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Write for TMC Bulletin 220.
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the representation of the radio amateur in legislative matters, and for
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GENEVA PROPOSALS

The first official word on the views of other countries toward possible changes in the world's regulations has now been published in the form of a "Book of Proposals" issued by the International Telecommunications Union. Unfortunately, several countries did not meet the publication deadline for filing their proposals and so the book—despite its bulk of two volumes and 869 pages—is not complete. However, with the specific caution that there may later be other proposals of concern to the amateur radio service, we can briefly summarize the highlights appearing in the first material received. We shall treat only proposals appearing to affect major amateur bands.

The band 3500-4000 kc. is not—and never has been—a worldwide amateur assignment. In the European-African area, only 3500-3800 is available to the amateur service at the discretion of national administrations, shared with fixed and mobile; in Asia-Oceania the figures are 3500-3900, on the same sharing basis. There are three proposals so far received to alter this arrangement. Australia wants to split the band with 3500-3700 for amateurs, the rest for fixed and mobile. India thinks a total of 10 kc. somewhere in the lower portion would be adequate for amateurs! Russia suggests that 3500-3650, still shared with fixed and mobile, would suffice. These proposals deal with regional allocations, we point out, and do not necessarily affect the status of the band in this portion of the world.

At 7 Me., it is no surprise to learn that a number of countries—as at Cairo in 1938 and again at Atlantic City in 1947—wish to expand broadcasting assignments at the expense of our 40-meter band. Outside of North and South America, the exclusive amateur portion is currently, and has been for the past twelve years, only 7000-7100 (50 kc. more in South Africa); 7100-7150 is theoretically shared between amateur and broadcasting but practically of no amateur use, and the top half is broadcasting exclusively. For the Geneva conference, Australia, Belgium, France, India, Italy, Japan, Netherlands, Poland and the U.S.S.R. have all indicated their intentions of either (1) bringing North and South America under the sharing arrangement existing elsewhere or (2) at least deleting 7100-7150 kc. sharing in their areas.

Australia and India are the only countries so far whose proposals impinge on 14 Me. Australia would cut off the top 100 kc., and India would take 50 kc. more, both arguing that the fixed service badly needs more space in this portion of the spectrum.

No country, so far, proposes any change at 15 meters.

For 28 Me., Australia, after taking potshots at lower frequency bands as mentioned above, proposes to put us back at 28-30 Mc! A coalition of France, Belgium, Italy and the Netherlands, however, wants to cut the amateur band to 28-29, with the rest for fixed, and Japan would like to use the top portion for fixed in its own country only.

Higher frequencies are largely regional in nature, of course, and so far no proposal has been published which looks ominous, though a number of suggestions have come forward for rearrangement of microwave bands, including ours. In non-allocations matters there are a few proposals for minor amendments of Article 42 dealing with the amateur service, but none of serious practical import to us.

It is impossible to sum up at present what all this means; the material is simply not sufficiently complete. Also, let us point out again that these are merely the initial proposals of the countries concerned, as part of the specified routine preliminary conference procedure we have been through many times before, and they may or may not get any measure of support at the conference itself. But perhaps by next month’s issue deadline we shall have supplementary material from enough additional countries to present a reasonably complete summary.

By the time that (September) issue reaches you, the League’s delegation will have left for Geneva, but we'll have regular reports in each subsequent issue and of course special interim communiques to the ARRL Board of Directors if developments warrant.

EXTRA CLASS STATUS

Ever since the Federal Communications Commission abolished the requirements of an advanced grade of amateur license as a condition to use of certain bands with voice emission (an action which the League vigorously—but unsuccessfully—opposed), the ARRL...
Board of Directors has attempted to rebuild some sort of incentive program into the amateur licensing structure. This effort has not borne fruit. Perhaps it is largely because the incentive to upgrade one's ability for the purpose of attaining a higher class of license must, in practice, consist of additional privileges; and since by the Commission's earlier action all privileges were made available to all amateurs (except Novice and Technician), this approach would have required withdrawing certain operating privileges from a considerable number of amateurs, and was therefore felt to be impracticable.

All this time the Amateur Extra Class license has existed in the Commission's rules but, being of little more use than a certificate of merit, it has received practically no attention from the amateur body. Apparently similarly concerned with the situation, FCC has now issued a Notice of Inquiry reproduced on page 67 of this issue, which solicits suggestions as to how our rules might be changed so as to make the Amateur Extra Class license one of more meaning and prestige. The Commission is receptive to any idea on the subject except one which, as stated in the Notice, it has considered before and rejected. The deadline for comment is September 15.

(See page 63)

COMING A.R.R.L. CONVENTIONS

August 15-16 — Pacific Div., Honolulu
August 22-23 — Central-Midwest Divisions, St. Louis, Mo.
September 5-6 — N. E. Division, Hartford
Sept. 5-7 — Maritime Province, Halifax, Nova Scotia
October 3-4 — Roanoke Division, Richmond, Va.

OUR COVER

The red banner across the cover of this month's issue calls attention to an important milestone in amateur pioneering. For further details, see W1HDQ's report on page 68. Incidentally, since Ed wrote his report, KH6UK and W6NLZ did it again, on June 30, and this time KH6UK was also heard by W6WSQ. The antenna on the cover is KH6UK's. Our lead story (eyes right) describes a parametric amplifier that was in use on these California-Hawaii tests.

CENTRAL-MIDWEST DIVISION CONVENTION

St. Louis, Missouri — August 22-23

A combined Central-Midwest Division ARRL Convention will be held in St. Louis, Missouri, Saturday and Sunday, August 22-23. The Chase Hotel, across from Forest Park, is convention headquarters. The hidden transmitter hunt and radio control demonstration will take place in Forest Park. The Convention is sponsored by the radio clubs of the Greater St. Louis area, with clubs in Missouri and Illinois participating.

The Convention begins on Saturday, August 22, with registration at 8 a.m. and a general assembly set for 1 p.m. A full schedule of meetings is planned to include DX, traffic, SSB, VHF, RTTY, MARS, RACES and YLRL. A Wouff Hong Initiation will be held midnight Saturday. FCC amateur exams are scheduled all day Friday, August 21, and 9 a.m. to 1 p.m. Saturday.

Among the personalities will be Goodwin L. Dosland, WØTSN, President, ARRL; George Hart, W1NJM, National Emergency Coordinator, ARRL; Lt. General Francis H. (Butch) Griswold, KØDWC, Vice Commander-In-Chief, Strategic Air Command; John G. Doyle, W9GPI, ARRL Director, Central Division; Robert W. Dennis, WØNWX, ARRL Director, Midwest Division; C. E. Dewey, W8BLM, Deputy Director, Communications Office of Civil Defense Mobilization; B. C. Simpson, RMC, K9BKS; W. C. Campbell, and W. B. Wright, K9KND.

Bud Drobish, W9QVA, will discuss his experiences in the operation of communication gear, including equipment aboard the MATS aircraft “Operation World-Wide” using W80LJ.

The convention committee urges hams to bring the whole family — baby sitters and a nursery will be available.

Pre-registration, by mail, including the Saturday night banquet and a Sunday luncheon, will be $10.50, without meals, $14.00. Hotel Convention registration only, is $5.00, and with banquet and luncheon tickets, $12.50. Pre-registration deadline is August 7. Send Convention registrations to The Amateur Radio Convention Committee, Inc., 317 North Meramec, St. Louis 5, Missouri.

NEW ENGLAND DIVISION CONVENTION

Hartford, Connecticut — September 5-6

The Hartford County Amateur Radio Association will present the first convention in Hartford in more than 20 years Labor Day week end, Sept. 5 and 6. Many special features are being planned to make this a memorable affair. Festivities will get underway with an informal preconvention party Friday night, to be followed by two days of general sessions, special-interest luncheons and breakfasts, contests, technical programs, transmitter hunts, FCC exams, a Saturday-night party and a grand banquet

(Continued on page 185)
Working Toward Lower Noise

Figures in Reception at 144, 220 and 420 Mc.

BY FRANK C. JONES,* W6AJF

Experimental Parametric Amplifiers

Like many other amateurs who have made a specialty of long-distance v.h.f. and u.h.f. work, the writer was extremely interested when news of the parametric, varactor or reactance amplifiers began to appear in print. But like other amateurs (and most of the professionals, too) we had only vague notions of how to put the new devices to practical use. After many hours of experimental work with a varactor diode from Microwave Associates, practical ideas began to emerge.

Many days were wasted in some of the early tests, as almost no experimental information was available. Learning about these new techniques had to be done the hard way, at the expense of much sheet metal, broken plunger-type trimmers, coax fittings and even one varactor diode. This cost of being early in a new field was well worth the effort, however, for at this writing we have one good amplifier on 144 Mc., a better one on 220 Mc., and a couple of good 432-Mc. units. Further work on 432 Mc. and a 1296-Mc. project are planned.

Some Preliminary Findings

Lowest noise figures and best amplification were obtained with a varactor diode in an amplifier, rather than an up-converter. Tests were made at 144 Mc. with up-conversion to 432 and 1296 Mc. The 432- and 1296-Mc. receivers had noise figures of 4 to 5 and 8 to 10 db., respectively. This deteriorated the over-all noise figure with the up-converter, so the final result at 144 Mc. was never below 2 db. Since a noise figure of 2½ to 3 db. was already available with several good 2-meter converters using tube amplifiers, the up-converter didn’t offer much improvement. The up-converter arrangement had the added disadvantage of requiring a highly stable pump power source.

On the other hand, a straight-through parametric amplifier apparently gets down under 1 db. at 144 and 220 Mc., and the pump stability requirement is not nearly so severe as with the up-converter. The up-converter is not as regenerative as the amplifier, and it seems to depend for its over-all signal gain on the extent to which the signal frequency is up-converted. A 1296-Mc. receiver gives more gain from a 144-Mc. up-converter than does a 432-Mc. receiver and, despite the higher noise figure of the 1296-Mc. receiver, the over-all noise figure is about the same.

The over-all noise figure of an up-converter system is given by

$$F = F_1 + \frac{F_2 - 1}{G_1}$$
where $F_1$ is the numerical value of up-converter noise figure, $F_2$ is that of the receiver used as the i.f. system, and $G_1$ is the gain of the up-converter or amplifier, as the case may be.

One down-converter was built, with a varactor diode and pump oscillator, but it showed a loss in gain and a poor noise figure, when compared to the up-converter system. Further up-converter tests are planned here in the near future.

One That Didn't Work — And Why

The first parametric amplifier for 144 Mc. built here used a silver-plated coaxial line, with a $\frac{3}{4}$-inch inner conductor and a $\frac{1}{2}$-inch outer conductor, about 12 inches long, shorted at one end. A small tuning capacitor and the varactor diode were connected from the open end of the inner conductor to the grounded shell, with a blocking capacitor in series with the diode. A variable oscillator covering 250 to 350 Me. was used as the pump, with a regulated plate supply, variable from 0 to 90 volts. The best pump frequency within the above range was around 285 Mc. Pump energy was fed in through a tap on the line about one inch from the grounded end. Coupling loops for the 144-Mc. input and output were about 3 inches long, mounted close to the inner conductor and series tuned with small trimmers. Moderately good noise figure was indicated, but the unit was unstable and very difficult to maintain in operation. Because one idler frequency was close to the signal frequency the amplifier was very ineffective in the presence of auto ignition, line noise or other external interference, and the system responded to signals on the idler frequency nearly as well as to the desired ones.

These limitations seemed to eliminate as undesirable the only type of circuit that had been mentioned in amateur literature up to that time. At 432 and 1296 Mc. this image effect might not be troublesome, as external noise is far lower there, and amateur QRM is not much of a problem. On 144 or 220 Mc., however, on-the-air results were very disappointing, and the design was of little use, other than to gain experience.

Practical Working Models

Then followed a long period of paper and sheet-metal work on parametric amplifiers for 144 and 220 Mc. The idea of a cylindrical coaxial tank was abandoned, as a line built into a long box of square cross section would serve equally well and, if made with a removable side, would be much more readily worked on. The line impedance should be known for working out practical dimensions. The impedance of a cylindrical coaxial line is found from the formula

$$Z = 138 \log_{10} \frac{D}{d}$$

The impedance of a line built in a long box with sides equal to the diameter of a cylindrical line has an impedance 10 to 15 per cent higher. Use of a $\frac{1}{4}$-inch inner conductor in a box $\frac{2}{3}$ inches square results in a line impedance of about 110 ohms. Boxes 12 inches long and $2\frac{1}{4}$ inches square were used in the 144- and 220-Mc. amplifiers described herewith.

1 Bateman and Bain pointed out in March QST that use of a pump frequency of twice the signal frequency fundamentally limits the over-all noise figure to no lower than 3 db., though noise figure measurements may make it appear that much lower noise figure is being achieved.—Ed.
Fig. 1 — Curve showing normalized input reac\(\text{tance} = \frac{X}{Z}\)

tance \(X\) versus length in wavelengths of short-circuited coaxial or parallel-line circuits. \(Z\) is the characteristic impedance of the line.

Four frequencies are involved in the operation of the parametric amplifier: the signal frequency, the pump frequency and two idler frequencies. The idler frequencies are equal to the sum and difference of the first two. The proper value of impedance for each frequency must be present for parametric amplification with a varactor diode.\(^2\)

A typical amateur design for 220 Mc. will be described, since the procedure outlined gave reasonably good results when applied to actual construction. A line impedance of 140 ohms was chosen, as this could be made easily with available components, as mentioned above. As a starting point a pump oscillator frequency of 500 Mc. was used. The upper idler frequency was then 500 plus 220, or 720 Mc. The lower is 500 minus 220, or 280 Mc. By a process of elimination, the coaxial line circuit shown in Fig. 2 was arrived at.

A half-wave line was chosen for 220 Mc. as the two idler frequencies could be tuned more readily with this design. One or more tuning capacitors for the idler frequencies are placed across the line circuit at the grounded or zero-voltage point.

2 The author appears to have used a more complex approach than is necessary here. Theory and practice indicate that only the lower of the two idler frequencies need be considered in the design of a parametric amplifier. The relatively low pump frequencies used by W6MJF may account for the need for taking the upper idler frequency into account in his experience. — Ed.

Fig. 2 — Voltage distribution and tuning points on a 220-Mc. line 10 inches long, with a characteristic impedance of 140 ohms. Idler frequencies of 280 and 720 Mc. result from the use of a pump frequency of 500 Mc. and a signal frequency of 220 Mc.
inches for 720 Mc. For a capacitance of 8 \mu\text{f}. at each end of the line, the value of X at 220 Mc. is 84 ohms, at 280 Mc. 70 ohms, at 500 Mc. 40 ohms, and at 720 Mc. 28 ohms. Each of these divided by 140 gives the \( \frac{X}{Z} \) on the vertical scale of Fig. 1.

Reading the values of line length from the curve gives the length to a zero-voltage point from each end of the capacity-loaded circuit.

The actual values plotted in inches in Fig. 2 are obtained by multiplying the wavelength in inches for each frequency by the decimal values of Fig. 1. These were 5, 3.15, 1.0, and 0.82 inches, respectively, from each end, neglecting end effects. For resonance in the 220-Mc. band, this line would be approximately 10 inches long.

To make Fig. 2, several vertical lines were drawn 10 inches long, or scaled into 10 equal parts. The relative voltage or impedance at 220 Mc. is shown as the dotted line with a null at the center.

