4-day hamfest at Niagara Falls for the 4th week of July 1970. Anyone interested in helping should contact Valerie. The Walton Radio Assn. operated W2LZ at the Delaware County Fair. Special certificates are being sent to the 250 contacts. W2ZTC is recovering from his illness and hospital stay. In the new gear line, W2TFL has a new SB-101, K2EZK a new kw. linear and WB2FWG a new vertical. W2AFB has a new 40-meter dipole now up 50 feet. W2CFP is now active on RTTY. Dave welcomes inquiries into the ECARS. K2DNN is the new chief of communications and Radio Officer of Chemung County Civil Defense. NYSCN now meets Sun. at 1000 local time and Mon. and Thurs. at 1945 local time with all sessions on 3677 kc. WA2GLA has the Swan 500C back in service. W2FDI is the new chairman of the Rochester v.h.f. group. The NCARC reports a very successful and enjoyable picnic. RAGS, operating W2AE/2 at the New York State Fair in Syracuse, presented a very favorable image to the public for ham radio. NYS reports a traffic total of 423, with 698 check-ins for Aug. Don't forget to get your inputs to me for the new ARPSC Honor Roll. Congratulations to BPLers WA2CAL, W2OE and W2AE/2. Traffic: (Aug.) WA2CAL 602, W2FR 430, W2OE 340, W2MTA 329, K2KQC 232, W2AE/2 231, WA2BEX 171, W2RUF 135, W2HYM 97, W2FEB 96, WA4PDM/2 84, WB2VND 49, WA2DHS 34, WB2HLI 34, W2CGD 33, W2OIO 30, K2UIR 21, K2IMI 20, W2PVI 20, W2RQF 20, W2MSM 18, WB2QKQ 18, W2WS 18, WB2RHJ 15, WB2RWR 13, K2DNN 12, K2SPO 11, WA2YJB 11, W2AFB 10, WB2WGF 10, WB2YEE 9, W2CFP 8, K2KIR 7, K2KTK 7, WA2ICU 3. (July) W2PZL 6, K2VCZ 4.

WESTERN PENNSYLVANIA—SCM, John F. Wojtkiewicz, W3GJY—SEC: W3KPJ, PAMs: W3WFR, K3ZNP. RMs: WA3AKH, W3KUN, W3LOS, W3NEM Traffic nets: KSSN, 2330 GMT; WPA, 0000 GMT 3585 kc. A big welcome to W3GQJ, who has returned to the section. W3SDV chases DX with a 50-ft tower and a TH6 beam. WA3HDK teaches school. W3LOS has been appointed net mgr. for the WPA Traffic Net. W3KPJ would like to contact, by mail or radio, hams who are stamp collectors. Lake City is represented by WA3LTB. W3SN teaches code and theory at the Erie YMCA. The following Novices are graduates of the Indiana County ARC: WN3MWA, WN3MYB, WN3MWF, WN3MWL, WN3MWI, WN3MWJ, WN3MYY, WN3MYX, WN3MWH. K3QIO is now WB8ETU at Morgantown, W. Va. Ex-W3LCI is now W3YN. K3ZNP has been appointed PAM for the low-frequency bands. W3WFR is PAM for the v.h.f. bands. WA3EYL received his USA CA 500 certificate. W3SHT will be in Florida during the wintry blasts up North. WA3ITL and WA3LEY have gone mobile. WA3ECD works s.s.b. with an Invader 200. WA3HSQ is back on the air with a new lean-over tower and TH-6 beam. WA3BLE is a welcome addition on the WPA Traffic Net. The following have upgraded their licenses: Amateur Extra, WA3GZQ, WA3GSB. (Incidentally, WA3GSB is only 15 years old and a Junior in High school.) Advanced: WA3FRT, WA3JBQ. General: WN3MDX, WN3KXO worked into Poland on 21-Mc. WA3MDP is the call of the new General Electric amateur emergency station. K3SBU terminated his Boy Scout activities after a hectic summer. K3IOX has moved to Roanoke, Va. K3FVO has moved to Warren County. K2BBK/3 teaches at Clarion State College. Interested in an appointment? If so, drop your SCM a line. I would like to take this opportunity to wish you and your families a very Happy Thanksgiving and thank you for your continued support. Endorsements: W3IDO as ORS. New appointments: K3ZNP as PAM, W3LOS as RM, K3VQV as ORS. Check the expiration date on your license. It may be time to renew. Traffic: (Aug.) WA3IPU 206, K3ZNP 189, W3LOS 118, W3KUN 72, WA3BLE 62, WA3AKH 51, K3EXE 42, W3GJY 33, K3SMB 28, W3YA 16, K3SJN 5, W3SN 4, W3IDO 3, WA3JBN 2, W3UHN 2. (July) K3ZNP 103.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—SEC: W9RYU. PAMs: WA9CCP and WA9PDI (v.h.f.). Cook County EC: W9HPG. Net reports:

Net	*Freq.*	*Times*	*Days*	*Tfc.*
IEN	3940 kc.	1400Z	Sun.	No report
ILN	3760 kc.	0100Z	Daily	232
NCPN	3915 kc.	1300Z	Mon.-Sat.	329
NCPN	3915 kc.	1800Z	Mon.-Sat.	
Ill. PON	3915 kc.	2245Z	Mon.-Fri.	546
Ill. PON	3915 kc.	1430Z	Mon.-Fri.)	
Ill. PON	145.5 Mc.	0200Z	M.W.F.	40
Ill. PON	50.25 Mc.	0200Z	M.W.F.	0

New officers of the Hiawatha Amateur Wireless Keyers Society are WA9QPU, WA9TDV, WA9VYR and WN9BJB. The club plans to tour teletype's Skokie plant for its next meeting. WA8IBM is now portable nine in Springfield and is the new Youth Director of the Sangamon County Chapter of the American Red Cross. W9VWY, WA9UHB, W9KOI, WA9NSO and W9KQX attended the Central States U.H.F. Society at Boulder, Colo., and W1HDQ was the principal speaker at the banquet. WA9TCW has enrolled in the University of Wyoming. K9GHR has just had a book published by Howard Sams entitled *101 Questions and Answers about Amateur Radio.* WN9ZIA has passed the General Class test. A new call in the Bloomington area is WA9CEB. A new Central Area Advisory Group, which is a part of the ARRL ARPSC program, has been formed. Contact W9VAY for details on this traffic program. W9CKA is the newly-appointed manager of the Central Illinois Public Service Company's Southern Division. WA9UNR has an HQ-170 and W4 wattmeter. WN9CGT is a new Chicago call. WA9VVU is now CP-25. The above three (calls) are brothers. WN9BJC worked an Illinois University teacher and native YA2HWI from Kabul, Afghanistan. WA9UNR and WA9ZLN have been appointed OBSs and W9ZTK was appointed OVS. W9LIW passed the Extra Class exam (he is 67 years young). WA9WYC is now Advanced Class. The Big Thunder Amateur Radio Club's Mini-Hamfest was an FB outing and many eyeball QSOs were held. Danville, Ill., was the scene of the first annual Vermillion County ARA Hamfest. A good time was had by those attending. WA9QZE is attending the University of Illinois. W9EY is back in business with a QSK rig. WA9OBP, a student at the U. of I., has a new HW-100, and his brother, WN9CIG, is a new licensee. WN9BUQ is a new Novice in Streamwood. WA9RSP received his Advanced Class ticket. WA9SLT and WA9VOL are enjoying their new 2-meter f.m. rigs. Traffic: WA9SFB 587, W9NXG 244, K9AVQ 172, WA9WNH 171, W9HOT 126, K9RAS 107, WA9BRQ 104, W9DOQ 59, WA9LDC 56, WA9NZF 36, W9LNQ 31, W9LDU 28, K9DQU/WB9AIE 26, WA9LHU 9, WA9OBP 9, W9PRN 8, WA9TUM 8, K9HSK 3.

INDIANA—SCM, William C. Johnson, W9BUQ—Asst. SCM: Mrs. M. Roberta Kroulik, K9IVG. SEC: W9BUQ.

Nets	*Freq.*	*Time*	*Aug. Tfc.*	*Mgr.*
IFN	3910	1330Z Daily 2300 M-F	152	K9IVG
ISN	3910	0000Z Daily 2130 M-S 2300Z S-S	517	K9CRS
QIN	3656	0100Z Daily	168	WA9FDQ
Ind. PON	3910	1245Z Sun.	46	K9EFY
Ind. PON V.H.F.	50.7	0100Z M-T	130	WA9NLE

It is with deep regret I report that K9BPA, of Muncie, and W9QWV, of Evansville are Silent Keys. K9LSB reports that the Allen County Radio Technical Society repeater station is very active. K9LSB, EC for Allen County, mailed out registration forms to all amateurs in Allen County to join the AREC program. K9FZU and WA9WCE operate c.w. on 7.1 Mc. They will adjust to your speed. WA9ZIQ is home

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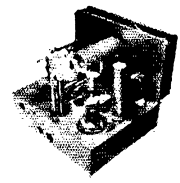

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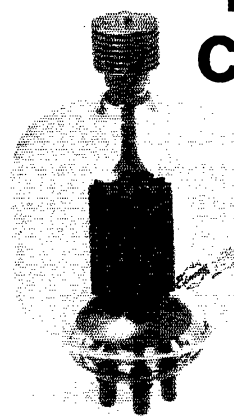

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from the service after a 4-year hitch. K9EFY is looking for an IPON net mgr. as he will resign Dec. 31, 1969. I would like to ask all EC's to make a monthly report. You never can tell when an emergency will occur in your area. Be ready at all times. Indiana placed fifth in the ARPSC-LO Bulletin traffic report. As one can see, reporting is important regardless of how small your traffic count is. K9VHY reports that the Indiana QSO Party was a success. W9PMT, mgr. of the Hoosier v.h.f. nets, reports Aug. traffic as 71. QIN Honor Roll: K9VHY 28, WA9VZM 25, WA9MTY 19, K9HYV 19, WA9KAG 18, W9QLW 16. *Amateur radio exists because of the service it renders.* BPL certificates went to W9UEM WA9LGQ W9JYO for Aug. and to W9ICU for June traffic. Traffic: (Aug.) W9UEM 905, W9JYO 403, W9FWH 336, WA9-LGQ 265, K9FZX 227, W9HRY 227, K9IVG 179, WA9BWY 130, WA9QOQ 93, W9CMT 86, K9CBY 67, WA9OHX 60, W9QLW 59, K9YBM 59, K9CRS 58, K9VHY 58, W9JBQ 57, W9RTH 48, W9BUQ 46, WA9CYG 45, WA9TJS 36, K9WGN 29, K9DCX 28, W9YYX 23, K9RWQ 22, WA9QEQ 21, W9SNQ 20, W9DOK 19, WA9GJZ 19, W9PMT 18, WA9BVL 17, W9LG 17, W9HWR 16, WA9AXF 15, WA9WME 15, K9EFY 14, K9BSL 12, WA9BHG 11, WA9CHY 11, W9FJW 10, WA9YXA 8, WA9VRV 7, K9ILK 6, WA9OAD 6, WA9ZCE 6, W9FC 4, WA9AMB 1, W9NZZ 1. (June) K9FZX/9 1092, W9JYO 696, W9FWH 517.

WISCONSIN—SCM, Kenneth A. Ebneter, K9GSC—SEC: W9NGT. PAMs: K9DBR, WA9IZK, W9NRP, WA9QNI, W9AYK and WA9QKP. RMs: K9KSA and WA9TXN.

Net	*Freq.*	*Time*	*Days*	*QNI*	*QTC*	*Mgr.*
BWN	3985 kc.	1245Z	Mon.-Sat.	320	162	W9AYK
BEN	3985 kc.	1800Z	Daily	805	73	WA9QKP
WSBN	3985 kc.	2300Z	Daily	1203	172	WA9QNI
WIN	3662 kc.	0115Z	Daily	203	119	WA9TXN
WSSN	3780 kc.	0030Z	Tue.-Thurs.-Sat.	52	10	K9KSA
WRN	3620 kc.	0130Z	Sun. (RTTY)	20	3	K9GSC
SWRN	50.4 Mc.	0300Z	Mon.-Sat.			K9DBR
SW2RN	145.35 Mc.	0330Z	Daily	136	16	WA9IZK

WA9QKP has been appointed PAM for the BEN at Noon. Renewed appointments: W9RQM as ORS; K9ZYS and W9KHH as OVSs; WA9QNI and W9RQM as OPSs; WA9QNI as PAM; W9LQC, W9BUG and W9SZL as ECs. WA9YCY is on with a Drake T-4X and 2-B. His father received his Novice ticket as WN9CHP. W9NLJ operated as W9NLJ/LA while on his vacation near Oslo. WA9RAK is on with an Apache and an SB-10. K9IMR got married and moved to Milwaukee. WA9LWJ has also married and moved to Junction City. BPL for Aug. traffic went to W9CXY. Traffic: W9CXY 514, WA9RAK 204, K9CPM 188, W9ESJ 156, WA9QKP 148, W9NRP 67, WA9TXN 58, W9KRO 53, W9SUF 48, K9TBY 41, W9DXV 36, W9AYK 35, K9FHI 34, K9KSA 21, W9BCH 20, WA9PKM 19, K9GSC 12, W9RQM 11, WA9UNN 10, W9DND 9, K9LGU 9, W9IQW 4, WA9SAB 1.

DAKOTA DIVISION

MINNESOTA—SCM, Larry J. Shima, WØPAN—SEC: WAØMZW. RMs: WAØRRA, WAØIAW. PAMs: WAØMMV, WAØOEJ, WAØHRM, WAØDWM, KØGYO. WAØMMV was presented with a Certificate of Merit by WØBUO, Dakota Division Director, at the Brainerd Area Amateur Radio Club Picnic in appreciation of Clarence's "outstanding contributions to amateur radio." WAØKFJ is undergoing basic training with the Air Force at Lackland AFB. The Minnesota Post Office Net meets at 1230 local time on 3910 kc. each Sun. Net Manager KØKKQ is looking for more check-ins. WØUWG recently received his Extra Class license. WØLH is a new resident in Minnesota. WAØIAW is now mobile. The Minnesota Weather and Service Net meets on 3912 kc. at 1745 local time daily. Stations are invited to participate and provide weather information from their area. KØMVF is a new A-1 Operator Certificate holder. Don't forget to participate in the Sweepstakes. Any Minnesota amateur is invited to send the SCM a monthly report of his activities. Reports can be sent on the section nets during the first 5 days of the month. Check last month's *QST* for net listings. The following appointments were acted upon during Aug.: KØORK, renewed as ORS; WAØMNE, appointed as OBS; WAØUTQ, new OVS; KØJTA, new OPS; WØHEN, OBS renewed; WAØOEJ, OPS renewed; WØFFX, EC Kanabec and Mill Lacs Counties renewed. Traffic: (Aug.) KØZZR 1616, KØLJV 1054, WØAA/Ø 562, WAØOEJ 254, WAØTQT 252, WAØIAW 215, WAØVAS 150, WAØHRM 112, WAØRRA 92, WAØTGM 86, WØZHN 84, KØMVF 82, WØBUC 66, WØPAN 61, KØGYO 59, WAØVYV 51, KØORK 46, WAØVKP 36, WØATO 34, WAØURW 33, WAØVTZ 32, WAØACI 31, WAØRKV 31, WAØMMV 30, WAØRKF 30, WAØIAD 28, WAØCJU 27, WAØVDG 25, WAØJPR 22, WAØJRA 20, WØUMX 18, WAØRKE 15, WNØYAH 14, KØZBI 14, WØBUO 13, WAØGRX 13, WØKLG 12, WAØNQH 12, WAØVIS 12, KØZXE 11, WAØDWM 10, WØBE 9, WAØMNE 9, WAØTYL 9, KØWXH 9, KØJTA 8, WØEQO 7, KØZRD 7, WAØOEF 6, KØFLT 5, WØIYP 5, WAØPMM 5, WAØJKT 3, WØKNR 3, WAØUWL 3. (July) WAØ-DFT 2.

NORTH DAKOTA—SCM, Harold L. Sheets, WØDM—SEC: WAØAYL. OBS: KØSPH. PAM: WØCAQ. RM: WAØRSR. WAØOVW had a 20-meter c.w. QSO with WAØGQI, of Fargo, who is with the Navy now operating TF2WLW in Iceland. The corn feed at KØPYZ was attended by 25 hams and 45 in all. WAØZOK has a SB-101 pushing a High Gain 5-band doublet. WAØGRX is a busy gal now acting as a substitute rural mail carrier. WA6MIW, ex-WAØPPK, has been in the hospital since arriving home in El Centro after the hamfest at the Peace Garden. KØDWX and family were in an auto accident during the Labor Day week end. WØDM will be teaching radio classes again this winter in the Junior High School system, as well as supervising the Central High School auditorium. WAØAYL returned to the old grind after two weeks in Ohio and Long Island visiting his folks and other relatives. WAØAAD has been working for the Park Board in Grand Forks teaching tennis. WAØRSR would like to have you c.w. fellows do some checking into the C.W. Net. VE4YC, and his XYL, from Brandon, were guests of WAØRWM.

ND RACES Net	20 sessions	474 check-ins	48 tfc. KØSPH RO
N. Dak. PON	15 sessions	186 check-ins	38 tfc. WAØHUD
ND CW Net	8 sessions	0 check-ins	0 tfc. WAØRSR RM

Traffic: WAØHUD 70, WØNMV 36, KØSPH 26, WØDM 12, WØWWL 6.

SOUTH DAKOTA—Acting SCM, Edward C. Gray, WAØCPX—SEC: WAØFUZ. PAM: WAØCWW. RM: WØIPF. WNØZIC is a new Novice from Bruce. WØDIY and WØIGG are Silent Keys. WAØYAK, of Colome, has a new Heath-kit line. WØIPF, of Huron, has a Drake TR-4 now. KØOTZ is back in South Dakota at Hartford. WAØUDJ, at Artas, has been on the nets. WAØUNE, Rapid City, and WAØSKA, Huron, are new ECs. Participation is needed on the SDN C.W. Net on 3645. Send WØNEO or WAØPNB a write-up and picture of yourself for their new directory and historical summary. Please send your station activities to the SCM every month. About 80 amateurs attended the picnic at Mitchell. Late Session Net, 1215 QNI, 74 QTX; Morning Net, 432 QNI, 72 QTX; NJQ Net, 309 QNI, 55 QTX, 49 informal. Traffic: WAØPNB 53, WØIG 32, WØHOJ 31, KØAIE 24, WAØFUZ 23, WØFJZ 5.

DELTA DIVISION

ARKANSAS—Acting SCM, Robert D. Schaefer, WA5IIS—SEC: W5PBZ. RM: W5NND. PAM: WA5-QMQ. WA5QMQ and K5YWL operated at K5OAZ in Long Beach, Miss., during the hurricane disaster. WA5VOM is the new pres. of the NAARS. Congratulations to WA5PWP on passing the Extra Class exam. It's good to have WA5GPO and WA5KJT back on the air after long absences. K5CEH, K5VBF and WA5QMQ handled 622 messages from the National Rural Letter Carriers Convention in Hot Springs. Welcome to new Novices WN5ZGI, WN5ZKE and WN5ZGH in the Harrison area. Ft. Smith has a lot of 2-meter f.m. activity and a repeater is being constructed. Fayetteville has a repeater on 6 meters. About 25 DX chasers attended the Annual ADXA Meeting in Little Rock. Speakers were W5KUC, WA5-GFS and ex-9Q5BD. The EC Net has been reactivated and now meets on 3995 ks at 2330Z Sun.
Traffic: K5CEH 622, W5NND 274, WA5IIS 206, W5-OBD 165, WA5TJB 38, WA5TLS 4.

LOUISIANA—SCM, J. Allen Swanson, Jr., W5PM—SEC: W5OB. RM: K5ANS. V.H.F. PAMs: WA5DXA, W5UQR. I regret to report the passing of WA5PGO. I am going to dispense with the regular remarks in this column and give you an idea of what Louisiana Hams did during Hurricane Camille. It is estimated that over 2000 messages, civil government, Red Cross, welfare, etc., were handled. Seven definite frequencies on 75 s.s.b., one on 40 and one on 20 were declared emergency frequencies by the FCC Office in New Orleans. From the New Orleans area 25 of the gang

went to Waveland, Bay St. Louis, Gulfport, Biloxi and Pascagoula. From Baton Route 18 of the fellows went to the Coast while approximately 50 stayed in BR and operated from the Civil Defense Emergency Center. From Monroe Area 8 hams went to the Coast and handled Red Cross traffic. The Navy's Communication Van went to Waveland and was manned by three of the gang, who operated under the call WA5-DNZ/5. Navy MARS (8th ND) with 91 stations and 6 nets handled 1900 messages. Four of the Metairie gang assisted W5FMO on the Red Cross Net and handled traffic 18 hours per day for over a week. Nets that were active were LAN (c.w.) Gulf Coast S.S.B. Net, Central Gulf Coast Hurricane Net, Delta S.S.B. Net and the Delta 75 S.S.B. Net. Civil defense had two nets going for days on the high end of 75. Traffic: W5GHP 407, W5FMO 400, WA5WKP 279, WA5QVN 265, W5CEZ 255, K5YMY 134, W5MB 110, W5PM 109, W5OB 96, WA5WBZ 90, WA5NYY 49, W5MQ 29, W5EA 10, W5JYA 1.

MISSISSIPPI—SCM, Clifton Comfort, WA5-KEY—SEC: WA5JWD has moved to the University of Miss. to enter law school. K4RIN/5 is now W5RUB. WA5SKI is back from summer vacation. WA5SUE reports increasing activity on 2 meters on the Coast. W4PBY, of Birmingham, is WA5YYU of Meridian. WA5KPS has started a proposal on auto tags similar to the law passed in Alaska (June *QST*). There are about 20 Mobiles in the state. Sun., Aug. 17 "Camille" came to the Mississippi Coast. The practice of the MSBN and CGCHN of using different net control stations each day with changes each quarter paid off. We had trained net controls where they were needed. The fellows within 150 miles of the Coast took the work load for this, several putting in over 40 hours each the first week. I will not try to name those who took part in this emergency. We can only say "thanks" to all those from out of state who came and helped us. There were nets as far away as California that went into session "for the purpose of handling traffic to or from the Mississippi Disaster." Traffic: W5RUB 724, K5FMV 377, WA5KPS 352, WA5FII 314, WA5UBQ 314, WA5MTW 278, WA5WJP 266, K5HUW 218, WA5-RMS 211, WA5IDF 209, WA5KBR 153, WA5KEY 126, WA5MPI 108, K5FSP 96, WA5PZI 81, WA5TOD 69, WA5JWD 67, WA5QQT 66, W5RNB 65, WA5MDD 52, W5SLO 52, WA5OOO 36, WA5OSN 31, W5WZ 18, WA5-SIM 13, W5BCM 4.

TENNESSEE—SCM, Harry A. Phillips, K4RCT—SEC: W4WJH. PAMs: W4PFP, WA4YBT, WA4EWW, WB4HMA. The Middle Tn. Am. Radio Club provided communications for a sports car rally. The members relayed scores from check-points to a central point. W4-WBK now has a fancy new transmitter to match his receiver. Tennessee amateurs were active for long hours after Hurricane Camille struck the coast. On Aug. 20 the TSSB Net operated for 4 hours and handled 77 messages. Much credit is given to those who participated by monitoring 3980 for incoming traffic and those who monitored the emergency nets in the stricken area. The Gibson County C.D. units took two rigs, truck and supplies to the area to assist in traffic-handling. Traffic: (Aug.) WA4UAZ 1074, K4AT 409, W4OGG 348, WB4GSS 123, W4SQE 116, WB4HYY 61, W4WBK 54, WA4WVW 51, WB4HMA 49, WB4JFT 48, W4WJH 46, WB4HLH 37, K4LTA 35, WB4ANX 27, W4LHE 20, K4AMC 17, WA4GLS 16, W4PFP 16, W4-IGW 13, WA4KYT 12, WN4LHK 9, WA4EWW 8, K4UMW 8, WA4YFG 7, WB4HSS 5, WB4JDD 4, WA4ZBC 4, WA4YEM 3. (July) W4OGG 241.

GREAT LAKES DIVISION

KENTUCKY—SCM, George S. Wilson, III, W4OYI—SEC: W4VYS. Appointed: WA4WWA as OBS, WA4-UAZ as OPS and ORS. Endorsed: WA4BZS and W4CSN as ECs; W4JUI as OO; W4BAZ, K4VDO and WA4VUE as ORSs; K4UMN and W4NBZ as OPSs. Nine has to be some sort of record for BPL in one month. Congrats to W4BAZ, K4YZU, WA4AGH, WA4-VUE, WB4FLA, WB4HQW, WB4HUS, WB4IOU and WB4KPE.

Net	*QNI*	*QTC*	*Net*	*QNI*	*QTC*
KRN	307	26	KYN	414	687
MKPN	450	131	FCATN	90	36
KTN	825	257			

The State Fair produced 2060 messages filed, 872 of which were for servicemen abroad. The nets did a fine, efficient job of moving it, and MARS gets a pat on the back as well. WB4HQW occasionally loads the paper clip I gave him on 80. Everyone's most heartfelt "welcome home" to W4MWX after his siege in the hospital. Despite some justifiable complaints, the C.D./CAP exercise proved its point and admirably demonstrated our effectiveness and enhanced our reputation as *the* dependable emergency communications service. Special thanks to the travelling portables. KYNers were treated to some perfect c.w. when W4UX took a several-hour stint of traffic-handling from K4HY with his award-winning code-typewriter. His *QST* article won him the cover-plaque, presented at the Kenvention. Traffic: (Aug.) WB4FLA 660, W4BAZ 258, WB4KPE 256, WB4IOU 254, WB4HUS 245, WA4-VUE 176, WA4AGH 172, WB4HQW 170, K4YZU 130, WB4FDK 97, W4UK 81, W4OYI 72, WA4GHQ 69, WA4DYL 52, WA4WSW 47, WB4EOR 44, K4UMN 41, W4CID 39, K4TRT 39, W4KJP 27, WA4FYH 23, WA4MXD 22, K4FPW 20, WB4HTN 16, W4SZB 16, WB4ILF 15, K4VDO 15, WB4GCV 13, K4MPT 12, WB4MSQ 7, K4YCB 7, WB4EQY 6, K4HOE 6, W4JUI 4, K4AVX 1. (July) K4AVX 6.

MICHIGAN—SCM, Joseph L. Pontek, K8HKM—Asst. SCMs: Rodger C. Phillips, WA8LWK; Howard A. Walker, W8JTQ. SEC: W8MPD. RMs: W8FWQ, W8-RTN, WA8OGR, K8KMQ, W8GAI. PAMs: K8GOU, K8JED. V.H.F. PAM: W8CVQ. Appointments: WA8-CUL and W8NDM as ECs; WA8MCQ as OO; WA8-QCW, K8CKD, W8PEB as OPSs; WA8MCQ and W8-RTN as ORSs. Silent Keys: WB8ANE and W8QBM.

Net	*Freq.*	*Time*	*Days*	*QNI*	*QTC*	*Sess.*	*Mgr.*
QMN	3663	2300	Daily	590	304	61	W8FWQ
WSSB	3935	0000	Daily	784	230	31	K8WRJ
UPEN	3920	2230	Daily	466	38	28	WA8LHC
PON-Day	3937	1600	Daily	692	512	31	K8LNE
GLETN	3932	0230	Daily	947	275	31	K8HLI
BR/MEN	3930	2230	M-Sat.	922	130	26	K8LJS
PON-CW	3645	0000	M-Sat.	88	18	18	VE3DPO
M6Mtn	50.4	0000	M-Sat.	103	31	19	WA8LRC

WA8LWK would like to hear from all high school radio clubs or anyone knowing of such clubs. W8UBD is now W8JE. W8BLP took a bathtub across Lake Michigan the hard way; he floated it. K8UDJ has a 100-ft. tower up now. The CMARC is planning another theory class. The UP had a successful picnic. GLETN's new officers are K8HLI, mgr.; W8AGQ, asst. mgr.; W9DRP, secy. The SEMARA has club QSLs now. WA8ZDR has a quad up now. Have received a lot of reports from Michigan hams who helped out with hurricane traffic and W8DT made TV with his efforts. Plans call for some club visits this winter. Please give us much lead on the invitation. This allows for program selection and scheduling. K8LNE and WA8WZF are sure consistent about BPLing. Traffic: (Aug.) K8LNE 706, WA8WZF 593, W8JTQ 386, K8KMQ 253, W8NOH 158, WA8MGM 130, W8MO 110, K8ZJU 105, W8IZ 103, K8MXC 76, WA8LXY 74, K8GHS 70, WA8SQC 65, W8GAI 64, K8HLI 57, WA8MCQ 53, K8JED 44, W8DSE 38, K8GOU 35, K8TIY 35, WA8PII 29, WB8-ANR 27, W8FX 27, W8ACW 24, WB8DTT 19, W8IUC 19, W8VIZ 18, WB8CFV 17, WA8ONZ 15, W8RTN 12, W8ZBT 12, W8AGQ 11, W8DSE 11, WA8VGQ 7, W8TBP 6, W8BEZ 5, W8DQL 4, W8SS 2.