Tuning the line to 220 Mc. is done with a 3-\mu\text{f}. variable capacitor, \( C_1 \), in parallel with the diode capacitance and, at the other end, by a 10-\mu\text{f}. capacitor, \( C_2 \). The null can be set at the exact center by running \( C_1 \) and \( C_2 \) in opposite directions when the coax line is being tested without a pump oscillator in preliminary alignment.

Next, consider 280 Mc., a proposed idler frequency. The null will be about 3 inches from each end of the 10-inch line, as shown in the second line of Fig. 2. To make the 4-inch middle section of the line become a shortened half-wave circuit at 280 Mc., capacitor \( C_3 \) can be added at the exact center without affecting the 220-Mc. circuit, if it is balanced properly. This value of \( C_3 \) can be calculated by the reverse process, using Fig. 1. The two 2-inch sections each side of the center are short-circuited lines at 280 Mc., having a length of \( \frac{2}{42} = 0.048\lambda \). From Fig. 1, 0.048\lambda corresponds to an \( \frac{X}{Z} \) value of 0.33, and since \( Z = 140, X = 140 \times 0.33 = 46 \text{ ohms}, \) or 12 \mu\text{f}. at 280 Mc. Actually, the reactance of \( C_3 \) is one-half this value since it is tuning two line sections in parallel so \( C_3 = 24 \mu\text{f}. \)

The same method can be used to calculate \( C_3 \) in the third line at 500 Mc. Obviously, the same value of \( C_3 \) cannot be used for both 500 and 280 Mc., so the 500-Mc. function is moved up to the shorter line on the other side of the varactor, as shown at the top of the left-hand drawing in Fig. 2. A short line with a large tuning capacitance will offer enough impedance at the pump frequency to function by varying the pump oscillator power into this circuit. Either the lower idler frequency or the pump frequency can be moved to this short line, but in general it is better to put the oscillator into the short line. If this line is about 1 inch long, \( \frac{1}{23.6} = 0.045\lambda \). From Fig. 1, \( \frac{X}{Z} = 0.3 \) and \( X = 140 \times 0.3 = 42 \text{ ohms}. \)

\( C_4 \) is thus equal to 7.5 \mu\text{f}.; including some capacitance through the varactor and the long circuit.

Consider the 720-Mc. idler frequency. The first null occurs about 0.8 inch in from each end of the 10-inch line. If it weren't for \( C_3 \), which is needed for the other idler frequency, the line would be nearly resonant since there is approximately a half wavelength (8.2 inches at 720 Mc.) between these nulls on the 10-inch line. But the presence of \( C_3 \) makes it necessary to have a null at the center of the line so \( C_4 \) will have no effect at 720 Mc. Adding equal capacitances, \( C_4 \) and \( C_5 \), at the correct points will tune the 10-inch line to 720 Mc., by multiple resonance. The distance from the end null to the center is \( 5 - 0.8 = 4.2 \text{ inches}, \) and half of this is \( \frac{4.2}{2} = 2.1 \text{ inches}. \) This length represents 2.1 = 0.128\lambda \text{ and from Fig. 1, } \frac{X}{16.4} = 1.0. \text{ Thus, } X = 140 \text{ and } C = 1.6 \mu\text{f. at } 720 \text{ Mc. Doubling this value for } C \text{ for tuning the two sections in parallel gives } C_4 = C_5 = 3.2 \mu\text{f.}

The effects of \( C_4 \) and \( C_5 \) on \( C_1 \) and \( C_2 \), and then on \( C_3 \), can be calculated, and amount to a slight increase in the effective capacitance at \( C_1 \) and \( C_2 \). Thus in tuning \( C_1 \) and \( C_2 \), their values would be set at about \( \frac{1}{2} \mu\text{f}. \text{ less than originally calculated. } C_4 \text{ and } C_5 \text{ are physically so near the null points at } 280 \text{ Mc. that } C_3 \text{ would be only a tiny bit less than calculated.}

All this looks fine but several factors have been neglected or their effects guessed at for simplicification. All tuning capacitors and even the varactor have inductance in the leads or plungers. Fortunately, this effect is small enough so careful adjustment of all capacitors and variation of the
The 220-Mc. parametric amplifier. The 220-Mc. tuned circuit is a half-wave line. Pump energy is fed into the short line at the top of the amplifier.

pump oscillator frequency will usually result in hitting the magic spot of proper amplification at low noise levels. If a high pump frequency such as 1000 to 1400 Mc. is used, the two idler frequencies also will be very high and the capacitor lead inductance will completely upset calculations. That is probably the reason why the 432-Mc. amplifier is still not completely satisfactory.

The dimensions of Fig. 3, based on the foregoing calculations, have been found to make a very good 220-Mc. amplifier. If the varactor "zero" capacitance is something more or less than 6 µf., the dimensions may have to be changed, since too much capacitance at C1, which — in effect, is across the varactor — may prevent proper "pumping." More data and more varactor diodes of different capacitances will have to be tested to study this effect. It would seem desirable for the varactor capacitance to be around 4 to 6 or 7 µf. for v.h.f. operation and 2 or 3 µf. for n.h.f. bands. The 432-Mc. band is a little high in frequency for a 6-µf. varactor and perhaps it would be easier to get a lower-capacitance unit into operation on this band.

The sketch in Fig. 3 gives the essential dimension and locations of capacitors for the 220-Mc. amplifier. Aluminum about 1/8-inch thick is suitable for the box if copper (heavy flashing sheet) is used for the end pieces. These should have bent-over lips on all four sides. The ends can be fastened into the aluminum sides with a couple of sheet-metal screws on each side. The 1/4-inch diameter center conductor should be soldered into the sheet copper end pieces for the 144-Mc. unit. In the 220- and 432-Mc. units only one end needs to be copper since the half-wave line is floating free of ground on a pair of small poly or ceramic insulators.

Fig. 4 gives the dimensions found suitable for 144 Mc. with a 6-µf. varactor. The dimensions in Fig. 5 for the 432-Mc. unit are for the same varactor diode. Miniature plate-type capacitors were used at first for tuning, but caused the circuit Q to drop too much. Later, copper solder lugs were made up to fit over the shafts to clamp against the box side, and then bent around for soldering to the ground lugs on the capacitors. The Q went back up and, since several of the glass piston-type trimmers which had been substituted had been broken due to carelessness, the little plate-type capacitors were put back into the 220- and 144-Mc. amplifiers.

Variable capacitors for the input and output links at 432 Mc. (near the center of the long line) were so large and space-wasting that very small 5-µf. NP0 fixed capacitors were used to tune out most of the link reactance at 432 Mc. Moving the 1-inch long insulated links (BNC coax fitting to 5-µf. capacitor) closer to or farther away from the center line is necessary in getting the amplifier to fire up properly. Similarly at 220 Mc., fixed 15-µf. ceramic capacitors (with minimum possible lead lengths) were finally used in series with the 2-inch links. At 144 Mc., two 30-µf. capacitors were substituted for the 5- to 40-µf. capacitors shown in the photograph of this amplifier. The links in this case were 3 inches long (including the capacitor). The 144-Mc. unit was modified as shown in Fig. 4 after the photographs were made.

Alignment Suggestions and Miscellaneous Notes

Alignment isn't easy unless one is lucky. Every tuning control reacts on the others, so a lot of patience and a diode noise generator are needed. The first step is to get a reference reading with the receiver connected directly to the noise generator. Then connect the parametric amplifier into the coax line between the noise generator and the receiver. Leave the pump oscillator turned off but have the varactor diode in place. (Handle it carefully!) Tune the end capacitors for best noise figure. If this is more than 20 per cent above the noise figure without the amplifier, adjust the input and output links also. Once you get the noise figure down near the original value, the signal circuit end tuning should be touched up slightly, because it is possible to get amplification off resonance and lose about 1 db. of noise figure. If the unit has a half-wave line, try to get it balanced up so a short circuit with a small screw driver to the box at the line center has no effect on the noise figure.

The next step is to turn on the pump oscillator and slowly increase its output. For safety, keep the oscillator input to less than one-half watt. The pump-circuit tuning and the idler-frequency

August 1959
adjustments have to be worked back and forth until the parametric amplifier begins to show some gain in the output reading with the noise generator on. When the right combination of all tuning adjustments and correct pump frequency are found, the pump power into the amplifier should be reduced to a point which gives from 5 to 15 db gain, with the amplifier well below the oscillating point. Connecting to an antenna may upset the amplifier unless the antenna system has a flat line of the same impedance as the noise generator. Again, a slight adjustment of the controls will make the amplifier operate normally with an antenna.

In the three units described here, two 6AF4 parallel-line oscillators are used. One has parallel \( \frac{3}{4} \)-inch rods spaced less than \( \frac{1}{4} \) inch edge to edge, with a small butterfly tuning capacitor at the end opposite the tube. Plate current is fed into the plate side through a 2000-ohm resistor at the center of the line, and a 10,000-ohm grid leak to ground connects to the other rod near its center. The tuning range is from about 700 to 830 Mc. The 425- to 550-Mc. oscillator has similar construction with 4-inch lines. These are not ideal, and a more mechanically and electrically stable oscillator for these ranges could be built with a heavy flat-plate line of lower impedance and greater physical length.

The 432-Mc. amplifier shown here uses approximately 800 Mc. as the pump frequency. By careful adjustment it has been possible to get an improvement of about 3 db, in noise figure over a 416B amplifier normally used at W6AJF on this band.

The 220-Mc. amplifier shows nearly 3 db, improvement over a 417A tube amplifier normally used on this band. The 144-Mc. unit shows from 1 to 2 db, improvement over a 417A tube amplifier. These improvements indicate that the parametric amplifiers are not far from a noise figure of 1 db. The 220-Mc. unit tuned up most readily with a pump frequency of 520 Mc. and the 144-Mc. unit with the pump at about 475 Mc. The pump frequencies may be changed a few megacycles without ill effects if the idler adjustments are varied. These frequencies apply only to these particular units with the one varactor used in all three.

**Spurious Radiation**

In some recent tests on the 144-Mc. amplifier for spurious output the pump frequency was set at 482 Mc. and the adjustments made for (Continued on page 139)

* Better results could be obtained with a higher pump frequency. Something of the order of 1500 Mc. or higher is recommended for use with 432 Mc. amplifiers.
Front panel layout. Controls along the bottom from left to right: grid-tuning capacitor, grid band switch, meter switch, switch for fixed output capacitors (coarse loading), variable output capacitor (fine loading). The large dial in the center drives the rotary inductor, while the large knob (Milen 10008) turns the plate tank capacitor.

180 Watts C. W. — 130 Watts Phone

BY FRED F. REED, K2RHG

6146s in Parallel

For some time, our correspondence has indicated more interest in transmitters running a power input of about 150 watts than those of any other input rating. This clean-cut straightforward job should be a popular item.

The amplifier shown in the photographs uses a pair of 6146 tubes in parallel and is designed to cover all amateur bands from 3.5 to 30 Mc. It can be operated at a maximum input of 180 watts on c.w. or 130 watts on phone. It may also be operated linear, Class AB1, for s.a.b. operation.

Circuit Details

The input circuit is a parallel-tuned tank link-coupled to the driver. Two separate coils are used in the grid circuit. They are used in series on 80 and 40 meters, while on 20 meters and higher one coil is entirely shorted out, as well as the required number of turns on the other coil, to obtain correct tuning of the circuit. The low-frequency link is also shorted out on all bands above 7 Mc.

The required value of output capacitance is obtained from a three-gang, 365-µuf.-per-section broadcast-type variable, C4, with all sections connected in parallel. This capacitor is supplemented by two 400-µuf. fixed capacitors, C5 and C6, to give a total of approximately 1900 µuf.

The meter used in this unit reads 1.5 ma. full scale. It is shunted to give full-scale readings of 15 ma. in the grid position of the meter switch, 30 ma. in the screen position, and 300 ma. in the plate position. Any meter with a full-scale reading of about 1 ma. may be used. Shunts are wound with copper wire following the procedure outlined in order to avoid difficulty in obtaining sufficient grid drive. The entire circuit is tuned by a 100-µuf. variable capacitor, C1.

The unit is neutralized by the capacitive-bridge method, while the combinations of L6L1 and L6L2 are adjusted to suppress any v.h.f. parasitic oscillation.

The rotary inductor (L9) used in the pi-network output circuit came from a surplus antenna-tuning unit and has a value of approximately 10 microhenrys; however, a Johnson type 229-201 inductor will work just as well and requires less space. The rotary inductor is used on all bands except 10 meters where a separate coil (L8) is used.

Shunts are wound with copper wire following the procedure outlined.
Fig. 1—Circuit of the parallel 6146 amplifier. Capacitances are in µuf. Unless otherwise specified, capacitors are disk ceramic.

- $C_1$—100-µuf. midget variable (Hammarlund HF-100).
- $C_2$—Neutralizing capacitor (see text and Fig. 2).
- $C_3$—300-µuf. variable (Johnson 154-2, National TMS-300 or similar).
- $C_4$—365-µuf. triple-gang broadcast-replacement type variable, sections in parallel.
- $C_5$, $C_6$—400-µuf. 1200- or 2500-volt mica.
- $J_1$, $J_2$—Chassis-mounting coax receptacle (SO-239).
- $L_1$—3 turns hookup wire at cold end of L2.
- $L_2$—30 turns No. 20, 7/8-inch diam., 16 t.p.i., tapped at 4½, 9½ and 20½ turns from grid end (B & W 3007 or Airdux 5161).
- $L_3$—26 turns No. 24, 1-inch diam., 32 t.p.i., tapped 8 turns from junction of $L_2$ and $L_3$ (B & W 3016 or Airdux 8327).
- $L_4$—12 turns same as $L_3$ (see text).
- $L_5$, $L_6$—5 turns No. 18 on 100-ohm 1-watt resistor.
- $L_7$—3 turns No. 10, ¾-inch diam., 1¾ inches long.
- $M_1$—0.1-5 d.c. milliammeter.
- $R_1, R_2$—100 ohms, 1 watt, noninductive.
- $RFC_1$, $RFC_2$—2.5-mh. r.f. choke (National R-50).
- $RFC_3$—1-mh. 600-ma. r.f. choke (National R-154U).
- $RFC_4$, $RFC_6$, $RFC_7$—7-µh. v.h.f. choke (Ohmite Z-50).
- $S_0$—2-pole 5-position ceramic rotary switch (Centralab PA-2003).
- $S_2$—Progressively-shorting rotary switch (Centralab PA-2042).
- $S_3$—2-pole 3-position phenolic rotary switch (Centralab PA-1103).

In the Handbook.

All power wiring is done with shielded wire, with adequate bypassing and filtering to prevent harmonic radiation.

Construction

The amplifier is built on a 10 X 17 X 3-inch aluminum chassis which is mounted on a standard 8¾ X 19-inch rack panel. The chassis is placed so that the bottom of the chassis is 3¾ inches up from the bottom edge of the panel. The layout of components can be seen from the photographs. The grid coils are mounted on insulated terminal strips and are set at right angles to each other. Both coils are made from Miniductor coil stock. Coils $L_3$ and $L_4$ are made from one piece of stock. Counting in about 30 turns from one end, the wire is cut at this point. One half turn is then unwound from each coil at the point where the cut was made, leaving two coils on the same support bars, separated by one turn. The wire is then removed from the ends of the coils until the correct number of turns is obtained in each. The grid tuning capacitor must be insulated from ground. Since this capacitor has a built-in L bracket, the foot of the bracket is mounted on a

<table>
<thead>
<tr>
<th>Plate Voltage</th>
<th>Screen Voltage</th>
<th>Grid Bias</th>
<th>Grid Current</th>
<th>Screen Current</th>
<th>Plate Current</th>
<th>Power Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Class C C.W.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>600</td>
<td>170</td>
<td>-88 v.</td>
<td>5 ma.</td>
<td>18 ma.</td>
<td>270 ma.</td>
<td>130 w.</td>
</tr>
<tr>
<td>700</td>
<td>160</td>
<td>-82 v.</td>
<td>6 ma.</td>
<td>22 ma.</td>
<td>210 ma.</td>
<td>180 w.</td>
</tr>
<tr>
<td>(A.M. Phone)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>600</td>
<td>150</td>
<td>-87 v.</td>
<td>6 ma.</td>
<td>15 ma.</td>
<td>220 ma.</td>
<td>130 w.</td>
</tr>
<tr>
<td>750</td>
<td>200</td>
<td>-50 v.</td>
<td>0</td>
<td></td>
<td></td>
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<tr>
<td>(AB Linear)</td>
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<td></td>
</tr>
<tr>
<td>600</td>
<td>200</td>
<td>-50 v.</td>
<td>0</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

The filament requirements are 6.3 volts at 2.5 amperes.
The meter switch shown in the photographs has ceramic insulation, but a switch with phenolic insulation will serve the purpose adequately, and such a unit is specified in the parts list.

The rotary inductor is mounted centrally on the chassis and is driven through a counter dial. The dial pictured is a Millen unit that was obtained from the local surplus market. A counter dial such as the Groth type would, no doubt, require less space and be easier to mount. The plate tuning capacitor is mounted on the panel at the same height as the inductor shaft to preserve symmetry. All paint on the panel, where any mechanical joint is to be made, should be removed to insure good electrical contact.

The output capacitor and the switch for the fixed capacitors are mounted beneath the chassis with the same panel height and spacing as the grid-tank components.

To complete the shielding, the chassis is fitted with a bottom plate and a cover made from Reynolds perforated stock.

### Adjustment and Operation

Before applying excitation the amplifier should be checked for parasitic oscillation by following the procedure outlined in the Handbook. The amplifier should then be neutralized. To do this, tune the grid and plate circuits to resonance in the 10-meter band. Plate and screen voltages should be disconnected and grid drive applied to give rated grid current. The meter is set to read grid current and the neutralizing capacitor adjusted until a setting is found where there is no kick in grid current when the plate capacitor is tuned through resonance.

The various operating voltages for all classes of operation are given in the following table:

<table>
<thead>
<tr>
<th>Class</th>
<th>Grid Drive Voltage</th>
<th>Screen Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class C</td>
<td>Approximately 1 V</td>
<td>20 V</td>
</tr>
<tr>
<td>Class AB1</td>
<td>Approximately 2 V</td>
<td>20 V</td>
</tr>
<tr>
<td>Class AB2</td>
<td>Approximately 3 V</td>
<td>20 V</td>
</tr>
</tbody>
</table>

The grid bias for Class C operation may be supplied from an external fixed supply, a grid-leak resistor, or a combination of both. The bias for Class AB1 should come from a fixed supply. It should be remembered that when this unit is used on c.w. it is not keyed and therefore some method of limiting the plate power input to under 50 watts during key-up conditions should be provided. This can be done by using separate fixed supplies for grid bias and screen voltage or, if the screen voltage is taken from the plate supply through a resistor, and grid bias supplied from a grid-leak resistor, a clamp-tube circuit may be used. For phone operation the screen voltage should be obtained from the plate supply through a dropping resistor.

A grid-dip meter is useful for initial tune-up. For 80 meters the plate tank capacitor should be set to almost maximum capacitance and the rotary inductor adjusted for resonance. The setting of the inductor should then be logged for reference. On 40 meters the capacitor is set to one half its maximum value and the same procedure followed. On 20 meters the capacitor is set so that the plates are only slightly meshed, and on 15 and 10 meters it is set as close to minimum capacitance as possible. After the settings of the inductor are known for each band, the inductor is set to the predetermined value and the circuit resonated with the plate tank capacitor.

With an exciter connected to J1, the grid circuit should be tuned for maximum drive. The output of the exciter should then be adjusted to give rated grid current. An exciter capable of at least four watts output should be used. With plate and screen voltage applied, the plate circuit should be tuned to resonance and the amplifier loaded to the desired input by means of the "fine" and "coarse" loading controls while maintaining resonance with the plate tank capacitor.

### Fixtures

Under-chassis view of amplifier. Grid-tank components are in upper left, output capacitors in upper right. The grid tank-capacitor shaft and the output-capacitor shaft are approximately 1/2 inches in from edge of chassis, while the shafts in the grid-tank and output circuits are spaced about 2 inches. The meter switch in the center. Connections from output coils and neutralizing capacitor are brought through the chassis with feed-through insulators. Clustered around the power socket in lower center are the v.h.f. chokes and bypass capacitors.

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**August 1959**
The comparative low cost of the cubical quad beam antenna, coupled with its favorable gain, has brought it considerable popularity among DX operators. In the tri-band version, the main item of expense has been the required three separate transmission lines. Experimental work by W3AZQ and others has shown that a single feed line may be used with little impairment of performance.

Single-Line Feed for Tri-Band Quads

The three-band cubical quad antenna system which was described in QST some time ago was the basis for a lot of discussion among the local hams, to say nothing of the wishful thinking of owning one. Although not much different in size than its single-band brother, the 20-meter quad, simply looking at the complexity of the complete system was enough to stagger one's imagination. Wishful thinking became more wishful as W3AZQ looked at the coax feed lines, thinking of his 75-foot tower two hundred feet from his shack, and hearing cash-register bells clicking off the coax. Wouldn't it work with one piece of coax, like an all-bander? Three feed lines and switches are expensive.

Three months later he erected the antenna. As he puts it, "I was the guinea pig. Bill (W3JOH) supplied most of the answers." The results were so satisfactory that five such antennas now dot the local area, with rigs running from 35 watts to 750 watts. Built from the supplied dimensions, not one has been touched up, or tuned, since its erection. On the pilot model, each element was tuned to the center of its respective band and adjusted for the highest front-to-back ratio. Tests indicate that a 25- to 30-db. front-to-back ratio is obtainable. No trouble has been encountered with feed-line length. Now in the process of rebuilding his larger rig, the DX-35 of W3AZQ is operating with 200 feet of coax on it, with a VK2 and an MF4 under its belt!

Antenna Elements

Fig. 1 is a sketch of the completed antenna. No. 12 enameled wire was used for the 20-meter elements. The radiator requires a 74-foot 4-inch piece of wire with four insulators. The first insulator is fastened 11 feet 2 inches from one end, and the remaining three insulators are spaced along the wire at intervals of 17 feet 4 inches. You now have the four sides of a loop, one side (the bottom) being open at the center. These floating ends will later be fastened to the common feed point which is at the insulator at the bottom of the 15-meter radiator. The 20-meter reflector is constructed from a 74-foot length of No. 12 wire. It is a perfect square, 18 feet 6 inches on each side, with an insulator placed at each corner. There is no open side or other insulators on it.

No. 14 wire was used for the remaining elements. The 15-meter radiator is 11 feet 5½ inches on the sides and top, the bottom being 5 feet 8½ inches on each side, from the center of the insulator. The 15-meter reflector is 12 feet 2½ inches on the sides and top. The bottom is 6 feet 11¼ inches on each side, from the center of the insulator.

3" INSULATOR

Fig. 2 (above)—15-meter reflector tuning loop. A similar loop, 20 inches in over-all length, is used in the 10-meter reflector.

Fig. 1 (left)—Sketch showing the completed three-band quad. The three radiators are driven from a common feed point. The spreaders are bamboo poles.
Jigs helped to maintain the correct angles during the welding process.

The 10-meter radiator is 8 feet 1 inch on the sides and top. The bottom is left open with 4½ inches of wire trailing from each of the two bottom-corner insulators. The reflector is another square, 8 feet 1½ inches on the top and sides, and 4 feet 4½ inches each side of the bottom insulator. As in the construction of the 15-meter reflector, a U-shaped piece of wire, this one 20 inches in length, was added across the bottom insulator.

**Spreader Bracket**

Following W4NNQ's design, the backbone of the quad framework is a bracket centered on an 18-inch piece of 1½-inch i.d. pipe. (See Fig. 3.) Black pipe, rather than galvanized, is preferred by the welder. The zinc coating on galvanized pipe causes excessive sparking and toxic fumes. Following W4NNQ's design, a reflector and radiator pole touching the ground are similarly oriented.

Four pieces of 1 X 1 X ½-inch angle iron 12 inches long and four pieces 11 inches long are required. These pieces are cut square at both ends, one end butting against the pipe. Displace two of the 11-inch angle irons, A and B, 103 degrees apart and at an angle of 51½ degrees to the pipe. (The shorter lengths will be the radiator supports.) A and B are welded on, 6 inches from one end of the pipe. Next, pieces C and D, 12 inches long, are welded onto the sleeve, below but as close as possible to A and B, at an angle of 51½ degrees to the pipe, and 75 degrees from A and B. C is placed opposite B, and D opposite A (see Fig. 3B). C and D will be the reflector supports. The assembly is turned upside down and the above process is repeated, taking care to keep all four shorter pieces on the same face of the assembly. In this case, however, the angle pieces are revolved 180 degrees so that the valleys of the angles will be facing upward, in the same direction as the upper set. Precut plywood jigs helped to maintain the correct angles during the welding process.

Fig. 3—The spreader mounting bracket. Two sets of four pieces of angle iron, welded to the center pipe, support the bamboo spreaders at the correct angles to provide proper spacing. (A) is a front view showing the angle pieces that support the spreaders for the radiators. Reflector supports are to the rear. The valleys of all angle pieces should be facing upward in this view. (B) is a top view looking down on the bracket and showing the upper set of four supporting angles. Angle pieces of lower set are similarly oriented.

The unit was given a coat of primer and finished in enamel. It is designed to slip over a 1-inch pipe mast. Two cases of shearing have caused us to use two ½-inch bolts in fastening the unit to the mast. One is placed near each end of the sleeve, at right angles to each other.

**Spreaders**

Cut off eight pieces of bamboo, just beyond the first joint after the 15-foot mark. With the bracket on the ground, fasten the four upper spreaders in the Vs of the angle iron by means of two hose clamps for each pole, after wrapping the bamboo with several turns of black friction tape to prevent the hose clamps from breaking the finish. Measuring from the outer diameter of the 1½-inch pipe, along the bottom of each pole, use a soft pencil to mark a point at 7 feet 5 inches.

The next point is 43 inches from the first point. The third mark is 43 inches from the second. See Fig. 1.

Wrap three or four layers of black friction tape around the bamboo centered at each of the three points. These points will be referred to as the 10-meter point, the 15-meter point and the 20-meter point, as indicated in Fig. 4.

Only the four upper poles, now in place, are so marked and taped. Do not mark the points before you mount the poles on the bracket, since measurements must be from the outer diameter of the bracket. Tip the assembly on its side (with a reflector and a radiator pole touching the ground). Fasten a front-to-back guy at the outermost (20-meter) points, keeping these points 13 feet 9 inches apart, center to center, on the bamboo.

If you use wire for guying, each span should be broken with an insulator to prevent any resonances. Fasten a front-to-back guy wire at the innermost taped (10-meter) points, keeping these points 13 feet 9 inches apart, center to center, on the bamboo. If you use wire for guying, each span should be broken with an insulator to prevent any resonances. Fasten a front-to-back guy wire at the innermost taped (10-meter) points, keeping these points 13 feet 9 inches apart, center to center, on the bamboo.

Now roll the assembly over so that the opposite pair of bamboo poles are resting on the ground, and the guy wires you have just fastened go up into the air. Fasten other guy wires in a similar manner, keeping the outer points 13 feet

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9 inches apart, and the inner points 6 feet 2 inches apart.

**Mounting the Elements**

Stand the unit upright. You are now ready for the elements. We used No. 12 soft wire to tie the corner insulators to the taped points on the spreaders, as shown in Fig. 5. A slight twist with a pair of pliers will allow the wire to bite into the tape, providing a nonshifting anchorage. No. 18 wire was used as a tie around the insulator to prevent the wire from slipping in the insulator.

It would be well to note at this point that the insulators do not “mug up” against the bamboo poles. The 20-meter elements require approximately 1 3/4 inches of wire between the spreader and the insulator, and the 15- and 10-meter elements will require about 2 3/4 feet. These lengths will allow for the “squaring up” process. There is nothing sorrier looking than a cubical quad at this stage of construction with all the elements in place before the squaring up begins!

Now fasten the 20-meter radiator to the 20-meter points where you fastened the longer front-to-back guy wires, keeping the open side of the radiator on the bottom side. Fasten the 20-meter reflector to the reflector side of the assembly, tying it to the 20-meter points. You should now have the correct front-to-back spacing of 13 feet 9 inches, since the elements are fastened to the same points as the front-to-back guy wires.

The 15-meter radiator is next fastened to the intermediate, or 15-meter points, with the center insulator (the feed point) placed at the center of the bottom strand. The 15-meter reflector is fastened to the 15-meter points of the reflector side, with the small U along the bottom. The 10-meter radiator is fastened to the innermost, or 10-meter points, with the open side downward, and the 10-meter reflector loop is mounted with the U on the bottom.

Raise the assembly about 10 feet above the ground by slipping the bracket over a piece of 1-inch pipe. The bracket is held in place either by running a ¼-inch bolt through the bracket sleeve and pipe or placing a pipe cap on the bracket sleeve. Fasten the four lower bamboo poles in place, using hose clamps and friction tape as before. Mark the 20-, 15-, and 10-meter points on the four lower spreaders, again measuring from the bracket sleeve and only after the spreaders have been mounted. Wrap these points with tape as you did on the upper spreaders. Now fasten the front-to-back guy wires at the 20-meter points, keeping them 13 feet 9 inches apart, and the 10-meter points 6 feet 2 inches apart.

Fasten the bottom of the 20-meter radiator to the 20-meter points on the radiator side. Since at this time the bottom side of the 20-meter radiator still remains open, it will be necessary to fasten a permanent guy from one side to the other, keeping the 20-meter radiator points 17 feet 4 inches apart. Break this wire with an insulator to prevent any resonance. You are now able to adjust all four corners of the 20-meter radiator until you have a perfect square. (I used mason’s twine tied onto each insulator temporarily to avoid bending and rebending the insulator tie wires during the squaring-up process.)

Now fasten the 20-meter reflector and proceed to square it by adjusting all four corners. Check the front-to-back spacing and adjust if necessary. At this stage you should begin to see the shape of things to come.

Fasten the lower corners of the 15-meter radiator and reflector to the 15-meter points, and square them up.

Fasten the lower corners of the 10-meter radiator and reflector. You will not need a temporary guy on the open side of the 10-meter radiator because the quad will be quite rigid by this time.

During the squaring-up process, sight along each bamboo pole toward the tip to be sure you have not distorted the pole by excessive stress at any tie point.