OHIO—SCM, Richard A. Egbert, W8ETU—Asst. SCM: Roger Barnett, K8DDG. SEC: W8OUU. RM: W8IMI. PAM: K8UBK. V.H.F. PAM: WA8ADU. Aug. net reports:

Net	*QNI*	*QTC*	*Sess.*	*Freq.*	*Time*	*Mgr.*
OSSBN	1858	1535	64	3972.5	1530 & 2345Z	K8UBK
BN	660	611	62	3580	0000 & 0300Z	W8IMI
06MtrN	501	137	59	50.61	0000Z	WA8ADU
				50.16	0200Z	
OSN	207	119	30	3580	2325Z	WA8VNU

OSN Net certificates went to WB8CHW, WA8YUB and WA8ZNC. The traffic session at the Findlay Hamfest was presided over by K8UBK, ably assisted by WA8MHO. W8IMI represented BN, and W8OUU and several ECs held up the AREC end of things. W8CHT spoke on behalf of 8RN, and WA8VNU represented OSN. W8OUU announced that the section has been divided into 24 areas of jurisdiction, each comprising three to five counties. Each of these areas will be headed up by one EC. We feel that AREC will be better organized and more effective with a fewer number of ECs handling more sizeable pieces of the section. The fine details have yet to be worked out, but our more eager ECs have already stretched their operations into adjoining counties with good results. WA8DWL was inadvertently left out of the BPL listing last month. Sorry, Nellie. To date I've got ten reports of fair stations at Canfield, Darke and

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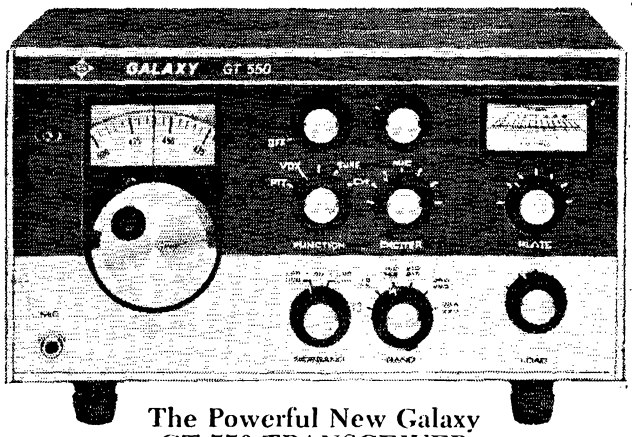

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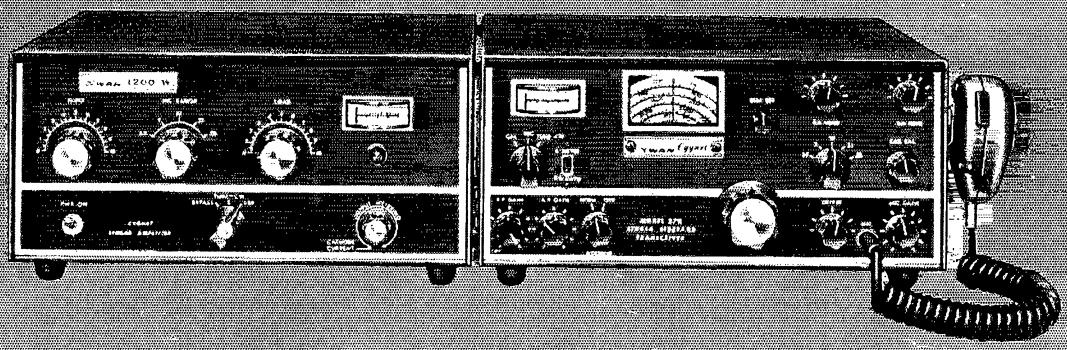
Wayne Counties, as well as the State Fair. All handled traffic for the public with the operation at the State Fair clearing over 1400 messages. Darke Co. EC W8ARW reports that a 7300-volt power line fell across the wires to the club station and wiped out all the gear. Mahoning Co. EC W8OE advised that the AREC-C.D. Club will conduct free code and theory classes again this fall. I regret to report the passing of W8EEI and W8OIS. W8GDQ reports working VK3-GU on 160. Congratulations to new Advanced Class WA8GRR. WA8YHN says he worked a W9 in Indiana running a kw. to a TV antenna 1000 feet high on 6. Stark Co. AREC-RACES is now publishing a bulletin. The Marlington High School ARC has applied for ORS and OPS appointments. K8POL, advisor/trustee of the KC of Explorer Post 285, gives interesting details of this year-old club of scouts. The club started out with six members, all unlicensed, and embarked on a self-training program and now is in business with seven licensees and a club station boasting operation on all bands through 6. Hurricane Camille made its impact felt through priority traffic. All the nets report traffic action, with the Apricot Net turning in its usual fine performance. Manager K8ONA reports that the net was in session from sun-up to midnight for 12 days. New appointments: WA8YTH and WA8ZNC as OPSs, WA8UPI and WA8DUL as OOs, WB8BPB as OVS and WA8TRE, W8JD, WA8DUL, WA8UPI and WA8ZNC as ORSs. BN certificates went to WA8UPI, WA8YUB and W8ETU. (Aug.) Traffic: WA8CFT 817, W8UPH 694, WA8OCG 668, WA8UPI 650, WA8ETX 545, K8ONA 544, K8UBK 404, W8SUS 388, WA8VNU 372, W8JH 350, WA8DWL 326, WB8AKW 316, W8QZK 249, WA8YUB 238, W8IMI 218, WA8ZTV 208, WB8DSV 206, W8OE 195, W8JD 192, W8QCU 187, WA8ULF 161, WA8ETW 159, WA8TYF 155, WA8DUL 137, W8PMJ 130, WA8TKM 115, WA8NOQ 114, W8GVX 109, W8LRE 104, W8CHT 100, WA8WAK 97, WA8ADU 95, WA8-ZNC 92, WA8SED 88, WA8GAK 84, WB8ALU 82, WA8BXN 72, WB8BZX 71, W8LAG 58, WA8SHP 51, WB8CHW 49, W8NAL 49, WA8COA 48, W8LZE 44, WA8SXI 44, WA8YIB 43, W8GNL 41, WA8QFK 37, K8BYR 33, WA8PPK 32, WA8VWH 32, W8UX 30, WA8YHN 30, W8DAE 29, WA8MHO 29, WB8BLH 28, K8LXA 28, W8FGD 27, WA8LAM 24, W8ETU 23, WA8FSX 22, WA8YLW 22, WA8GRR 21, WA8ZJF 19, K8DHJ 18, K8EHE 17, W8OUU 17, W8ERD 16, WA8-MCR 16, WB8AKU 14, WB8BPB 13, W8EMK 13, WA8JEH 13, K8DDG 12, WB8EHI 12, WA8ETV 11, WA8VBS 11, W8WEG 11, K8CXY 10, W8GOE 10, WA8TRE 10, WB8CKI 7, W8ARW 6, WB8CEH 6, W8QXQ 6. (July) W8SUS 215, WA8QFK 21, WN8CKI 6, WA8COA 6, WN8CEH 1.

HUDSON DIVISION

EASTERN NEW YORK—SCM, Graham G. Berry, K2SJN—Asst. SCM/RM: Ruth E. Rice, WA2VYS. SEC: W2KGC. PAM: WB2VJB. V.H.F. PAM: WB2-YQU. Section nets: NYS on 3675 nightly at 2300Z; ESS nightly on 3590 at 2300Z; NYSPT&EN nightly on 3925 at 2300Z. Appointments and renewals: K2AXI, W2WGE and K2CXO, new ECs for Orange, Greene and Rockland Counties, respectively; WB2YQU and WA2FYE as OVSs; K2MME as ORS; W2TPV and W2ANV renewed as ORSs. Station activities: WB2PYZ received his old call, W2FGI from the FCC. WB2RBG is college-bound and facing inactivity. WA2HXM reports much activity by the Holy Cross Radio Society, with regular meetings on 14.250 at 1800Z Sat. W2EAF now is net mgr. for Navy MARS. WA2OJD holds a new Extra Class ticket. W2SZ is planning a membership drive with the opening of R.P.I., and will be active in contests this year as well as handling traffic. August picnic notes: NYS and NYSPT&EN both held Annual Picnics. From Sept. column: WB2-RBG is not a "her"—don't know what happened. The New Rochelle Club provided communications for the city swim meet for the 11th year in a row, with K2EBX in charge and K2JQB, WB2RLS and W2DPV active on 2 meters. W2DPV now is Deputy RACES Officer for New Rochelle. Please be sure your club bulletins and news letters get to the SCM and Asst. SCM as well as to K2IES for coverage in the *Hudson Council Newsletter*. Vacation notes from the staff shows WA2VYS Maine-bound; K2SJN and WA2QEG back from a European trip and a visit in London to RSGB Hq. All stations in the area, particularly ECs from other counties, are invited to join in the Westchester County AREC net, 3925 kc M-W-F at 8 P.M. local time. The ESS honor roll for August check-ins includes W2ANV, WA2VYS, WA2VYT, WB2-FUV and WB2IFN. It's easy to see how E.N.Y. racked up a 29th place in the annual Communication Dept. tabulation for traffic but we could do even better with more reports to the SCM from individual

POWER / PORTABILITY / PERFORMANCE



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Cygnet Linear Amplifier

1200 watt matching amplifier with self-contained AC power supply

For those times when the quarter kilowatt of the model 270 transceiver isn't quite enough to break through, the Cygnet Amplifier illustrated above provides a 5 times increase in power. Utilizing a grounded grid, super-cathode-drive circuit, both efficiency and linearity are exceptionally high. In a matching cabinet which includes the AC power supply, the 1200-W makes a most attractive companion for your Cygnet transceiver. It plugs directly into the Model 270, and may be adapted easily to the 260 as well as other transceivers.

SPECIFICATIONS: Power Rating: 1200 watts P.E.P. input with voice modulation, 800 watts CW input, 300 watts AM input. ● Covers 80,40,20,15, and 10 meters. ● Four 6LQ6 tubes operating as grounded grid triodes. ● Third order distortion down approximately 30 db. ● Pi output tank for 50 or 75 ohm coaxial antenna feed. ● Computer grade electrolytic filter capacitors. ● Silicon diode rectifiers. ● Complete with interconnecting cables, ready to plug into the 270 and operate. ● 117 volts, 50-60 cycles input. Available on special order for 208-220-240 volts. ● **Dimensions:** 5½ in. high, 13 in. wide, 11 in. deep. Weight: 25 pounds. (Carrying handle included.)

Amateur net: **$295**

Deluxe *Cygnet* 270 Transceiver

5 BANDS 260 WATTS for fixed, portable or mobile operation

A complete amateur radio station with built-in AC and DC power supply and loudspeaker. The Cygnet 270 contains all the features required for home station operation, yet it is compact and light enough to make an ideal "traveling companion" on those business or vacation trips.

SPECIFICATIONS: Power Input: 260 watts P.E.P. in SSB voice mode, and 180 watts in CW mode ● **Frequency Range:** 3.5-4.0 mc, 7.0-7.3 mc, 14.0-14.35 mc, 21.0-21.45 mc, 28.0-29.7 mc ● **C.F. Networks:** Crystal Lattice Filter. Same as used in the Swan 500 C. 2.7 kc band width at 6 db down. 4.6 kc wide at 60 db down. Ultimate rejection exceeds 100 db ● **Unwanted** sideband suppressed 50 db. **Carrier** suppressed 60 db. 3rd order distortion down approx. 30 db. ● **Audio Response:** flat within 3 db from 300 to 3000 cycles in both transmit and receive modes ● **Pi Antenna coupler** for 50 to 75 ohm coaxial cable ● **Grid Block CW keying** with off-set transmit frequency ● **Solid state VFO circuit** temperature and voltage stabilized ● **Receiver sensitivity** better than ½ microvolt at 50 ohms for signal-plus-noise to noise ratio of 10 db ● **100 kc Crystal Calibrator** and dial-set control ● **S-meter** for receiver, P.A. Cathode meter for transmitter tuning ● **Improved** AGC and ALC circuit. Separate **R.F.** and **A.F.** gain controls ● **Sideband selector** ● Provision for **plug in of VOX** unit, external VFO, headphones, and Cygnet Linear ● **Tube compliment:** 12BA6 VFO amp., 12BE6 trans. mixer, 6GK6 driver, 6LQ6 pwr. amp., 6BZ6 rec. R.F., 12BE6 rec. mixer, 12BA6 1st I.F. amp., 12BA6 2nd I.F. amp., 12AX7 prod. det. A.F. amp., 6AQ5 A.F. output, 12AX7 mic. amp., 6JH8 bal. mod., 12AV6 AGC-ALC amp. **Dimensions:** 5½ in. high, 13 in. wide, 11 in. deep. Net weight: 24 lbs.

Amateur net: **$525**

PLUG-IN ACCESSORIES: Model 508 External VFO, Model 510X Crystal oscillator, Model VX-2 VOX unit.

OTHER ACCESSORIES: Model FP-1 Phone Patch, Mobile Mounting Kit, Model 45 Manual Switching 5 band Mobile Antenna, Model 55 Remote Switching 5 band Mobile Antenna.

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stations. W2TPV now is in Alaska. K2UYK reports his station now has full break-in on c.w. W2CRS says anyone interested in v.h.f. should check into the East Coast Round-up Sun. on 3980 at 2130 local for discussions. Traffic: W2EAF 279, WA2GQW 95, WA2VYS 85, WB2VJB 40, WA2VYT 40, W2ANV 26, WA2FBI 26, WB2FUV 25, W2TPV 18, K2SJN 17, K2UYK 17, WA2CRW 16, WB2RBG 6.

NEW YORK CITY AND LONG ISLAND—SCM, Blaine S. Johnson, K2IDB—Asst. SCM: Fred J. Brunjes, K2DGI. SEC: K2OVN. PAM: W2EW.

NLI*	3630 kc.	1915/2200	Nightly	K2UAT/RM
NLIVHF*	145.8 Mc.	1930	MTWTF	WB2RQF/PAM
NLIPhone*	3932 kc.	1600	Daily	WA2UWA/PAM
Clear Hse	3925 kc.	1100	Daily	WA2GPT/Mgr.
Mic Farad	3925 kc.	1300	Ex. Sun.	K2UBG/Mgr.
East US	3683 kc.	0001	Nightly	K2UBG/Mgr.
All Svc	3925 kc.	1300	Sun.	K2AAS/Mgr.
NYSPTEN	3925 kc.	1800	Daily	K2SPO/Mgr.

** Section Nets. All times above are local.*

K2UBG was operating mobile/4 in Virginia at the time of Hurricane Camille and he checked into the Mississippi Hurricane Net on 3925 kc. K2UBG allow that those Gulf Coast stations did one heck of an FB job. During this period, the Mike Farad Net, which normally traffics on 3925 kc. moved off about 3 or 4 kc. and handled about a dozen pieces of hurricane traffic from there. WA2HMO reported that he's having QSK trouble so I immediately leaped for my Q-Sig manual to see what sort of malady this might be. It seems quite serious. However, within the framework of his initial report one could make at least two interpretations. Either stations are hearing him between his signals, or he is hearing stations between their signals. I sent a signal in May and another in July; do you suppose he heard me in June? W2DBQ participated in the Hurricane Disaster Net on 14,320 kc. s.s.b. during "Camille's" debut. WB2DZZ is extremely proud of the S/Line stuff he recently acquired to go along with the li'l Classic 33 beauty. Friends should be advised that the red-rimmed eyes are due to the new system's magnetic attraction for DX-type signals which quickly added 15 new countries to the DX portfolio. The Jumpsuit and QCWA Net's Sat./Sun. schedule is now: 14,232 kc. from 1500-1630 and 14,345 kc. at 1700 (both times are in Zebra). W2PF says the monthly meetings of the Luncheon Club at the Engineer's Club in N.Y.C. were resumed on 9/17/69. Anyone interested may contact either W2NQR or W2PF. WA2BRF has up to 10 states on 2 meters now, but allows he'd rather chew with the locals which isn't quite so wham-bam! Hey, WA2PMW has his RTTY rig sittin' on 145.62 Mc. all day with an Auto-Start box hooked to it. All you do is charge in on the channel (with your RTTY of course) and leave the rascal a message if he's not there. His report says you'll get a reply, but it's not clear whether you'll get back a recording, or he'll call you later. Five other members of the same Tu-Boro RC have this peachy-keen feature. If they all monitor the same channel 24 hours a day, do you suppose the machines hold their own QSOs when all the rascals are away? WB2UFO has gone and moved to Hartford, Conn. WB2RXR has come up on 2 meters with a Twoer. WB2ULX allows that s.s.b. on 2 meters is the way to go and it has increased his range threefold. He reports he can now make consistent and reliable contacts into Md., Del., Pa., R.I., Conn. and Mass. Welcome and congratulations to two new Novices, WN2KNI and WN2LCN, of the Flatbush Radio Club.

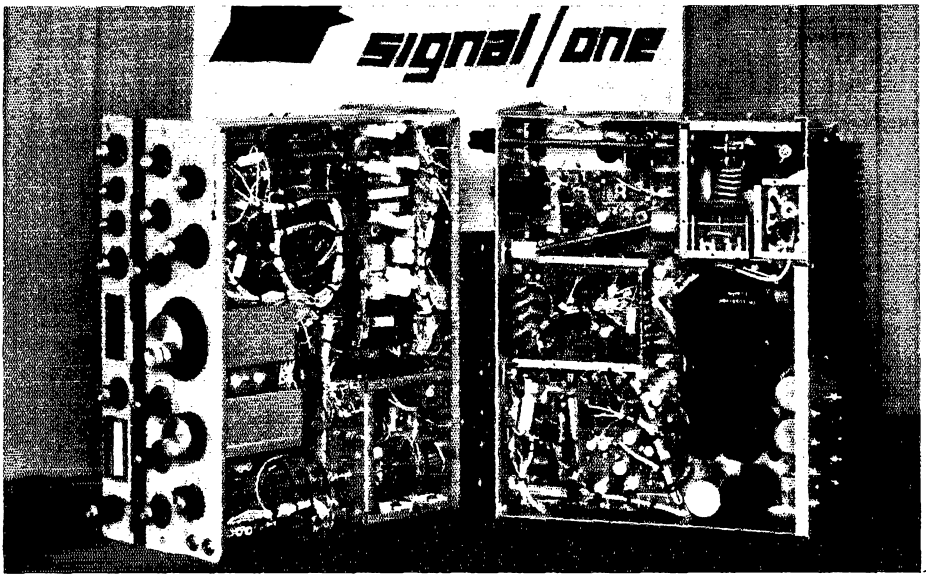
NORTHERN NEW JERSEY—SCM, Louis J. Amoroso, W2ZZ—SEC: K2KDQ. RM: WB2RKK. PAMs: W2PEV, K2KDQ, WA2KZF and WA2TBS.

ARPSC Section Net Schedules

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*Tfc.*	*Mgr.*
NJN	3695 kc.	7:00 P.M.	Dy	31	501	301	WA2BLV
NJN	3695 kc.	10:00 P.M.	Dy	31	312	145	WA2BLV
NJSN	3740 kc.	8:00 P.M.	Dy	31	236	49	WB2RKK
NJEPTN	3950 kc.	6:00 P.M.	M-Sat.	31	467	290	W2PEV
NJPON	3930 kc.	6:00 P.M.	Sun.	5	83	30	WA2TBS
NJAN	50,425 kc.	8:00 P.M.	M-F	22	221	43	WA2KZF
PVETN	145,710 kc.	7:30 P.M.	Dy	31	204	186	K2KDQ
ECTN	146,700 kc.	9:00 P.M.	Dy	31	238	118	WA2TBS

New appointments: WB2FEH as OPS. OO reports were received from W2TPJ, K2BMI and WB2NYK. WB2FEH is the new mgr. for the NJSN, replacing WB2RKK who is now in college. Good luck, OM, and many thanks to WB2RKK for a great job. WA2DNB, WB2NYK and WB2OQM also are off to school. WN2-

It's no secret ...



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Maybe you saw it ... even operated it. But if the crowd kept you from getting a *really good look*, here are highlights of the inside story of ...
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PERFORMANCE ... built in
- Dual-gate MOSFET receiver
- Ultra-sharp selectivity
- IF Shift (to slice off QRM)
- 300 watts input *all* modes
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- Instant band change *without tune-up*
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KYB is a new ham in the Chester area. WN2LES is in Linden. WA2IHV received his Advanced Class license. WB2NYK reports DXCC totals of 157/139. WA2EIN is on RTTY with his SB-101. WB2DRJ received his DXCC. WB2FEH now is using a keyer. WA2DQE has a new Swan 350. WB2BCS reports 15 new members. WA2EUX is chasing 20-meter DX. WB2VLC is going to NCE. WA2CRF added the SR-2000 to the shack. WA2RIN is home after 35 months in DL4-Land. WB2QQU is going to Cornell. K2ZIP moved to Denver and WA2QPD moved to Montana. Good luck to both. WA2NHH has his monitor working for his SSTV setup. WB2DFG is using a new Swan 500C. WA2QBJ added the GT-550 to the shack. WB2HXR's solid state 2-meter receiver is putting out a good signal. W2TUK and W2ZZ presented the ARRL charter to the BARK group. Our SEC is looking for some new ECs. If you are interested in this type of work, please contact K2KDQ or W2ZZ. A special note to all DX men: Keep an envelope or credits with the W2-K2 QSL Bureau. The address is P.O. Box 505, Ridgewood, N.J. The SCM does not handle QSL cards for DX QSO. The Bureau takes care of that job. Good luck to all in the SS and hope to work you. Traffic: (Aug.) WB2RKK 621, K2DEL 389, K2KDQ 323, WB2FUW 312, WA2IGQ 215, WB2DDQ 180, WA2BHJ 166, WB2FEH 115, WB2NSV 107, WA2TBS 80, WA2BAN 70, WA2DNB 65, W2PEV 60, WA2IISJ 58, WA2DQE 54, K2TZC 41, WB2CWP 36, WB2BXK 30, W2CVW 26, WB2WUZ 25, WB2YXJ 25, W2ZZ 25, WA2ACP 22, WB2YPQ 22, WB2WID 21, WA2CCF 19, WA2EUX 16, WA2GLI 16, WA2NJB 15, WB2TUL 14, WA2CLO 12, W2JDH 12, WB2HEO 11, WA2BCT 10, WA2KZF 8, WB2WNZ 7, K2ZFI 7, WA2-EUO 6, W2EWZ 6, K2PBP 6, WB2BCS 4, WB2DRJ 4, W2DRV 2, WB2VFX 1. (July) W2CVW 25, W2DRV 9, WA2GIE 7, K2ZFI 6, W2ABL 4, W2EWZ 3.

MIDWEST DIVISION

IOWA—SCM, Wayne L. Johnson, KØMHX—SEC: KØLVB. PAM: WØPZO. RM: WØLGG. OBSs: WØLCX, WØJAQ, WAØMIT. New appointee: WAØMLE as OO transferred from Kansas. The Marshalltown group did a fine job as hosts of the 75-Meter Picnic. Their central location helps the good attendance. WØLMM at Des Moines has joined Silent Keys. Members of the Iowa 160 Meter Net paid their respects to Pvt. Ricky Swaney, son of WØMEL, who was killed in conflict in Vietnam. The Southwest Iowa ARC classes of WØRMG have new Generals WAØTSN, WAØTSP and WAØTSR. WNØZNN reports six new hams in Clayton County because of the efforts of WØSFK. WAØAWH has transferred to a new job in Colorado. All Mary's friends wish him the best of luck. WAØOTE is DXing on 40. WAØKWH and WAØIJN are recent new Extras. ARRL Midwest officials are meeting on 7280, Sun. at 0100Z. Everyone is welcome. It is certificate-renewal time. Is yours up to date? Happy Turkey Day.

Net	*Freq.*	*Day*	*GMT*	*QNI*	*QTC*	*Mgr.*
Iowa 75	3970	M-Sat.	1830	1445	238	WØPZO
Iowa 160	1815	Daily	0100	635	7	KØTDO
Iowa SSB	3970	M-Sat.	2359			WØYLS
TLCN	3560	Daily	0030	163	131	KØAZJ
PON	3915	W-F	0030			WAØDYV

Traffic: (Aug.) WØLCX 1105, WAØBSF 177, WØMLE 146, WAØOTQ 126, WØUPX 104, WAØLAB 102, KØ-AZJ 95, WØLGG 77, WØKB 74, WAØYVR 60, WAØKZL 42, WØJPJ 34, WAØVDC 22, KØTDO 21, WAØPOE 16, WAØMIT 10, WAØQZL 9, WAØUVH 9, WAØPPW 7, WØDMX 6, WØMOQ 6, WAØVDP 6, WAØGVJ 5, WAØOTE 5, KØEXN 4, WAØROM 2. (July) WØMLE 124, WØDUA 88.

MISSOURI—SCM, Robert J. Peavler, WØBV—SEC: WØBUL. New appointments: WAØVRI as ORS and OPS. Appointments renewed: WAØKUH as OBS, WAØFMD as ORS. PHD certificates went to WAØ-UGU, WAØOFO and KØIKZ. With deep regret I report the passing of Paul E. Anway, WØGF, ex-WAØIKK. A lawyer for the Kansas City Power and Light Company, Paul was active in amateur radio for many years. Net reports:

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
MEN	3885	2230Z	M-W-F	13	134	16	WØBUL
MNN	7063	1800Z	M-Sat.				WØOUD
MON	3585	0000Z	Daily	20	128	69	KØAEM
MoSSB	3963	2300Z	M-Sat.	26	842	139	WØRTO
MoPON	3933	2200Z	M-Sat.	26		129	WAØTAA
SMN	3585	2100Z	Sun.				WØOUD
PHD	50.45	0030Z	Tue. (GMT)	4	68	4	WAØKUH

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FROM THE MAKERS OF THE FAMOUS GALAXY TRANSCEIVERS

The Galaxy FM-210 2 Meter FM Transceiver

● Now every Amateur can buy Galaxy's well-known quality and performance in a 2-Meter FM Transceiver! This American-made, solid-state, FET front end transceiver offers no compromise performance for direct or repeater communications...a full 5 watts of Power (or 10 watts with the optional AC-DC Power Booster!) Check these specs and you'll agree it's a lot of Transceiver for only $199.95! *See one...try one!*

SPECIFICATIONS

Frequency range: 143-149 MHz. Antenna Impedance: 50 Ohms Nominal Power Req'mts: 12-14 VDC (or optional power booster)

Transmitter: Power Input: 5 watts (10 W. with pow. booster) • Freq. Control: 3 Chan. crystal controlled • Microphone: High Impedance req'd. • Deviation: Adj. narrow or wideband with clipper filter also adj. for optimum clipping level.

Receiver: Sensitivity: SINAD .5uv for 12db, 1uv provides 20 db quieting. • Adjustable squelch • Modulation Acceptance: FM wideband (narrow band available) • Type: Dual Conversion, FET front end for minimum cross modulation and overload • IF Frequencies: 10.7MHz and 455 KHz • Freq. Control: 3 chan. crystal controlled • Audio Output: 3 watts (intr'nl 3.2 spkr.)

Power Booster: Provides high power operation from either 12-14VDC or 117 VAC. Makes an ideal fixed station accessory. ($39.95).

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MWN 3585 0245Z Daily 26 120 103 WAØRVR

The times given above will be moved one hour later with the shift to Standard Time. Congratulations to WØEXQ, who was named Ham of the Year by the St. Louis Amateur Radio Club. WØUQP passed the Extra Class exam; WAØRBZ, WAØRCA and WAØUOX the Advanced Class. New Novices: WNØZIX and WNØZLP. WAØVBG graduated from Northeast State College in Aug. and has gone to teach in Iowa. WØLNV has moved to Green Bay, Wis. WØKKC has moved to Kansas City, where he is a professor in the college system. KØRPH, WØMXI and KØWBD are running phone patches to Vietnam, Thailand and Japan on MARS frequencies. KØETY is trying radio control of model airplanes. WAØTSI reports that the FCC office in Kansas City now holds amateur exams only on Thurs. at 1:00 P.M. Traffic: KØONK 1698, WAØRVR 634, KØAEM 362, WAØVRI 324, WAØHTN 62, WØBV 49, KØORR 34, WØBUL 33, WAØFKD 33, WØJKF 33, WAØVJN 29, KØRPH 28, WAØHQR 23, WAØFMD 15, WØRTO 11, WAØKUH 4, WØBVL 2, WNØZLP 2.

NEBRASKA—SCM, V. A. Cashon, KØOAL—SEC: KØODF. The NSN report was not received in time for submission to *ARRL*. Net reports must be received at this QTH by the 7th of each month for the preceding month. NEB I and NEB II were inactive for the month of Aug. Now that the summer season is coming to an end, it is hoped that net reports are received in time and that more stations will forward their station activity reports. Hope everyone had an enjoyable summer.

Net	*Freq.*	*GMT*	*Days*	*QNI*	*QTC*	*Mgr.*
NMN	3982	1230	Daily	991	53	WAØJUF
WNN	3950	1300	M-Sat.	536	7	WØNIK
AREC	3982	1330	Sun.	215	6	WØIRZ
CHN	3982	1730	Daily	902	41	WAØGHZ

Traffic: (Aug.) KØNEB 131, WØLOD 62, KØUWK 52, KØKJP 44, WAØJIH 39, KØJTW 38, WØBFV 34, WAØHWR 33, KØJFN 27, WAØOMY 27, WAØQGZ 17, WAØLOY 16, WAØBOK 15, WØNIK 15, WAØPCC 15, WAØGHZ 12, WAØOQX 12, KØSEA 11, KØDGW 9, WØFQB 8, WØHTA 8, KØODF 8, WAØDXY 7, KØHNT 6, WAØIXD 6, WAØCHN 5, WAØDFS 5, WAØEEI 5, WAØHFN 5, WØZOU 5, WØATU 4, WAØPIF 4, WAØQEI 4, WAØFGV 3, WØHOP 3, KØOAL 3, WØVEA 3, WØRAM 2, WØURC 2, WØVFR 2, WAØJAV 1, WAØSCS 1, WAØUPK 1. (July) WAØJIH 21.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, John J. McNassor, W1GVT—RM: WA1HSN. PAM: K1YGS. V.H.F. PAM: K1SXF. Aug. activity report:

Net	*Freq.*	*Days*	*Time*	*Sess.*	*QNI*	*QTC*
CN	3640	Daily	1845	31	212	205
CPN	3965 M-S	1800 Sun.	1000	31	435	94
VHF 2	145.98	M-S	2200	21	79	20
VHF 6	50.6	M-S	2100	21	144	15

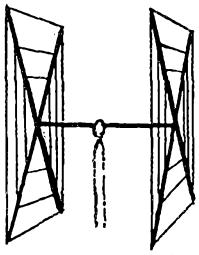
High QNI: CN—W1EJI, W1EFW and K1EIR, CPN—W1DQJ, W1GVT, K1SXF, K1YGS and WA1JVV. The high standards set by former SEC, W1PRT, makes it difficult to get a replacement who will continue in the same manner. Willingness and ability are prime requisites—any suggestions? Please read the ARPS Section in each *QST*. Providing emergency communications is a vital part of amateur radio and an ideal way to fill our Public Service requirement. Director W1QV's *Newsletter* includes thanks to our retired PAM, W1YBH, for his dedicated service. PAM K1YGS sent *News-notes* and *Net Rosters* to CPN Members. The picnic season included outings by Murphy's Marauders and the V.H.F. 6- and 2-Meter Nets. W1JMY and K2SRF are recovering from recent illnesses. Congratulations to: K1VTM for Extra Class; K1EIC, K1EIR, WA1JQC and WA1HOL for Advanced Class; WA1JYE for WAC; WA1JQC for WAS; and W2NBP and W1TS on their retirement! Home-Brewers: WA1HOL, *solid state keyer*; WA1FNJ, automatic CQer; W1EOR, 5-watt all-band s.s.b. transmitter plus linear! Traffic outlets are appreciated in all areas. On your fall and winter schedule please include time to check in on CN, CPN, V.H.F. 6 or V.H.F. 2—you meet the nicest people there! Traffic: (Aug.) W1EFW 244, W1EJI 168, WA1IGF 139, W1AW 102, K1EIR 79, WA1HSN 76, WA1HOL 71, WA1FNJ 64, K1SXF 59, WA1JGA 58, WA1JMO 56, WA1KMR 56, K1EIC 48, WA1JGF 45, W1GVT 43, W1WCG 36, WA1JVV 35, K1QPN 28, WA1JQC 25, WA1GFW 17,

AHA! YOU THOUGHT GOTHAM

was a giant, automated, mechanized, computerized factory. No, no, no. Just two brothers, making thousands of the best antennas possible at low, low, low prices that reflect the tiny overhead. In QST since '53 without missing an issue!