Now take the loose ends of the 20-meter radiator up and inward and fasten them to the insulator which is in the bottom leg of the 15-meter radiator, one wire on each side. Bring the loose ends of the 10-meter radiator toward this same insulator and fasten one wire on each side of the insulator. See Fig. 6.

The 15-meter radiator should remain a perfect square and should not be pulled out of line by strain from the other two radiators. Solder the one set of three wires together. Solder the three wires on the other side of the insulator together. We completed these junctions by adding a terminal lug on each side of the insulator and placing terminal lugs on the coax cable, then bolting the coax onto the common feed terminals. Should it become necessary to remove the coax, it is easier to remove the bolts than to unsolder the junction. The entire junction was wrapped with tape. The single coax cable is easily dressed by taking it over the top of the spreader and allowing it to slant downward toward the common feed point. Some sort of anchorage should be provided here to prevent wear. I used Scotch electrical tape.

None of the quads in the area have actually
been adjusted for maximum performance, element lengths and spacings being the “book” dimensions shown here.

Typical s.w.r. readings shown by a Monimatch are as follows:

<table>
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<th>Frequency (Mc)</th>
<th>S.W.R.</th>
</tr>
</thead>
<tbody>
<tr>
<td>28.5</td>
<td>1.75</td>
</tr>
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<tr>
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<tr>
<td>14.0</td>
<td>1.5</td>
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<tr>
<td>14.1</td>
<td>1.4</td>
</tr>
<tr>
<td>14.2</td>
<td>1.4</td>
</tr>
<tr>
<td>14.3</td>
<td>1.25</td>
</tr>
</tbody>
</table>

Perhaps the three months of work by W3AZQ didn’t extract the last whisker of performance obtainable, but the quads have fulfilled all expectations. One local lad landed a CR6 (his 100th country) with his completed quad just above ground, before he had it up to its ultimate height!

A quad with three separate feed lines definitely has a slight gain over one of this type, but it doesn’t take a seat very far ahead. Band switching is simply a matter of tuning the transmitter to the desired band. Flexibility plus — and no expensive coax switches!

The Viking II hanging on the end of the coax has returned more 5-and-9-plus reports from DX-land than I ever expected to hear. I only regret that I did not have one up long before this.

K2JEF, noticing the increased interest in amplifiers using a Penta PL-172 or similar tube, has sent along photos of his new final, with the thought that his layout ideas might help others who were embarked on similar construction projects. The photos are pretty much self-explanatory, although we might mention one small point. K2JEF built in a scope for modulation monitoring, the circuit being a duplicate of the system used in the Eldico 100F exciter. What looks like a small neutralizing capacitor mounted on the vacuum variable capacitor bracket is actually the coupling capacitor for the scope. The input circuit is resistive, using a 100-ohm, non-inductive resistor, and about 100 watts of drive are required.
The 12AQ5 doubler and its slug-tuned plate coil are mounted on the rear apron of the chassis. The original 12A6 has been replaced by the 12BY7 mixer above.

Simple Modification for 21 Mc.

BY JOHN V. FILL,* K2GC/4

"Cheap and Easy S.S.B." Goes on 15

After a year’s operation on 20 and 75 meters with the W2EWL Special, I decided to see if this dependable exciter could be made to work on 15 meters. The sideband part on 9 Mc. could be left alone, I figured, and all that should be necessary to do would be to increase the frequency of the BC-188 oscillator from 5 Mc. to 12 Mc., and put in 21-Mc. grid and plate coils.

However, it soon became apparent that the v.f.o. was somewhat unstable at 12 Mc., and hard to tune. Removing three turns from the top of the original oscillator coil was sufficient to permit tuning the v.f.o. to 6 Mc., with the tank capacitor near maximum, and the stability was greatly improved. To get to 12 Mc., the 6-Mc. pickup winding was fed, as shown in Fig. 1, to the grid of a 12AQ5 doubler stage mounted on the rear apron of the chassis. The plate coil of this stage was tuned to 6 Mc., and link-coupled to the cathode of a 12BY7 in the mixer, instead of the original 12A6. This gives a lot more drive. It may also be of advantage to adjust the value of the mixer cathode resistor for optimum. The octal...
socket that formerly held the 12A6 was removed and replaced by a 9-pin socket. When the doubler output circuit is resonated at 12 Mc. there should be enough r.f. at the plate coil of this doubler to light a 60-ma. (pink bead) bulb connected across a couple of turns of wire when placed close to the coil. An absorption wavemeter is handy to make sure that the output is at 12 Mc.

The 9-Mc. sideband signal is link-coupled to the control grid of the 12BY7 mixer. This is the reverse of the procedure in the original W2EWL Special but results in much more drive for 15-meter operation.

The plate of the mixer is series fed, with its tank circuit tuned to 21 Mc. and linked to a similar LC arrangement in the grids of the 16258. This helps get rid of unwanted harmonics of the 9- and 12-Mc. signals.

The final plate coil is three turns of Air-Dux 1610, 2 inches in diameter, 10 turns No. 16 per inch. With 600 volts on the plate of the final and 22½ volts of battery bias, there should be enough r.f. available to fully light a 50-watt, 115-volt bulb in place of the antenna, with normal audio input.

Rather than use the original method of switching the exciter on and off, I prefer to break the B-plus 250 volts to all tubes but the first two 12AT7s. This keeps everything quiet and cooler during reception and allows VOX operation from the plate of the third a.f. tube which is coupled through a 0.01-µf. capacitor to the VOX. For c.w. operation, the original keying method in the cathode of the mixer is used.

The results on the air either "barefoot" or driving a pair of 813s in grounded-grid have been excellent.
How To Wind Your Own Transformer

Small Transistor Power Supplies at Low Cost

BY C. A. THUNEN,* W6ACT

With an old audio-transformer core and a small amount of wire, it is no trick at all to cut the cost of a small transistor power supply considerably by winding your own transformer. W6ACT shows how a satisfactory design may be determined experimentally.

Transistors are getting cheaper. By taking advantage of this fact and by building the transformer it is easy to build a satisfactory power supply for a receiver or a mobile transmitter. Most of the transistor power transformers on the market are quite expensive, but an old audio transformer can be rewound to make a suitable substitute. If the core is a half inch or so in thickness it will do. Not much iron is necessary as the frequency will be considerably higher than 60 cycles.

Determining Ampere-Turns

The first step is to strip off the old winding and make a wood winding form with the same cross-sectional dimensions as the core. A temporary trial winding is then made to use in determining the proper number of turns for the final winding. To make this winding, cut a strip of cardboard the same width as the opening in the window of your transformer core. Wrap a single layer of this cardboard around the wood form and secure it with a turn of friction tape. On opposite sides of the form, lay strips of tape, sticky side out, lengthwise on the form. When the winding is complete, the ends of these two pieces of tape are folded back over the winding to hold it in place.

Now wind 20 or 30 turns of enameled wire around the center of the form on top of the cardboard, and tape. Any wire size from 16 to 20 will do. When the first coil is in place, put on two more similar coils, one on either side of the first. There is nothing critical about these coils, and smaller wire may be used. When the three coils are wound, tape them up and assemble them on the core.

The next step is to connect the first coil to a 6-volt storage battery in series with a rheostat, a switch and a d.c. ammeter. To one of the other coils a low-voltage source of 60-cycle a.c. should be connected. A voltage of 2 to 6 is about right. The third coil should be connected to the vertical plates of an oscilloscope. The sweep frequency may be almost any value since any pattern will give the desired indication.

Turn on the a.c. and there should be a picture on the scope face. Now close the d.c. circuit and increase the current by adjusting the rheostat. As this is done, the pattern on the scope will decrease in height. Advance the rheostat control until the pattern just disappears, and read the current. When this current is multiplied by the number of turns in the first coil, the product is the number of ampere-turns necessary to saturate the core. The operation of the multivibrator-type circuit requires that the core saturate, and this should occur without exceeding the maximum collector-current rating.

Primary Winding

Having determined the number of ampere-turns to saturate the core, you may proceed to design the final winding. To do this, first choose the power transistors you will use, and find the collector-current rating from the manufacturer's literature. CBS Hytron 2N255 and 2N256 are low in price and will work well. Divide the ampere-turns for saturation by the collector current and you have the number of turns for the primary winding of your transformer. The proper wire size may be found in the wire table in all editions of the ARRL Handbook. There will be two coils and each will conduct only half the time, so the wire need be only large enough to carry half the rated current of the transistor.

Before winding the coil, make a couple of removable ends with square holes to slip over the wood form to confine the winding to the space available in the core window. An insulating base of thin cardboard or heavy paper should be put on the wood form, with strips of tape as before. For the final primary coil, two strands of enameled wire are wound in parallel. Cut two pieces of the primary wire and holding them parallel, wind on the number of turns determined above. Be sure to leave sufficient lead length at the starting end for connections. When this double primary coil has been wound, fold the tape ends down to hold it in place and wrap it with a thin layer of insulating paper.

Bias Winding

On top of this layer of paper lay two more strips of tape to hold the next winding. This is the base-bias winding and is put on in the same manner as the primary, winding two wires in parallel. For this winding smaller wire may be used. No. 28 is about right. Wind on about one fifth as many turns as in the primary winding.

*704 G St., Crescent City, Calif.
The secondary coil goes on next, but before starting it you had best test out what you already have so as not to waste the time and material on the secondary coil if the primary is not going to work.

There are many circuits which will oscillate with the power transistors available. The circuit shown in Fig. 1 has worked well in a receiver power supply. C1 is a hash suppressor. It should be connected from the ungrounded side of the 6-volt line to chassis. If the positive side of the line is grounded, the capacitor should be connected from negative to chassis with the positive side of the capacitor to chassis.

Testing the Primary

Assemble the partial winding on the core and wire up your favorite circuit. Be very careful to connect the d.c. supply with the correct polarity, or the transistors will be ruined. In case you are not familiar with transistors, there is a little trick to help in remembering the various polarities. Transistors are designated p-n-p or n-p-n and these letters refer to the polarities of the elements. The center letter gives the polarity of the collector and “center” and “collector” both begin with c. How can you miss?

When power is applied, the circuit should oscillate and you will know it as you can hear it buzz. If all goes well and it oscillates, you are ready to design the secondary winding. Wind five or six turns over your coil by threading them through the core. Apply power and measure the voltage on this temporary secondary coil. It is an a.c. voltage, so use an a.c. voltmeter. By dividing the number of volts by the number of turns, you find the volts per turn, and by dividing the volts per turn into the desired secondary voltage, the number of turns for the secondary winding is found.

Now take the transformer apart, put the winding back on the core and wind on the secondary coil. Use a wire size that will just about fill the remaining space in the core opening. If a center tap is desired, wind two secondary coils. For the same rectified output voltage, each secondary must have the number of turns previously estimated. However, the wire need be rated for only half the load current. The two coils should be connected so that they assist. If little or no voltage output is obtained when the two windings are connected in series, reverse connections to one of the coils. In general, the secondary current that can be drawn safely without damaging the transistors will be approximately twice the collector current rating divided by the ratio of secondary turns (one secondary if center tap is used) to one half the primary turns.

A power supply built by the method described above worked quite well. 2N255 transistors were used and the supply was designed to work from a 6-volt battery. The collector current runs about 2 amperes and the open-circuit secondary voltage is about 120 volts d.c. This particular supply was designed to operate a BC-174 surplus receiver which requires 90 volts and, under load, the supply delivers just about that voltage. The rectifiers used were Sarkes Tarzian M-150 silicon units and they cost 90 cents each. The transistors are listed at $1.32 each. By using a junk-box transformer, all the rest of the components can be purchased new for less than $10.00.

Such details as the exact number of turns and wire sizes which were used in the supply described here were purposely omitted since this article was intended to enable you to design your own power supply.

1 Unless special transformer core material is used, transient spikes of collector voltage may develop sufficient amplitude to damage the transistor in time. If a check on an oscilloscope shows spikes exceeding the maximum collector voltage rating, it would be advisable to connect a 25-mfd. 50-volt electrolytic capacitor and a 20-ohm resistor in parallel from each base to chassis, connecting the positive side of the capacitor to the base. — Ed.

WSOPR had a new tri-band beam and tower in his back yard and in the process of getting it lined up to suit himself had to climb it a number of times. After watching these proceedings for a while, a neighbor’s child asked, “Does your erector set work better now?”

Another “first”? W1AMO operated mobile (or was it portable in motion?) from a large brick house that was moved about a mile. He used a gasoline generator to power the gear.

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Amateur Communication at 36,500 Mc.

These pictures show Richard G. Somers, W6NSV, and William J. Odum, K6YYF, with gear they set up for two-way work on a frequency of 36,500 Mc. The work was done in July, 1957, which makes it the first known instance of amateur two-way communication on any frequency in the unassigned territory above 30,000 Mc. For various reasons the work could not be reported heretofore, but is detailed here as a significant contribution to the amateur record.

The experiment took place on the roof of a Hughes Aircraft Company building in Culver City, California. The size of the building limited the distance to 500 feet, but there was every indication that at least three times this distance would have been possible. The transmitter used by W6NSV employed a Raytheon QK201 klystron, velocity modulated with keyed 1000-cycle square-wave tone. The klystron output was fed to a radiating horn through a directional coupler, a microwave frequency meter and a slotted line section. Power was obtained from laboratory-type regulated supplies.

K6YYF operated a Hughes-built transmitter, equipped with automatic frequency control circuits and its own regulated supply. It was also modulated with a 1000-cycle square wave, keyed for m.c.w. communication. The horn antenna was similar to the one used with the other transmitter. Portable pack sets were used in preliminary alignment of the microwave horns.

Both receivers used tuned horns coupled to crystal detectors. The output of the detector was fed to a sensitive audio amplifier tuned to the modulation frequency. At 0.0082 meters, the operating wavelength, the horn aperture is 8.5 by 12.2 wavelengths providing beams narrow enough to provide isolation between horns, and duplex operation was carried out using the same frequency for both stations. This is a duplex system somewhat different from those normally used in amateur microwave communication. Use of straight crystal-detector and audio-amplifier systems for receiving also is a different approach to microwave work by amateurs.

W6NSV and K6YYF expressed their appreciation to R. W. Clapp of the Microwave Laboratory of Hughes Aircraft Company, for his assistance in making the nonclassified equipment available for use in the experiment.
An ARC-5 Triple Superhet

Anyone investing in the ARC-5 receivers will soon respect them for their stability and simplicity but will regret their lack of selectivity, bandspread, b.f.o.-a.v.c. switch, b.f.o. pitch control, low-impedance input, and other refinements of conventional receivers. All these problems can be overcome if the BC-453 (190-550 kc.) is used as a highly-selective third-i.f. channel for the higher-frequency receivers. The BC-454 (3-6 Mc.) and the BC-455 (6-9 Mc.) can readily be converted by replacing their audio circuitry with a second converter, producing a 455-kc. output for the BC-453. This can be done by using the erstwhile b.f.o. coils designed for the high intermediate frequencies of these receivers as high-frequency oscillator coils in the new lineup. Thus the low selectivity of the high-i.f. receivers is replaced by the well-known sharp selectivity of the Q5-er. Also, the too-fast tuning rate of the high-frequency receivers is supplemented by the dial of the BC-453, which can be used to examine the approximately 10-kc. passband of the 455-kc. channel at a tuning rate only one tenth as fast: where the dial of the BC-451 or -455 covers 100 kc. per division, the dial of the BC-453 covers only 10 kc. per division.

Use of the original FT-220-A rack in which the receivers were originally installed, plus some modifications to be described, provides the rest of the conveniences named above. Numerous other modifications not discussed here were made; for example, a separate audio chassis with a Select-O-Ject was built. We doubt that anyone would want to duplicate our setup exactly, but the advantages of utilizing these receivers in this fashion are considerable. For a few dollars, the amateur with a reasonable knowledge of circuitry can develop a receiving system which, for selectivity, stability, and ruggedness, is hard to match. The high-frequency receivers, of course, cover only 3.0 to 9.1 Mc., but can be used as building blocks for the higher bands by application of crystal-controlled converters. This is a lot of receiver for a little money.

Mechanical Arrangements

If you can find an FT-220-A receiver rack, use it as a side-by-side mount for the units, which should plug into a socket strip at the rear. The switches on the rack should be removed and the audio-response switch, receiver selector, and a.v.c.-b.f.o. switch mounted in the vacated holes. The necessary wiring can be concealed neatly in the front channel and passed back through the tubes which form part of the rack to the strip at the rear. The extra converter tube required in the BC-451 and BC-455 replaces the detector-b.f.o. tube (12SR7) and so a new socket is not required. The new i.f. transformer occupies the place of the removed audio output (12A6) stage. Low-impedance r.f. inputs and outputs are used throughout, requiring modifications to the antenna coils on all three receivers and to the 455-kc. i.f. transformers. An unused corner in the front of the BC-453 is used for a pitch-control.

The receivers lined up on the mounting rack. The BC-453 is at the left; the bar knob at its lower right corner is the b.f.o. pitch control. The adapter panels on all three receivers have been fitted with gain controls and coax sockets for low-impedance antenna input. Each of the high-frequency receivers has its own 455-kc. output cable, seen between the first two units. The proper cable must be connected to the BC-453 input when changing h.f. receivers.

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capacitor. The r.f.-i.f. gain control, normally mounted on the remote equipment, is brought to the front of each receiver, using terminals which exist for it on the adapter-plug receptacle, the face plate of which is used to mount the input coax connector and gain control for each set.

Low-Impedance Input

Low-impedance r.f. input is a more conventional feed system which ties in better with most amateur antenna and feed-line arrangements. In any case, its use is essential with the BC-453 low-frequency receiver to avoid exposing unshielded wire which will pick up unwanted signals. Complete shielding is vital in a multi-super lineup.

The procedure is as follows: Remove the adapter plug panel at the front of the set. Remove the plug itself, the small knob on the front, and its associated shield from the small panel. Drill this panel suitably and install the coax connector of your choice; we used Jones 101s. Beside it, install the r.f. gain control for the set: the 50,000-ohm wire-wound control intended for the job, which is mounted on the remote unit, is ideal. However, almost any miniature pot will do. Connect it to Pins 6 and 7 of the receptacle in the receiver by soldering 4-inch lengths of flexible hook-up wire between the control and prongs. You won’t need the plug feature again so don’t worry about getting solder in the prongs.

Connect the coax connector by means of 6 inches of shielded wire, which is run through a hole you must drill in the corner of the plug mounting can in the receiver, to Pins 1 and 6 on the antenna coil receptacle. This receptacle is accessible after the front-end coil assembly is removed. These pins, unused in the original circuit, are now employed to bring the antenna input into the antenna-coil can. See Fig. 1 for pin numbers.

Now remove the antenna coil from its can by removing the four small screws which hold it. Wind on the new antenna primary coil immediately above the main coil on the form. See Table I. Tie the coil to Pins 1 and 6 on the coil socket and dope the finished coil with cement or beeswax.

<table>
<thead>
<tr>
<th>Receiver</th>
<th>Number of Turns on Primary Coil</th>
<th>Wire</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC-453</td>
<td>60</td>
<td>No. 32 enam. close-wound</td>
</tr>
<tr>
<td>BC-454</td>
<td>25</td>
<td>&quot;</td>
</tr>
<tr>
<td>BC-455</td>
<td>16</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

Re-install all items, coiling up the surplus lengths of gain control and coax lead inside the box.

Installing a Converter

Remove the 12A6 tube and socket and all associated wiring. Remove the 12SR7 tube and all wiring except that for the heater. (It is assumed that the heater wiring has been modified for 12.6 volts as described in other articles.) Wire the 12SR7 socket for a 12K8 converter as shown in Fig. 2. It will be necessary to drill a grommet hole in the side of the last i.f. transformer for the lead to the 12K8 signal grid. This
Fig. 2—Converter circuit for 455-kc. output from 3-6 and 6-9 Mc. receivers. The 12K8 replaces the 12SR7 in the original receiver circuit. Components without circuit designations are in the original circuit; new components are listed below.

- \( C_1 = 100-\mu \text{f} \) silver mica for 2830-kc. b.f.o. coil; 300-\( \mu \text{f} \) silver mica for 1415-kc. b.f.o. coil.
- \( C_2, C_3, C_4 = 0.01-\mu \text{f} \) disk ceramic or paper.
- \( R_1 = 3900 \) ohms, 1/2 watt.
- \( R_2 = 47,000 \) ohms, 1/2 watt.
- \( R_3 = 8200 \) ohms, 1/2 watt.

The h.f. oscillator of this 12K8 second converter tune to 2830 — 456 = 2374 kc.,

modify the b.f.o. coil (part No. 5856 in the BC-455) by removing it from its can and solidly mounting an additional 100-\( \mu \text{f} \) silver-mica capacitor in parallel with the coil as indicated in Fig. 2. This will bring the circuit to approximately the right frequency. In the case of the BC-454, modify the b.f.o. transformer by adding a 300-\( \mu \text{f} \) silver mica in parallel with the existing tuning capacitor inside the can.

Obtaining A.V.C.

Locate the black lead on the under side of the last i.f. transformer in the BC-453 — the one that goes to the junction of the 500K and 100K resistors. Without removing this lead, connect at point "X" the a.v.c. filter shown in Fig. 3. Output of this filter (point "Y") is then carried back to a pin at the rear octal plug. The octal sockets in the rack should then be wired to supply a.v.c. voltage to the same pin in each of the h.f. receivers. This pin in each h.f. receiver's plug is then wired to the a.v.c. line of the external audio amplifier used, and point Z connected to pin 8 of the octal power socket through \( S_1 \) (see Fig. 4).
that receiver, which should have been disconnected and left floating during the initial dismantling. A convenient tie point in the BC-454 is the No. 1 pin of the second i.f. transformer; in the BC-455, the front pin of the rear capacitor unit (part No. 5411) on the right side of the chassis when the receiver is upside down with its front facing you.

B.F.O. Pitch Control

All ARC-5 receivers are built without panel control of b.f.o. frequency, which is obviously unsatisfactory for amateur purposes. The modification to overcome this is done by installing a 75-μf. APC variable to the left of the adapter panel (receiver held upside down) in the BC-453. The capacitor shaft is brought out at the same height as the "Align Input" control on the other side. This capacitor is connected through RG-59/U coax to the 85-kc. b.f.o. transformer (part No. 5852), bottom terminal. This coax must be firmly cleated down at two or three points to prevent any movement, since the cable becomes part of the tuned circuit of the b.f.o.

To compensate for the added capacitance of the cable and 75-μf. pitch control, 43 turns should be carefully removed from the b.f.o. transformer coil. A suitable shield for the capacitor, a precaution against radiation of the b.f.o. signal inside the front end, can be cut from one of the discarded adapter socket cans and bolted to the chassis using several of the small screws which are available everywhere on this equipment and which become surplus when unneeded components are removed. Saw the feet from one of the surplus capacitors to use as nuts. This shield is shown in one of the photographs.

B.F.O.-A.V.C., Receiver-Selector and Audio-Response Switches

The circuit of the b.f.o.-a.v.c. switch, which applies heater power to one or the other h.f. receiver. We would rather have left the heaters on and switched the B supply, but were short of heater current.

The high 85-kc. selectivity results in rather boomy speech. We installed a very small (100 μf.) audio coupling capacitor in the output line with an s.p.d.t. switch on the front to short it out. Thus the audio response at low frequencies can be cut sharply for phone reception or left normal for c.w. or zero-beating. This is a very simple system; a more satisfactory one would compensate for the considerable change of level which results, or would use a high-pass filter.

Reducing Drift

Considerable thermal drift was experienced at first. We cooled off the BC-453 by drilling four ½-inch holes through each side of the shield which houses the tubes and the i.f. cans, right opposite the tubes and as low as possible. Several more holes, in a line above each tube string in the cover for the tube compartment, then established a circulation of air to carry away the tube heat. We then removed the 12A6 on completion of a separate audio chassis, and moved the two dropping resistors, part No. 5895, outside the chassis. In addition, the r.f. stage tube of the i.f. receiver was removed and a 10-μf. coupling capacitor, connected between the grid and plate prongs in the socket, was substituted. This keeps the gain to manageable proportions.

These reductions in both generated and accumulated heat completely eliminated the drift problem.

Gain and Selectivity

Gain is far greater than is required. We removed the first i.f. stage in each h.f. receiver, in addition to the r.f. stage in the i.f. receiver as described above, substituting octal plugs with 10-μf. capacitors bridging the plate and grid pins in each case. The BC-453 receiver is operated with the 85-ke, i.f. transformers as loosely coupled as possible, by drawing out the fiber rods which project from the tops of the i.f. cans to the limit of their travel.

Tuning and Setting Up

Check the BC-453 receiver by tuning it to a frequency near the i.f. of any broadcast set, 455 ke., or thereabouts. Tune the broadcast set to any strong signal and bring a length of insulated

This view shows the gain control and coax input connector on the adapter panel, and also shows the b.f.o. pitch-control capacitor in the lower right-hand corner. The shield sitting in front of the chassis covers the b.f.o. capacitor when the BC-453 is reassembled. The low-impedance primary for the antenna coil (upper right, removed from the shield) is wound on the phenolic form alongside the universal-wound coil.

QST for
wire near the plate pin of the last i.f. stage, connecting the other end to the "A" terminal of the BC-453. The broadcast station should come in loud and clear on the BC-453. Transfer the wire to the newly-installed coax socket; it should also be possible to get a good signal there.

Now connect either h.f. receiver to its power supply and check that the oscillator section of the second converter is running. This is most easily done by checking the bias voltage on the 12K8 cathode and shorting the oscillator grid to ground. The bias should rise sharply when you do so, indicating that oscillation has ceased.

Now it is necessary to establish the second i.f., which must be somewhere near the nominal frequency of the modified 455-kc. i.f. transformer you have just installed. You can hit it right on the nose with a b.c. set used as a frequency meter. Assume you are setting up the BC-455 (6-9.1 Mc., design i.f. 2830 kc.) and that you want to produce a second i.f. of 455 kc. The ex-b.f.o. of the BC-455 now has to tune to 2830 - 455 = 2375 kc. Tuned to 900 kc., your broadcast set's local oscillator will have a second harmonic at 2(900 + 455) = 2830 kc. This will beat with the BC-455's new second h.f. oscillator, if it is running at the desired frequency of 2375 kc., to produce the broadcast set's own i.f. of 455 kc. Thus it is only necessary to tune the broadcast set to 900 kc., and rock the BC-455's b.f.o. tuning capacitor (accessible through a small hole in the side of the chassis) until a strong unmodulated carrier is heard. If your broadcast set has a different i.f., or if you want a different second i.f., you'll have to go through the above arithmetic for that particular set of frequencies.

In setting up the 3-6 Mc. BC-154, tune the broadcast set to the same frequency and repeat the operation; it so happens that the frequency relationships are the same, except that you are using the fundamental of the broadcast set's oscillator.

This technique takes advantage of a common form of BCI in the 160- and 80-meter bands, in which the amateur signal is tunable on the broadcast set even though the signal is far out of the tuning range of the receiver being interfered with.

Now that the new oscillators in the high-frequency receivers are on frequency, you should be able to hear signals from the front end of either one of them when you connect its output coax to the input connector on the BC-453, and connect an antenna to the "A" terminal or coaxial input of the high-frequency receiver. Peak up the signals by tuning the BC-453, both main tuning and "Align Input" controls, and then the 455-kc. output transformer in the h.f. set. Note: Once you have lined up the BC-453 on one of the h.f. sets, make no further adjustments to it. When proceeding to bring the second h.f. receiver into line, limit your adjustments to its second oscillator and the output 455-kc. i.f. transformer only. This will make it possible to switch from one receiver to the other without retuning the BC-453.

Some day we'll put the receiver selector function on a single switch which changes both B supply and antenna inputs in a single operation. If you're starting from scratch, this would be a worthwhile feature to incorporate. The setup we have described requires that two coaxial connectors and a switch be changed when changing bands, which is inconvenient.

Having done all the above, and assuming your receivers worked O.K. before the modifications, you need not touch any other alignment adjustments.

This makes a great little lineup. Treat it with respect and you may find yourself still getting good service from it 12 years later, as we are here!
Radio Detection of Silent Satellites

BY CLAYT ROBERTS,* K2OUX/W1MVV, PAUL KIRCHNER,* W2YBP, AND DAVE BRAY,* K2LMG

The effects described in this article show definite correlation with satellite passages, and form a new method for detecting satellites without transmitters. Amateurs properly situated with respect to WWV (within the skip zone) or other continuous signal have the opportunity of making similar observations.

The majority of amateurs are interested in the conditions of the ionosphere and upper atmosphere to some extent because of the effect they are known to have on propagation. We are interested in finding out if 20 meters is wide open or washed out as a result of the F-layer conditions over certain areas, or if there is an inversion or aurora existing for v.h.f. enthusiasts. Operating conditions depend so much on just what is going on “up there.”

With the launching of several earth satellites by both the U. S. and Russia this past year interest has been aroused in the effects that might result when such a vehicle, traveling at speeds of 18,000 miles per hour or more, passes through the upper atmosphere and areas of the ionosphere. We know that there must be gas molecules present in the upper atmosphere as well as charged particles which make up the ionosphere itself. It has recently been found that the ionosphere exists at much greater altitudes than was earlier anticipated. It has been speculated that enough ionization to support radio transmission could be produced by the motion of a satellite as it orbits around our earth. One method for obtaining clues to such conditions is to search for and analyze certain effects on electromagnetic waves which can be matched with the passage of satellites.

Last October, the authors started looking for such effects. As a beginning point, we figured that if such an ion cloud did exist its critical frequency would be below the v.h.f. region, because various types of radar operating at v.h.f. and above see satellite echo areas of essentially the same dimensions as the physical dimensions of the satellite. Thus it was apparent that lower frequencies must be used to obtain reflections from the ion clouds. Having no high-power radar or California kilowatt transmitters at our disposal, we decided to use the WWV transmitters, which seem to be most conveniently located with respect to Ithaca, N. Y., for such observations. The search for reflected signals was made on 5, 10, 15 and 20 Mc.

Preliminary results indicate that disturbances which are correlated with satellite passes do exist. Through the use of the various frequencies, more than one type of disturbance has been observed. On the 20-Mc. frequency a fast flutter, similar to the familiar airplane flutter seen on TV screens, was observed. We had expected to find this, as it had already been reported by W8JK. However, at 15 Mc., and especially at 10 Mc., two very different types of disturbance were found.