QUADS

Worked 42 countries in two weeks with my Gotham Quad and only 75 watts . . . W3——



CUBICAL QUAD ANTENNAS— these two element beams have a full wavelength driven element and a reflector(the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount; uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a foolproof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you!

10/15/20 CUBICAL QUAD SPECIFICATIONS

Elements: A full wavelength driven element and reflector for each band.

Frequencies: 14-14.4 Mc.; 21-21.45 Mc., 28-29.7 Mc.

Dimensions: About 16′ square

Power Rating: 5 KW.

Operation Mode: All.

SWR: 1.05:1 at resonance.

Boom: 10′ × 1¼″ OD, 18 gauge steel, double plated, gold color.

Beam Mount: Square aluminum alloy plate, with four steel U-bolt assemblies. Will support 100 lbs.; universal polarization.

Radiating elements: Aluminum wire, tempered and plated, .064″ diameter.

X Frameworks: Two 12′ × 1″ OD aluminum 'hi-strength' alloy tubing, with telescoping ⅞″ OD tubing and dowel insulator. Plated hose clamps on telescoping sections.

Radiator Terminals: Cinch-Jones two-terminal fittings.

Feedline: (not furnished) Single 52 ohm coaxial cable.

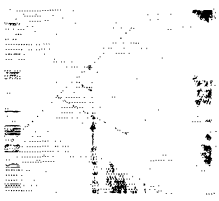
Now check these startling prices— note that they are much lower than even the bamboo-type:

10-15-20 CUBICAL QUAD	$35.00
10-15 CUBICAL QUAD	30.00
15-20 CUBICAL QUAD	32.00
TWENTY METER CUBICAL QUAD.	25.00
FIFTEEN METER CUBICAL QUAD.	24.00
TEN METER CUBICAL QUAD	23.00

(all use single coax feedline)

BEAMS

"Just a note to let you know that as a Novice, your 3-El. 15 Beam got me RI Section Winner and New England Division Leader in Novice Round-up. See June QST, p. 57 for picture of ant. (below). Tnx for a fine working piece of gear. 73s, Jay, WA1JFG"



Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history! Each beam is brand new! full size (36′ of tubing for each 20 meter element for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; ⅞″ and 1″ aluminum alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

2 El 20	$19	4 El 10	$18
3 El 20	25*	7 El 10	32*
4 El 20	32*	4 El 6	18
2 El 15	15	8 El 6	28*
3 El 15	19	12 El 2	25*
4 El 15	25*		
5 El 15	28*		

*20′ boom

ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, TI2FGS, 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. *DEALERS WRITE!*

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K1YGS 17, W1LUH 16, W1QV 11, W1YBH 11, W1BDI 10, WA1FXS 8, W1BNB 6, W1CTI 5, W1CUH 5, W1OBR 3. (July) W1WCG 91, K1QPN 14. (June) W1WCG 42. (May) W1WCG 155.

CONNECTICUT TOWNS · SEVEN-ELEVEN QSO PARTY
(For Connecticut Stations Only.)

December 6-7, 1969

All *Connecticut* amateurs are cordially invited to participate in the Connecticut Towns QSO Party, sponsored by the Connecticut Wireless Association, Inc.

Rules: 1) The operating periods of the party are broken up into three sections; 7:00 PM to 11:00 PM EST Saturday Dec. 6, 7:00 AM to 11:00 AM Sunday Dec. 7, and 7:00 PM to 11:00 PM Sunday Dec. 7. 2) Any and all amateur bands, phone and cw, may be used. Suggested operating frequencies are: *phone* 1.815 3.925 7.26 14.275 21.350 28.7 50.12 145.12; cw 1.810 3.56 7.06 14.06 21.06 28.06 50.1 and 145.1 MHz. 3) Stations may be worked once per band per mode. No cross band or cross mode contacts are permitted. Mobile stations may work other fixed stations more than once per band (from different locations) but may count them as a multiplier only once. 4) Context exchange consists of contact number, signal report and town your station is located in (tax town for motor vehicle registration to be used in determing town you're located in). 5) Score one point per contact. Multiply total contact points by the number of towns worked (total of 169) to determine final score. 6) Logs must show band, mode, time of contact, contact number, signal report and town. Include your class of license and county for purposes of awards determination. All logs must be postmarked no later than January 15, 1970 and should be sent to Norman Williams, K1UDD, Box 388, Stafford Springs, Connecticut 06076. 8) A trophy will be awarded the top scorer in the state. Additionally, certificates will be awarded the top two scorers in each county as well as the top Novice and Technician scorer in the state. Connecticut Wireless Association members are not eligible for awards.

This is an opportunity to meet new friends and renew old acquaintances. So get on the air this December weekend and meet the gang in the Connecticut section.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, Jr., W1ALP—SEC W1AOG received reports from W1RPF, WA1s IRY and DXI. We were all saddened by the death of W1EAE, who was operating in our c.w. net at the time. W1PV also became a Silent Key. K1PNB has taken over as *RM* for the *80* c.w. band. W1LE, new EC for the New Bedford Area, has appointed W1UID, who is Radio Officer for New Bedford, as Asst. EC. He says that the So. Eastern Mass. ARA, W1AEC, will play an important part in the set-up. WA1KOW has a Ranger I on the air. W1RSP has an NC-200 on 10. K1GAZ has the call WB4MZR down South. W1AKC, on 2, is working the gang up this way. W1HHU was in the hospital. W4CEH, ex-W1BNU, called on the land phone. K1ZZY has a tower for beams. K1CZH is getting ready for 160/80 DX he also will be on 2-80. WA1s IRY, JVL, JYY, JVM and WN1IRX set up a rig at the Foxboro Fair and handled traffic. K1IBR and gang renovated W1AEC's shack. W1PVD/LZW has been on from Eastham with an SB301-401 on several bands. K1ESG has a TCC certificate. WA1EYY and W1OJM are in the hospital. W1AOG checks in on the East Coast ARS on 7255 kc. K7JRE/1 made WAC. K1YUB has a 4BTV antenna. WN1LIX has 29 states. WA1JKZ has WAC, and three-element mini beam on 15 s.s.b. K1PNB is working some at WFGL/WFMP. The EM2MN had 21 sessions, 178 QNIs, 96 traffic. The 5-Meter Cross Band Net had 14 sessions, 28 QNIs, 1 traffic. New on 6 RTTY: WA1HVY, K1FWF, WA1-BWV. F.m. *repeater W1ELU in Marlboro has input* 146.340, output 146.940. W1ELP has an SB-500. W1EUJ has a 600-watt rig on 220. K1QDR is building a new wooden tilt-over mast for 220/432 Mc. Mass. Chapter NAHC is on 50.4 at 10 A.M. Sun. Raytheon RC officers are W1YLB, pres.; W1MOJ, vice-pres.; W1LRB, treas.; W1VBI, secy. The T-9 RC met at W1IIB's. ficers are W1YLB, pres.: W1MOJ, vice-pres.; W1LRB,

Meet The Adaptable 2-Meter Rig

Heathkit HW-17A
Adapts to AM or FM Modes, Fixed or Mobile

Wouldn't it be nice to have a 2-meter base station that installed in the car in seconds or worked FM or AM when you wanted? The HW-17A is your piece of gear, OM. Has a built-in 117 VAC supply for fixed use, and once you've installed the optional HWA-17-1 Mobile Power Supply in your car, you're ready to run mobile.

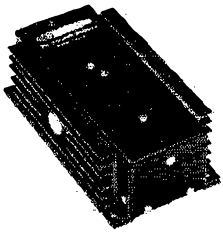
And to operate wideband FM, to use those repeaters around the country, just install the HWA-17-2 FM adapter.

The Heathkit HW-17A is really a separate receiver & transmitter on one chassis (only the power supply and audio output/modulator are common). Covers 143.2 to 148.2 MHz . . . ideal for MARS & CAP ops. The solid-state dual conversation superhet receiver with a prebuilt, prealigned FET tuner has 100 kHz calibration, ANL, squelch and 1 uV sensitivity. Selectivity is 27 kHz @ 6 dB down. A front-panel meter monitors received signal strength and relative power output. The 3-position front-panel switch has a "Spot" position for finding transmit frequency, a Receive/Transmit position and a Battery-Saver position that cuts current drain way down during those long periods of mobile monitoring. A space-saving 3 x 5" speaker is built in.

On the transmitting end is a hybrid tube-transistor circuit with a 25-30 watt input and a healthy 8-10 watts AM output. Modulation is automatically limited to less than 100%. A front-panel selector switch chooses any of four crystal frequencies or an external VFO (the Heathkit HG-10B at $39.95* is ideal). Tune up is quick and easy.

The HW-17A goes together in about 20 hours with circuit board construction & measures a slim 14⅛" W x 6¼" H x 8½" D with everything in place. Ceramic PTT mike included. Start having one rig in two different places . . . order your HW-17A now.

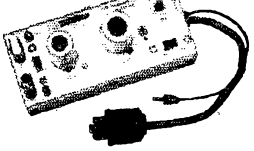
Kit HW-17A, 18 lbs. **$129.95***



Solid-State Mobile Power Supply

Supplies operating voltages for HWA-17A. Large heat sinks for cool 50% duty cycle. Circuit breaker protected. For neg. gnd. systems. Cables & connectors included.

Kit HWA-17-1, 5 lbs. **$24.95***



FM Adapter For HW-17 Series

Transmits wide band (15 kHz) FM. Just flip a switch for AM or FM. Two crystal positions (146.94 MHz crystal included). Installs without hole drilling.

Kit HWA-17-2, 2 lbs. **$17.95***

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*Mail order prices; F.O.B. factory. AM-221

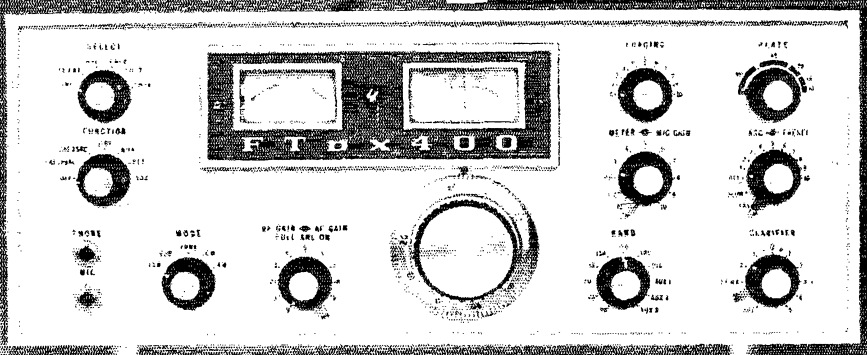
W1WNK has an Advanced Class license. W1MNK has an SB-401 and an SB-200 on the air. W1MX announces the Fifth Mass. QSO Party to be held Nov. 1. K3QDD/1, chairman. K1BJZ is getting some of her rigs repaired. W1TZ is living on a boat down in Hyannis. W1LIN and K1HFG are moving to Longmeadow. K1IUW now is a married man. W4VZP is ex-W1DXO. Massasoit ARA held a meeting. WA1INS showed some slides. Amateur Radio On the Air Assn. held a meeting at Mt. Hood in Melrose with WA1FHU, K1PNB, W1s ALP, HKJ, WA1s JVL, LIX, K1ESG, K7JRE and a few XYLs attending. K1UCT is editor of the Whitman Club's monthly bulletin. Appointments endorsed: W1AKN, WA1DXI, K1ERO as ECs; W1PEX as OPS; K1BJZ as OBS; K1PNB as RM for 80 Novice band; W1BHV as ORS. WA1FNM is a new OPS. W1VLU, now in Sandwich, is Asst. EC and RO to W1AKN. WA1IRY has his Advanced Class license. Your attention is called to our Novice Net, on 3733 kc. Mon., Wed., Fri. at 6:30 P.M. and code practice at 8:15 P.M. Anyone wishing to help out should get in touch with K1PNB. New Novices: WN1s LPH, LPN, LPO, LPC, LPK, LPL, LOV, LOS, LPD, LPM, LQJ, LQK, LQP, LQH, LQI, LQN, LRJ, LQW, LRK, LRI. Other new ones: WA1s LON, LOO, LPV, LOI, LOJ, LOL, LOK, LPZ, LQB, LQM, LRL, LRN, LRM. WA1LQR is a new club, the St. Stephens ARC in Lynn. Traffic: (Aug.) K1ESG 451, W1PEX 306, WA1EYY 259, WA1JVL 173. WA1FAD 119, WA1IRY 117, W1EMG 100, K1PRB 91, W1HKJ 53, W1CTR 33, W1BUF 31, WA1IFE 25, WA1IJL 21, W1AOG 18, WA1HHK 18, W1DOM 14, WA1DPX 11, W1CZB 10, K7JRE/1 8, K1YUB 7, W1LE 4, WA1DED 2, WN1LIX 2, K1CLM 1, WA1JKZ 1. (July) W1PEX 457, K1WVW 8, K1YUB 7, WA1DEC 5, WA1DED 4, K1PNB 4.

MAINE—SCM, Peter E. Sterling, K1TEV—WA1FCM is returning to the U. of M. and hopes to be active from W1YA. New hams in Maine are WN1LPG, WN1LOX, WN1LOZ and WA1LPS. Welcome to the fraternity, fellows. K1GUP has been on from his new QTH with QRP power. W1GJZ and W1WAS worked VE2DVO on 2 meters. He is running a 40-element colinear beam up 65 feet so point your beams *into* the north, boys, he is looking for contacts. WA1KNX is on with a new HW-100. I am still looking for news to put in the column. How about it, fellows, there must be some news in the state? W1AI has moved to his new QTH in Saco and hopes to be on the air soon. WN1LNG has moved into his new house in Westbrook. K1RSA is back on the air with a 522 and eleven-element beam. Traffic: WA1FCM 203, WA1KLO 42.

NEW HAMPSHIRE—SCM, Donald Morgan, K1QES—SEC: K1RSC. RM: K1BCS. PAM: K1APQ. Welcome to WA1LOG (T) Salem, WA1LOH (T) Kingston, WN1LQO Nashua. The GSPN report shows 946 check-ins and 85 traffic. The NHEPN shows 134 check-ins and 85 traffic. The 18th N.H. QSO Party was very successful with K1CXP the winner. The Bow Radio Club is to be complimented on running such a nice party. WA1JTM is a new ORS and at a new location. K1AC was endorsed as ORS for another year. We have two holders of OO Class I and II. We can always use dedicated personnel in the appointed field. Any and *all* interested should contact the SCM. K1-IIK is heard frequently after a long absence. Club activity is picking up once more. The ham population continues to grow within the state. A new 6-meter net is contemplated in southern N.H. Interested members should contact and support K1SYJ. Mobile activity is on the increase. K1APQ and K1RSC need support and net controls. Be courteous, it pays large dividends. Traffic: K1BCS 124, K1PQV 28, K1QES 9, K1IIK 2.

RHODE ISLAND—SCM, John E. Johnson, K1AAV—SEC: K1BII. RM: W1BTV. PAM: W1TXL. V.H.F. PAM: K1TPK. RISPN report: 31 sessions, 474 QNI, 99 traffic. This month, I think we should thank all the members who consistently over the months send their traffic reports to the SCM. W1TXL, our PAM, has worked hard on traffic and has several BPL awards to his credit. W1BTV, our RM, has worked hard to keep the C.W. Net operating. Assisting him are W1YKQ, WA1BLC and K1QFD, our only XYL appointee. K1TPK, our V.H.F. PAM, has worked several months with the AREC in addition to the traffic nets. K1VYC, of Pawtucket, has been very active on 6 meters. WB2HPW/1, of the U.S. Navy, is a recent member of the nets and is very active in the Newport area. K1NJT has been very active reporting on the RISPN traffic. These are only a few of the many traffic people in the state but their reporting has been excellent over the years. All club

TOP OF THE YAESU F LINE



THE FT DX 400 TRANSCEIVER

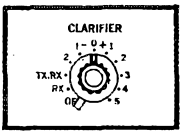
Conservatively rated at 500 watts PEP on all bands 80 through 10 the FT dx 400 combines high power with the hottest receiving section of any transceiver available today. In a few short months the Yaesu FT dx 400 has become the pace setter in the amateur field.

FEATURES: Built-in power supply • Built-in VOX • Built-in dual calibrators (25 and 100 KHz) • Built-in Clarifier (off-set tuning) • All crystals furnished 80 through the complete 10 meter band • Provision for 4 crystal-controlled channels within the amateur bands • Provision for 3 additional receive bands • Break-in CW with sidetone • Automatic dual acting noise limiter • and a sharp 2.3 KHz Crystal lattice filter with an optimum SSB shape factor of 1.66 to 1.

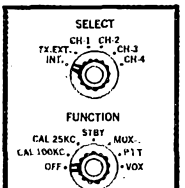
Design features include double conversion system for both transmit and receive functions resulting in, drift free operation, high sensitivity and image rejection • Switch selected metering • The FT dx 400 utilizes 18 tubes and 42 silicon semi-conductors in hybrid circuits designed to optimize the natural advantages of both tubes and transistors • Planetary gear tuning dial cover 500 KHz in 1 KHz increments • Glass-epoxy circuit boards • Final amplifier uses the popular 6KD6 tubes.

This imported desk top transceiver is beautifully styled with non-specular chrome front panel, back lighted dials, and heavy steel cabinet finished in functional blue-gray. The low cost, matching SP-400 Speaker is all that is needed to complete that professional station look.

SPECIFICATIONS: **Maximum input:** 500 W PEP SSB, 440 W CW, 125 W AM. **Sensitivity:** 0.5 uv, S/N 20 db. **Selectivity:** 2.3 KHz (6 db down), 3.7 KHz (55 db down). **Carrier suppression:** more than 40 db down. **Sideband suppression:** more than 50 db down at 1 KHz. **Frequency range:** 3.5 to 4, 7 to 7.5, 14 to 14.5, 21 to 21.5, 28 to 30 (megahertz). **Frequency stability:** Less than 100 Hz drift in any 30 minute period after warm up.

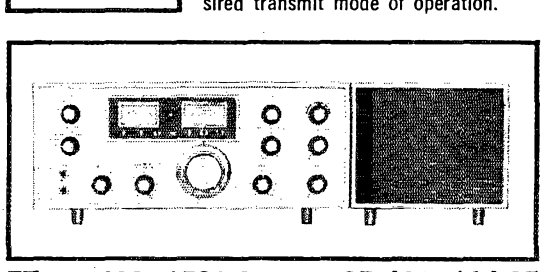


CLARIFIER CONTROL — Does the work of an external VFO — allows operator to vary receive frequency 10KHZ from transmit frequency, or may be used as an extra VFO combining transmit and receive functions.



SELECT CONTROL — Offers option of internal or outboard VFO and crystal positions for convenient preset channel operation.

FUNCTION CONTROL—Selects crystal calibration marker frequency and desired transmit mode of operation.



FT DX 400 $599.95 — SP-400 $14.95

activities should be reported to the SCM as soon as your plans are known. Traffic: W1TXL 384, W1YKQ 150, WB2HPW/1 81, W1BTV 32, K1QFD 29, K1TPK 29, WA1BLC 15.

VERMONT—SCM, E. Reginald Murray, K1MPN—Every once in a while this column digresses from the usual format of listing complete net activity. This is such an occasion for two reasons. First, we do not have reports from all nets and second, some frequency and time changes are in the works. By next month we should be back on schedule. It is with great regret that we must report W1WOO (Middlebury) and W1TLI (Essex Jct.) as Silent Keys. Both were active on 2-meter f.m. and will be missed by all of us. WA1HSG (Newport) was elected Vt. SB Net Mgr. WA1JGK now is attending Middlebury College. Welcome to Novice WN1LPA (St. Albans). Note the Green Mountain Net now is on 3932 and the VTNH Net now is the MNV Net, still on 3685. Traffic: K1BQB 159, WA1IZD 18, K1MPN 15, WA1GKS 14, WA1JGK 12.

WESTERN MASSACHUSETTS—SCM, Percy C. Noble, W1BVR—C.W. RM: W1DVW. SEC:—. PAM:—. We hope to fill both of these posts soon. This year's officers of the Hampden County Radio Assn. are K1ANF, pres.; W1LS, vice-pres. and program chairman; WA1DNB, secy.; Alphone Brousso, treas. WA1IAU is the new *Zero Beat* editor, and WA1GOK the new publisher (replacing W1IC who has done such a fine job the past several years). A total of 34 calls were seen during Field Day at Middlefield! New appointments: W1HRC as OPS, WA1JCT as ORS. Appointments endorsed: WA1EYF as OPS, WA1ABW, K1WZY, W1ZPB as ORSs. Oh, gosh, there were others, too, but I've already sent the forms in to ARRL. We need many new ECs. Any of you willing to tackle this very difficult job? W1DVW, our C.W. Route Manager, reports the following for the West. Mass. C.W. Traffic Net (daily on 3560 kc. at 7:00 P.M.—all invited) for Aug.: 110 QNIs with a total of 102 messages handled. The top six in attendance were W1BVR 31 sessions, W1DVW 18, WA1JCT 17, W1ZPB 16, K1WZY 9, W1KK 7. If it seems to some of you that I stress c.w. activity, here is the story: First of all, that is our closest knit ARRL activity; and secondly, and perhaps more important, is the fact that I receive much more information from them. You other fellows send in your reports to me and by golly they will be mentioned in this column. Fair enough? Traffic: (Aug.) W1BVR 100, W1ZPB 90, W1DVW 69, W1IHI 22, K1WZY 18, WA1JCT 17, WA1ABW 1. (July) W1IC 23.

NORTHWESTERN DIVISION

IDAHO—SCM, Donald A. Crisp, W7ZNN—The FARM Net convenes at 0200 GMT on 3935 kc. week days. The RACES Net convenes at 1515 GMT on 3991 kc. week days. WA7MDT is a new ham in Arimo, Idaho. WA7MGH is a new call in Tetonia. WN7MFJ just got on the air in Ashton. San Diego 200th Anniversary—Idaho Contest is scheduled for the week of Nov. 3-Nov. 9. Awards will be made to the Idaho amateurs with the most contacts with San Diego amateurs. W7GHT received an ORS endorsement. Your SCM attended a very informative Northwestern Division League meeting at Walla Walla. The Gem State Club set up an amateur radio display in a downtown store window to attract new prospects for a club-sponsored code and theory class. W7HPH has sold his home in Boise and plans to travel. FARM Net report: 20 sessions, 449 check-ins, 104 traffic handled. Traffic: W7GHT 156, WA7BDD 55, W7IY 20, K7OAB 11, W7FIS 2, W7ZNN 2.

MONTANA—SCM, Joseph A. D'Arcy, W7TYN—SEC: W7RZY. PAM: W7ROE.

Montana Traffic Net	3910 kc.	0000 GMT	M-F
Montana Post Office Net	3950 kc.	0245 GMT	Daily

K7NDV is the new EC for Silver Bow County. WA7BQS is in the service stationed at Fort Meade. K7VRH has moved to KH6-Land. W7IMZ, at Missoula, and the club will sponsor the Glacier Park Hamfest next year. If you would like to help out, write to Jerry and he will line you up. The Anaconda Amateur Radio Club has a new call, W7VNE, a memorial to Mal Jurmg, of Anaconda. New calls in the Anaconda area are WN7NAA and WN7NFV. W7RZY is back from school in Florida. K7CHA also went along. W7LBK is now on 2 meters. K7ABV is a new OBS for c.w. in the section. We still need OO stations. The Butte Club's paper, *the Tyler*, is available if you will send an SASE to W7OIO.

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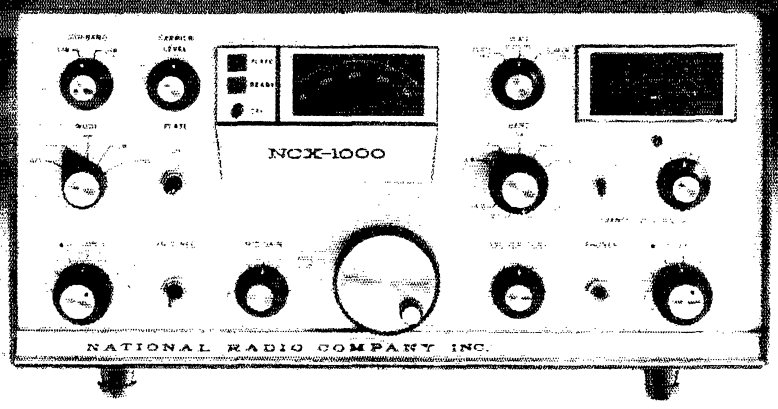

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W7JX is a Silent Key and will be missed. Traffic: (Aug.) WA7IZR 56. (July) WA7IZR 316, W7LBK 26.

OREGON—SCM, Dale T. Justice, K7WWR/WA7KTV—SEC: W7HLF. RM: W7ZFH. PAM: K7RQZ. August net reports: K7IFG and WA7HKV report for the BSN, sessions 56, traffic 152, check-ins 1032. K7YQM reports for the Oregon AREC Net, sessions 31, traffic 64, check-ins 747, contacts 71, maximum number of counties 17. K7YIA reports for the Salem Area AREC Net, sessions 31, traffic 14, check-ins 237. W7VIF reports for the OEN, sessions 61, traffic 48, check-ins 4459, contacts 503. K7OUF is building up the NSN after the summer months. WA7IJV is handling a lot of traffic into Portland. W7MLJ still is heading the Post Office Net, which meets at 6:30 local time on 3920 kc. Wed. W7DEM keeps us informed of activities in Grants Pass. W7HLF sends in his first SEC report. New appointment: WA7KIU as EC for Hood River County. WA7FTN handled 486 phone patches to S.E. Asia during August. Traffic: K7RQZ 388, WA7IFS 98, WA7IJV 81, K7WWR 50, K7OUF 44, W7BNS 37, W7CPK 34, K7YQM 28, K7IFG 26, WA7HKV 25, WA7JMD 13, WA7KTV 13, W7DEM 11, W7MLJ 10, WA7JAU 8, K7-USZ 6.

WASHINGTON—SCM, Harry W. Lewis, W7JWJ—Net traffic reports:

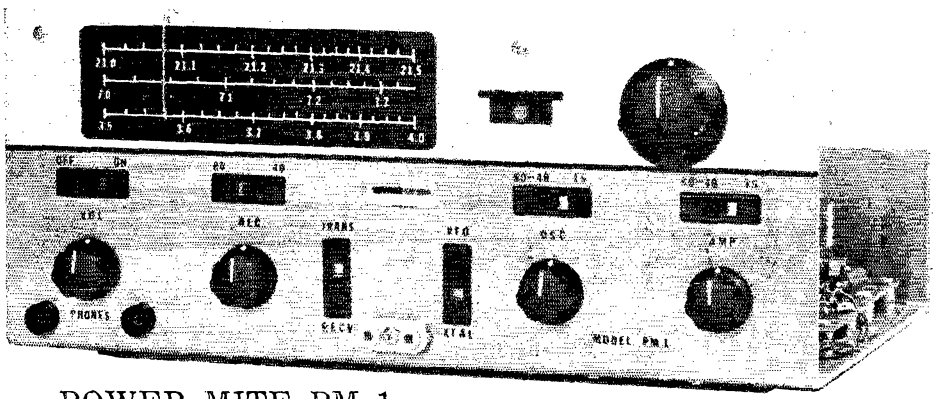
Net	*QNI*	*QTC*	*Sess.*
WARTS	1411	228	31
NTN	893	279	31
WSN	324	294	31
AREC	30	8	5

Aug. saw activity with traffic being originated from two fairs in Washington. The Amateur Radio Association of Bremerton set up a booth at the Kitsap County Fair. It was manned by WA7GWL and WA7LTF, with assistance from W7NMT and W7AAO. Two transmitters were in operation; one on 50.38 Mc. and one on 14.3 Mc. W7AXT was on the receiving end and relayed traffic into the National Traffic System with W7ZIW assisting. The Rodeo City Radio Club of Ellensburg was on the air from the Ellensburg Fairgrounds during the annual rodeo with the call W7WKB/7 and with W7BQ handling the traffic. WA7KWY has passed the Advanced Class exam, moved to a new QTH, rebuilt his Lyson transmitter and is now erecting new antennas. W7SAB has a new vertical under construction for 3845 kc. omni-directional for slow-scan TV schedules with KH6BAS. The Air Show was held at the International Airport near Spokane in Aug. The Inland Empier V.H.F. Club operated with W7WIL, K7PWK and K7LRD. W7LWX served as a base station. K7-TWW was chief coordinator of the entire air show. The purpose was to serve the public in parking and communications to the aircraft pit area, grandstand and flight line. Others assisting were K7TWW, K7UCJ, K7EIU, W7DBJ, K7OEY, WA7KOI, K7RZE, K7UXS, WA7CJM, W7LVB, W7GBU and WA5EJY/7. WA7KOB is a new ORS, a football player at age 15 and an FB c.w. operator on WSN. The Northwest S.S.B. Net recently held elections with W7OEB, the new mgr.; K7-KPC, secy.-treas.; K7SUQ, K7OUV, W7VDR, WA7-GWF, directors. The new officers of the WARTS Net are W7JWJ, mgr.; WA7DZL (PAM), director-at-large; K7YFJ, rec. secy.; W7QGP, secy.; W7UVI, WA7HSJ, K7AJT, WA7CYY, directors with W7BUN offering to back up the secy. as needed. Traffic: K7UDG 4430, W7BA 1838, WA7HKR 720, W7DZX 521, W7PI 379, W7KZ 378, W7AXT 279, W7VE/7 224, W7JWJ 162, WA7-KOB 107, W7GYF 82, W7MCW 82, W7BQ 81, W7ACQ 77, K7CTP 62, W7APS 51, W7BTB 51, W7IEU 51, WA7-EDQ 47, W7GVC 33, WA7DZL 31, WA7HSJ 27, WA7-BDB 25, WA7LOL 25, K7LRD 22, K7UZB 19, WA7FVT 12, W7ZHZ 8, K7GZI 7, W7RXH 5, W7AIB 4, K7BBO 4, W7BUN 4, K7YFJ 4.

PACIFIC DIVISION

EAST BAY—SCM, Paul I. Parker, WB6DHH—How come I didn't hear from as many of you this month. Your comments make this column. W6TTS is trying to build a linear and is finding parts just as hard to get as for the receiver he was building a few months ago. WA6DIL made the BPL list again this month. This is a young fellow in high school and he sure is doing a fine job handling traffic on the Northern Calif. Net. W6IPW also got his fingers into the traffic pie this month. Good going to both of you. K6PJ reports that 21 Mc. has been treating him very well these days and he has managed to get in some DX. W6RGG is going to start transmitting the pertinent DX Bulletins on 14.002 kc. Mon. at 0200Z and on 146.54 Mc. Wed. and Fri. Look for him. The East Bay Radio Club had a

Would you believe a quality transceiver for only $49.95?



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- 40-80 meters. 15 meter converter available.
- Crystal control or transceive operation.*
- Slide-rule dial. Flywheel tuning.
- Power—12 volt lantern battery.
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- Metered power amplifier stage.
- Silicon transistors. Integrated circuit.
- 2 KHz receiving band width.
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Model PM 1 $49.95

The basic circuit modules used in the PM 1 are available. Tuning dial and full instructions included. Designed for bread board mounting. Complete circuit boards need only to be inter-connected. Model MR 1 $29.95

Convenience Kit for MR 1. Meter, antenna switch, knob, connector and panels. Model AC 1 $7.95

Side-tone monitor. For normal keying or practice. Model AC 2 $5.95

15 meter convertor. Covers 21.0-21.45 MHz. For PM 1 or MR 1. Model AC 3 $8.95

Low power SWR meter. ½-250 watts. Model AC 4 $14.95

Low power antenna tuner. Matches random length, twin-lead or open wire antennas. Model AC 5 $8.95

* Transceive on 40-80 meters. Crystal only on 15 meters.

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picnic on Sept. 14 and sure had good weather for that one. The Mount Diablo Amateur Radio Club again handled the Walnut Festival under the care and direction of WA6ANE. That just about does it and I sure would like to hear more from everyone next month. Traffic: W6IPW 573, WA6DJL 373, WB6DHH 1, K6PT 1.

HAWAII—SCM, Lee R. Wical, KH6BZF—SEC: KH6GQW. RM: KH6GHZ. PAM: KH6AD. V.H.F. PAM: KH6EEM. QSL Mgr.: KH6DQ. RACES Nets: (40, 10, 6 and 2 meters) Coordinate with KH6AI.

Nets	Freqs. (Mc.)	Times (GMT)	Days
Friendly Net	7.290	2030Z	M-F
Boy Scout Ham Radio Net	21.360	1800Z	Sat.
Pacific Interisland Net	14.320	0830Z	M-W-F
S.E. Asia Net	14.320	1200Z	All
Marianas Islands Net	3.850	0830Z	2, 3, 4th Tue.
Gecko Net (Marianas Is.)	14.240	0930Z	Tue. & Thurs.
Pacific DX Net	14.240	0700Z	Tue. & Thurs.
Marine Corps Net	21.380	1900Z	All
Confusion Net (phone-patches)	21.400	0200Z	All

Plan to attend the Southwestern Division Convention Oct. 17-19 at the Hilton Inn in San Diego, Calif. With all his traffic-handling experience we welcome KH6GHZ as our new RM. Meade formerly was our SEC. We wish to welcome two new ECs to our ranks. KH6GQP is EC for Maui Island. KH6GLU, of Pacific DX Net fame, is EC for Molokai Island. We still need ECs for Kauai and Hawaii islands. Any takers? VS6DR passed through Honolulu recently. The new U.S. Ambassador to Japan, Mr. Armin H. (Hank) Meyer, W3ACE, ex-EP3AM, stopped for a brief stay in KH6-Land before proceeding to his new post in Tokyo. I have a certificate for KH6FON, who moved to the mainland without leaving his forwarding address. KH6FRE, in Oklahoma City, is signing W5JKJ. Traffic: KH6GHZ 227, KH6BZF 83, KH6GQW 37, KH6GRG 28, KH6NO/KH6 7.

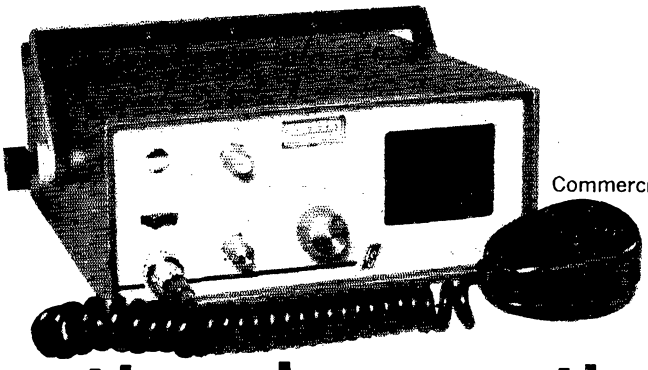
NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: WA7BEU. The Sierra Hamfest was successful

NEVADA QSO PARTY

December 6-8, 1969

Nevada amateur radio operators announce their first QSO Party contest, open to all amateurs worldwide. An attractive certificate signed by Governor Paul Laxalt of Nevada will be awarded to the highest scoring winners. *Rules:* 1) Contest time 0001 GMT Dec. 6 to 0800 GMT Dec. 8, 1969. 2) CW and RTTY operation scheduled on the odd hours, phone operation on the even hours. 3) Nevada stations will score one point for each contact multiplied by the number of ARRL sections and/or foreign countries worked. 4) Outside Nevada stations will score 5 points for each Nevada station worked and multiplied by the total number of different Nevada counties (maximum of 17). 5) Credit will be given for contacts with the same station for each different band and/or type of emission used. 6) A cetificate will be awarded for high score in each foreign country, each ARRL section, each of the United States (other than a section winner), each Nevada county (other than a section or state winner), who submits a log for proof of working 5 or more stations. 7) An additional certificate will be awarded to one Novice in each of the 50 United States (who did not win under rule 6). 8) Contacts by non-Nevada stations must be with Nevada stations and may be while operating fixed, portable or mobile. 9) Suggested frequencies are: CW 3735 7175 14135 21135 28035, RTTY 3620 7140 14090 21100 29010, Phone 3935 7275 14335 21435 29000, VHF 52.525 145.8 146.34 146.94. 10) The general call is "CQ NV". 11) Information to be exchanged time in GMT, call, frequency, emission, location of station contacted. Legibility and accuracy are very important. 12) Total your score and be sure to include your name, call and complete address. If operating portable or mobile note the location of operation.

Mail log to Nevada QSO Party, Box 73, Boulder City, Nevada 89005, no later than Dec. 22, 1969. Include a #10 addressed stamped envelope or IRC. Decisions of the judges will be final.



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Bounce it! Subject it to vibration! Make it hotter---or colder, the frequency stays put. No missed schedules on squelched standby. Precision quartz crystals in compact, temp-controlled chambers hold both transmitter and receiver frequencies to close tolerances.

Standard commercial models are one-sided, LSB **or** USB but available options include switchable SB's, compatible AM and CW. The military model pictured above has all these features built in.

The low receiver radiation---only 400 micro-microwatts---may be a particularly important consideration for certain applications.

An available brochure gives complete information on the **LST-275** transceiver.

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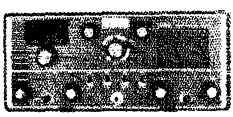

Covers 75-40-20-15 meter amateur phone bands. Truly small, lightweight, only 19 pounds.

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because of the hard work of W7OYQ, W7PC, W7SRM, W7THH, K7YVN, K7ZAU, W7ZFN, HH2PR and many others. Nevada's first *ARRL QSO Party* will be held from 0001 GMT Dec. 6, 1969, to 0800 GMT Dec. 8, 1969. Special certificates signed by Governor Paul Laxalt will be awarded to the high score winners. See operating rules in this issue. K7ICW and XYL W7SNP attended the v.h.f. meeting in Boulder, Colo. WA7CQS headed a drive for Hurricane Camille's victims, netting 14 tons of food, clothing, etc. K7ZQV is active again on c.w. The Nevada Emergency Net meets on 3996.5 kc. at 1800 local time Mon. and Thurs. with WA7EJZ as NCS.

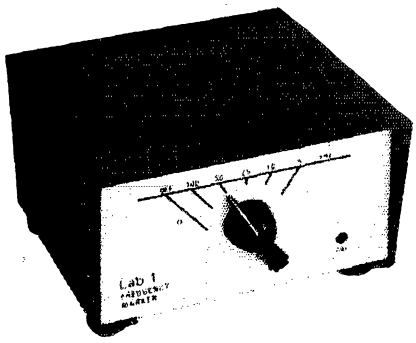
SACRAMENTO VALLEY—SCM, John F. Minke, III, W6KYA/WA6JDT—ECs: K6RHW, W6SMU, WA6TQJ. RMs: W6LNZ, W8VDA/6.

Net	*Freq.*	*Time*	*Days*	*Mgr.*
Northern California Net	3630 kc.	0300Z	Daily	WA6LFA
NCN/2 (Slow Speed)	3630 kc.	0430Z	Daily	WB6WGR
California Novice (CNN)	3737 kc.	0400Z	Daily	WB6UHF
Yolo County C.D.	145.68 Mc.	0300Z	Tues.	WA6TQJ

Several S.V. members attended the Sierra Hamfest at Bower's Mansion near Carson City. Included in the attendance were three SCMs (S.V., S.J.V. and Nev.) and two ARRL Directors, W6ZRJ and W6KW. WA6UIT is a new station for Beale AFB with WA0KKR as the chief operator. K6RPN, of Grass Valley, had trouble with a pack rat stealing his tubes. The rat got away, but if he had caught him, Doug says he would have taught the "electronically-minded" rat how to send a CQ. W6FRE recently worked W6GDO in Rio Linda from Austin, Nev., on 2 meters. Our neighboring Nevada section will hold a QSO Party the first week end in Dec. Let's give them a hand by participating. Contact W7PBV for details. If you participated in the California QSO Party, please send me your logs. Traffic: (Aug.) W6LNZ 52, WA6UIT 9, W6VUZ 5, WB6MAE 4, W6KYA 2. (July) WB6ZJV 20, WA6RBD 10.

SAN FRANCISCO—SCM, Hugh Cassidy, WA6AUD —SEC: W6WLV. WB6JOX has found that an apartment is not the best QTH for an amateur station. K6NF reports 25 hot-shot Morse operations on his Western Amateur Radio Morse Circuit, 7100 kc. at 8:00 A.M. and 7:00 P.M. local times. K6SRM was in the July QD Party and made over 100 c.w. QSOs. WA6JUV has completed work on an electronic keyer. WA6QXV keeps the traffic circuits with check-ins to the Mission Trail, Golden Bear, California Weather Nets and Navy MARS. K6TWJ continues to be a long-time regular on the Golden Bear Net, 3975 kc. at 0200Z. WB6JQP continues to handle much traffic when home and came close to BPL in Aug. WA6BYZ *did* get in there and made BPL for the eighth straight month in 1969. W6BWV has had little time on the air with other matters taking his time. W6WLV has taken to looking for DX in addition to checking in with the Northern California Net. K6MHO and K6UFT got their DXCC certificates. W6JJJ is a transplant from W3-Land and is checking into some traffic nets. W6WLV continues to note the jump from zero to the middle of the pack for the section in the last SET and says that with next year's SET coming soon, he aims to move higher in the list. Hal reports 5 active emergency nets within the San Francisco section. W6EAJ has been doing some OO work from the wilds of the Mattole River Country. W6HVN was the speaker at the Marin Radio Club Sept. meeting. W6EEE was stricken in her home on an island in San Francisco Bay and had to have emergency evacuation. WB6UJO has returned from a trip to Scandinavia where he visited many amateurs in SM-, LA- and OH-Land. The K6GWE repeater provided 24-hour coverage over the Labor Day week end for any possible highway emergencies. K6KGI, from Eureka way, recently received the Army Commendation Medal for action in Vietnam. The Marin Club provided 2-meter communications for a Jaycee Orange Crate Derby and also handled communications for the Dipsea Race in August. Traffic: (Aug.) WA6BYZ 438, W6WLV 95, WB6JQP 90, WA6AUD 16, K6TWJ 10, W6BWV 8, WA6QXV 3, K6SRM 2, W6CYO 1. (June) W6WLV 215.

SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6JPU—I want to wish everybody a very nice Thanksgiving. If you look around, you will find a lot to be thankful for. WB6YXB put up a 2-meter beam and is active on the high frequencies. W6JUK is finding out what a kw. does on 2 and 6 meters. WN6KKD, a new Novice, has a Swan 500C. W6ZFN is now using an S/Line on all bands, with a quad beam on 10-15-20 meters. K6OZL has 250 countries confirmed. WA6SCE is active on the various nets handling traffic. W6IIK



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Frequency marker identical to above, less cabinet & switch

- **Keep your receiver calibrated**
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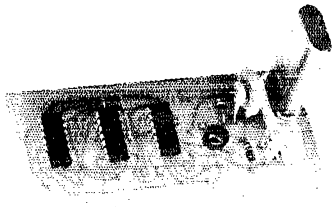

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is on with a Swan 350C. W6QLY is on 75 s.s.b. WN6OCZ is on the air with an HQ-110 and a T-60. W6DPD is building a 2-meter amplifier using a 3CX1000A. The new officers of the Tulare County Radio Amateur Club are W6NKJ, pres.; WB6OCZ, vice-pres.; WA6MLQ, secy.; W6ILR, act. chairman. W6ASV showed pictures of FD activities at the TCARC. WB6ZHN, WA6ZRK and W6VSR are on 2-meter f.m. WB6YCK put up a trapped doublet. K6RGZ is holding code classes. WB6RLX is active on 2-meter f.m. It takes only a few minutes to send those Form 1 cards, so send them. Traffic: (Aug.) K6OZL 10, WA6SCE 9. (July) WB6YXB 55.

SANTA CLARA VALLEY—SCM, Albert F. Gaetano, W6VZT—SEC: W6VZE. RM: WA6LFA. W6VK has resigned as EC for the Half-Moon Bay area as he has moved to Nevada. WB6DUC has been appointed for that area. W6MMG vacationed in W1-Land during the month of Aug. W6BPT has been quite active in routing MARS traffic into NCN. This has been good for the net and also good for MARS because it gives them some good outlets they don't have. Keep up the good work, Pinky. WA6OXE had the high traffic count in the section for the month of Aug., which indicates that he has been quite busy. The QCWA Annual Picnic was well attended and all had a good time. K6DYX, who is trustee of the Monterey Navy School station, K6LY, reports the station has its new beam and 100-ft. tower up. The Sierra Hamfest was held just outside of Carson City, Nev. and was attended by many S.C.V. members, as well as the Pacific and Southwestern Division Directors and the S.C.V. SCM. It was a fine barbecue and everyone had a good time. In fact, the turnout for the affair was over two hundred, which is astounding when you consider there are *about fifteen hams in the whole area. Traffic is starting* to pick up again on NTS. All we need now is the winter band conditions so that copy will be better. Traffic: WA6OXE 1165, W6RSY 346, W6NW 140, K6DYX 126, WA6LFA 121, W6VZE 114, W6DEF 112, W6BPT 96, W6ZRJ 64, W6VZT 46, W6YBV 36, W6OH 23, W6AUC 21.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Calvin M. Dempsey, WA4UQC—Asst. SCM: James O. Pullman, W4VTR. SEC: W4EVN. RM: W4IRE. PAM: W4AJT. V.H.F. PAM: W4HJZ. K4EO has signed up eight members for the AREC and says he will have more soon. The Yadkin Valley Emergency Net is getting started and is operating on 29.9 Mc. The Carteret-Craven Amateur Radio Club sent me its club bulletin. The club has several stations that will be on 2 meters soon. The Raleigh Amateur Radio Society has 44 members and a lot of plans in the making. W4ED won the prize at Shelby for being the oldest ham. Jim is a fine ham and has more get-up-and-go than a lot of the younger ones. The Shelby Hamfest was great. The boys did a real fine job as usual. It was good to see our Director, W4KFC, and W4ACY at Shelby.

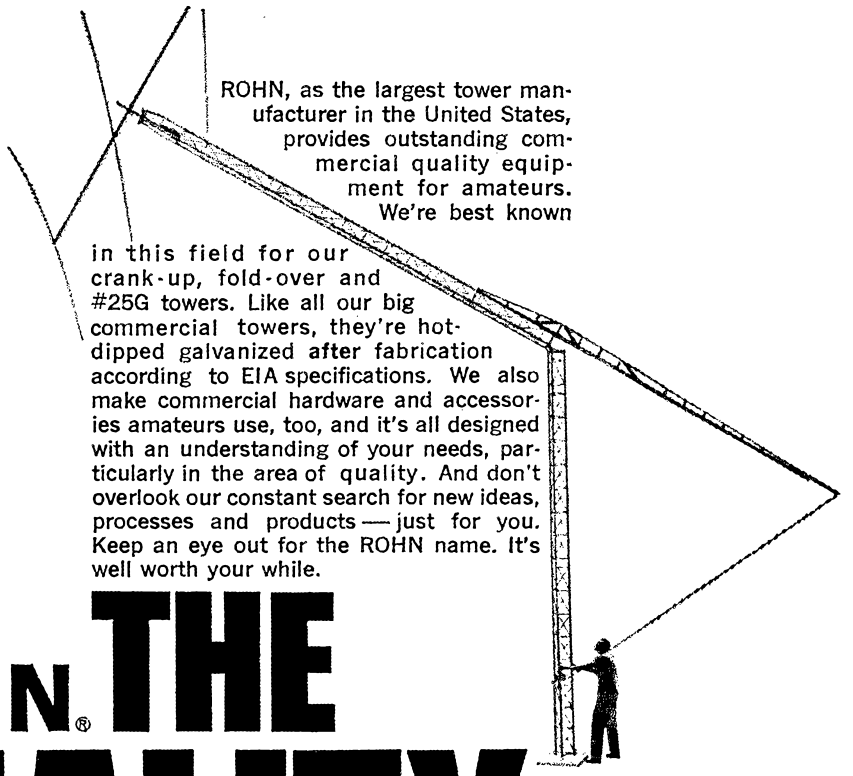
Net	*Freq.*	*Time*	*Days*	*QTC*	*Mgr.*
THEN	3923 kc.	0030Z	Daily	123	WA4VNV
NC SSB	3938 kc.	0030Z	Daily	28	WB4GFL
NCN(E)	3573 kc.	2330Z	Daily	79	W4IRE
NCN(L)	3573 kc.	0300Z	Daily	56	WA4CFN

Traffic: (Aug.) W4IRE 234, W4EVN 150, WA4GMC 68, WB4HGT 63, K4VBG 42, W4FDV 32, K4TTN 29, WB4GHK 28, W4OTE 21, WB4KXL 17, WA4AKX 16, WB4HHI 9, K4ZKQ 7, WA4UQC 5, WB4BGL 2, K4CIA 1. (July) W4IRE 77.

SOUTH CAROLINA—SCM, Charles N. Wright, W4PED—SEC: WA4ECJ. PAM: W4VFO. RM: K4BSS/4.

SCPN	3930 kc.	0830 and 1530 EST	Sun.,	12 Noon Daily
SCN	3795 kc.	2345Z and 0300Z	Daily	Aug. Tfc.: 72
SCSSBN	3915 kc.	0000Z	Daily	Aug. Tfc.: 127

Many of the S.C. gang eyeballed with W4KFC and W4ACY at the Shelby Hamfest. W4EZF and W4GUZ, in Seneca, have gone s.s.b. with a Swan 500C after many years of a.m.ing. In Anderson, WB4AQF has a new TR4 and WA4MWC, WB4EOC and W4FVV have gone s.s.b. on 2 meters. K4RSL is now in his new QTH. From Spartanburg, K4NZE is now AB8CSA in Vietnam. WB4CBJ reports that the Carolina Repeater Society has successfully tested a new 2-meter site near Pelion at the WB4CBJ QTH. Its v.h.f. antenna is up 35 feet and the u.h.f. is up 27 feet. First tests conducted by WB4CBJ, K4MOC, W4TYS, WA4MWA, K4DSK, W4EGV, W4MAR, WA4MPC, WB4KUJ and WB4ENS indicate that the location is a very good one.



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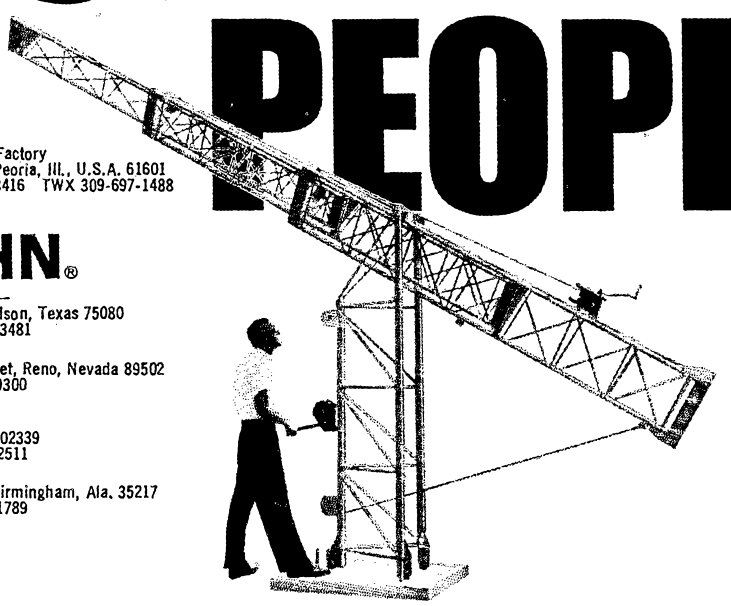

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The winter traffic season is on us—join a net and help! Remember the Sweepstakes Contest, Nov. 8-9 (phone) and Nov. 15-16 (c.w.) and show the other 49 states that there really is a S.C.! Traffic: K4BSS/4 162, W4-NTO 95, K4OCU 38, W4FVV 5.

VIRGINIA—SCM, H. J. Hopkins, W4SHJ—SEC: K4LMB. PAM: W4OKN. RMs: K4MLC, WA4EUL. This space is not ordinarily used for editorializing or expounding philosophy, but since it's our last we might be allowed a little license in that direction. For the past twelve years, or more, the Virginia SCM has been elected by administrative procedure—a single candidate was nominated. You members have just participated in a balloted election in which there were three seemingly equally qualified candidates. While we would like to acknowledge individually the many good wishes and kind expressions that have been sent, it would be most difficult within a reasonable time. Our sincere thanks to all of you. Also thanks for the excellent effort and dedication toward the organization and its activities. It is a real pleasure to report that in calendar year 1968 Virginia again placed in the top 20 percent for ARPSC activities. It is most gratifying to be able to turn over a winning team to the new SCM—believe me, we've got one. Thirty-six amateurs and an equal number of family members and guests turned out for the 2nd Annual VSBN Picnic at the country home of W4OUK in mid-Aug. W4YZC has upgraded to Extra and WA4TOJ and WB4FDT to Advanced. W4VZR provides v.h.f. RTTY transmissions of W1AW Bulletins on 146.7 Mc. almost nightly. The Fish Net is active on 28.650 nightly in the Richmond area with WA4OPW at the helm. W4JUJ skeds former VN Mgr., W4LK, who is now in Florida. W4KAO is active on VSBN from Emporia, a rare part of the section. After nearly 19 years in the same QTH, W4SHJ has moved. Don't forget the time change, back to standard, as you tune for your favorite nets on 3680, 3935 and 3947. W4NLC, W4-SQQ and K4KNP are still the Virginia "iron men" in 4RN, but K4PQL looks like a front-runner in this department. The v.h.f. and repeater crew from Lynchburg turned in a great performance during disastrous conditions in flood-stricken communities. The 75 meter nets, including several mobiles, also assisted. WA4PBG acted very ably as SEC during the absence of K4LMB. Traffic: (Aug.) W4SQQ 509, WB4FJK 328, W4NLC 327, W4QDY 244, WB4CVY 228, K4KNP 199, W4UQ 198, WB4GTG 159, W4RHA 81, WB4FDT 64, WB4DRB 57, WB4GTS 53, W4OKN 51, W4SHJ 50, WA4PBG 38, WA4JJF 30, K4JM 29, W4THV 25, WB4IYC 24, W4YZC 16, WB4IRA 15, WA4MJF 14, K4TSJ 13, WA3IYS/4 10, WA4NJG 9, W4DM 8, W4ZYT 8, K4LEF 6, W4MK 6, WB4JTT 4, K4BTQ 3, W4IA 3, K4LMB 2, WB4LQV 2, W4TE 2, W4KX 1, WA4WQG 1. (July) WB4KFC 29.

WEST VIRGINIA—SCM, Donald B. Morris, W8JM—SEC: W8EV. RMs: K8TPF, K8MYU. PAMs: K8CHW, W8IYD. Net Mgr.: C.W.—WB8BBG; phone—WB8AQE. The late session of the C.W. Net meets at 10 P.M. on 3570. Congratulations to the Tri-State ARC of Huntington for staging an outstanding Division Convention. From the Division, Director and Vice-Director, W4KFC and W4ACY, respectively, attended; from Headquarters, W1ICP and W1UED. The Kanawha ARC of South Charleston has resumed publication of *Splatter* with WA8FLF as editor. WA8TYP replaces W8HCY as EC for Kanawha County. WB8BBG received his Advanced Class license and hit a new high in traffic work. I regret to report the passing of WA8-CDN, WA8LJN and W8FVU, ex-8AQI in the '20s. The Mountain State Emergency Net, which meets on 3920 at 8:30 A.M. Sun., held 4 sessions in Aug., with 47 stations and 7 messages. WVN Phone Net, on 3890, reports 31 sessions, 372 stations and 68 messages. C.W. Net held 56 sessions with 241 stations and 114 messages. W8DUV and W8DUW attended the Great Lakes Division Convention. WA8NDY and WA8WCK are active in c.d. work. Traffic: WB8BBG 307, WA8POS 297, WA8ZZI 65, WA8NDY 50, WA8YHH 37, WA8RQB 33, WA8WIX 30, W8CKX 19, WA8WCK 11, W8JM 9, WB8-AQE 6, WA8YSB 6, WA8LFW 3, W8DUV 2, K8MSP 2, K8ZDY 2, WB8AVQ 1, K8MND 1, W8QEC 1, K8QEW 1, K8QYG 1, W8TGF 1, WA8TWR 1, W8WEJ 1.

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, Charles M. Cotterell, WØSIN—Asst. SCM: Neal Morris, KØTIV. SEC: WAØHLQ. RM: WØLRN. PAM: WØCXW. V.H.F. PAM: WAØ-LIK. Could use a volunteer or two as V.H.F. PAMs in other areas of the state. There is quite a lot of v.h.f. activity all over at present. The Denver RC had a good meeting on 2-meter repeaters with amateurs from as far away as Pueblo. OO WØLRW is now getting started with one cooperative notice. KØHWB again leads with 15. OVS WØWYX reports two openings on

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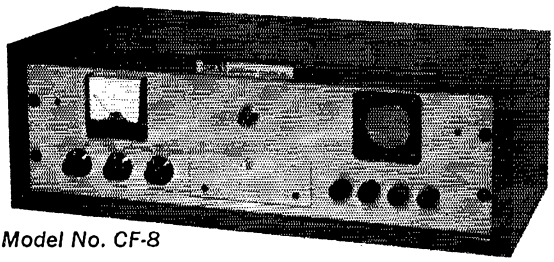

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146.34 into Texas and New Mexico. The repeater again is active most of the time. He has been active on the 420-Mc. band with others. WØWYX and WØKFH are new OPS appointees. WØGV is a new OO. WØBPT and WØLKD are new ECs. Hope all ARRL members will cooperate. We need to build the AREC up a lot. CCN reports 17 sessions, QTC 31. Hi-Noon had 31 sessions, QNI 865, QTC 70 and 988 minutts. Columbine had 26 reported sessions, QNI 835, QTC 112 and time of 1256. They run quite a few phone patches. WAØ-UUK, WØECN and WØBWJ report a lot of rig time on "Camille." Thanks, fellows. WØLRN has a new linear. WØWYX has so many antennas he can't count them. He uses an 8-ft. coax cavity. WØOWP is working on an emergency unit. Traffic: WØLRN 150, WØ-WYX 110, WØBWJ 36, KØMNQ 33, WAØMNL 29, WØSIN 15, WØKFH 14, WØLRW 9, WAØKOQ 3, WØ-LCE 2.

NEW MEXICO—SCM, James R. Prine, W5NUI—The 2-meter f.m. repeater program in the state continues to provide reliable coverage from Los Alamos to El Paso. Many modifications have been made in antennas and equipment at Sandia Crest to improve this link. Fall is now with us and I trust that you have taken the precaution to service the emergency a.c. power unit since Field Day. Running that generator up to temperature at least once each month will insure that it will work when most needed. Station activity report cards are available from your SCM. WA5SJR, of Carlsbad, joined the Silent Keys Aug. 7. Traffic: K5-MAT 98, W5DMG 42, WA5UJY 15, K4VXJ 12, W5NUI 8, WA5OHI 7, WA5MIY 6, K5IFJ 2.

UTAH—SCM, Thomas H. Miller, W7QWH—SEC: W7WKF. RM: W7OCX. Nets:

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*
BUN	7272 kc.	1930Z	Daily	31	616	67
UARN	3987.5 kc.	1530Z	Sat.-Sun.	..	...	..

BUN participated in hurricane traffic. BUN also participated directly in emergency traffic on two occasions during August. The Rainbow Canyons ARC of Cedar City is busy working on a 2-meter repeater. 2-meter activity really is on the upswing in Utah. Most stations seem to be leaning to f.m. The ARRL film, "Hams Wide World," made its debut in Salt Lake City on KSL-TV, thanks to the efforts of W7LEB and WØ-BWJ. Send station activity reports to the SCM. Forms are available upon request from the SCM. K7ZIA is sporting a new four-element quad on a 30-ft. boom. It shouldn't be too hard to find his house in Brigham City. Traffic: W7OCX 120, W7EM 62, WA7GTU 4.