"Doppler" and "Rumble"

The first effect observed at 10 Mc. differs from

Reflected Signals from Satellite-Generated Ionization

The authors and the receiving set-up at Ithaca. Left to right, K2LMG, K2OUX/W1MVV, W2YBP.

Although the air is extremely thin at heights of some hundreds of miles there are enough molecules to form a detectable reflecting cloud, when ionized by bombardment of the speeding satellite. Like the well-known ionized meteor trail, such an ionized cloud often can reflect high-frequency signals with enough strength to be observable, under proper receiving conditions.

The flutter type of reflection obtained at 20 Mc. in that the signals received contain an audio tone of changing frequency. This tone is not transmitted by WWV. The frequency change is similar to that which would be obtained from a transmitter aboard the satellite itself, and for this reason has been called a "Doppler" reflection. The reflected signal bouncing off the satellite and its ion cloud beats with the WWV carrier received by ordinary sky wave.

The audible Doppler beat note is not clean sounding. When observed on a spectrum analyzer, it is seen to consist of a smear of frequencies 50 to 200 cycles wide moving, as would be expected, from a few hundred cycles gradually through zero beat and up again. As might be anticipated, observations indicate that the Doppler is heard more often at night. The density of the ion cloud partially surrounding the orbiting vehicles is probably dense enough for reflections at this frequency during the day, but at that time the reflected signal is absorbed more by the stronger ionosphere.

The second observed effect is in the form of a delayed disturbance. This effect is a very rough audio note containing components between 60 and 400 cycles. It is delayed approximately 8 to 10 minutes after known satellite passages (and after the Doppler disturbance). The frequency distribution remains relatively constant with time, not varying in pitch as the Doppler signal does, and for this reason the effect has been called a "rumble." The duration of the "rumble" varies from a few seconds to nearly one minute. There are several clues to the cause of the "rumble," but nothing conclusive as yet.

The effects described have been heard on both 10 and 15 Mc. However, generally speaking, the disturbances observed on 15 Mc. have been much less frequent and considerably weaker than on 10 Mc. It has been found that the "rumble" is more consistent in its appearance than the "Doppler" and, on the lower-altitude passes of the satellites, it generally appears both day and night.

So far no extensive effort has been made to explain the Doppler and the rumble disturbances in detail, although a large number of observations have been made on the two components of Sputnik III. The data which have been obtained have been compared with the scheduled passes of the satellites, as well as with the Doppler signal recorded from Sputnik III's transmitter. All these data still need plenty of analysis before we will get the rest of the answers.

Results on Discoverer I

The study was recently interrupted to apply the not-yet-proven technique to the lost satellite Discoverer I. This was done because the radio of the satellite was for all practical purposes unable to report the satellite's position, and the orbit plane was such that the satellite was not visible over most of the area of the earth. Day and night listening periods were set up in Ithaca and Schenectady, New York. In Ithaca the help of K2VMH and W2KRF was obtained to ease the strain of the long and late listening times. In Schenectady wonderful cooperation was obtained from W20DC, W2DAG, K2QFX, and W3ZHL. Additional support was received from W2DSB in Johnson City, and from W1TBSN and W1NXY in Boston.

Extremely good results were obtained using the 10-Mc. reflected signals. For a period of over two weeks consistent returns were obtained that matched very closely the orbit predicted by the Air Force from the launch data. The rumble effect was very consistent. The Doppler returns, although not obtained on every pass of the satellite, definitely existed and at times lasted for periods up to 5 minutes.

The project is now being continued using the facilities of General Electric Company to gather more and better data, in order to determine the exact cause of the phenomena. However, from the results obtained so far, it appears that the observed signal disturbances are definitely correlated with actual satellite passes, and that each satellite builds and carries along with it a cloud of ionized particles.

Strays

The Boy Scouts International Bureau in Ottawa has announced the Second Annual Jamboree-on-the-Air, from 0001 GMT Oct. 23, to 2400 GMT, Oct. 25. Scout hams are invited to exchange greetings. This is not a contest and there is no prescribed exchange. Any bands may be used. Special QSLs will be sent from the International Bureau station and K2BFW, the Boys' Life Radio Club station. For more information, contact Harry Hardar, W2GND, Boys' Life editor and Boy Scouts of America coordinator.
A TV rotator easily handles the simple 15-meter beam.

Simple Beam Construction
for 15 Meters

Adding a Reflector to the One-Element Rotary

BY CHARLES D. THOMPSON, JR.,* W4UVY

The 2-element 15-meter beam described here by W4UVY takes little space and is easily constructed. It's an inexpensive way of tripling your effective radiated power.

One of the simplest methods of obtaining a unidirectional field pattern is by means of a parasitic array, which consists essentially of a half-wave dipole associated with one or more parasitic elements; i.e., reflectors and directors. It is characteristic of parasitic-element systems to show maximum radiation in one direction.

This helps to reduce interference in directions other than that over which communication is being carried on.

One of the simplest and least expensive methods of constructing such an array is the one to be described. As shown in Fig. 1, this antenna consists basically of the "One-Element Rotary" used as the driven element with an added parasitic element. The parasitic element is longer (tuned to a lower frequency) than the driven element and is therefore a reflector and reinforces radiation in the direction of a line pointing away from itself toward the driven element.

**Elements**

The same type material and general configuration...
Fig. 2—Detail showing method of attaching coil and coax connector to driven-element members. The reflector coil, slightly larger, is bolted directly to the tubing at both ends.

Copper Tubing
Coax socket
Coax plug
Coax

Loading Coils

As shown in Fig. 1, the two lengths of conduit for each element are supported on four stand-off insulators on a 4-foot 2 X 2. Mounting points for the coils and coax connector are made by flattening the ends of the tubing for a length of about 1 1/2 inches, as shown in Fig. 2.

The coil for the driven element is made of 1/8-inch copper tubing. It consists of 5 turns spaced 1/4 inch apart and has an inside diameter of 1 inch. This coil is connected in series with one length of the conduit to the center-conductor pin on the coax fitting. To secure a good connection at the coax fitting, care should be exercised in the soldering. The other end of the coil is connected to the conduit with a screw and nut.

The coil for the reflector is also constructed of 1/8-inch copper tubing. It consists of 6 turns, 1-inch inside diameter, turns spaced 1/8 inch apart. This coil is connected directly between the two lengths of conduit with screws and nuts.

Conduit or tubing could be used for the boom with possibly a slight weight reduction and gain in mechanical stability. However, the 2 X 4 wood boom has withstood East Tennessee environmental conditions very well and a small TV rotator has proved adequate for rotation.

Antenna Mast

The spacing between the elements is 8 feet 6 inches. The antenna is mounted on the mast by securing a 1-inch floor flange to the center of the 2 X 4 boom by means of three 2-inch bolts as shown in Fig. 1. The floor flange is connected to a 12-foot length of 1-inch pipe. This is inserted 6 feet into a 21-foot length of 1 1/4-inch pipe which serves as a mast. A hole that will clear a 1 1/4-inch bolt is drilled through the mast pipes approximately 1 foot from the top of the larger pipe. Then a 1 1/4-inch bolt is slipped through the hole and secured by a lock washer and nut. The 1-inch pipe is cut and a rotator installed or, by the use of bearing sleeves at the mounting points, the entire mast could be rotated by hand.

Feeding the Beam

Tuning of the reflector affects the feed-point impedance of the driven element as well as the gain and front-to-back ratio. In this instance, it was found that the tuning was such as to provide a good match to 72-ohm line.

The spacing and tuning of the elements are factors in determining the gain of an antenna-reflector combination. The reflector does not require connection to the driven element or associated circuit. When the driven element is energized, the resultant field induces a current in the reflector in such phase (in this particular instance) that the fields of the two elements in a direction from the reflector through the driven element combine to increase the total radiated power in that direction.

For transmitters having a pi-network output circuit capable of matching a 72-ohm load, coupling is just a matter of adjusting the network to the point where normal loaded plate current is obtained. For transmitters whose output circuit is designed to operate into an impedance which differs greatly from the 72-ohm value, an impedance-matching network must be inserted between the transmitter and the transmission-line input.

MEMBERSHIP CHANGES OF ADDRESS

Four week's notice is required to effect change of address. When notifying, please give old as well as new address. Advise promptly so that you will receive every issue of QST without interruption.
A 75-Watt V.F.O.
for 20-40 C.W.

A Specialized Rig
for the Code Man

BY GILBERT L. COUNTRYMAN,* W4JA, EX-W3HH

Although the author calls this a "v.f.o.", it has enough power output to qualify as a transmitter in its own right. It is designed especially for c.w. work — not, as are many transmitters, primarily for phone with a key jack added almost as an afterthought. Concentrating on one aspect of operating simplifies construction despite the fact that there are five stages from v.f.o. to final.

Judging by the author's correspondence during the past year, there are numerous old-timers who prefer to pound brass, usually sticking to one or two bands. They keep a few schedules with friends or relatives, and other operating time is devoted to rag-chewing. DX, contests and traffic as time will permit. They take pride in their notes, keying characteristics and ability to handle a bug. Several have expressed interest in a simple 75-watt transmitter, for use on one or two c.w. bands, which could also be used to drive a high-power amplifier. The exciter to be described fills these specialized requirements, while the basic design is applicable to phone as well as c.w.

Many of the v.f.o. circuits used today, although satisfactory for phone, are marginal for c.w. use; and many published circuits with sufficient stability and bandspread for single-sideband make inadequate provisions for c.w. keying. The same holds true for manufactured transmitters, which variously feature time-sequence keying, differential keying, "modified" grid-block keying (whatever that is) and so on, but as heard on the air only a few of these transmitters have what the writer feels can be considered acceptable keying.

To permit the use of the builder's pet key-thump filter or electronic keyer, no provisions for wave shaping have been included in the unit to be described. The exciter features:

1) Simple construction using only stock components.
2) A stable v.f.o. with adequate bandspread for any use.
3) Compactness, but not to the extent that construction becomes a chore.

1) Selection of the 20- or 40-meter c.w. bands at the flip of one s.p.s.t. switch.
2) No TVI.
3) Essentially single control.
4) Output up to 75 watts as desired.

An 80-meter v.f.o. is followed by a untuned isolation stage. Next is an isolation amplifier fixed-tuned to the center of the 40-meter c.w. band. This drive a fixed-tuned 5763 that operates either straight through on 40 meters or doubles to 20. The final, a 6146, runs straight through on both bands. Only one setting of the plate tank capacitor of the 6146 is necessary for the band selected. This stage could not effectively be made fixed-tuned, however, because of the detuning effect of different loads that may be applied to its output circuit.

The V.F.O. (6C4)

A high-C Colpitts oscillator was decided upon, and originally it was planned to use permeability tuning. A coil wound on a Millen 73001 form mounted horizontally in an octal socket worked to perfection and the bandspread was ideal, two complete revolutions covering the 20-meter c.w. band. Unfortunately, the coefficient of expansion...
of the powdered-iron slug was so great that the frequency drift could not be compensated. The best result obtainable, an 8-ke. drift downward over a period of 70 minutes (2 ke. on the fundamental frequency) was, of course, unacceptable. Permeability tuning was regretfully abandoned. If anyone is interested in further experimenting, one oscillator coil consisted of 10 turns of No. 20 enameled wire, close-wound in the center of the coil form. Other components were the same as shown in Fig. 1, except that approximately 500 μf. fixed capacitance paralleled the inductance in lieu of the variable capacitor. Another grid coil used 13 turns of No. 26, with no shunt capacitor. The 3/16-inch hex nut termination of the core screw is easily secured to a 1/4-inch shaft coupling by drilling another hole in the shaft coupling, threading it for an 8-32 screw and centering the core screw in the coupling. This was necessary to eliminate shaft eccentricity. A 3/16 to 1/4-inch split bushing also could have been used.

The oscillator tube is a 6C4. The output is taken directly from the grid, which is rather unconventional, but resulted in improved oscillator stability as compared with taking the output from the plate cathode, or directly from the tuned circuit. With the component values shown in Fig. 1, from a cold start the v.f.o. has an upward drift of 200 cycles over a 10-minute period and thereafter the drift is negligible.

A direct-reading v.f.o. dial calibration is operationally unnecessary because a v.f.o. is normally set to a receiver frequency. A 5-to-1 ratio National Velvet Vernier dial is used. If direct-reading calibration is desired a Lucite pointer can be made to replace the four-inch dial, which can be removed from the Velvet Vernier mechanism by unscrewing three bolts under the knob. A calibrated chart can then be fastened to the panel with masking tape.

With the components shown, 180 degrees on the dial just covers the 40-meter e.w. band, which gives adequate bandspread on both 40 and 20. Changes in the inductance and tuning capacitance can be made to give any bandspread desired.

**Isolation-Doubler Stages (6AU6s)**

The first 6AU6 isolation stage runs with low driving voltage. Its output can be grounded with no perceptible change in the oscillator note. The second 6AU6 has a broadly tuned plate tank centered on 7050 kc. It provides additional isolation and has sufficient amplification to drive the 5763 both straight through and doubling to 20 meters. Isolation of the first three stages is promoted by regulated plate voltage, r.f. chokes in the high-voltage and heater leads, and bypassing the heaters of these three tubes at the sockets.

The 50-ohm resistor in the plate-supply lead of the second 6AU6 was included to permit clipping an external milliammeter across it so the core in the plate coil, Lp, could be adjusted to give a dip in the plate current with the v.f.o. set at 3525 kc. This adjustment, which fix-tunes the stage at 7050 kc., is quite broad so the effect of heating in the core may be disregarded.

A panel switch, S1, cuts in the first three stages for v.f.o. spotting in the receiver. This switch is paralleled by a Millen steatite two-terminal strip at the rear of the châssis, for connection to the send-receive remote-control system.

**Driver (5763)**

The 5763 has an excitation control in its screen circuit to provide adjustment for proper grid current to the 6146. This control is on the chassis and is not brought out to the front panel. It is set once and forgotten. One unique feature of this rig is found in the 5763 plate circuit where, by an appropriate LC...
Fig. 1—Circuit diagram of the transmitter. Unless otherwise indicated, capacitances are in µf., resistances are in ohms, and inductances are in µh.

**C1**—35-µuf. variable (Hammarlund MC-35-S).

**C2**—900-µuf. silver mica.

**C3**—100-µuf. N750 neg.-temp.-coeff. ceramic.

**C4**—0.0015-µuf. silver mica.

**C5**—15-µuf. zero-temp. coeff. ceramic.

**C6**—25-µuf. ceramic.

**C7**—5-12-µuf. zero-temp.-coeff. ceramic trimmer (Centralab 822FZ).

**C8**—91-µuf. zero-temp.-coeff. ceramic.

**C9**—200-µuf. variable (Hammarlund MC-200-M).

**L1**—10 turns No. 20 enam., close-wound on 1-inch form (see text).

**L2**—No. 26 enam., close-wound, length 11/16 inch, diameter 1/2 inch, on slug-tuned form (National XR-50).

**L3**—Same as L2 except No. 18 enam.

**L4**—4 turns No. 26 wound on 50-ohm 2-watt carbon resistor.

**L5**—12 turns No. 18, diameter 1/2 inches, turns spaced wire diameter; link 3 turns at ground end.

**R1**—25,000-ohm 3-watt control, wire-wound (Clarostat).

**S1, S2**—S.p.s.t. toggle.

**Remote**

**Coil Winding**

The 6146 may be operated at any input up to 90 watts, depending upon the plate voltage used. The grid current is measured when initial adjustments are made, by using a low-range external milliammeter across the 50-ohm resistor provided at the grounded end of the grid circuit.