WYOMING—SCM, Wayne M. Moore, W7CQL—SEC: K7NQX. RM: K7KSA. PAMs: W7TZK, K7SLM. OBSs: K7SLM, K7NQX, W7SDA, K7TAQ, WA7FHA. Nets: Pony Express, Sun. at 0800 on 3920; YO, daily at 0130 GMT on 3610; Jackalope, Mon. through Sat. at 1215 on 7260; Wx Net, Mon. through Sat. at 0630 on 3920; PO Net, 1900 Mon. through Fri. on 3950. K7NCK, of Gillette, passed away Sept. 5 after a lingering illness. Fred was a very active ham and an all-around nice guy who will be missed by all. W7TZK has been transferred to Baggs, Wyo. K7UHS has moved to Denver and W7NBO has moved from Denver to Casper. The 2-meter repeater atop Sherman Hill is now in continuous operation, receiving on 146.16 Mc. and re transmitting on 146.76 Mc. It is operating under the call K7SDD. The heavy hamming season is now starting. Help the nets by checking in as often as you can. Traffic: K7VWA 56, W7TZK 50, W7SDA 46, W7OBE 13, K7KSA 10, WA7AUV 6, WA7GOV 1.

SOUTHEASTERN DIVISION

ALABAMA—SCM, Donald W. Bonner, W4WLG—SEC: K4KJD. RM: W4HFU. PAM: WA4EEC. The Birmingham Amateur Radio Club, W4CUE, has had a marked revival of interest in the past year. The club has a new tri-band beam up now and operates on 80-2 meters and meets the 1st and 3rd Thurs. New hams in Decatur are WN4NLK, WN4NLL and WN4NLN. WB4BLX and WB4LAL both have new HW-100 rigs. WB4LNM has his Advanced Class ticket and a new HW-22. K4UMD has a new Swan-270 transceiver. Thanks also to everyone who helped with the communications to the Gulf Coast after Hurricane Camille recently. Thanks also to Decatur for an FB hamfest this year. It was good to have Director Bolvin with us again. W4CAH is back in Birmingham from Georgia. Jerry is active on 6 and 2. The AENB C.W. Net seems to be doing well now but needs more regular check-ins, especially from the south of Birmingham. Traffic: WB4HJN 313, W4FVY 244, K4BSK 140, K4AOZ 136, WB4JMH 125, WB4LAL 111, WB4EKJ 102, W4HFU 88,

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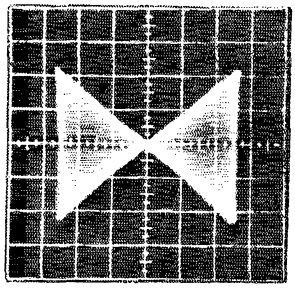

Figure A

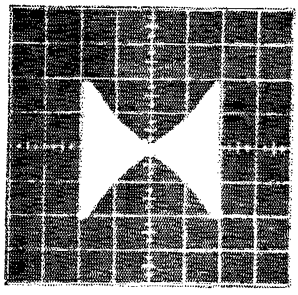

Figure B

All amplifiers for SSB operation are called linear amplifiers. Frankly most of them are "so-called" linear. One amplifier, the 2K-3, stands out as a linear linear. You've heard the clean, sharp signals on the air. They shout "LINEAR LINEAR". As proof, study the oscilloscope displays published in a national amateur publication which reviewed the 2K in comparison with competitive amplifiers. Note the 2K's classic straight slope bow-tie pattern in figure A as compared with the non-linear curvature of the competitive amplifier in figure B. Remember...the curvature of figure B means "splatter" on the band. Remember...the straight lines in figure A are the sharp, clean signals of the 2K-3.

Wouldn't you really rather own a LINEAR linear than a "so-called" linear?

The 2K-3 (Console or desk model) $745.00

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☆ *The new 3K amplifier is now available for continuous duty high power RTTY and extra power SSB operation. $895.00 F. O. B. Los Angeles, Calif.* ☆

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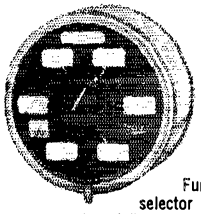
WB4KDI 47, WB4LNM 46, K4WOP 37, WN4KSL 19, K4UMD 19, K4WHW 16, WB4BLX 15, WA4AZC 14, WN4NJG 14, WA4TMY 14, WB4ADT 12, K4KJD 4, WN4KSJ 2.

EASTERN FLORIDA—Acting SCM, Ronald J. Locke, W4YPX—SEC: W4IYT. Asst. SEC: W4SMK. RMs: K4EHY (C.W.), W4RWM (RTTY). PAM 75: W4OGX. PAM 40: W4SDR. PAM V.H.F.: WA4BMC. Official Bulletin reports were received from WA4EYU, K4LPS and K4DAX. The organization of the traffic nets and emergency ARPSC groups including RACES and AREC was strained but not broken when Hurricane Camille crossed the coast and slammed into Louisiana, Alabama and Mississippi. A group of medical types from the Jacksonville area sped to Biloxi to aid the victims of the disaster. One of these, W4SME, set up his station with the help of ex-WA4NEV and handled over 800 pieces of traffic for the stricken area. Around the state many other stations acted as relays for W4SME/5 and the storm-hampered amateurs along Old Muddy. WB4JDA, WB4AIW, WA4SCK and more too numerous to mention handled volumes of emergency and H&W messages for civil authorities and residents. Our kudos also to the competent West Florida Phone Net, especially K4VFY/5. On-the-air meetings of the Florida LOs now are held on 3940 after the Florida Sidebanders Emergency Net every Wed. with W4SMK at the helm. All LOs, please take note and attend. Our EC for Dade County, WB4HKP, is organizing a Dade Emergency Planning Committee composed of one member from each public-service-minded club in the county. The Melbourne and Tampa Hamfests were great successes as usual. WA4RGO needs mobile stations to complete the links in the Mobile Emergency Net, which will make sure of Florida's amateur population being ready for future hurricanes. Get your f.m. and s.s.b. mobile units in good working order. Traffic: (Aug.) WB4AIW 621, K4EHY/4 414, WB4FLW 346, WB4HJW 268, WA4IJH 242, WA4NBE 186, WB4EPD 157, W4ILE 152, W4DVO 124, WB4GHD 124, W4FPC 115, K4DAX 108, W4YPX 106, WN4IIV 101, W8BZY/4 101, W4SDR 98, W4ZAK 98, W4EHW 82, WB4IER 78, WA4HED 77, W4NGR 66, K4LEC 64, K4QYV/4 64, W4SMK 63, W4AKB 57, K4IEX 58, WB4JDA 51, WA4CIQ 48, W4IYT 46, K4SJH 37, WB4ADL 33, WA4BGW 32, W4VPQ 24, WB4FJY 23, WB4HNL 22, K4LPS 22, W4BNE 18, W4IAD 18, W4ROA 18, W4SCY 16, WA4EYU 13, WB4IAG 11, W4LK 11, W4BKC 9, WB4ICD 8, W4SOM 7, W4TJM 3, K4EBE 2, W4YNM 1. (July) W4BKC 6, W4SOM 3.

GEORGIA—SCM, Howard L. Schonher, W4RZL—SEC: WA4WQU. RM: W4FDN. PAMs: K4HQI, W4YDN. W4LRR reports local activity on 146.940 f.m. with a net on at 8 P.M. Fri. nights. The Georgia Southern ARC has a new club call, WB4NXH, on campus at Georgia Southern College. The club is issuing a W-10-U award for working 10 university clubs. The first four awards went to W4DQD, WA4UFW, W9UZS and W8IEC. The Georgia Single Sideband Net had 692 check-ins with 175 messages and 26 patches. The Georgia State Net had 291 check in with 150 messages, K4TXK left Georgia for a new location in California. WB4EPS has a new SB-200. WA4VWV had an auto accident and nearly demolished the SR-150. WA4JSU is active on 3975. WB4NQA had extensive lightning damage. K4HQI was inactive because of vacation. WB4NQA was very active during the aftermath of Hurricane Camille. W4DDY is back on the active list with EAN assignments accounting for much of the activity. K4BAI was just beginning to get back in the swing of traffic when a move to a new QTH curtailed activity. WA4UQQ returned from a European honeymoon and is back on the air. WA4GXZ is completing an HW-12 and soon will be lost to s.s.b. He has been active on GSN and 4RN. Traffic: WB4NQA 854, W4RZL 288, WA4WQU 144, W4YDN 129, W4CZN 127, WA4RAV 113, WB4DMO 74, W4FDN 61, K4TXK 61, W4TYE 61, W4PIM 58, W4DDY 54, K4BAI 52, WA4UQQ 37, W4NSO 32, WA4GXZ 27, WB4EPS 25, WB6UTC/4 4.

WEST INDIES—SCM, Jose Medina Hernandez, KP4CO—The West Indies section is active again. For re-appointments or new appointments for SEC, RM, PAM, V.H.F. PAM, OBS, RM RTTY, etc., please notify the SCM by post card or by air. Thanks to KP4DV, our former SCM, for the orientation. Congratulations to the Radio Club de Puerto Rico on the fine deluxe edition of its *Ground Wave* and to the Puerto Rico Amateur Radio Society on its fine bulletin. Actively phone-patching on 14,270 kc. daily are KP4s FS, BBK, ABD, AVD, CK, CPG, WR, FJ, AWP, AAK, CSZ, DCR, AKS, CQY, CKY, ES, AST and CO. KP4s BJA, PT and BI have joined the Silent Keys. On-the-air club activities: 7230 kc., Radio Club de Puerto Rico, P.R., KP4ID; Amateur Radio Society,



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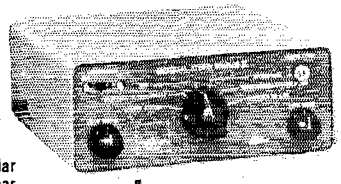

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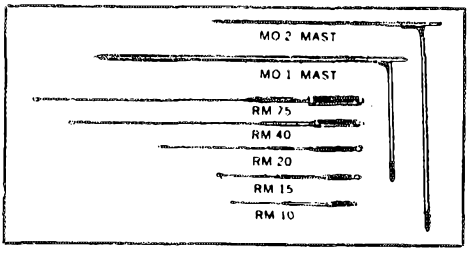

MOBILE ANTENNA

10-15-20-40-75 METERS

Model	Description — Mount or Height	Net
MO-1	54" mast folds at 15" Fr. Base Rear deck or fender	$10.75
MO-2	54" mast folds at 27" Fr. Base Bumper	$10.95
RM-10	10 meter resonator 80" max.-77" min.	$7.95
RM-15	15 meter resonator 81" max.-76" min.	$8.95
RM-20	20 meter resonator 83" max.-78" min.	$9.95
RM-40	40 meter resonator 92" max.-87" min.	$11.95
RM-75	75 meter resonator 97" max.-91" min.	$13.95

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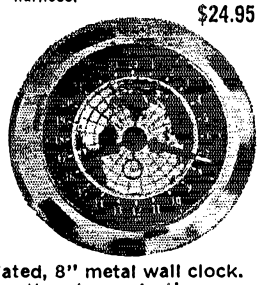

24 hr. chrome plated, 8" metal wall clock. Inner dial with South polar projection map of world indicates time around world. Polar projection dial adjustable for various time zones. Model 191 **$8.95**

Also 12" dial, white, red sweep, Model 2405C **$21.95**

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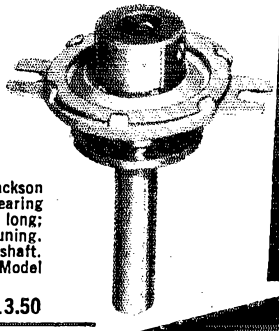

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Rugged, compact, completely automatic HYBRID-transformer type unit provides push-to-talk or manual operation. VOX operation for SSB, DSB or AM. Adjustable "line null" control gives excellent null on all telephone circuits. Separate gain controls for transmitter and receiver inputs. In "patch" position receiver speaker is de-energized and audio is switched to telephone handset. RF filtering and bypassing prevents RF feedback from telephone line. Easy to install and operate, wired and tested. **$25.00**

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P.R. Water Resources Radio Club, KP4CSC, Sun. 1400 GMT on. KP4 6-meter activity is very high. KV4EY needs help to get a KV4 radio club going and works as VP2VY for DXpeditions. KP4BW is busy with commercial broadcasts. KP4BA runs the WX Net.

WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4IKB. PAM: W4MQQ. RM: K4UBR RM-RTTY: W4WEB. Nets:

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*
WFPN	3957 kc.	2200Z	Daily	31	363	50
QFN	3651 kc.	2230/0200Z	Daily	62	474	378
NW Fla FM	146.94 Mc.	0030Z	Thurs.	4	...	...

Several hams from N.W. Fla. went to the "Camille" disaster area to provide communications, including WA4LBM, W9CTA/4, K4VFY, WA4IMC, WB4EQU, WA4EVU, WB4HEQ and WA4WAX. Pensacola: WB4NPZ and WN4NTT are new hams. The FFARA sponsors a WAP Award. Contact K4FKV for details. WB4DVM had to have his appendix removed. W4HJ joined the Silent Keys. WB4HKM has a new SB-200. Fort Walton: K1WYS made top section score in the June V.H.F. QSO Party, and second place in the S.E. Division. WB4NQV received his Tech. Class ticket. WB4NRM got his General and W4FDJ and K4HXS moved up to Advanced Class. Defuniak Springs: K4VWE resumed the Sat. night NCS job on WFPN. Bonifay: K4AVO is the second ham in a month to become active from this rare county. Marianna: WB4NSR, the XYL of W4KCA, received her Tech. Class license. Tallahassee: WA4EOQ is trying to clear up rig trouble. W4MQQ was appointed PAM for h.f. and OPS. Perry: WA4GHE moved here from Madison; he is on 2-meter f.m. only at present. K4AVS is active on 75-meter s.s.b. Cross City: WA6CWV is now stationed here. W7NQY was transferred overseas. Traffic: (Aug.) K4VFY 853, WA4WAR 275, WB4EQU 188, K4LAN 90, W4RKH 90, W4IKB 58, WB4NHH 30, WB4DVM 26, WA4EOQ 21, WA1EBN/4 18, K4HSK/4 15. (July) K4LAN 72, WB4DVM 44, WA4WAR 20, WB4EQU 10, WB4HKM 8, W4KCA 7.

SOUTHWESTERN DIVISION

ARIZONA—SCM, Gary M. Hamman, W7CAF—SEC: K7GPZ. PAM: W7UXZ. RM: K7NHL. The Arizona Automobile Assn. extends its thanks to all amateurs who participated in the Bring-'Em-Back-Alive program during the three major holiday week ends last summer. K7KCB and W7GX coordinated the activities at W7IO/7, which was located in the AAA building. The Arizona Repeater Assn. has completed testing an additional receiver site in Mesa and plans to have the receiver operational soon. Nets operating in Arizona are as follows:

Net	*Time (MST)*	*Days*	*Freq. (Mc.)*
Ariz. Post Office Net	2030	Mon.	3.560
Ariz. Post Office Net	1430	Sun.	3.915
Ariz. RACES Net	0800	Sun.	3.9905
Ariz. Repeater Assn.	2000	Tue.	146.94
Copperstate Net	1900	Mon.-Fri.	3.878
Maricopa RACES	1900	Wed.	28.68
Maricopa RACES	2000	Thurs.	50.44
Maricopa RACES	1900	Thurs.	145.35
Phx. VHF Net	2000	Wed.	50.35
Pima RACES Net	0845	Sun.	3.9905
QCWA Net	0900	Sun.	3.935
Twelfth Region Net	2000	Daily	3.570

Traffic: K7NHL 313, W7GEP 104, W7AMM 100, W7LLO 31, WA7ISP 26, WA7GAE 23, W7UXZ 20, W7CAF 15, W7SBZ 15, W7JMQ 14, W7DLF 10, WA7HLU 8, WA7NAR 4, K7RBH 4, WA7HUH 2.

LOS ANGELES—SCM, Harvey D. D. Hetland, WA6KZI—Asst. SCM: Donald R. Etheredge, K6UMV. The new 40 PAM is K6BWD, who recently returned to Smogsville after two and a half years as W7EJU in Las Vegas. A new ORS is W6IVC. W6JET is back with OBS skeds following a spell in the hospital. W6DQX's station was torn down for a move, but is expected back by SS time. WB6OLD plans to give W6DQX some strong SS competition. WB6GGL reports a new TR4 and new mobile antenna. W6INH has a new tri-band pigeon roost; WA6JHD is active on 40 and 20 meters with a new mobile. WB6KGK reports repairs to his 2-meter rig. WB6KXI is heard frequently during the evenings on the Western Public Service System on 3952 kc. EC W6LVQ plans to rebuild AREC in the Whittier area. W6MLF reports high traffic totals including 199 originations, mostly from USOs in the area. W6OEO is off on a three-month vacation! WB6UHF reports an FB mobile trip with WB6OLD and WB6KPN to Oregon to fish. K6VNX is bothered by nearby power lines generating QRN, but Mrs. VNX completed

a Heathkit SW receiver and is working on the code. WA6NZI *has been active on the low end of* 40-meter c.w. A new General is WA6MPF and a new Advanced Class licensee is WB6WUW. K6AEH has a new vertical as well as a Swan in the new VW. W6FD is busy building a new 20-meter beam. W6EJK has a new SB200 linear. W6SBL sports an FT DX-100. W6UTE is now *mobile*. W6ORG *reports that* San *Diego* ATV *stations* are being received regularly in the L.A. area. Club program chairmen are advised that the Southern Calif. ATV Club is available to put on talks and demonstrations for clubs in our area (contact W6ORG). W6TFS run 22 watts *output* on ATV *mobile!* WA6WKF reports continued skip openings on 50 Mc. The LERC/W6LS Prizefest is scheduled for Dec. 4. WA6ABP is working on a 15-meter mobile rig. WB6VZI just finished an SB-301 receiver. WB6KPN keeps weekday skeds with VK2AFN on 28.050 Mc. as well as keeping an eye open for 10-meter openings. Section amateurs are encouraged to keep the SCM informed of their current activities by mailing a monthly activity report at the conclusion of each month. In exchange for the monthly report you will be provided a current copy of the SCM's monthly bulletin, *Didi-dumdum-didi*. The exchange of bulletins with clubs is welcomed. The SCM's address can be found on page 6 of each issue of *QST*. Traffic: (Aug.) W6MLF 658, WB6BBO 541, K6CDW 158, W6QAE 138, W6MN 126, W6INH 63, W6DQX 46, W6BHG 42, WB6KXI 34, W6FJT 24, W6OEO 20, WB6UZS 20, K6CL 12, W6IVC 8, WB6KGK 8, W6DGH 7, K6EA 6, W6FD 6, WA6TWS 6, K6BWD 5, W6TN 4, WB6UHF 2, W6USY 2, WB6ZVC 2, W6HUJ 1, WA6JHD 1, WA6WKF 1. (July) W6MLF 452, WB6PKA 414, W6MN 76, W6DGH 47, W6FD 34, WB6KXI 16, W6JPH 13, K6EA 7, W6IVC 7, WA6ABP 1.

ORANGE—SCM, Roy R. Maxson, W6DEY—RM W6BNX has been handling many phone patches for the personnel of the U.S. Coast Guard and they have presented him with a plaque for this invaluable service. RN6 Mgr. WA6ROF advises he is back in school with a 9-unit load. WA6GVD took part in the New Orleans Hurricane Watch and also passed the Advanced Class exam. OPS W6BUK enjoyed a trailer trip to Arizona seeing several of the QCWA gang and enjoying some nice QSOs. K6OT is having line noise again. W8ELW/6 still is waiting for his 6th district call and has started construction of a tilt-over antenna mast. ORS WB6ZEC expects his traffic to drop now because of school activity. OVS WB6PHO reports on a number of 6-meter openings and got his 13th state, Maryland, on 6. OPS W6GB received DXCC, 282 countries. WA6ORJ moved from Pomona to Tustin. He recently received a Montego in the Lincoln Mercury Showroom Contest. The AARU, Inc. K6SYU Annual Dinner Dance will be held Sat., Nov. 8, 1969, at 8 P.M. at Michaels' Inn. Traffic: WA6ROF 251, W6BNX 225, W8ELW/6 112, K6MCA 78, W6WRJ 62, WB6ZEC 34, WA6GVD 16, K6OT 9, W6GB 4, W6BUK 2.

SAN DIEGO—SCM, Richard E. Leffler, WA6COE—Art Smith, W6INI, has been appointed Asst. SCM for the coming year. Art is active with the North Shores Club. We're glad K6BPI is now out of the hospital after his heart attack in Aug. WB6SEZ is now on RTTY. Both the 75 and 2 AREC Nets are undergoing reorganization. Help by filling out the new questionaires and forms. Hams desiring to become active in these AREC nets should contact the SEC, WA6KHN. Novices should contact WB6SEZ to enroll in the new Novice AREC Net Sun. morn. at 3725 kc. This group *meets* at 0900 and is *open* only to Novice check-ins. Both the North Shores and V.H.F. Clubs held picnics in Sept. Don't forget the OBS skeds nightly on 3920 at 2030 (WB6IMN) and on TWTh nights on 21,390 at 2100 (WB6UNB). The Aug. meeting of the S.D. DX Club was held at the home of W6OME. ARC-El Cajon had HB9ABU/6 *speak* at the Aug. *meeting*. V.h.f. activities: The t.m. group met at the home of K4AFS/6. WB6TFC finished his homebrew TV camera while W6GTZ worked on converting the CMU-15 for grid-modulation on ATV. K6KTP is experimenting with new FET converter circuits for his ATV. K6BTO is active on 1240 Mc. Happy Thanksgiving. Traffic: (Aug.) K6BPI 4518, W6VNQ 651, W6EOT 501, W6LRU/6 84, W6BGF 81, WB6IMN 57, WA6BDW 34, K6HAV 13, W6YKF 6, WA6COE 5, WB6UNB 4. (July) W6EOT 327.

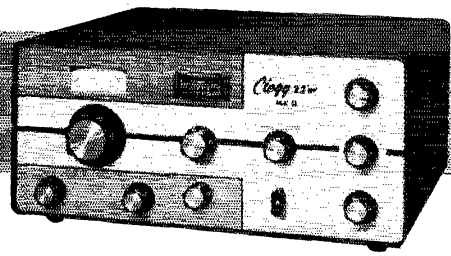
WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. E. Harrison, W5LR—Asst. SCM: Gene Pool, W5NFO. SEC: W5JSM. PAM: W5BOO. PAM: (v.h.f.): WA5KHE. Asst. SEC (Eastex) WA5KHE. RM: W5QGZ. The West Gulf Division Convention was well organized and the most "all-inclusive" from a League standpoint in many years. Congratulations to K5IBI and staff. K5GMY,

HERE'S THE ALL NEW *Clegg 22'er MK II*

2 METER TRANSCEIVER

WITH THESE EXCLUSIVE FEATURES



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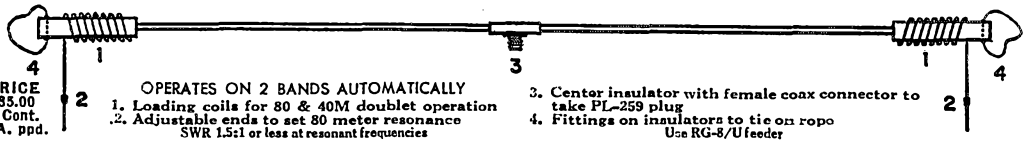

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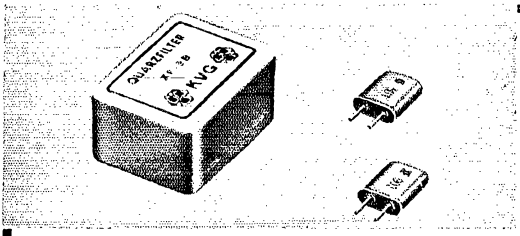

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Size $\frac{127''}{64} \times \frac{1''}{364} \times \frac{3}{4}''$.

Filter Type		XF-9A	XF-9B	XF-9C	XF-9D	XF-9E	XF-9M
Application		SSB-Transmit.	SSB	AM	AM	FM	CW
Number of Filter Crystals		5	8	8	8	8	4
Bandwidth (6dB down)		2.5 kHz	2.4 kHz	3.75 kHz	5.0 kHz	12.0 kHz	0.5 kHz
Passband Ripple		< 1 dB	< 2 dB	< 2 dB	< 2 dB	< 2 dB	< 1 dB
Insertion Loss		< 3 dB	< 3.5 dB	< 3.5 dB	< 3.5 dB	< 3 dB	< 5 dB
Input-Output Termination	Z_t	500 Ω	500 Ω	500 Ω	500 Ω	1200 Ω	500 Ω
	C_t	30 pF	30 pF	30 pF	30 pF	30 pF	30 pF
Shape Factor		(6:50 dB) 1.7	(6:60 dB) 1.8 (6:80 dB) 2.2	(6:60 dB) 1.8 (6:80 dB) 2.2	(6:60 dB) 1.8 (6:80 dB) 2.2	(6:60 dB) 1.8 (6:80 dB) 2.2	(6:40 dB) 2.5 (6:60 dB) 4.4
Stop Band Attenuation		> 45 dB	> 100 dB	> 100 dB	> 100 dB	> 90 dB	> 90 dB
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Arlington RC pres., is planning a Christmas Party for all members. The same goes for the Kilocycle Club, Dallas Club, Irving and surrounding area. W6-EWX/K6AAK, of West Texas, now is residing in Point Mogul, Calif. W5UJN, Pottsboro, reported his thoughts regarding Act II to W5EYB. Another report came from our top OO, W5PBN, of Richardson. W5JPM, of Childress, is interested in QCWA work. The Tex. C.W. Net has seven stations assigned to RN5. SCM records show 17 League affiliated clubs in Nortexas. The Irving ARC reports a class for Generals now is in operation; the same for the Fort Worth Kilocycle Club. WA5KHE says we should check up on ourselves, since our number of licenses has decreased at the rate of 11K/yr. The EC program is proceeding very well but we have found that many people like the authority accompanying EC work but very few want the ulcers attached thereto. This reminds me: How many of you answered Hart's note in July *QST* pp. 63-64 on traffic talk? Folks, the point system is coming. We recently received a flurry of requests for OPS appointments. Qualifications are demanding and dedicated operators are scarce. K5-QKM is the new Henderson County EC. ARRL station appointments are available to Conditional/General Class or higher. Code practice is available from W4RHZ, W4RUB, W6ZF, W6ZRJ, WA7DXI, W8CAM, WØFA, NAV (7301 kc.) and NPD (7375 kc.). What happened to the EC in Waco? Our Route Mgr. is having rig trouble. Traffic: (Aug.) K5BNH 1899, WA5PPF 981, WA5KIV 256, K1ZAT/5 126, K5LZA 73, W5JSM 46, W5HVF 23, WA5FRJ 22, W5KYD 21, W5LR 20, W5MSG 2, W5PBN 2. (July) W5JSM 68.

OKLAHOMA—SCM, Cecil C. Cash, W5PML—Asst. SCM: W. L. (Smoky) Stover, K5OOV. SEC: WA5-FSN. RMs: W5QMJ, WA5RYM. PAMs: W5MFX, K5TEY, WA5JGU, K5ZCJ. Your SCM and wife just returned from North Carolina where we visited our son, who is stationed at Fort Bragg with the 82nd. A.B. Div. W5MFX reports he and his wife vacationed and visited their son in New York. W5FW and wife, W5PWN, just returned from Florida by way of Houston where they visited their daughter. Asst. SCM K5OOV vacationed in Tennessee. K5WPP, EC for Muskogee County, has moved back into town and has his antennas back up. WA5ZOO, ex-WAØNFP, now of Enid, who is a minister, has been elected vice-pres. of the Disciples Amateur Radio Fellowship. The Assn. met in Seattle recently. The OCVHFARC operated a traffic booth at the State Fair as usual. The Oklahoma City v.h.f. repeater WA5ZAA, is now on the air. The Electron Benders of Tulsa, W5OK is holding code and theory classes for up-grading license and also Novice instruction. Circle Nov. 14, 15 and 16 on your calendar. This is when the Texhoma Hamarama at Lake Texhoma State Lodge will be held. The West Gulf Division has our copy of "The Ham's Wide World," which is being circulated for viewing. The first run of it was on KSWO-TV Ch. 7 in Lawton at 5 P.M. (2200Z) Sun., Sept. 14. The film is available from the West Gulf Division Director. Traffic: (Aug.) K5TEY 1291, WA5QIQ 81, WA5LWD 66, WA5IMO 60, WA5ZOO 45, W5FKL 40, W5QMJ 24, K5SWL 18, WA5FSN 14, WA5YRO 11, W5PML 10, W5MFX 8, W4IQ 4, K5OCX 2, K5OOV 2, W5JJ 1. (July) WA5RYM 5.

SOUTHERN TEXAS—SCM, G. D. Jerry Sears, W5AIR—SEC: K5QQG. PAM: W5KLV. RM: W5EZY. Congratulations to new ECs, WA5TCP, Jasper County; WA5JCJ, Fort Bend County; and WA5TMN, Angelina County. We welcome to Southern Texas from Western New York K1DIK/5, now at Texas A. & M. and an OO. OO K5SBR/5, reporting for W5AC at Texas A. & M., says there is little activity on 144-Mc. s.s.b. EC W5TFW reports that during the Annual Dick Dowling Days Celebration at Sabine Pass communication was furnished by Port Arthur ARC members WA5DUG/5, W5IYV/5, WA5NJW/5, K5RVF/5, W5MSX/5, W5UV/M, W5EQK, W5FCD/5, W5APX/M and W5TFW/5, with visitor WA5-VYW/5 and fixed WA5RVL for outside contacts. 2 meters gave excellent coverage of the area Aug. 30-31 and Sept.

1. W5BOY, Corpus Christi, is the proud recipient of a new Extra Class license. WA5RCF reports for the University of Texas Club station, W5EHM. The club, with 17 participating, furnished communications and message service during the Austin Aqua Festival. 2 meters worked out very well. Many amateurs in Southern Texas have been quite busy handling emergency and welfare traffic as the result of two hurricanes. There is not enough room here to list all who helped. Thanks, fellows, your efforts are much appreciated by many. EC WA5FJN suffered a heart attack in July but now is back in business. If you missed the West Gulf Division Convention at Amarillo you missed a real fine well-planned convention. Everyone enjoyed the event and the Panhandle ARC deserves a big "thanks" for an enjoyable meeting. Traffic: WA5FJN 349, W5QJA 198, W5OBC 194, W5EZY 149, WA5AUZ 112, WA5THM 103, W5EHM 91, K5HZR 79, W7WAH/5 62, K5ROZ 35, W5BGE 30, W5ABQ 24, W5TFW 24, K5WYN 8, W5AC 4, WA5QKE 4, W5KLV 2.

CANADIAN DIVISION

ALBERTA—SCM/SEC, Don Sutherland, VE6FK—PAM: VE6ADS. ECs: VE6SS, VE6AFQ, VE6XC, VE6AWM. The new directors of ARLA are: North—VE6BB; Edmonton—VE6ASF, VE6AVQ, VE6VF; Central—VE6SS, VE6AVQ; Calgary—VE6TF, VE6AFS, VE6ATG; South—VE6AJZ, VE6ABS. The editor of the *Alberta Amateur* is VE6AWW. The Amateur "BEBA" program is over for the year. Once again VE6ADX was the heart of the scheme. Without his facilities and inimitable NCS operation, we would be hard pressed. VE6SB handled the Banff Gate area with his usual success and efficiency. Thanks to all who helped out in this effort to save lives and help people to enjoy the holiday week ends. Congratulations to VE6ATG and VE6ATH on the birth of their son Randall. I enjoyed a brief but enjoyable visit from KH6BZF, SCM Hawaii, this summer. VE6APO is now VE6BB. VE6BR soon will be on with a new SR2000—if he can keep the final intact. VE6PL soon will have his antennas up. We have missed Medicine Hat on the APSN. The Aug. QNI for the APSN was 900, but traffic was only 27 not counting BEBA traffic. Traffic: VE6FK 25, VE6UD 4, VE6AKV 2.

BRITISH COLUMBIA—SCM, H. E. Savage, VE7-FB—Well what do you know—after ten years we missed a month's report! Reason—new bus, new country and wonderful vacation. We met VE7PJ, had supper with the family and saw the moon-landing. VE7ASY reports forest fires are ending and he is getting down to BCEN business, time 0200 GMT, 3650 kc. VE7AZK was organist during the Pacific National Exhibition. VE7KY still is in the intensive care ward showing some improvement. VE7AYQ is signing VE3FS for awhile. Vancouver ARC's code classes are conducted by VE7BZQ and VE7AXB. Reports have it that VE7UJ's homebrew S.S.B. rig is a dream to see and work. VE7DB was rear-ended by a truck the day he was to MC the Okanagan International Hamfest. Reports are fair. VE7BJL, at his age, has gone s.s.b. with a DX-400. VE7LL, the Green Key Man of Burnaby, is trying to put all of the Burnaby ARC members on RTTY. The SCM and SEC have tried by letters to clubs to obtain applications for ECs and information on club activities. How about you? Are you interested in EC appointment? Traffic: (Aug.) VE7ASY 97, VE7AC 30, VE7GG 5. (July) VE7LL 16, VE7AC 10, VE7SE 9, VE7GG 7.

MANITOBA—SCM, John Thomas Stacey, VE4JT—MTN has now returned to seven-day-a-week operation and is looking for stations. The net meets at 6:45 P.M. Central Time on 3615 kc. and VE4EI is the manager. Thanks go to VE4FQ for a fine job of recorder for MTN during the summer. VE4QJ continues to render excellent service to the evening phone net. Now that summer is over I am hopeful that operating reports will be more plentiful. Traffic net reports: Phone Net, sessions 31, QNI 524, QTC 7. C.W. Net, sessions 9, QNI 25, QTC 5. Traffic: VE4-CR 9, VE4FQ 9, VE4QJ 9, VE4RO 7, VE4JA 4, VE4RL 3, VE4FO 2, VE4RB 1.

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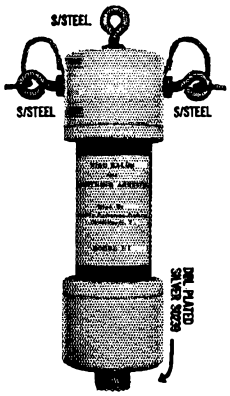

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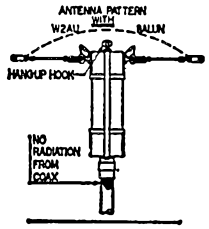

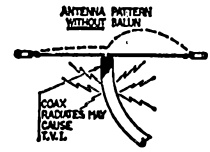

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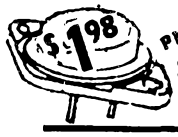

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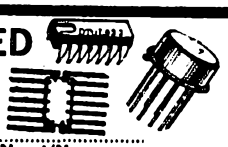

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MARITIME—SCM, William J. Gillis, VE1NR—SEC: VE1HJ. The NSARA-sponsored convention held on the Labor Day week end was well attended and enjoyed by all, including VE1LG, who celebrated his 94th birthday. VE1APV, 16 years old, of Dartmouth, was the youngest in attendance. VE1ARY won the hidden transmitter hunt; VE1AMB, the DX trophy; VE1YO, the VE1GR trophy; VE1IT, the ladies' code contest; VE1ZN, the men's code contest. Other presentations went to VE1AFU, VE1ALV, VE1YO and VE1RO. New NSARA executives are VE1AUE, pres.; VE1AQU, 1st vice-pres.; VE1QD, 2nd vice-pres.; VE1AKO, secy.-treas. The Newfoundland 75-Meter Phone Net is looking for more participation on 3785. Congrats to VO1CX on his fine efforts in support of the White Cane work. APN reports QNI 200, QTC 62, sessions 58. Traffic: VE1AMR 64, VE1RO 31, VE1IT 14, VE1AAX 12.

ONTARIO—SCM, Roy A. White, VE3BUX—VE3GMQ has had to resign as EC for Leeds County as he is going to college. Have we a volunteer for the job? VE3CMT has moved to Chatham, N.B. VE3ERU is moving to the Kingsville Lake area. Congrats to VE3GBA who got married in Aug. Congrats also to the Metro ARC which did such a splendid job with its ham shack at the Canadian National Exhibition using the call VE3CNE. Thanks to the many thoughtful people who sent me "get well" cards during Aug. VE3CAB tells me the 2-meter, 300 ft. repeater tower north of Napanee will be operational by the first of the year. This is a joint effort of the Kingston and Belleville Clubs and, when completed, should make regular contact feasible from Windsor right through to Montreal. We, up here in VE3-Land, heard lots of emergency traffic being handled by our friends to the south during the recent hurricanes. It certainly proved that amateur radio can provide emergency communications when called for. In other words, we provide a public service and serve the public interest. VE3FXC is going to install a "Mini-beam" on top of his trailer before leaving for Mexico so that he can check on us poor devils shoveling snow this coming winter. Glad to hear VE3FQM on now and then. VE3RR is back from a trip to the Yukon and VE3BZI is back home after a holiday in VE7-Land. My thanks to VE3DPO for sending me a membership certificate in the Grey-Bruce C.W. Net. VE3BXL is in Victoria Hospital in London for a little body work. The latest word from D.O.C. is that reciprocal agreements concerning "third party" traffic exist between Bolivia, Chile, Costa Rica, El Salvador, Honduras, Israel, Mexico, Peru, U.S.A. and Venezuela, but *not* with Great Britain, Australia and New Zealand. Traffic: (Aug.) VE3EMQ 227, VE3DPO 86, VE3FRE 79, VE3GI 74, VE3DBG 60, VE3EBH 53, VE3GCE 40, VE3DU 28, VE3EHL 19, VE3APL 16, VE3EWD 13, VE3EBC 4, VE3VD 4, VE3AWE 2. (July) VE3AWE 7.

QUEBEC—SCM, J. W. Ibey, VE2OJ—Because of illness their report must be brief. A full report will appear in the next issue of *QST*. Traffic: VE2OJ 21, VE2EC 30, VE2DR 14, VE2CP 8.

SASKATCHEWAN—SCM, Gordon C. Pearce, VE5-HP—Activity on the bands in Saskatchewan was fairly steady all summer with all bands, especially 2 meters, being quite active. Both 2-meter mobile and 75-meter mobile activity has been steady. The Saskatoon Club handled the communications for the Motor Race Rally and the Regina Club handled communications for a Moose Jaw-Regina Walkathon. The new RM is VE5GL and his net mgr. is VE5SC. Saskatchewan and Canada generally had the pleasure of hosting GI3CVH as he travelled by car from the East to the West Coast and back. VE5PZ and VE5EQ and others were out of commission for a while in the hospital. The XYL of VE5JR passed away suddenly in Aug. VE5KZ has planted the seeds for a new antenna farm. The newly-appointed director District No. 1 of the SARL is VE5HD, of Estevan. Traffic: VE5GL 79, VE5SC 38, VE5BO 8, VE5SN 6, VE5JK 5, VE5KZ 5, VE5BD 4, VE5DN 4, VE5EQ 2, VE5HZ 2, VE5YR 2, VE5XI, 1.

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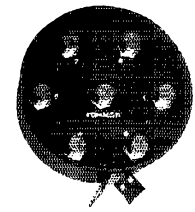

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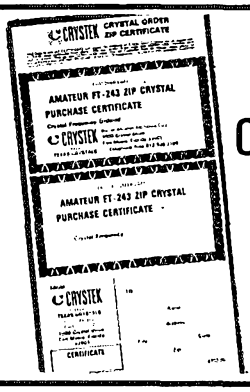

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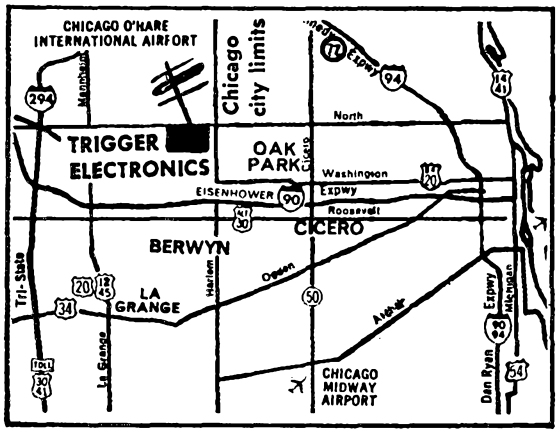

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Where the HAM IS KING!

HAM-ADS

(1) Advertising shall pertain to products and services which are related to amateur radio.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others. No Box Reply Service can be maintained in these columns nor may commercial type copy be signed solely with amateur call letters. Ham-ads signed only with a post office box or telephone number without identifying signature cannot be accepted.

(3) The Ham-Ad rate is 35¢ per word, except as noted in paragraph (6) below.

(4) **Remittance in full must accompany copy, since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.**

(5) Closing date for Ham-Ads is the 20th of the second month preceding publication date.

(6) **A special rate of 10¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature.** Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 10¢ rate. Address and signatures are charged for, except there is no charge for zipcode, which is essential you furnish. **An attempt to deal in apparatus in quantity for profit, even if 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 invertions. 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.

ROCHESTER, N.Y. is again Hamfest, VHF meet and flea market headquarters for largest event in northeast, May 16, 1970. Write WNY Hamfest, Box 1388, Rochester, N.Y. 14603.

R. L. Drake Co. Notice: come say hello to the fellows from the R. L. Drake Company at the following conventions: Las Vegas, Nevada, SAROC convention. Jan. 7-11, 1970.

WELCOME To Maritime. Mobile service net, 14313 KHz, daily 2130Z. Amateur Radio's service to the Fleet. Vic Barry RDC USS Corry, DD817 FPO N.Y..N.Y. 10950.

INVITATIONS: New York Radio Club invites New York Area hams and SWLS to its regular monthly meetings, the second Monday of each month at the Hotel George Washington, Lexington Ave. and 23rd St. at 8 P.M. W2ATT, New York Radio Club.

QCWA—Quarter Century Wireless Association is a non-profit organization founded 1947. Any amateur radio operator licensed 25 or more years is eligible for membership. Write for information. A. J. Gironda, W2JE, Box 394, Mamaroneck, N.Y. 10543.

MICHIGAN Hams! Amateur supplies, standard brands. Store hours 0830 to 1730 Monday through Saturday. Roy J. Purchase, W8RP. Purchase Radio Supply, 327 E. Hoover St., Ann Arbor, Michigan 48104. Tel. NOrmandy 8-8262.

FREE Sample copy Long Island DX Association Bulletin. Latest DX news. Business size SASE to K2AFY, Box 74, Massapequa Park, N.Y., L.I. 11762.

CHECK your first 2-way radio contact. If it was 40 or more years ago, you are eligible for membership in the most exclusive club in all of Amateur Radio, The Old, Old Timers Club. Write for membership application and details. Bert E. Gamble, W5ZC, *Executive Secretary*, 402 Beck Building, Shreveport, La. 71101.

WANT Early issues of Radio News, Science & Invention, Electrical Experimenter, Radiocraft, Modern Electronics, Popular Radio, Radio Broadcast, Wireless Age, 1923-25 Callbooks. For Historical Library. Wayne Nelson, W4AA, Concord, N.C. 28025.

PROP Pitch rotor, WW2, small, excellent, $45.00. Link, 1081 Aron St., Cocoa, Fla. 32922.

WANTED: Military and commercial laboratory test equipment. Electronicraft, Box 13, Binghamton, N.Y. 13902.

FILTER-Condensers: Aerovox oil-filled 100 mfd. @ 3000vdc condensers, $30.00 each. Basil J. Weaver, 1821-C Ave. M, Lubbock, Texas 79401.

SOUTHERN California Amateur Network. Scan 14.325 MHz Monday through Friday 0400 GMT. Join us, K6YCM.

SAROC new QTH Stardust Hotel new QTR February 4-8, 1970. Cocktail parties hosted by Ham Radio Magazine, Swan and Galaxy. Additional information and Stardust Hotel special room rate card QSP SASE SAROC, Box 73, Boulder City, Nevada 89005.

AN INVITATION NYC area Hams and SWL's are invited to attend NY Radio Club meetings—2nd Monday of every month. George Washington Hotel, 23rd St. and Lexington Avenue at 8 PM.

QSL Cards?? America's finest!! Personalized made-to-order. Samples 23¢. DeLuxe 35¢. Religious 25¢ (refunded). Sakkers, W8DED, Box 218, Holland, Michigan 49423.

QSLS—100, $1.40 and up postpaid. Samples, dime. Holland, R3, Box 649, Duluth, Minn. 55803.

C. FRITZ—QSLs that you're proud to send, bring greater returns! Samples 25¢ deductible. Box 1684, Scottsdale, Arizona 85252.

QSLS "Brownie" W3CJI, 3111 Lehigh, Allentown, Penna. 18103. Samples 10¢. Catalog 25¢.

QSLS. With all this competition, you've gotta have something different. Try us. Samples 10¢. Alkanprint, Box 8494, Minneapolis, Minn. 55408.

QSLS stamp and call brings samples. Eddie Scott, W3CSX, Fairplay, Md. 21733.

QSLS Free samples, attractive designs. Fast return, W7IIZ Press, Box 2387, Eugene, Oregon 97402.

QSLS—SWLS. Samples 25 cents. Malgo Press, Box 375, M. O. Toledo, Ohio 43601.

QLS SWLs Hundred $2.00, samples dime. Garra, 414 Mahoning St., Lehighton, Penna. 18235.

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.

RUBBER Stamps $1.25 includes tax and postage. Clint's Radio, W2UDO. 32 Cumberland Ave., Verona, N.J. 07044.

3-LINE engraved badge, any color, $1.25. Special rates to clubs. Fallert's Engraving, 121 N.C. St., Hamilton, Ohio 45013.

QSLS, samples 10¢. Fred Leyden, W1NZJ, 454 Proctor Ave., Revere, Massachusetts 02151.

QSLS by K1FF: $2.00 for 100. Others at reasonable prices. Samples 25¢ (deductible). K1FF QSLS. Box 33, Melrose, Mass. 02177.

QSL, SWL, cards that are different. Quality Card stock, Samples, 10¢. Home Print, 2416 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.

QSLS, SWLS, XYL-OMS. Sample assortment, 25¢. All the fabulous designs of the late Warren Rogers. KØAAB. Patterson Printing Co., 961 Arcade St., St. Paul, Minnesota 55106.

QSLS 300 for $4.50, samples 10¢. W9SKR, George Vesely Ret. #1, #100 Wilson Road, Ingleside, Ill. 60041.

QSL cards Finest quality. Economical prices. Fast service. Free samples. Little Print Shop, Drawer 9848. Austin, Texas 78757.

QSLS-100 3-color glossy $3.50; silver globe on front; report form on back. Free samples. Rusprint, Box 7575, Kansas City, Mo. 64116.

QSLS. Gorgeous rainbows, cartoons, etc. Top quality! Low prices! Samples 10¢ refundable. Joe Harms, W4BLQ, P.O. Box 158, Edgewater, Fla. 32032.

QSLS SWLS, WPE. Samples 15¢ in adv. Nicholas & Son Printery, P.O. Box 11184, Phoenix, Ariz. 85017.

RUBBER Stamps, 3-line address $1.50. J. P. Maguire Company, 448 Proctor Avenue, Revere, Massachusetts 02151.

QSLS, finest YLRL's, OM's samples 10¢ W2DJH Press, Warrensburg, N.Y. 12885.

QSLS. Neat, Quick, 10¢, Filmcrafters, Box 304, Martin's Ferry, Ohio 43935.

QSLS-SWLS. Hundred, $2.00. Samples dime. Willow Press, 223 N. Uldriks Dr., Battle Creek, Michigan 49017.

QSLS Kromekote glossy 2 & 3 colors, attractive, distinctive. Choice of colors, one hundred—$3.00 up. Sample 15¢. Agent for Cal-D-Calls. K2VOB Press, 457 Chancellor Ave., Newark, N.J. 07112.

3-D QSLS—The modern concept that makes all others old-fashioned. Samples 25¢ (refundable), 3-D QSL, Co., Monson 2, Mass. 01057.

EMBOSSED QSL's. Free Samples, with cut catalog 25 cents. Ace Printing Service, 6901 Clark Ave., Cleveland, Ohio 44102.

ORIGINAL EZ-IN double holders display. 20 cards each in plastic, 3 for $1.00 or 10 for $3.00 prepaid and guaranteed. *Free samples to Dealers or Clubs*, Tepabco, John K4NMT. Box 198T. Gallatin, Tenn. 37066.

LOW Priced QSLs! Free samples! K.L.L. Press, Box 258, Martinsville, N.J. 08836.

QSLS 3-color glossy 100. $4.50. Rutgers Vari-Typing Service. Free samples. Thomas St., Riegel Ridge, Milford, N.J. 08848.

RUBBER Stamps, badges, nameplates. Fast accurate delivery. Request price info and style charts from Fulton Rubber Stamps. Route 216-A, Fulton, Maryland 20759.

PICTURE QSL cards of your shack, etc. from your photograph. 500, $12.00. 1000, $15.25. Also unusual non-picture designs. Generous sample pack. 25¢. Half pound of samples 50¢. Raum's, 4154 Fifth St., Philadelphia, Penna. 19140.

QSLS. Kromkote, 100/$2.50 up. Buy best for less. Samples, 10¢. Mills Printing, P.O. Box 1004, Lima, Ohio 45802.

QSLS, $2.50 for 100. Samples 10¢. Diamond-Somar, 863 185th St., Euclid, Ohio 44117.

QSLS. Second to none. Same day service. Samples airmailed 25¢. Ray, K7HLR, 25 South Terrace Drive, Clearfield, Utah 84015.

NEW! QSL's professionally designed. Every card original. Free samples. Printing follow through by W1FLX QSL Design, 20 Britton St., Pittsfield, Massachuetts 01201.

CANADIANS: Complete 2kw station for sale, Collins KWM2, 312B5, Henry 2K, Delhi 50 ft. ham tower, Ham M rotator and 20 mtr. 3el. Telrex beam, mobile p.s. & antenna. H. Barber, VE3AWP, 30 Silver Aspen Cr., OHawoi 15 Ont. Tele. 613-824-4665.

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.

NOVICE Crystals: 40-15M $1.33, 80M $1.83. Free list. Nat Stinnette, Umatilla, Fla. 32784.

SELL swap and buy ancient radio set and parts magazines. Laverty, 118 N. Wycomb, Lansdowne, Penna. 19050.

DUMMY Loads, 1 KW, all-band, $7.95; wired, $12.95. Ham Kits. P. O. Box 175, Cranford, N.J. 07016.

POLICE Fire Radio Dispatcher directories! Exclusive official directories: Call signs, frequencies of local, county, state agencies. National. For all VHF fans, CD, AREC, RACES, MARS, VFD's Catalog for stamp. Communications, Box 56-T Commack, N.Y. 11752.

WANTED: Military, commercial, surplus, airborne, ground, transmitters, receivers, test-sets, especially Collins Airborne. We pay cash, and freight. Ritco Electronics, Box 156-Q567, Annandale, Va. Phone: 703-560-5480 collect.

WANTED: 2 to 12 304TL tubes. Callanan, W9AU, 625 West Jackson Blvd., Chicago, Ill. 60606.

HAM'S Spanish-English manual $3.00 Ppd., Gabriel, K4BZY. 1329 N. E. 4th Ave., Fort Lauderdale, Florida 33304.

WANTED: For personal collection: How to Become a Radio Amateur, Edition 9; The Radio Amateur's License Manual, Edition 12. W1CUT, 18 Mohawk Dr., Unionville, Conn. 06085.

QST's Wanted: December 1915 to December 1916, 1913, IRE proceedings. Any unreasonable price! Ted Dames. W2KUW, 308 Hickory Street, Arlington, New Jersey.

FOR Sale: SB-101 and SB-200. Wanted, kits to wire. Heath preferred, 12% of cost, some in stock. Professionally wired. Lan Richter, K3SUN, 131 Florence Drive, Harrisburg, Penna. 17112.

WE Buy all types of tubes for cash, especially Eimac, subject to our test. Maritime International Co., Box 516 Hempstead, N.Y. 11551.

CASH Paid for your unused Tubes and good Ham and Commercial equipment. Send list to Barry, W2LNI, Barry Electronics, 512 Broadway N.Y., N.Y. 10012. Tel: (212) 925-7000.

TOROIDS, 88 mh uncased. 5/$2.50. Postpaid. Humphrey, WA6FKN. Box 34, Dixon, Calif.

WANTED. Tubes and all aircraft and ground radios. Units like 17L, 51X, 618T or S. R388, R390, GRC. Any 51 series Collins unit. Test equipment, everything URM, ARM, GRM, etc. Best offer paid. 22 years of fair dealing. Ted Dames Co., 308 Hickory St., Arlington, New Jersey 07032.

INTERESTING Sample copy free. Write: "The Ham Trader," Sycamore, Illinois 60178.

RTTY gear for sale. List issued monthly, 88 or 44 Mhy toroids, five for $2.50 postpaid. Elliot Buchanan & Assoc. Inc. Buck, W6VPC. 11067 Mandana Blvd., Oakland, Calif. 94601.

SWAN 500. Best offer over $350.00; excellent condition. WA3EYM, 5944 Doris Drive, Erie, Pennsylvania 16509.

TELETYPE Picture for sale. 50 pictures for $1.00. Perforated and audio tapes also available. Pictures for Volume Two solicited. Grene, W9DGV, 2210-30th St., Rock Island, Illinois 61201.

SELL: All kinds of plate and fil. transformers, chokes, capacitors 4-250A, 4-125-A, 4-65A, 813 tubes, new, BC-610E parts. Best offer. W3KZ, 441 W. Stafford St., Philadelphia, Penna. 19144.

SELL Or swap: Hallicrafters SX62A. Will add cash for HO-180A or other. Bill Keasler, 311 Shannon, Elburn, Illinois 60119.

TR-4, AC-3, nominal use, cartons, manuals. $450.00. Bill Strong, WA5KPE, Box 15352, Millsaps College, Jackson, Miss. 39210.

WORLD OSL Bureau. See ad page 138.

1000 PIV @ 1.5 amp. epoxy diodes includes disc bypass, caps and bridging resistors. 10 for $3.95. Postpaid USA. With diode purchase. 125 Mf. at 350 volt electrolytic capacitors, 50¢ each. Postpaid USA no limit. East Coast Electronics, 123 St. Boniface Rd., Cheektowaga, N.Y. 14225.

SELL/Trade: NLS digital voltmeter Model 450R complete with book. Need CV-60, SRR-13, TTY gear, WX equipment. Thompson, 5 Palmer, Gorham, N. Hamp. 03102.

WANTED: Lorch HR-240 or Racal 6217. Condition, price, SN, accessories available. Write to: Boris Malinowsky, 169 East 32nd St. 6, Paterson, N.J. 07514.

INTEGRATED Circuits: New Fairchild MicroLogic; epoxy TO-5 package. 900 buffers, 914 gates, 60¢ each. 923 J-K flip-flop, 90¢ each. Guaranteed. Add 15¢ postage. HAL Devices. Box 365Q, Urbana, Illinois 61801.

HALLICRAFTERS HT-32, HT-33, SX-101A. Superb condition. New pair of spare 4CX300's, $600. Professor Colton Tullen, K2PXQ, Department of Physics, County College of Morris, Dover, New Jersey 07801.

NEMS-CLARKE receivers wanted, 1400 series crystal controlled telemetry models covering 215-245/260 MHz preferred, but all models in 1300, 1400, 1500, 1600 and higher numbered series also of interest. Please send accurate description of what you have to Tucker Electronic Co. P. O. Box 1050, Garland, Texas 75040.

BEST Offer: Complete mobile in '69 Buick LeSabre, 9000 miles; FF1 unit 3935-3999 xtals Waters ant. syst., band-adder xtra, 20-40 coils, compl. Webster ignition shielding w/Sprague filters, Johnson CB-323 outside spkr, Drake AC-4/RV3 for portb. oper. Home sta. TR-4 SB-200 AC4 RV3 xtra. DC-3 supp. Johnson CB-323 w/a.c. power; Ranger II Drake 2-B rcvr, two TA-33 beams, Ham-M 35 ft. windmill tower (stdg); 10 ft. xtra sec., new truckload spare parts. Everything goes! Package deal only! Will sell without Buick. A. Zwink, W1HOM, 3 Inverness Rd., Arlington, Mass. 02174.

TELETYPE Wanted—M28 typing units any condx, keyboard perforators—reperforators, cast aluminum TD bases, all unused parts. Sell, too! Typetronics, Box 8873, Ft. Lauderdale, Fla. 32150.

WE'RE Trying to complete our collection for Callbooks at Headquarters. Anyone have extra copies of Government Callbooks 1922-1925 and Radio Amateur Callbooks 1928-1934 ARRL, 225 Main St., Newington, Conn. 06111.

TELETYPE Wanted: Models 28, 32, 33, 35, Receivers R-390A, R-388. Cash, or trade for amateur equipment. Alltronics-Howard Co., Box 19, Boston, Mass. 02101. Tel: a.c. 617-742-0048.

DAH-DITTER Keyer. Integrated circuit electronic keyer. Fully self-completing on both Dit and Dah with automatic spacing. Built-in A.C. pwr. supply, reed relay output, with sidetone monitor and speaker. Completely assembled and tested. Only $34.95. Dealer inquiries invited. Send your order to M & M Electronics, 6835 Sunnybrook, N. E., Atlanta, Georgia 30238.

SPIDERS For boomless quads. Heliarc welded aluminum. Al's Antenna Accessories, 1339 South Washington St., Kennewick, Washington 99336.

R389, R390, R390A, 51J4, 75A4, 75S3A, NC101X, HR050T1, HR060T1, SP600, KWM-1, KWM-2, 62S1, 312B5, HA-2, and others. List for SASE. W2ADD.

SELL, trade or buy Call Books, Handbooks, magazines, and old radio sets and parts. Erv Rasmussen, 164 Lowell, Redwood, City, California 94062.

WANTED: An opportunity to quote your ham needs, 30 years a ham gear dealer. Collins, Signal/One, Drake, Swan and all others. Also $25,000.00 inventory used gear. Request list. Chuck, W8UCG, Electronic Distributors, 1960 Peck, Muskegon, Mich. 49441.

TRANSFORMERS rewound. Jess. W4CLJ, 411 Gunby, Orlando, Fla. 32801.

GREENE—Center of dipole insulator with or without balun. Free flier. O. Watson Greene, Box 423, Wakefield, R.I. 02880.

WANTED: QST copies in good condition 1920, 1921, 1922 and August of 1958 to complete personal 50-year collection. Rex Bassett, W4QS, Box 4163, Fort Lauderdale, Florida.

TOROIDS. Uncased 88 or 44 mhy. 5 for $1.50 ppd. M. Wenschenker, K3DPJ, Box 353, Irwin, Penna. 15642.

REPAIR and calibration service. Write before shipping. Pan Tronics, Inc., 6608 Edsall Road, Alexandria, Virginia 22312.

TOROID Coils 88 mh uncased postpaid. 5/$2.00. La Von Zachry, P. O. Box 845, Apple Valley, Calif., 92307.

HALLICRAFTERS SR-150, Mobile Mount, Antenna, $375.00; SX-117W/spkr, $225.00; Heath SB-200 Linear, $195.00; HW-29, $45.00; CB GW14A, $89.00. All in excellent condition. W2ERV, 14 Bernice Dr., Freehold, New Jersey 07728.

QSTS: August 1922 to date, in excellent condition, complete with single exception of March 1953. Highest offer by January 1, 1970; you pay freight. Write Mrs. Scott Cooper, 1714 Alder Court, Bozeman, Montana 59715.

NOVICE Crystals, 75 cents. Free list. Gregory Ginn, 1240 21st St., Hermosa Beach, Calif. 90254.

MECHANICAL, Electronic Devices Catalog, 10¢. Teletype reperforator Model 14 with rewinder new, unused, $69.95. Silicon rectifier 4000PRV-lamp, $3.95 ea. Fertik's, 5249A. "D", Philadelphia, Penna. 19120.

RESISTORS, Resistors, Resistors, Resistors. Only 8¢ each; 10/60¢ Ppd. May be assorted. Garrett Industries, 4504 Nunnswood, Lakeland, Fla. 33803.

NOVICES: Need help for General Ticket? Complete recorded audio-visual theory instruction. Easy, no electronic background necessary. Write for free information. Amateur License, Box 6015, Norfolk, Virginia 23508.