A simple link-coupled output circuit suffices since the rig is normally used as a driver for a high-power amplifier, to which it is connected by a length of RG-58, U or RG-59 U coaxial cable. If it is run "barefoot," an antenna coupler should be used anyway for harmonic suppression, so the additional control for a pi-network output was not considered to be justified.

The link winding around the ground end of the plate coil is ordinary push-back wire and has one end connected to a grounded soldering lug bolted to the chassis. The free end runs on top of the chassis to a point directly over the coaxial socket, where a National through-bushing takes it down through the chassis. It is then soldered to the center terminal of the coaxial socket. This was done to keep all plate wiring above the chassis and the grid circuits below.

The slider on the screen voltage divider should be set at about the midpoint to give a key-down screen voltage of 125 volts with a plate voltage of 500 (the 6146 should be loaded to normal input when this adjustment is made). This setting will not have to be changed if the high voltage is increased to 700 volts or so. When the photo was taken this resistor had been removed to the power supply to eliminate one source of beat, but no operational improvement was noted. It may be located under the chassis, close to the right-hand side, running from front to back. About four 3/16-inch ventilating holes should be drilled in the chassis directly over it.

**Keying**

The last two stages are simultaneously cathode-keyed to avoid difficulties with the 6146 and to eliminate the need for a clamper tube for protection as would be necessary if oscillator keying were used for break-in. True break-in, the ability to break a station while it is transmitting, is used by relatively few c.w. stations.
that the added circuit complexity hardly made its inclusion worth while.

By keying the last two stages simultaneously, the waveform can be shaped as desired. Fig. 2 shows one simple key-click filter used by the author which can be adjusted for near-perfect keying without clicks or chirps. A simple but highly effective vacuum-tube keyer was described by the author on page 59 of QST for February, 1957. Merely connecting a 5- to 10-μf electrolytic capacitor across the key, being sure to maintain the proper polarity, results in keying superior to the average c.w. signal on the air today.

**Power Supply**

No power supply is included because many amateurs have suitable supplies available. More important, with an external power supply the v.f.o. heat problem is simplified. The 250 volts for the 5763 is obtained from a 50-watt 8000-ohm series-dropping resistor located in the power supply. Connections between the exciter and power supply are through a multiconductor cable plugging into sockets on the rear of each unit. The high-voltage transformer used should have an adequate current rating—200 ma. or more. The author uses a Stancor P8041. Either 500 or 650 volts under load is available by turning a ceramic switch that shorts out the first choke in the filter, changing it from choke to capacitor input.

**Construction Notes**

Normal precautions should be taken when wiring the grid circuit of the v.f.o., although the high-C Colpitts circuit is nowhere near as fussy mechanically as a Clapp oscillator.

No miniaturization was attempted but the cabinet is only 11½ inches wide by 5½ high and 8½ deep. The cabinet and chassis foundation is a stock item made by the California Chassis Company, their No. LTC-470. The cabinet is removed by unscrewing only two 10-32 machine screws at the rear of the chassis. Rubber feet on the base of the cabinet protect the table top, improve ventilation and assist in minimizing susceptibility to shock.

The shielding around the v.f.o. components below the chassis is provided by a 4 × 4 × 2-inch aluminum utility can with top and bottom plates removed. The can is fastened to the chassis with the sheet-metal screws that come with the box. One of the unused 4-inch square plates is cut down and bent and used for the shield between the 5763 and the 6146 stages underneath the chassis. The 3-12-μf. ceramic trimmer in the plate circuit of the 5763 is mounted on this shield. The other utility box plate is similarly cut and bent and used on top of the chassis between the 5763 and the topside of v.f.o. parts.

Tie points are used liberally to facilitate the mounting of components. Shake-proof washers are used with every machine screw. It is necessary to insert washers between the front panel and chassis to take up about 3/32 inch of slack if the LTC-470 unit is used. These are placed on the two machine screws at each end of the front panel and on the two switch shafts.

The meter hole was easily cut with a 2½-inch punch. The meter shield was made by cutting down an unfinished aluminum utility can, 4 × 4 × 2 inches. The type with detachable front and back plates can easily be arranged to fit between the chassis and the cabinet top. This shielding proved to be more effective than the often-used cut-down tin can with fluted edges. Any enamel on the inside of the panel must of course be removed to give good r.f. contact with the meter shield. Meter manufacturers are missing a good bet by not copper plating the case.

August 1959
and the inside of the flange.

Rear chassis connections include a key jack, coaxial r.f. output socket, remote v.f.o. control terminal strip, and power connector. The front panel has only the v.f.o. dial, v.f.o. switch, milliammeter (0 to 200 ma.) the 20/40 switch, and a knob to tune the plate circuit of the 6146 to either 20 or 40. Only one adjustment to the dip in plate current is necessary for coverage of the band selected.

Initial Testing

Each stage should be wired and tested before proceeding to the next stage. No difficulties were experienced with this transmitter until the 6146 stage was added, and the trouble here was eventually traced to an open circuit in the 2.5-mh. choke in the grid circuit. The author had neglected the normal precaution of testing all r.f. chokes for continuity before wiring them in the circuit.

Adjustments

Necessary adjustments are summarized for convenience:

6C4 — With the values shown in Fig. 1 it is only necessary to adjust the coil winding very slightly, forcing a few end turns apart and pushing them closer together until the v.f.o. signal is heard with the receiver set to 3500 kc. and with the v.f.o. tuning-capacitor plates fully meshed. It is convenient to put a few drops of coil dope on the winding and make the adjustment after 10 or 15 minutes, when the coil dope has started to harden but before it has set firmly. This maintains the exact wire spacing desired.

Second 6A1U6 — The core of the plate coil may be adjusted to approximately 7050 kc. with a grid-dip meter after it is wired in the circuit. Then set the v.f.o. on about 3525, connect a milliammeter across the 50-ohm resistor in the plate circuit, and adjust the core to the dip in the plate current.

5763 and 6146 — Attach a 25-watt light bulb to the amplifier r.f. output coaxial socket. Set the v.f.o. at midscale. Connect a milliammeter across the 50-ohm resistor next to ground in the grid-return lead of the 6146. Set the excitation control to maximum. Close the v.f.o. switch, close the key, and adjust the core of the 5763 plate coil and the ceramic trimmer capacitor, C7, for maximum grid current with the 20/40 switch open. Tune C9 for minimum plate current with the plates of the tank capacitor about one-fourth meshed. Now close the 20/40 switch and retune the 6146 plate tank to the dip near maximum capacitance. The grid current should be the same as before. If not, adjust L8 and C7 until the grid current is the same whether the 20-40 switch is open or closed. Any value between 1.5 and 3 ma. will be satisfactory. If the current is over 3 ma., back off the excitation control. Watch the plate current of the 6146. With the light-bulb load the plate current should dip to about 30 ma. on both 20 and 40 and should be the same value for both bands. With the three-turn output link the 25-watt bulb will light to about one-half normal brilliance and with the same intensity on both bands. Maximum bulb brilliance will not quite coincide with maximum dip in the plate current. This is normal.

This completes adjustment of the last two stages. For 20 meters merely open the 20/40 switch and set the final tank to the dip in the plate current at low capacitance. For 40 meters close the 20/40 switch and adjust for the dip at high capacitance. The 6146 will load up to 125 to 150 ma. when connected to a high-power amplifier or to an antenna through an antenna coupler.

TVI-Proofing

After all components are wired in place and

V.f.o. components are shielded by the 2 X 4 X 4-inch box at the upper left in this bottom view. The control on the chassis at right center is the excitation adjustment, setting the screen voltage on the 5763 driver.
Fig. 2—Keying wave-shaping circuit. $T_1$ is a 6.3-volt filament transformer with primary in keying line and $R_1$, a 300-ohm control, connected across the 6.3-volt winding. The setting of $R_1$ determines the "make" shaping. The switch and capacitor values determine the "break" shaping; capacitors may be either electrolytic or paper, and other values may be used for a desired characteristic.

testing is completed, a grid-dip meter should be used to determine whether there are any resonances near the TV bands as such resonances can result in TVI. In the case of the 6146, a strong resonance point was found near the plate of the tube and its r.f. choke at about 56 Me., which almost certainly would have loused up Channel 2. The solenoid type r.f. choke originally installed was removed and a 1-mh. choke with pie windings was substituted. The resonance disappeared.

A Z-50 choke had been included in the keying lead at the jack and the key jack had been bypassed by a 0.01-uf. ceramic disk capacitor. A fairly strong resonance was found at the key jack on 78 Me. and on-the-air test showed serious cross-hatching on Channel 5. Removal of this r.f. choke and changing the key bypass capacitor to a 0.001-uf. ceramic disk stopped the interference without detriment to the rig's performance.

Every transmitter is different, unless built to factory production-line techniques, but the above steps are representative of those necessary to de-TV1 any transmitter.

The rig has proved to be 100 per cent reliable in all respects and operation is a pleasure. The note is consistently reported as T9 with the LC filter shown in Fig. 2.

One final word of caution: Remember there are 150 volts on the exposed remote terminal at the rear of the chassis, and although one side of the key is grounded there are some 110 volts across it, key open. Just don't use both hands to adjust your bug with the rig turned on!

Strays

Last March the Aruba Amateur Radio Club held a field day and subsequently had a fine write-up on it in Aruba Esso News. As these photos show, field day is just about the same no matter where it's held. At the left PJ2AQ operates the transmitter at one of the stations while PJ2AK manipulates the receiver. At the right is the sort of organized confusion that all of us have taken part in at one time or another—the gang helps PJ2AF erect a beam. There were twelve stations active during the 24-hour test, and emergency gear got a good workout.
August, 1934

... Big news this month was the announcement of mobile privileges on the 50-60 Mc. band and above 110 Mc.

... Grammer and Hall described new equipment for the 50-Mc. station, including a stabilized transmitter and a non-radiating receiver.

... L. W. Hasty gave forth with some pointers on noise-reducing antenna systems.

... J. N. A. Hawkins, then W6AAR, contributed one of the all-time great QST humor stories — entitled "Behind the Scenes With Next Year's Model."

... Other technical contributions included a medium-powered phone-c.w. transmitter with pentodes (W1RF and W1HTM), a four-band transportable phone and c.w. transmitter (W9FVM), and four pages of hints and kinks for the experimenter.

... The IARU news column summarized pertinent amateur regulations throughout the world.

... And J. H. Dellinger, Chief of the Radio Section of the U. S. Bureau of Standards, discussed long-delay radio echoes and how amateurs could participate in special observations of these phenomena.

\[ \text{Silent Keys} \]

It is with deep regret that we record the passing of these amateurs:

W1CGQ, Charles A. Parker, Hyannis, Mass.
W1FJM, Walter E. Purpeck, jr., Pawtucket, R. I.
W1FRD, Clarence Adams, Canaan, Conn.
W1HTF, George M. Cole, Northwood Center, N. H.
K2AE, Henry Primm Broughton, Schenectady, N. Y.
W2PF, Harold J. Scharer, Orange, N. J.
W2ZPN, Joseph Hermann, Youngs, N. Y.
K2ZZM, Robert J. R. Buchanan, Huntington, N. Y.
W3ACM, Earl A. Marryman, West Lanham Hills, Md.
W3BFX, LeRoy A. Jewell, Cumberland, Md.
K3CTU, Dr. Harvey L. Fuller, Baltimore, Md.
W3ZT, Alfred R. Cook, College Park, Md.
ex-W4ERH, John Nance Hall, Vienna, Va.
W4JBF, Leland D. Gash, Miami, Fla.
W5BLG, Hervin K. South, Portland, Tex.
W6CAM, H. D. Worthington, Downey, Calif.
W6TCI, Walter Ivan, Redwood City, Calif.
W6ZZ, Miles Weeks, Menlo Park, Calif.
ex-W8COV, Richard E. Ham, sr., Millford, Ohio.
W8ICD, Charles A. Smith, Bucyrus, Ohio.
W8JBP, John F. Old, Jr., Saukville, Mich.
K9JLS, A. F. Stockberger, Canton, Ill.
W8SJJ, Otto L. Woolley, Colorado Springs, Colo.
Q8DC, Herbert M. Tee, Burnley, England.

\[ \text{Strays} \]

Since last month's issue, high claimed c.w. scores ranging from 200,000 to 500,000 points have been reported by CN8JE, DJ2HC, DJ3KR, E88BF, JA1VX, OK3EA, VK2GW, VK5NO, and ZL1NQ in the 1959 ARRL DX Test. Also, excellent phone tallies from 80 to 300K are claimed by CN8JE (multiope), EA8JE, O22JJ, and ZL1NQ.

W1VG likes to call this his "heel-and-toe" WAC. Pete says he's been working on it for a good many years and for 6000 QSOs. If the significance of the photo escapes you at first, kindly note that the sequence is something like this, "VK3JA1CR7L9DL5VE6VK3JA," etc., etc. No, the IARU office did not issue a special endorsement for this!

\[ \text{Quiz Quiz} \]

Jack Bacon, W8NCG of Columbus, Ohio, keeps the puzzles popping with the following, which he credits to a friend at the O.S.U. Antenna Laboratory:

You have two items, a "black box" with N (any large number of) terminals on it and an ideal (perfect) r.m.s. voltmeter. Tests with the voltmeter show that when the meter is connected between any two of the terminals on the box, the meter reads the same. The problem: What is in the box? (No, smarty, the meter reading is not zero when connected to any pair of terminals, and it is zero when the meter isn't connected.)

The answer to last month's Quiz is shown below. L and C resonate at 60 cycles; when both switches are closed a parallel-tuned circuit is formed that holds down the current flow.
We're not sure that "adapter" was the wisest choice of names for this auxiliary sideband unit produced by the Heath Company, since the word is often used along with "converter" or "slicer" to designate a receiving gadget. You may have to read the fine print in the ads to realize that this is a transmitting accessory, designed specifically as a companion piece to the Apache transmitter,\(^1\) converting its output to sideband. The instruction book also contains modification details on how to set up the DX-100 transmitter series to accommodate the SB-10 (a separate kit may be purchased for this purpose).

Perhaps the most attractive feature of the unit, from the standpoint of an amateur already possessing an a.m. transmitter, is that it makes use of existing r.f. circuitry already in the companion transmitter, and also draws its power from the same source. We see no reason why appropriate modifications of comparable transmitters of other manufacture could not be made to accommodate the unit to achieve sideband output.

A block diagram of the SB-10 is shown in Fig. 1. Nine tubes are employed, all but two performing dual functions. Using the phasing method of sideband selection, the SB-10 takes r.f. from a driver stage in the transmitter and splits it into two components, which are then each shifted 45 degrees by RC networks for a total of 90 degrees. The single-sideband signal is generated at the output frequency of the transmitter. For each band, an entirely different network of precision capacitors is switched in to provide the proper phase shift at each operating frequency. Approximately 3 watts of r.f. drive power is required.

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\(^1\) QST, March 1959, page 44.
A compact, neat layout of components and chassis is shown in this bottom view of the SB-10 (one reinforcing aluminum angle was removed for the photograph). The center section immediately behind the panel contains r.f. phase shift and balanced modulator input circuits. The rear section contains the bandswitched output stage and rear-panel components.