WANTED: All types of tubes. Top prices paid for Varian and Eimac. Jaro Electronics Corp., 150 Chambers St., New York, N.Y. 10007.

SELL: Brand new Yaesu FT-DC-400 transceiver and FL-DX-2000 linear. W8AO, 2912 Riverview Boulevard, Silver Lake, Ohio 44224.

DX AWARDS Log: This 150-page book just published giving number and type of contacts needed for over 100 major awards for hams and SWLs by clubs world-wide includes cost and how and where to apply. Individual logs provided for each award to keep complete record of contacts and confirmations. Required over two years to prepare. Most complete and up-to-date source of DX Awards available. $3.95 postage paid ($4.95 foreign). The McMahon Co., (W6IZE), 1055 So. Oak Knoll, Pasadena, Calif. 91106.

EICO 753 Transceiver, A.C. 751 power supply. Stable, transistorized, VFO. Immaculate, professionally wired, with manuals and Turner 350 mike. Inspection invited. Deliver 50 miles. Asking $185. K8MGT, 69 E. Dodridge St., Columbus, Ohio 43202.

For Sale or Trade: One RME-4350 receiver, with matching speaker, in xclnt condx. Price: $90.00 or will swap for Ranger xmtr. Must be in gud condx. Also want Foldover tower. W8-GUN. Charles H. Moore, Nunica, Mich. 49448.

FOR Sale: NCX-3, NCX-A, absolutely perfect condx, $180.00. Boutell, 901 Nicholson, So. Milwaukee, Wis. 53172.

HALLICRAFTERS FM/AM, base receiver covers all 144 MHz, no xtals needed, $75.00; 220 MHz transmitter pair 4X150As, $75. Other 220 MHz gear excess to my needs; lit test and VHF/UHF equipment sell or trade. SASE, pls. W4API, Box 4005, Arlington, Virginia 22204.

SELL: Swan 250 with AC and DC power supplies, plus speaker and cabinet. Asking $300.00. R. S. Caverhill, W2EBC, 1688 Stanley Road, Cazenovia, N.Y. 13035.

WANTED, Kits to wire, 10% of cost. Satisfaction guaranteed. Dick Doolittle, W9KMF, 3121 15th St. So., Wisconsin Rapids, Wis. 54494.

ROTARY OSL File, pockets for 160 cards included (file maximum 500). $7.95 postpaid. K9VCZ. McNamara, MB Products & Sales, 1917 North Lowell, Chicago, Illinois 60639.

COLLINS 73S3, $380.00; 32S3 with 516F2 AC supply, $575. 312B4, $125.00, or package for $1050. Heath SB-200, $200.00; MM-2 'scope with rec. adapter, $50.00; Ameco 2-Meter conv. 26-30 IF, F/W, $30.00. Late Ranger I with PTT, $75.00; Teletype 15 printer, $65.00; 14TD, $40.00; 14 typing reperf with keyboard, $75.00. All with 60 wpm gears and no waivers. Motorola two-case on 146.94, $70.00. 1.5 kc mech. filter for 75S3B, new, $45.00. All gear in top condition. W8POZ, 1900 Alhambra, Ann Arbor, Michiran 48103. Tel: a.c. (313)-761-1269.

DRAKE T-4X with neat homebrew power supply, just like new, $325.00; Collins 32V3, in exclnt condx with many spare tubes, including 4D32, $150.00. Marion Wise, W4PRO, 15 Willow Rd., Hampton, Va. 23364.

SBE-34 Transceiver, late model, includes mike, calibrator, mobile mount, manuals. In exclnt condx: $275.00. W1MIJ, 58 Felch Road, Natick, Mass. 01760.

GOVERNMENT Surplus Electronics Bargain Catalog, 96 pictured pages. Send 25¢. Meshna, Nahant, Mass. 01908.

DRAKE T4X, R4A, MS4, AC4 for $600. In xclnt condx. Eugene Ornstein, 1347 Ocean Ave., Brooklyn, N.Y. 11230.

WANTED: Plate transformer 2000 or 2500 VAC, 500 Ma. each side of CT. Give mfr. model number and full data in your letter. W2CVY, 70 Beech Terrace, Wayne, N.J. 07470.

FOR Sale: H-P oscilloscope, Model 150-A with voltage current amplifier, Mod. 154-A, high gain amplifier, Model 151-A plug-in units. Perfect condition: $600. F.o.b. Springfield, Ohio 45504. R. A. Pitzer, 111 Englewood Drive. Tel: a.c. (513)-399-4946.

VALIANT modified for SSB exciter or adapter. This rig worked 225 countries AM/CW/SSB. In exclnt condx, with new finals. Prefer NYC area. Price $130. WA2LOR, 1105 Towne House Village, Hauppage, L.I., N.Y. 11787.

"DON And Bob" new specials: Galaxy GT-550 $399.95; Drake R-4B, $363.00; T-4XB, $380.00; Hammarlund HQ-215, $449.00; Tri-Ex W-51, $330.00; Hy-Gain TH6DXX (Reg. $169), $144.95. Write for quote. USED Collins 75A-4, $350.00; KWS-1, $650.00. Guaranteed buys. Rotron 3380 rpm Squirrel-cage whisper fan 2 ¼" dia. $5.95; Ray 6J56C, $3.95; Motorola HEP170, 3.5A 1000 Piv, 39¢ each, 1-82 indicator with driver, transformer, $5.95; Telex HMY-2K headset, $3.95; 2.5V 10A filament xfrmr $3.95. We stock many discontinued tubes, manuals. Write us your needs. Complete export facilities. Prices f.o.b. Houston. Sales guaranteed. Bankamericard, GECC. Don, K5AAD, Bob, WA5UUK. Madison Electronics, 1508 McKinney, Houston, Texas 77002. Tel: a.c. (713)-CA-42668.

WANT: Heath DX-60B or similar; advise on condx, price. Bill Houston. Will answer all replies to this address. 506 S Gilbert, Powell, Wyoming 82435.

FOR Sale: NC-300 receiver, very clean, in exclnt condx, recently aligned. Asking $250.00, or best offer. A. H. Watson, K1ABP. Fiske Hill Road, Sturbridge, Mass. 01566.

WANTED: Manual for AN/WRA-1, WB4FEA, 609 Mountain Ave., S.W., Roanoke, Va. 24016.

INVADER 2000, PL-175As shortly replaced, mint condx, $550.00; Heath Ham-Scan HO-10, new, $50.00. Panoramic Panadaptor PCA-2T 200, $35.00; National 50/60 NBFM adaptor, new, $15.00. Roger Batista, WB2ZBM, 1219 Taylor Ave., Bronx, NYC 10472.

SALE: QSTs complete sets: '25-'32, '37-'39, '44, '52-'59; '61-64. Nearly complete sets: '42, '43, '60, '65. Other issues available and some duplicates of above issues. Make offers. Paul Capitolo, W6RQG, 1735 LeRoy Ave., Berkeley, Calif. 94709.

SURPLUS Gear wanted. Frequency shift converter CV-182; frequency shift exciter O-39C/TRA-7; antenna tuning unit BC-939-B; power supply RA-87-A; radioteletypewriter control C-808/GRC-26A. Advise condition, price in your first letter. All inquiries answered. Carlton D. Trotman, W3BRX, c/o Upward Bound, Lincoln University, Lincoln University, Penna. 19352.

PERFECT SX-115 rec., $275; SP-44 Panadapter with inst., $40; Autronic Keyer and paddle, $40; Hallicrafters factory-wired VTVM, $25; factory-wired HC-1 capacity bridge, $20; General Radio 805 standard signal gen, 16 KHz to 50 MHz recalibrated one volts to one microvolt. Excellent condition $350, or will trade for measurement 202 FM generator, Knight 10 Kc, 100 Kc, 500 Kc xtal frequency generator, $15. Well-built homebrew 2125 and 2975 Hz. T.T. signal source within 5 Hz, $20. Bliley 100 KHz xtal and oven, $5.00. Clean HT-32, $200. Perfect HT-33A, $300. Fritz Franke, 919 Ridge Court, Evanston, Illinois 60202.

SELL: Heathkit Shawnee HW-10 six-meters transceiver. Saturn Six mobile antenna $115.00. WB2AIZ, 15 Ellmyer Rd., Edison, N.J. 08817.

HW-32, latest factory modifications, little use, mobile mike, mounting bracket, book: Hustler 20M coil section, $100. Budd Meyer, 6505 Yellowstone, Forest Hills, N.Y. 11375.

WANTED: Poly-Comm 2, in perfect condx. All wire a.c. and d.c., and mike. WA3LGC, 136 Lamont Ave., Glenolden, Penna. 19036.

WANTED: Good electronic keyer and Vibroplex, XE1NE, Box 2807, Mexico City, Mexico.

HY-GAIN TH6-DXX, new. Best offer takes it. Sry, won't ship. Monto, Wisteria Path, Sands Point, Port Washington, N.Y. 11050.

HEATH SB-200, perfect. $220.00. K4BBF, 3606 Skyview, Huntsville, Ala. 35801. Tel: 536-9776.

15 KSR Teletype page printers, gud condx, $35.00 each F.o.b. Pictures. Charlie, KØQVL, 2015 No. 50th St., Omaha, Nebraska 68104.

MANUALS: R-274/FRR, TS-173/UR, TS-323/UR, $5.00 each. Hundreds more. List 20¢. S. Consalvo, 4905 Roanne Drive, Washington, D.C. 20021.

HOME Owners Assn. says "Nix"! Rohn FK45G Heavy duty fold over tower extra section below hinge, 60 ft. with antenna support tube 6 7 8 9 10 11 12 13 14 15 all hardware included and many extras, additional bolts, accessory shelf for Ham-M or TR-44 2"; extension tube 8 ft. long, 2" Eafnir self aligning ball thrust bearing, erection tool, extra guy wire, instructions. New never erected. $360.00. Stoner RT-1 transistorized RTTY converter, like new, with manual—$85.00. Wanted: 75A4, serial above 5000. Clean! Phil Stout, W3LL 324 Broadmoor Road, Baltimore, Md. 21212. Tel: (301)-435-0226.

FOR Sale: Ham and engineering book collection. Send for list, K1APA, 3 Sunny Acres, Brattleboro, Vermont 05301.

WANTED: Variable capacitor. Dual 200 UUF, 2000 volt, Johnson 155-505 or equivalent. David Higgins, K1BCG, 54 Milwaukee Ave., Bethel, Conn. 06801.

SELL: HA-10 amplifier, spare final, 2 Dow-Key relays, $165.00; HW-32, absolutely mint, $85. Pick up linear or pay postage. I will deliver it within 100 miles radius. Mike Wilke, WB4AQL, 3607 Cambridge Rd., Montgomery, Alabama 36111.

WRLS Used Gear has trial-terms-guarantee! 75S1, $299.95; G-50, $159.95; SR150, $299.95; HW-12, $89.95; Swan 250, $279.95; Duobander 84 $119.95; NC-200, $249.95; SB-34, $299.95; Valiant, $149.95; Ranger, $99.95; Galaxy 300, $139.95; Galaxy V Mk II, $299.95. Many more. Free "Blue Book" List from WRL, Box 919, Council Bluffs, Iowa 51501.

SB-100 Heath Transceiver. Built-in speaker. $325.00. W8QUR, 3023 Emmick, Toledo, Ohio 43606.

MUST Sell: TR-108 with xtals, Viking 500 xmttr, DX-60 xmttr, HG-10 VFO, Knight V-44 VFO. Jim McClure, WA9-BYR, 627 Dundee Ave., Barrington, Illinois 60010.

AEROMOTOR Tower 85 ft., four legs, 35 ft. masting; gin pole, prop pitch rotor; antennas: Mosley S-402 and TH-36; Telrex 11 el. 6M; Ranger II; HX-30; T/R switch. Will ship. Joe Engressia, 9050 SW 117 Ave., Miami, Florida 33156.

R4B, MS4, with WWV, 160 and all of 10 meters, $350.00. DX-35 with spotswitch added, $20. Ed Knobloch, WB2BDF, 160-33 Highland Ave., Jamaica, L.I. N.Y. 11432.

HEATH SB-630 station console. Well wired. $75.00. Crystals 80-10 meters, free list. $1.00 postpaid. Steve, WA2FKE, 12 Sanderson, W. Caldwell, N.J. 07006.

GALAXY V Mk II with VOX, AC-35 power F-3 CW filter. In top condx. First certified check for $250 takes. Brooks Carter, W4FO, Rte 1, Box 239D, Irmo, S.C. 29063.

SELL: NCX-5, Mark II, and NCX-A power supply, $450; SB-620 Scanalyzer, $90; HO-13 Hamscan, $50; Galaxy Rejector, $15.00; HK-1B keyer, $15.00; 14AVQ, $20.00; Eico Dipper, $20.00; Waters compreamp 359, $15.00; D-104 mike, $10.00; APX-6 transponder with all tubes, power supply, and modulator, $25.00; homebrew 6M kilowatt linear (4CX250B's) with plwer power supply, $100 or your best offer. Sony 105 tape-recorder, $70.00. K. R. Hill, W3ELY, 404 Benoaks Drive East, Severna Park, Md. 21146.

WIRELESS Shop. New and reconditioned equipment. Write, call or stop by for free estimate. 1305 Tennessee, Vallejo, Calif. 94590. Tel: a.c. (707)-643-2797.

SALE: $10 Gotham 2-element 20-meter beam. You pick up. Bob Newman, K4UWS, 1407 Pinedale Dr., Opelika, Alabama 36801.

SELL Or swap Apache xmtr, SB10 SB adapter, vacuum tube voltmeter new. Electric guitar. Want: Swan 250 6 meter trans. Peter Donneau, W1YIX, 11 Blanche Ave., Cumberland, R.I. 02864.

TWOER, unmodified, clean, mike, rocks, accessories, $35.00. BC-639A, RA-42A, exclint, $50.00. Send for list. Surplus, commercial material. Want local mint 75A2, HRO-60, HRO-50. W6KEC, 320-A S. 2nd Ave., Arcadia, Calif. 91006.

SALE: Clegg 22'er, in exclnt condx. $150.00. Bickell, W4ZSB, 2160 N. E. 56th Pl., Ft. Lauderdale, Fla. 3308.

TR-3, AC-3, MS-4, $325.00. Also Johnson 1 KW Matchbox with SWR bridge, $95.00. Ship either at your expense. Fred Jackson, W4CEH, 1717 Meredith Lane, Belleair, Clearwater, Fla. 33516.

COLLINS 75A4, SN5774. 3.0 KHz filter, $350.00; Gonset GSB-100, $125.00. Both are in mint condition. Take the pair for $450.00. Jim Lindsay, W3HQY, 3218 Polk Road, Norristown, Penna. 19403. Tel: a.c. (215)-584-6638.

COLLEGE: For sale— SR-400, used 10 hours, Swan 350, Heath phone patch, etc. WB4APZ. Tel: a.d. (813)-995-5314.

TELETYPE Equipment and parts. New and used. We stock just about any teletype item. Write for more details. RTTY Electronics, P.O. Box 655, El Cerrito, Calif. 94530.

FIRST Best offer: HW-32A, HP-23, mike, complete package only: NC-300. Dumont 208B 5-inch 'scope, $25.00; 5 ft. rack cabinet, $25.00. Les Kalmus, K2SHL, 10 Bull Run, West Nyack, N.Y. 10994.

SELL: NCX-3 in gud condx, without power supply. $165.00. Call 1-215-692-7547 or write 518 Nottingham Drive, West Chester, Penna. 19380. W3CAW.

SELL or Swap: U.S. diver's scuba tank with J-valve and Aquamaster regular, $90. RCA color CT-100 with bad kine, $40 f.o.b. will consider swap on good Ham-M, mobile antenna, linear parts, etc. Rex Nielson, W9CRQ, 1808 So. 64th St., West Allis, Wis. 53214.

GALAXY V xcvr and a.c. power supply. Just got married and need the money. A sacrifice at $200. In perfect mechanical and electrical shape. WB2NZV, 14 Gordon Place, Glen Rock, N.J. 07452.

SWAN 400, 80-10 VFO, power supply and mike. All in mint condx. All for $325.00. E. Parks, 6486 Nancy St., L.A., Calif. 90045.

SELL: Complete 1969 Heath station: SB-301 rcvr w/c.w., a.m. filters plus two and six-meter converters, SB-401 xmtr, w/xtal pack, SB-200 linear, SB-620 scanalyzer, SB-630 console, SB-610 Monitor 'scope, 60 ft. Tri-Ex crank-up tower, Mosley TA-33 beam. $1250.00. J. R. Doak, W8QJM. Tel: a.c. (914)-679-6032 or write Box 486, Woodstock, N.Y. 12498.

SELLING Out: Viking II, $1000; SX-100 $75.00, plus most elaborate xmtr ever, 500 w. 4-65As PA, 811A's modulator, 'scope, G-E commercial cabinet, loaded with extras. Meters, relays, variable power devices. Built to meticulous professional standards, $200.00. W2GCO, Ted Skoglund, West Lake Road, Cazenovia, N.Y. 13035. Tel: a.c. (315)-655-9397.

SELL Digital voltmeter, Nixie readout, like new, sacrifice. Send for data. J. Rider, Box 301, Prospect Heights, Ill. 60070.

HEATHKIT DX-60B, HG-10B, microphone, excellent condition, $90 or best offer. WAØUOX, 710 Line St., Kirksville, Mo. 63501.

HALLICRAFTERS HT-32 and SX-101 Mark III, in xclnt condx, very little use, both $390.00. W4AVU. Phone a.c. (703)-293-5207 between 6 and 10 PM EST.

FOR Sale: SB-500 for HW-100, $150.00; SB-310 with all filters, $210.00; EUW-20A, $100; 3395.4 KHz filter, $10, or first best offers. J. Taschetta, RR 1, Box 11, Bridgman, Michigan 49106.

HEATH HW-12 mint condition. $88.00. L. Johnson, 2400 Jams, Topeka, Kansas 6614.

FOR Sale: F.M. Signal Generator 1-20 mc, gud condx, $30; BC-221-T freq. meter, with manual and calibration book, new condx, $80; Ameco 2-meter converter 7-11 i.f., xclnt, $15; BC-654A, $10; Heath grid dip meter, fair, $5; RCA 7-inch VTVM, xclnt, $30; audio oscillator, $20; RF signal generator, $15; Telrad xtal standard, $15; Supreme 3-in. 'scope $20; surplus aircraft transmitter, $10; also many misc. components. Keith Knowlton, K1JPH, Charlton City, Mass. 01508.

COLLEGE Expenses, must sell: NC-190 rcvr, $150; Clegg 22'er, $160.00; both are in xclnt condx. Richard Eisenberg, WB2RFT, 920 Hewlett Dr., Valley Stream, L.I., N.Y. 11581.

4CX250B tubes, new, postpaid, $21.00 pair. C. M. Pruett, Star Rte C, Flamingo Bay, Ft. Myers, Fla. 33901.

SELL: Collins, Central Electronics, Monitor Radio, Heathkit, Henry Model 2K, and many more. Stamped envelope for list. Don't miss this fine gear surplus to my needs. Ted Valpey, W1ATP, P.O. Box 87, Mellen Street, Holliston, Mass. 01746.

32-S3 SN #11607 with matching power supply, all modifications with factory realignment, in mint condx, $525. Mosley Classic 33, TR-33, 10 foot top section Rohn Tower with 40 foot each rotor cable and RG-8/U $130. Johnson 250w. Matchbox w/o bridge, $40. Terms: freight collect. Cash, certified check, or money-order. Contact Ed Lauster, WA2MXW, Telephone 9 to 5: 867-8484, ext. 216, after 5 PM, a.c. (212)-HO5-3836.

SWAN 350 with 117-XC power supply, speaker, $350. All in xclnt condx, original packing and manuals. Used little, never mobile. W8DXR, 933 Havensport Drive, Cincinnati, Ohio 45240. Tel. a.c. (513)-851-2919.

SELL: Drake R-4 and T-4X with a.c. p/s and Clegg Zeuss with p/s/mod unit. All in xclnt condx. $750 F.o.b. River Forest, Ill. Art, WA9IQP, 811 Franklin, River Forest, Ill. 60305.

CYCLONE SR-400 xcvr P/S 500 a.c. Cost $950. Will sell for $599.95. Prefer local pick-up deal, or you pay shipping. Certified check. Ronald M. Nagata, W6RQZ, 1330 Curtis St., Berkeley, Calif. 94702. Tel: a.c. (415)-526-7345.

HW-22, $70; Mobile supply, $30; Nixie readout digital volt-ohm meter $60; solid-state 80 and 40 meter c.w. xmtr with VFO, 30 watts input, Attractive cabinet, $70; Heathkit vtvm, $25.00; Hallicrafters TO-9 keyer, $40; Heathkit r.f. lab generator, $30; Roberts 6000s stereo portable tape-recorder, mike, a.c. supply, $250.00. K7AZB/6, P.O. Box 252, Mountain View, Calif. 94040.

SELLING Cheap, going to college: Drake 2-C receiver with 2-CQ speaker/Q multiplier; 2-NT transmitter; Hy-Gain 14AVQ. $350 takes the entire station, in perfect brand-new condx, with xtras. Larry Moss, 138-05 Cronston Avenue, Rockaway, N.Y. 11694. (NYC area): Tel: a.c. (212)-474-6155.

SELL: 5" Heathkit oscilloscope, Model O-3, $28; also 3" RCA Mod. 1245, $32. Both are in xclnt condx. W2KWC, 31 Swing Lane, Levittown, L.I., N.Y. 11756.

VIKING Invader 200, HQ-170A receiver, $200 each. Will ship. O. G. McKinney, Jr., 403 So. Jefferson St., Lewisburg, West Virginia 24901.

NCX5MK2 (mint), heavy duty a.c. power supply. Choice of NCXD or Eico 752 d.c. supply. All cables. Reluctance PTT mike. Hustler antenna 80 thru 10 coils. Best reasonable offer. Will deliver within 50 miles. W8GNN/5, Rte #2, Mountain Home, Arkansas 72653.

SWAN 500, homebrew p/s, VOX. Best offer; Ham-M rotator, 40 ft. 8 conductor cable, $50; TA33SR 40 ft. RG/8-U, $50; Heath Twoer, $10; Homebrew 160 rig, 6146 final, $10; homebrew 20-10 SSB xcitr, 6DQ6 final, $35; Gonset phone patch, $10. WB2PWU, Ed Gerber, 48 Greystone Road, Rockville Centre, N.Y. 11570. Tel: a.c. (516)-766-5793.

WANTED: Collins S/Line Swan 250. Give age; Description, price. WA3HMQ, 301 Blacksmith Rd., Campbell, Penna. 17011.

SELL: Two Western Electric pushbutton telephones. One wall, one desk. HA-700 Lafayette general coverage receiver. All mint condx. First best offer. 379 Adams Ave., West Hempstead, N.Y. 11552. Tel: a.c. (516)-489-5899.

HALLICRAFTERS HT-40 xmtr. Not a kit! New condx. $50.00. A. Wilson, Box 392, Pineland Park, East Brewster, Cape Cod, Mass. 02640.

FREQUENCY Synthesizer, 10 KHz to 26 MHz in 10 Hz steps $100, or first best offer Defunct storage 'scope with memotron tune, $25; 8 digit solid-state frequency and period counter, Nixie readout, with manual; needs work—$200. Other test equipment. Send SASE for list. Davco DR30, $200. Rick Factor, WA2IKL, 30 W. 60th St., NYC 10023.

HALLICRAFTERS SX-130 general coverage communications rcvr. With matching R-50 spkr. And manual. Used only 4 Months. Will accept reasonable trades. $150.00. WN9BUR, Mike Moore, 918 Hunter, Wilmette, Ill. 60091. Tel: a.c. (312)-251-9127.

DX-pedition XYL approved? VP2M QTH, DeLuxe station. Universal power supply, 6-160 antennas. You supply transceiver. Beautiful house and garden overlooking Caribbean. Swimming pool. K. Hollatz, VE3FHO, P.O. Box 1178, Elmira, Ontario P., Canada.

QSTS: October 1948-October 1968 complete run. Includes 6 QST binders (like new). Everything for $25.00 F.o.b. Clifton, N.J. Bob Eckert, 133 East 7th St., Clifton, N.J. 07011.

QSTS 1922 to date, two copies missing. Bound new, in original carton. Raytheon 4D32 tube. First best offer. Dean Reiss, W9EIK, 2418 6th St., Wausau, Wisconsin 54401.

HE-45B and VFO, excint; $65.00; power supply B.B. $5.00; 10-meter converter, old tubes. Call a.c. (516)-IV9-4295 for Peter, WB2PAA, 11 Woodview Road, West Hempstead, L.I., N.Y. 11551.

PERFECT Condx: HT-37, $190.00. Eico 'scope, $25.00. W2TXV. Tel: a.c. (516)-676-4477.

COMPLETE Station for sale, or individual components: DX-100B (10 thru 160 M, 125 watt A./CW xmtr), Allied R-100 rcvr, Heath AM-2 s.w.r. meter, Hy-Gain 4-band trap dipole, Blitzbug, mike, antenna relay, coax, and all manuals. $225.00 or first best offer takes all. Will not ship, sry. Write: W3RBK, Doug Spencer, 361 Castlewood Drive, Devon, Penna. 19333.

JOHNSON Viking Ranger transmitter/exciter, factory-wired, with Viking Matchbox coupler: $100.00; National NC-98 receiver with speaker, $50.00. All in very gud condx. Erich Kessler, Ex/K2GVU. Tel: a.c. (215)-345-0241.

NEW Electro-Voice #619KK dynamic mike. Prize. Factory sealed carton. Sells for $30. My price $20.00, plus shipping. W2JBL.

SELL: 32S-1, 75S-1, 516F-2 and SM-1, $700. 32V-1 and 75A-1, $200; SBE-33, SB1-LA and SB1-MIC, $275; HA-1 TO-Keyer, $50; deluxe Vibro-Keyer, $20; Deluxe Vibroplex, Original, $20; DeLuxe Vibroplex Presentation, $30; McElroy Bug, $20; Instructograph, $15.00; BC-221J; Heath HM-10A, $25.00; Simpson 260, $25.00; Eico 460, $50.00; D-104, $15. Following $10 each: E-V 910, Heath HM-11, Johnson 250-20, Eico 352, Meissner 10-1154 analyst, Heath BE-5. Miscellaneous. Vernon Phillips, W7NPV, 523 West Babcock, Bozeman, Montana 59715.

COLLINS Mint condx, 75S1 with noise-blanker; 32S1 and 516F-2, $775. Egbert, WØMMM/6, 17333 Tramonto, Pacific Palisades, California 90272. Business phone: a.c. (213)-399-9311, ext. 3854.

CHRISTIAN Ham Fellowship now organized for Christian hams who wish to fellowship with other Christian hams. Request free information how to witness to other hams. Christian Ham Callbook, $1 donation. For free details write Christian Ham Fellowship, 5857 Lakeshore Drive, Holland, Michigan 49423.

FOR Sale: 2M FM Motorola "Dispatcher" xcvr 12V with all accs. and mounts; cost $595 all xistor. Sell for $50. D-104 mike and stand, $10. 2M or 6M FM modulator w/built-in power supply 110 V., $10. HH2BA halo w/mast and coax, $7.00. Will ship. WA2BQV.

ANTIQUE 1926 RCA UV-199 type tube wanted. Must be in operating condx. W9IQI, Robert Streeter, 4417 Hessen Cassel Road, Fort Wayne, Indiana 46806.

FM(BC221) frequency meter, unconverted, with original calibration book, $40; prop pitch motor, WW2, small, $40; (2) 4X250B new in sealed Eimac containers, $20 each; 450TL, never used, in Eimac carton, $35.00; 450TH, used, in gud condx, $15.00; Dumont 241 'scope, in gud condx, $45.00; xtal set, FT243, 120 xtals in 25 kc increments from 5675 to 8650 kc, $25.00; Powerstat, 1 KVA 7.5A, 115VAC, $8; Adjusta-A-Volt, 1500-B, 115V in, 0-135V out, 2KVA, 15 amps, $20.00; Transtat, 95V-130V in, 115 V out, 9.5A, 1.1 KVA, $6.00; Variac 200C 5A, 115VAC, $6. W6WZD, 182 Atherton Ave., Atherton, California 94025.

FOR Sale: TS-186 freq. meter: 100-10,000 mcs, new, spares. Transit case. Calibr. book inc. optg. instrx, schematic: $175; HQ-170AC (part of estate), used 10 hrs, spotless. Spkr: all $200. QSTs: 1930-1968 run. Write wants or SASE for list. 25¢ ea. plus postage. COs 1946-68 run, 20¢ ea. "Radio", "Audio Engrng", ARRL and W. Coast Handbooks. List available. Also: 60 tech manuals older surplus eqpt, any reasonable price for lot. List of 1400 RDZ and TDZ xtals. All separated, only in lots of 100, 10¢ etch. E. Halton, W1QWU, Providence College, Providence, R.I. 02918.

SELL: 4 BTV antenna with capacity hat new $25.00. F. Rodio, Brooklyn, N.Y. 248-2293.

COLLINS 75S-3B, 32S-3, 516F-2. All absolutely in perfect condition, $1000. KØAHO, 45 Green Meadow Park, Clear Lake, Iowa 50428.

COLLINS S/Line absolutely mint condition, purchased Feb. 68. 75S-3B, 32S-3, 30L-1 & 516F2 all for $1925.00; WA6JJE Lansing Wong, 1125 South Westmoreland Avenue., Los Angeles, Cal. 90006 Phone (Day) 387-7986, (Nite) 387-6642.

WANTED: Drake 4-line or Collins KWM-2 complete station for MARS opn. Must be late serials, not abused and good cash price delivered Baltimore, Md. Bob Williams, W3BSE, 2003 Tadcaster Rd. 21228.

NEW Galaxy GT-50. Will consider your gear in trade. W4UHP, 1300 Milton Street, Clearwater, Florida 33516.

75A4 late number $370.00, Heath SB101 with AC supply $325.00, HQ13 Ham Scan $10.00, 40Ft.-Tri-Ex crank-up tower $49.00, Globe King 500B $99.00, 2 to 4 KV 100 mil. power supply kit $49.00, Viking VFO $10.00. Dr. W. F. O'Rourke, 102 East 23rd Street, Scottsbluff, Nebraska, 69361

KRAFT KP4-B, Lanier Cimet, Falcon 56, Foam-Glide I, all excellent and complete $275. Roger T. Scaggs, 615 Joe Morse Drive, Cooperas Cove, Texas 76522. Tel. 817-KI7-2632.

FOR Sale: Heath SSB, HX-29 transmitter, HR-20 receiver and HP-20 power supply, $150.00 Gonset 2-meter communicator GC105, 117VAC/12VDC, $125.00. Regency FM monitor receiver MR-10B, 152-174 MHz, $50.00 All F.O.B. Gil Voyles, 5103 Marshburn Avenue, Arcadia, California 91006.

NCX-5 with NCX-A power supply and speaker: $375. Central Electronics 200V: $345. Dr. M. F. Hash W7YHS, 319 N 26th St., Billings, Montana 59101.

SELL: NC-303 with XCU-300 xtal cal, Eico 720, xmtr, Heath HG-10B VFO. Excellent condx/manuals. WB6YSB, 733 N. Palm, Upland, California 91786.

"HOSS trader Ed Moory" says if you don't buy your ham gear from him, you might pay too much! Shop around for your best price and then call the "Hoss" before you buy! New display equipment: factory warranty: Swan 350-C, $339.00; early model Swan 500C, $419.00; FTDX-400, $489.00; BTI LK-2000 linear, $599.00; new SB-34, $359.00; "no first reasonable written offer will be refused on new late model Swan 500C and power supply!—"try me". New Rohn 50 ft. foldover tower prepaid, $188.00: New Mosley Classic 33 and Demo Ham-M Rotor, $209.00: Used equipment: HQ-170A, $179.00: Swan 500, $339.00; "mint" 75A-4, $559.00: "Ed Moory Wholesale Radio Company" Box 506, Dewitt, Arkansas 72042. Phone (501) 946-2820.

FOR Sale: Collins 75S-3B, excellent cond. $325.00, John Mc Farlin, 929 E. Jones Street Apt. No. 45, Santa Maria, California 93454. Tele. 805-WA5-0257.

SELL: Collins 75A-3, $215.00, and 32V-3, $125.00, both recently aligned. Teletype model 19 with communication keyboard and table, $125.00. All equipment in excellent condition. Buyer pick up. Write W2CMD.

DX60B, only 6 months old, $70 postpaid. WAØYAK, Chan Skippy, Colome, So. Dak. 57528.

FOR Sale: Collins 74S-3 $435, 32S-3 $475, 516F-2 $110, 312B-5 $135, beautiful condition, original cartons, manuals and cables, $1100 for package complete. Henry- 2KD, 30 hours of use, $500. WA4WAO, 1815 Forney Drive N.W., Huntsville, Ala. 35805; Tel. 205-534-5512.

DRAKE 2-C receiver, excellent condition, $175 or best reasonable offer. John P. O'Banion, WB6WQF, 8929 Grovetree Way, Elk Grove, California 95624.

BEEN drafted: HT-37 $195, very condition, HQ-170C, $170, needs work on 80 meters otherwise very good. Or? WØHBH, 711 N. Taylor Kirkwood, Mo. 63122. Tele. 314-96-52310.

HQ200 matching speaker DX60B and HG10B vfo, all mint condition, excellent, used two weeks first $260.00 takes. E. Braff W2HCH, 851 Jay Drive, Wantagh, N.Y., 11793.

COLLEGE: Must sell NCX-3, NCX-a, good condx- $190. Ranger I, clean- $65. Gary Kaser WA8KME, 314 Birch Lane, Paw Paw, Mich. 49079.

FORCED to sell Hallicrafters S-108 $85, S-85 $75, SX-130 $140, R-51 clock speaker $25, National NC60C $40. All in mint condition with manuals, moving to mobile home. Kenneth Bailey, 1261 East 35th Place, Gary, Indiana 46409 219-887-3140.

SIX meters: Lafayette He-45B w/VFO, halo antenna, 100 ft. coax. Best offer. Steve, WB2UFN, phone 212-AX7-8435.

COLLINS 75S3, 32SI, 30LI, 516F2, 312B4 with cables, manuals, etc. $1290 to clear estate. Will deliver anywhere in the southeast of midwest within reason. W8AZT, 6127 Southhampton Drive, Dayton, Ohio 45459, Tele. (513) 434-1694.

SELL: Collins 32S-1, Performs like 32S-3, Modified by Henry Radio, 516F-2 AC supply and speaker in matching cabinet included $425. 75S-3 $375. All for $775. FOB. Wanted: 75S-3B with or without CW crystals. W6DQ, 8 Surrey Lane, Rolling Hills, California 90274.

QST'S thirty years complete, 1937 through 1966. Excellent condition. All in official ARRL binders. First best offer. Capt. W. A. Smith, W7WS-Route 6, Box 618, Tucson, Arizona 85704.

WANTED: Johnson KW match box, Millen 90651 GDO, impedence bridge. State condx, age, min. price. All replies ans. C. Harrow, Box 505, Conway, N.H. 03818 WB4HQG/1, WB4AQG.

FOR Sale: Invader 200, mint, $225. Heath HA-10 with 3B28's, all new tubes, Dow-Key 260B-2604, $160. A. Reges, 6220 North Grand Avenue, Kansas City, Missouri 64118.

INSTRUCTION wanted for fee beginner in theory and code in Manhattan, N.Y.C. Eves. (212)724-1738. Mr. Edgar.

SELL: TBM-8 transmitter with modulator and power transformer. Make an offer. Chaminade Radio Club, W2JTZ, Jackson Avenue, Mineola, New York 11501.

SELL: Hallicrafter 2000 including power supply, little use, excellent $1200.00 W4EOJ Gallant, 4411 No. Federal Hwy. Pompano Beach, Florida 33604.

WANTED: Central-Electronics 600-L. Prefer LA or San Diego area. Charles Judson, WA6AIF, 10914 Ashton Avenue, Los Angeles, Ca. 90024 213-473-3187.

TEST Equipment: HP524D counter $495, HP400 DR vtvm $45., Dumont 401 BR $150., Tektronix RM 15 $400. All equipment in excellent condition. D. G. Wilson, W6GOT, 2036 Briarwood, Santa Maria, Ca. 93454 805-WA5-0754.

WANT/swap pre-1925 radios and tubes. Dick Sepic, 1945 East Orange Grove Blvd., Pasadena, California 91104.

4-400 TUBES wanted, prefer new unopened, will consider used tubes if output has not fallen off. Also need 0-200, 250, or 300 mmf vacuum variables. Will sell Knight 2 mtr. transceiver TR-108 with vfo like new, no scratches or dents, works fine, with manuals $75. WA4YFI, Bill Smitherman, Route 2, East Bend, N.C. 27018.

KNIGHT TR-108 two meter transceiver; Hy-Gain two meter halo; Knight T-150A, AM-CW transmitter; WRL, Globe Scout 65B, AM-CW transmitter; Keyer and Brown BTL paddle, Ray Crawford, W4VRO, 7120 Kingsbury Cir., Tampa, Florida 33610.

SELL: Hallicrafters SX-101A in mint condition, $190. WB2SFC, 134 Utterby Road, Malverne, N.Y. 11565. Tel. 516-593-7804.

RTTY gear—model 15, comm. keyboard and letters, sync., motor, 60 wpm and 75 wpm gears, floor standing case, pwr. supply, paper, excellent cond., $100.00; model 14 typing reperf, with keyboard, case, sync., motor, tape, end-of-line indicator, excelent cond., $75.00: model 14TD sync., motor, excellent, $25.00; prefer Northeast deal; W2CVR, Box 472, Schenectady, N.Y. 12301, tone, 518-393-8754.

SELL: KWM-2 (Serial No. 13409), PM-2 (A-C Pwr. supply), and CC-2 (Samsonite carrying case). Excellent condition. All for $725. Good package for portable applications. Contact WA1KAY, 15 Moraine Street, Belmont, Massachusetts 02179.

GROUNDED Grid filament chokes, 30 amps, $4.00. Plate chokes 800 MA, $2.00. PPUSA 48, William Deane, 8831 Sovereign Road, San Diego, California 92123.

WANTED-Drake R-4B and T-4XB. Joseph Nolin. Tel. Monday thru Thurs. evenings, a.c. (518) 399-8774, Scotia, N.Y.

TECHNICIAN: Fast growing cable television company needs electronic technicians in several areas. If you are young, outdoors type, and have experience in trouble shooting and repair of transistorized amplifers, send complete resume or call Aurovideo Inc., 1380 Main Street, Waltham, Mass. 02154, 617-891-6748.

SELL: Polycomm 62B, Excellent, $150. Richard Stannard, 18 Circle Drive, RD1 Voorheesville, N.Y. 12186.

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WANTED: Unaltered HRO-Sr., HRO-M or HRO-5. Prefer pick-up deal. Ralph Sieloff W2WKR, 64 S. Cottage St., Valley Stream, N.Y. 11580.

SELL: $30.00 each-Eico 720 transmitter, RCA WR-59A Sweep generator, Heathkit AJ-12 stereo tuner, Heathkit SA-2 stereo amplifier, Clough-Brengle 79B Audio generator. $90.00. Hammarlund HQ-110 receiver. WA9ZWY, 1414 Harvey Avenue, Berwyn, Illinois 60402.

VACATION: in Coronado, California, Will exchange large two bedroom apartment with TA-33 and 40 meter vee, near ocean, for QTH on west coast. Week to six months. K6ØO, John Morris, 868 G. Ave., 92118.

FOR Sale: Collins 75A4, SN 2606—3.1 & .5 filters—$350.00. Hallicrafters SSB/AM xmtr—HT 37, including new plate xfm —$175.00. National NC 109 rcvr, all band, FB novice—$75.00. Heath HO-10 monitor scope—$35.00. All above equipment is clean and in good working order. Lila Howard, WA2JIO—516-FI4-2046.

COLLINS 5154, $600.00., NCX-3 AC.DC supply, $240.00., Heath Keyer, $30.00., 95Z4 Venier Knob, $25.00., Collins 302C3 wattmeter, $80.00., 516F2 transformer (used) $22.50., Bird dummy load 100-1000mc, $30.00. Items FOB. James Zimmerman, KØARV, 2925 Wildwood Court, N.E., Cedar Rapids, Iowa 52402.

WANTED: Collins 75S-3, 32S-1 or 32S-3, 312B-4, 516F-2. Hallicrafters SX-117, HT-44 combo. All must be mint with manuals. WA6JWK/4, 2304 N. Florida Street, Arlington, Va., 22207.

SWAN 350 little use, excelent, homebrew ps $275. Robert Fortman, 65 Aleta Drive, Rochester, N.Y. 14623.

BECKMAN cput meter 5310; transistorized; operates to 200 Kc, $195.00. Other units available. Parts. Sundtek, 131 Allen Ave., Springfield, Oregon 97477.

HEATH DX-40 - $25, Lafayette HE-80 - $70, Ameco nuvistor 2M converter $30, 2M big wheel - $5, Stephen Slavsky, WB2TJE, 83-60 118th Street, Kew Gardens, N.Y. 11415.

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FOR Sale: Lafayette HA-460 6 meter AM transceiver, 20 watts, built-in vfo and ac/dc supplies. Excellent condition. Hallicrafters S-38D receiver. Best reasonable offer. Spicer, K8HJM, 334 N. Miami Street, Trenton, Ohio 45067.

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COLLINS 51J2 $250. 310-B4 all band exciter 2E25 final, like new $95, W3WXC, Richard Klein, 997 Warfield Lane, Huntingdon Valley, Penna. 19006.

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MUST Sell for college expenses: Valiant I, $130.00; SX-11 receiver, $140; HT-40 transmitter, $50 or your offer. WA2APG, 27 Hearle Dr., Pequannock, N.J. 07440.

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HW-12, $75.00; HQ-100AC, $95.00; T-60, $29.00, all f.o.b. Skokie, Illinois. Brian McCuaig, 5056 Jarvis, Skokie, Ill. 60076. Tel: a.c. (312)-674-5033.

FOR Sale: Hammariund HQ-129X, FB condx, general coverage rcvr, $65.00. Ameco 15-watt xmtr, c.w. $8.00. Phone a.c. (516)-269-9818, John, WB2SBA.

FOR Sale: Mosley TA33SR beam $69.00, AR22 rotator $20.00, NC, HR050T rcvr, $125.00. Johnson Ranger $85.00. All A1. K9HQC, Lawrence Van Someren, Baldwin, Wisconsin 54002.

WANTED: Mint 80-10 linear, HW32, Heath 3" scope, Ameco PT preamp. Sell: 90 ft. heavy duty tower. Give full particulars. K3WIU, Waymart, Pa. 18472.

KLEINSCHMIDT keyboards that can be used to build the Touchcoder II Keyer (July 1969 "QST"). Complete with cover-shield, manufacturer's drawings, control switches, harnesses, etc. Modernistic design, new in factory sealed cartons, $10 each (shipped postage collect). Will Shepard, 12,000 Twin-Cedar Lane, Bowie, Maryland 20715.

GREAT Circle bearings to over 700 points, with return bearings, distances (miles or kilometers), zones, continents, call prefixs, and time differences (from any two time zones) computerized to your own QTH. $5.00. Give call sign, QTH, choice of time zones, choice of miles or kilometers. Bearings, 22 Campbell Hall, Princeton, N.J. 08540.

SELLING out: Hallicrafters SX-146-500 cycle filter, calibrator, HT-46, HA-16 vox, SB2-LA linear all cables, relays, mike. $565.00 takes this nearly new rig. Deliver free to Iowa, Kansas, Missouri, Eastern Nebraska. WAØQJM, R. E. Mason, 8632 Broadmoor Overland Park, Kansas 66212.

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DRAKE 2B, excellent condition, $150.00. Stan WB2QQX, 15 Myrtledale Road, Scarsdale, N.Y. 10455, Tele. (914) SC3-6050.

COLLINS transceiver 2-9MHz 95w an cw ARC-2 $60. Jerry Malone, W1FNZ, 27 Maple, Cambridge, Massachusetts 02139.

SELL: HQ-145X rcv'r like new, with cover, manual, original carton. Best offer over $145.00. Tel: AC (215) 259-8986 after 6:00 P.M. Weekdays or write Rev. Richard F. Hall, 22 S. Springfield Rd. Apt. 2-C, Clifton Heights, Pa. 19018.

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DX'ers: Custom built Cushcraft 4 element 20 mtr. beam, 30 ft. boom, 10 DB gain, weight 65 lbs, 10 months old mint condx, no shipping, $75.00. Wanted: Mosley S-402 2 element 40 mtr. beam, state condition, W9HOG, 703 Huntington, Schaumburg, Ill. 60172. Phone: 312-894-1328.

FOR Sale: Swan 500 C, 117 xc power supply, $510. This equipment used very little and is mint condition. K9LWA, Robert White, 2540 Birch Drive, Richmond, Indiana 47374.

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HEATHKIT DX-20, 11 yrs storage, in mint condx w/manual, crystals, balun, $39.00. Drake 2-A receiver in excint condx, w/code records, key, oscillator, manual: $139.00. K6RMM, 4919½ Gloria Ave., Encino, Calif. 91316.

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WANTED: Variac controlled—rack mounting 2000V 500 ma. p/s. K2ARO, Edna Drive, Hyde Park, N.Y. 12538.

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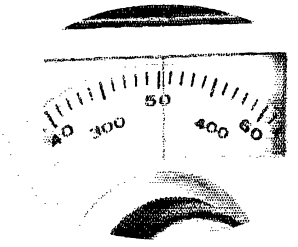

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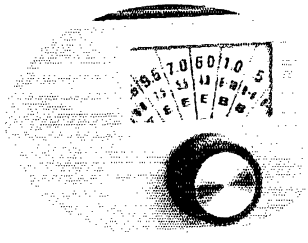

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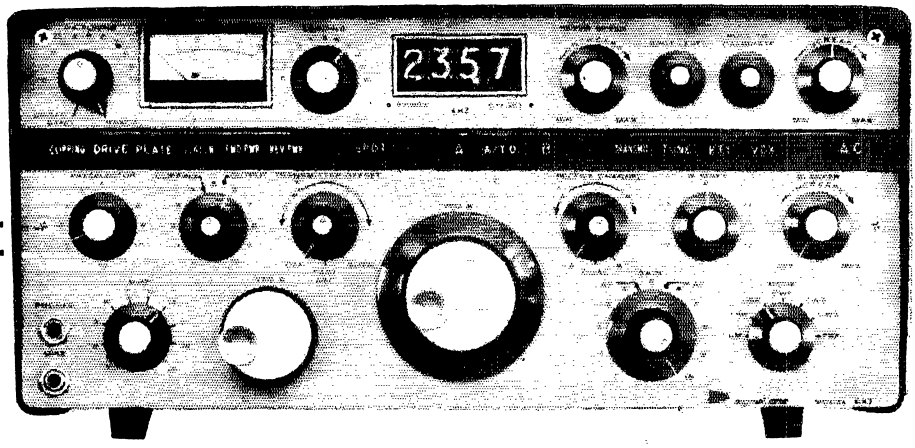

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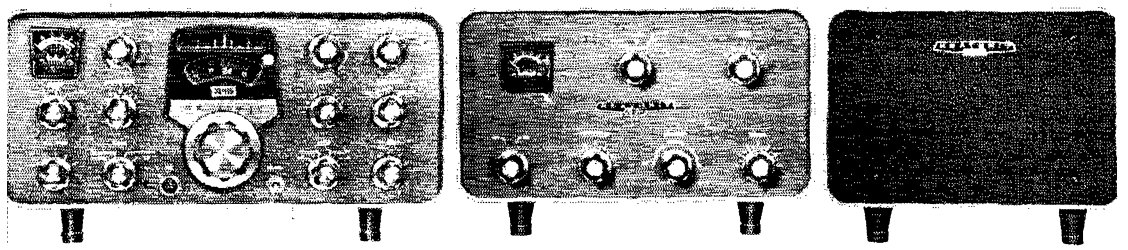


Heathkit® SB-110A & SB-500

VHF Is Where The Action Is These Days ... Moonbounce, long-haul DX, more efficient antenna designs ... and a whole lot less QRM. And whether you're a serious VHF'er or an 80 through 10 man just starting to discover 6 and 2, Heath has the gear you need to go first class ... the SB-110A — the 6 meter SSB/CW Transceiver that puts thousands of hams on 6 ... and the SB-500 — the new 2 meter Transverter that gives more sideband and CW capability on 2. Check the features and specs below ... and be convinced that when you go to the high bands, go with the SB gear from the Hams at Heath.

• SB-110A covers 50 to 52 MHz with crystals supplied ... total coverage 49.5 to 54 MHz • Same Heath Linear Master Oscillator as used in SB-101 for exact frequency control • Switch selection of Upper Sideband/Lower Sideband/CW • 180 watts PEP SSB input — 150 watts CW input • Features same high quality crystal lattice filter as used in Heath SB-101 • Operates PTT or VOX • Separate offset CW carrier crystal for pure, clean CW note • Automatic Level Control helps prevent overdriving and distortion • Automatic Noise Limiter • Built-in 100 kHz calibrator • Built-in Antenna Switching • One kHz dial calibrations — bandspread equal to ten feet per megahertz • Three oscillator modes aid CW, cross-mode or split frequency — LMO-controlled transmit and receive, crystal-controlled transmit and receive and crystal-controlled transmit with variable-tuning receive • Fast, easy assembly

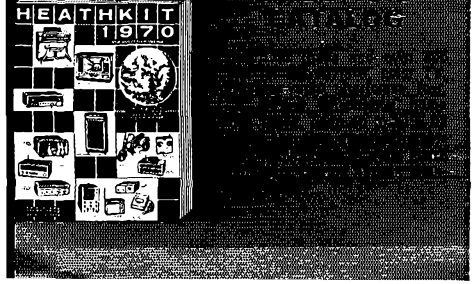
Kit SB-110A, 6 M Transceiver, 23 lbs..... **$299.00***
HP-23A, AC Power Supply, 19 lbs..... **$51.95***

PARTIAL SB-110A SPECIFICATIONS — RECEIVER SECTION: Sensitivity: 0.1 uv for 10 dB signal-plus-noise to noise ratio. **Selectivity:** 2.1 kHz @ 6 dB down, 5 kHz max. @ 60 dB down. **Image rejection:** 50 dB or better. **IF rejection:** 50 dB or better. **Audio output power:** 1 watt. **AGC characteristics:** Audio output level varies less than 12 dB for 50 dB change of input signal level (0.5 uv to 150 uv). **TRANSMITTER SECTION: DC power input:** SSB, 180 watts PEP; CW, 150 watts. **RF power output:** SSB, 100 watts PEP, CW, 90 watts (50 ohm non-reactive load). **Output impedance:** 50 ohm nominal with not more than 2:1 SWR. **Carrier suppression:** 55 dB down from rated output. **Unwanted sideband suppression:** 55 dB down from rated output @ 1000 Hz & higher. **Distortion products:** 30 dB down from rated PEP output. **Hum & noise:** 40 dB or better below rated carrier. **Keying characteristics:** VOX operated from keyed tone using grid-block keying. **GENERAL: Frequency coverage:** 49.5 to 54.0 MHz in 500 kHz segments (50.0 to 52.0 MHz with crystals supplied). **Frequency selection:** Built-in LMO or crystal control. **Frequency stability:** Less than 100 Hz drift per hour after 20 minutes warmup under normal ambient conditions. Less than 100 Hz drift for ±10% supply voltage variations. **Dial Accuracy:** Electrical, within 400 Hz on all band segments, after calibration at nearest 100 kHz point. Visual, within 200 Hz. **Dial backlash:** No more than 50 Hz. **Calibration:** Every 100 kHz. **Power requirements:** High voltage, +700 v. DC @ 250 ma. with 1% max. ripple. Low voltage, +250 v. DC @ 100 ma with .05% max. ripple. Bias voltage, −115v. DC @ 10 ma with .5% max. ripple. Filament voltage, 12.6 v. AC/DC @ 4.355 amps. **Dimensions:** 14⅞" W x 6⅝" H x 13⅜" D.

• SB-500 covers complete 2 meter amateur band when used with SB-110A having a full complement of crystals • Tunes 144 to 146 MHz when used with SB-101, SB-301/SB-401 combination and HW-100 • 140 watts PEP input • 50 watts output for a really big signal on "two" • Highly sensitive receiver — 0.2 uV for 10 dB S+N/N for solid copy QSO's • Fast, easy, exact tuning • Uses a pair of inexpensive 6146's in AB1 configuration in the final • Driving unit supplies final plate voltage ... all other operating voltages come from built-in, very stable supply — no extra outboard supply to buy • Supplies ALC voltage to driver to prevent flat-topping • Reliable, relay-controlled T/R switching • No cable changing necessary to go from lower band gear to 2-meters — internal relays do it all by just turning the SB-500 on • Built-in meter monitors plate current or relative power • Built-in 1 MHz crystal calibrator • SB-Series styling

Kit SB-500, 2 M Transverter, 19 lbs..... **$179.95***
Kit SB-600, Station Speaker, 6 lbs..... **$19.95***

SB-500 SPECIFICATIONS — RECEIVER — Sensitivity: 0.2 microvolt for 10 dB signal-plus-noise to noise ratio for SSB operation. **Spurious Response:** All are below 0.1 microvolt equivalent signal input, except at 145.390 MHz (50 MHz IF only). **Antenna Input Impedance:** 50 ohm unbalanced. **TRANSMITTER — DC Power Input:** 140 watts PEP. **Power Output:** 50 watts (50% duty cycle). **Output Impedance:** 50 ohm with less than 2:1 SWR. **GENERAL — Frequency Range:** Any 2 MHz Segment between 144 and 148 MHz into 50 MHz or 28 MHz tuned IF. **Mode of Operation:** SSB or CW only. **Power Requirements:** (1) 120/240 VAC, 50/60 Hz at 82 watts (internal). (2) 700 to 800 VDC at 200 mA (from driving unit). **Fuse:** ¾ ampere slow-blow for 120 VAC (formerly 3AG); ½ ampere slow-blow for 240 VAC. **Front Panel Controls:** Meter-calibrate switch, final tuning, off-on (function) switch, preselector, final loading, driver tuning. **Chassis Controls:** Relative power adjust & bias adjust. **Rear Apron Connectors:** RF output, ALC, linear relay, relay, drive, power plug, low f receiver, low f antenna, fuseholder. **Tube Complement:** 6CB6 transmitter mixer, 6CB6 crystal calibrator, 6DS4 receiver RF amplifier, 6DS4 receiver mixer, 12GN7 transmitter RF amplifier, (2) 6146 final amplifiers, (types 6146A or 6146B may be directly substituted), 7059 heterodyne oscillator-amplifier, 8156 RF driver, OA2 voltage regulator. **Diode Complement:** 5 silicon diodes, 750 mA, 500 PIV; 3 in power supply, 2 in ALC. 1 Germanium diode, 1N191; REL PWR. **Cabinet Dimensions:** 12¼" wide x 6⅝" high x 13" deep. **Overall Dimensions:** 12¼" wide x 7-15/16" high x 14" deep including knobs and feet. **Net weight:** 14½ pounds.



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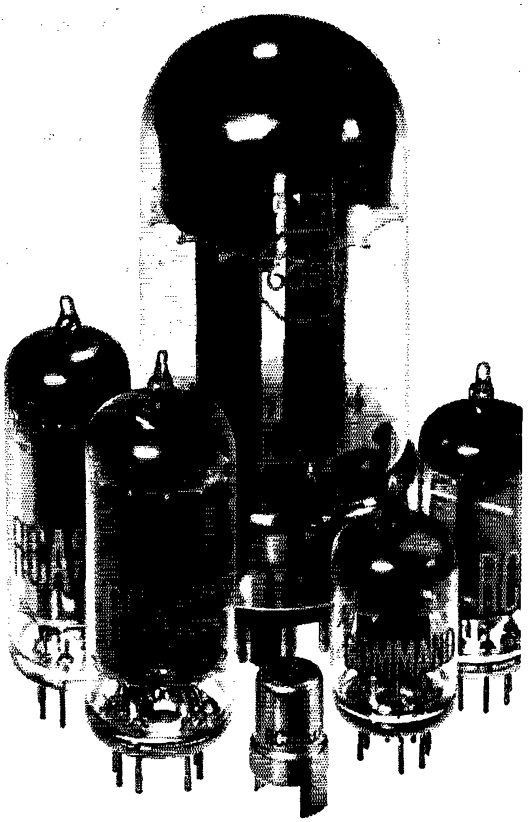

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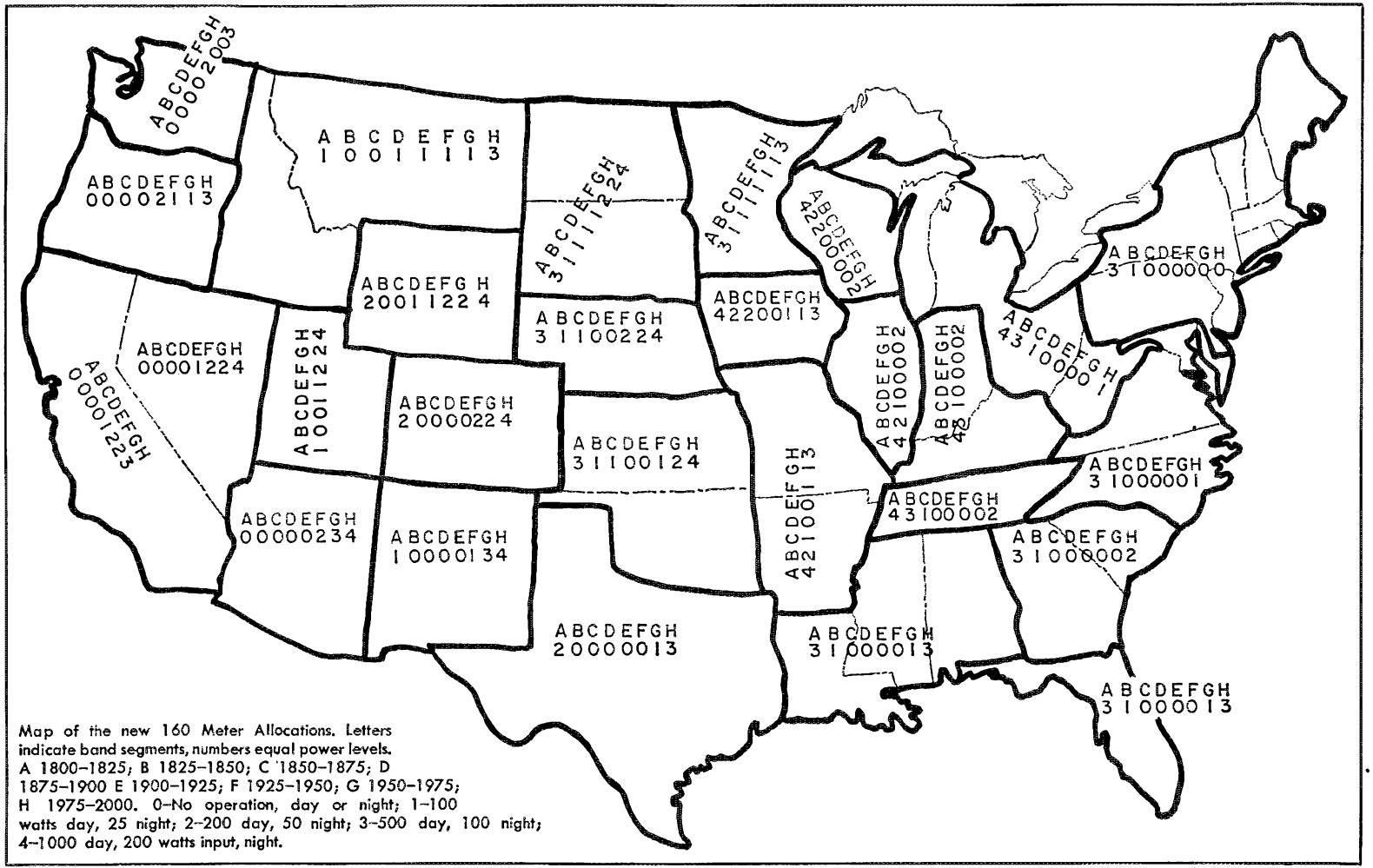

Map of the new 160 Meter Allocations. Letters indicate band segments, numbers equal power levels. A 1800–1825; B 1825–1850; C 1850–1875; D 1875–1900 E 1900–1925; F 1925–1950; G 1950–1975; H 1975–2000. 0–No operation, day or night; 1–100 watts day, 25 night; 2–200 day, 50 night; 3–500 day, 100 night; 4–1000 day, 200 watts input, night.