The band switch, controlled from the front panel, allows switching the unit to any amateur band from 80 to 10 meters in a single operation. Separately, the audio signal, which has been amplified in three stages, is split into two signals 90 degrees apart in passing through a B & W 2Q4 phase-shift network. These signals then go into separate audio amplifiers. The r.f. and a.f. signals are next fed to a pair of balanced modulators in proper phase so as to permit cancellation of the carrier and one sideband. Here, a switching system permits selection of upper or lower sideband, or both for a.m. The sideband signal is then amplified by a 6CL6 broadbanded r.f. amplifier stage which is followed by a tuned 6BQ5 (EL84) amplifier with a pi-network output tank. Both the driver and amplifier are operated Class A. Relative power output and carrier nulling are indicated by a panel meter connected to the final r.f. amplifier stage.

Output from the amplifier is rated at 10 watts p.e.p., which is adequate to drive a pair of 6146s in the function for which the unit was designed. Both input and output of the SB-10 are designed for low-impedance coaxial line connections.

In addition to generating the s.s.b. signals, the SB-10 also has built-in audio and control circuits which include provision for manual or VOX operation, and an antitrip amplifier working from the receiver output. A 12AT7 relay control tube operates a relay whose contacts connect at the SB-10's rear apron, to mute the receiver speaker circuit. A line from the key jack of the transmitter is also connected to the relay contacts to close that circuit when the relay operates. Auxiliary relay contacts are available for controlling an antenna relay.

Several controls, normally needing only initial adjustments, are internal or are on the rear of the cabinet. These are the ratio balance control in the cathodes of the audio output tubes, and the sensitivity controls for both VOX level (transmitter sensitivity) and antitrip level (receiver sensitivity). Front-panel controls include the band switch, balanced modulator tuning, carrier null controls, output tuning, sideband selector (mode switch), audio gain, and VOX-standby-manual function switch. Sufficient broadbanding is employed in the r.f. circuits so that normal frequency excursions in one band may be made without the necessity for SB-10 readjustments.

Assembling the unit required 18 hours of work, in this instance by a constructor already familiar with kit techniques. The only difficulties encountered were a couple of instances of clearance problems, but fortunately these were covered by adequate cautions in the assembly instructions. We did find that the control shaft extensions...
through the front panel are barely of sufficient length, and one has to be certain the knob set screws get an adequate bite on the shafts.

The manufacturer states that unwanted side-band suppression is in excess of 30 db, and carrier suppression is in excess of 40 db. The unit normally obtains power from its companion transmitter through an accessory socket. Its requirements are 6.3 volts a.c. at 3.5 amp., and 350 volts d.c. at 30 ma. on standby and 140 ma. when delivering rated output.

The instruction book contains assembly and tune-up instructions, the latter being specifically in connection with the Apache transmitter, which uses two 6l40s in the final stage. We find it a little hard to understand the recommendations for a.m. linear operation (page 50); the input figures given seem far too high, considering the rated plate dissipation of the 6140s. Also, Fig. 21 on the same page, a simulated scope pattern showing a.m. ripple on an s.s.b. single-tone signal, repeats an error which crept into a formula when this type of pattern was discussed in September 1955 QST (the correct formula was subsequently given in the November 1955 issue).

The SB-10 is 10 inches high, 0¾ inches wide, 13 inches deep, and occupies a minimum of operating table space. We feel we should mention that several YLs and XYLs, normally unimpressed by radio gear, on seeing the unit spontaneously remarked that it was unusually handsome. — J. H.

The Transtech 432T

Here is a tripler-amplifier for the v.h.f. man who has a 144-Mc. r.f. source and wants to work on 432 Mc. It is similar in several respects to equipment for this purpose that has appeared in the ARRL Handbook for the past several years, but it has some interesting electrical and mechanical innovations. The Transtech 432T (Transtech, R.F.D. 1, Hopewell Junction, N. Y.) is capable of taking the legal limit of 50 watts input on 432 Mc. easily, and it can be driven by any 144-Mc. transmitter having an r.f. output of 5 watts or more.

Two 5894 dual tetrodes are used. The tripler has a coil grid circuit that resonates in the 2-meter band with the input capacitance of the tube. Silver-plated copper strip lines are used in the plate circuits, and in the final grid circuit, in the manner of the Handbook 432-Mc. rigs. Output coupling is done with capacitor plates of the same stock, terminated in a half-wave balun, as shown in Fig. 1. A relative indication of power in the coaxial line is given by an r.f. voltmeter, the circuit of which is also shown in Fig. 1. The coupling loop, $L_1$, for the voltmeter is simply the lead to the 1N34 rectifier, bent near to the hot terminal of the coaxial output fitting, $J_1$.

Users of the 5894 and other tubes with plate wires protruding through the top of the glass envelope may be interested in the method used in the Transtech 432 for making the plate connection to the tuned line. A thin strip of silver-plated sheet copper 7/16 inch wide is bent as shown in Fig. 2. A short tab of the same material, similarly bent, is bolted against the pin on the other side. Anyone using this system is cautioned to line up the plate lines with care; though the top of the tube envelope is made of fused glass it should not be called upon to withstand appreciable twisting or pressure. Bending the strips used

![Fig. 1 — Schematic diagram of the amplifier plate circuit, showing output coupling system.](image-url)

![Fig. 2 — Method of making connection to the plate terminal rods of the 5894 tubes used in the Transtech 432T. Flat silver strap used for the plate line is bent to fit around the rod at the top of the tube envelope, and a short piece of stock similarly bent is bolted to the plate line, making a tight fit on the rod.](image-url)
for the tuned circuits should be done with a nail or other hard rod simulating the plate pin.

The Transtech 432T is mounted back from a 3½-inch panel, in a way that allows meters and other components to be completely outside the chassis proper. This simplifies shielding problems, and in units where all parts and tubes are mounted inside the chassis, or on the back, it is a real space saver.

The meter has a 25-ma. scale. Switch positions provide for reading the tripler grid and plate currents, the final plate voltage and grid and plate currents, and output. The last item is relative, of course, the indicator system being of the r.f. voltmeter type, with no attempt at calibration.

The model inspected here violates the standard safety code for power supplies, in that a female socket is used on the chassis for power connection. This requires that the power cable be terminated in a male plug, leaving hot terminals exposed if it is removed from the transmitter without turning the power off. Power requirements are 6.3 v. a.c. at 4 amp, and 300 to 350 v. d.c. at 270 ma.

--- E. P. T.

**Strays**

Already having a couple of phone poles in his yard, K4RER found it an easy matter to design and construct his own tilt-over antenna support. As can be seen from the photos, by means of a swivel, a winch, a pulley, and some ½" steel cable, he rigged up some 2" pipe so that it can be raised and lowered together with the rotator and beam. The winch is of the self-locking type and holds the mast securely in position, particularly because of the vee-shaped bracket at the top of the pole into which the mast snaps when pulled up snug against the pole.
The Bowdoin’s last voyage — four days from Falmouth, Mass. to the Marine Museum at Mystic — was tougher than a 15-month trip to the North Pole ... at least for her ham radio operator.

Don Mix, W1TS, of Bristol, Conn., sailed on the Bowdoin 36 years ago with the famous Arctic explorer Admiral Donald B. MacMillan. The first ham to operate a short-wave set in the Far North, he was the little Bowdoin’s only link with civilization.

In those days he pounded his WNP call on 220 meters with a cumbersome cage antenna strung between the masts.

This June, he sailed on the Bowdoin again, giving hams their last chance to work the ship before she was permanently enshrined in the Marine Museum.

He worked on 20, 40 and 80 meters with a SX-101A receiver and HT-30 transmitter donated by Hallicrafters and his own Johnson Viking Valiant. He had a single antenna run neatly up a mast — and entirely too much civilization.

The Bowdoin, 88 feet long and weighing 35 tons, was built to carry eight. There were 16 members of former Polar crews aboard this time plus 30 newsmen who alternated between interviewing Don and hauling him off into corners to demand why he wouldn’t send out their stories so they could pull a fast one on their competitors.

The Bowdoin has sails and an auxiliary engine. She traveled by engine. “There were so many people on deck, you couldn’t put a sail up without sweeping half of them off,” said Mix.

At every port, sightseers swarmed aboard.

“I’d have a big ring of people all staring at me and a dozen heads peering down through the hatch as I tried to send. They all wanted to know what I was doing. I wasn’t doing much.”

Things quieted down about 11 P.M. so Don pounded brass until 3 A.M., catching three hours sleep a night. But radio conditions were bad in the late hours.

The last two days, he couldn’t transmit while underway. The gas generator powering Don’s rig was on deck. It was quiet, but not silent. The fog was so heavy that crew members needed complete silence to listen for fog horns and to call from bow to wheel.

Then a handsome yacht escorting the Bowdoin ran aground on rocks.

“They thought I was pretty dumb when I said I couldn’t call the Coast Guard on the ham bands,” Mix reported.

But real tragedy struck the last night before reaching Mystic. Don ran out of cigarettes.

The Bowdoin was anchored half a mile out, off Fisher’s Island. Cigar-smoking Don was caught. “I nearly died of nicotine loss.”

Despite the obstacles, W1TS QSO’d hams as far away as California. Three of his contacts were with hams he worked from the North Pole on his first Bowdoin voyage: R. B. Bourne, W1ANA, of West Hartford, Conn.; Bob Morris, W2CQZ, of Millburn, N. J.; and Bart Molinari, W6AWT, of San Francisco, Calif. He even worked Robert J. Rupienas, W1DDO, of Boston, Mass., who was running a quarter-watt transistor rig.

All QSOs will receive specially designed QSLs.

The Bowdoin, designed by Admiral MacMillan, is known as the sturdiest wooden ship of her size ever built. But she wasn’t designed for six-footers.

“The only place I could stand up was under the hatches,” said lanky Mix. “But there were only three hatches — and one was above the dinner table.” — F.M.
AN OSCILLATOR CIRCUIT FOR A 6-METER CONVERTER

We (W4SGI, W4LQE, W4KNY) were interested in the transistor receiver described by W2TGP in QST, February 1959, page 11. It appeared from the data on the 2N384 r.f. amplifier that this transistor would also work on 50 Mc.

After building the local oscillator portion of the "front end," we had difficulty getting it to oscillate so we tried a circuit suggested by W4LQE. The circuit is shown in Fig. 1. One feature of this oscillator is the feedback capacitor C1, which may be replaced with a crystal so that the circuit becomes crystal controlled. Of course, the fundamental frequency (or overtone frequency) of the crystal must be the same as that of the tuned circuit. If more than one 2N384 is available, the one with the highest gain is selected for the r.f. amplifier and an inferior one is used for the oscillator.

With this oscillator circuit and W2TGP's r.f. amplifier and mixer circuit, we constructed a 6-meter converter. It was tested in W4SGI's shack and performed well. Naturally, it could not compare with our best tube converters, but it did a remarkably good job.

Some general remarks about the proper handling of transistors may help those who have not had much experience along this line. Due to the capacity of sockets, it would be wise to solder the transistors in place rather than to use transistor sockets. The leads should lie left as long as is consistent with wiring needs. During the soldering operation the transistor leads should be held firmly with a pair of long-nosed pliers which will act as a heat sink and keep the heat away from the transistor. The tuned circuits should be grid dipped before installation of the transistor. Normally the transistor will add only a few μF. of capacity to the circuit. If "dipping" is done after the transistor is installed, little or no dip will be observed and there is a chance of damage to the transistor.

— H. E. Banta, W4SGI

FEED-LINE CONTINUITY AND SHORT-CIRCUIT CHECKER

When installing a beam of the split driven-element variety I always connect a 100,000-ohm, ½-watt resistor across the element at the antenna as shown in Fig. 2. Installation of this inexpensive component enables me to check continuity or shorts in the feed line at any time by measuring the resistance of the feed line with an ohmmeter. Any value over 100,000 ohms means a break somewhere in the feed line or a bad connection at the driven element. Any value less than 100,000 ohms indicates a short. Insertion of the resistor does not affect the performance of the antenna system.

— John E. Grewe, W9DGV

PIN SOLDERING AID

Soldering to pins such as those found on plug-in coils, phono plugs and tube bases is sometimes difficult. Often the solder will adhere to the sides of the pin making it oversized and too large for its socket. I use a lighted match to "smoke up" the outside of the pin before soldering. After this treatment the solder will not stick to the pin and the smoke residue can be easily wiped off when the soldering job has been completed.

— Douglas Dawson, KN0RTW

PROTECTION AGAINST SHORTS AND ARCING

Bolts or machine screws that extend through chassis or partitions sometimes come dangerously close to high-voltage leads and components. To insure against short circuits and arcing, I use a common household electrical wiring splice-connector threaded over the projecting bolt or screw. These splice-connector are usually made of insulating plastic and have a tapering internal thread. When they are threaded onto the bolt they make a very tight fit.

— Jerry A. Collum, KB1KM

Fig. 1—Circuit of the 6-meter oscillator circuit. The tuned circuit Cb, Csc, L1 is tuned to the oscillator frequency. L1 is tapped at one turn from the cold end. See QST, February 1959, page 11, for circuit information on the r.f. amplifier, mixer, etc.

Fig. 2—W9DGV's feed-line checker.
EFFICIENT TRANSISTOR HEAT SINK

The transistor heat sink shown in the photograph is made up of "Tube and Fin Assembly" stock used in homes for hot-water heating. This material is available from most plumbing-supply distributors and is relatively inexpensive in short lengths. With a little persuasion a scrap piece of sufficient length could probably be promoted without charge.

The stock comes with aluminum fins attached to a 3/8-inch copper pipe running through the center axis. Copper plates will have to be soldered to the ends of the pipe to form the two large end plates on which the transistors are mounted. The sink shown in the photograph required a 3-inch section of "fin" stock. The end plates are 2 X 4 inches and the fins are 2 X 2 3/4 inches. Though it can be held in the palm of the hand, it has an effective cooling area of about 130 square inches.

— E. Laird Campbell, W1CUT

THUNDERBOLT SCREEN PROTECTION

Since some Thunderbolt owners are unaware of the automatic screen protection inherent in the equipment, and because others building their own equipment could utilize the simple circuitry to advantage, a brief description of the Thunderbolt screen circuit appears to be worthwhile.

The old and accepted practice of using a high series screen impedance is used so that the screen dissipation is limited because the screen voltage drops as the screen current increases, thus limiting the screen power input.

For example, the Thunderbolt utilizes a 600-volt screen supply which feeds a VR tube chain through a 2500-ohm resistor to provide regulated 510 volts on the 4-400A screens. In the event of a bias failure — as adverse a situation as can occur — the screen current goes up to 150 ma., the supply voltage drops to 540 volts and the 275-volt IR drop in the resistor leaves only 165 volts on the screen, or 12 watts per tube. This is approximately 1/4 of rated dissipation. Screen current is also within ratings.

The series screen impedance should be as high as possible, consistent with supply volts, desired regulator or operating potentials and tube characteristics.

— A. M. Pichitino, W0EXD

MODIFYING THE HEATHKIT MMI FOR MOBILE MEASUREMENTS

The modification described here will enable an amateur possessing a v.o.m. with a 0-1.5 volt scale to change the range to read 0-15 volts. Most volt-ohmmeters seem to have ranges either too high or too low for measuring the 12 to 14 volts in an automobile. A 0-15 volt range makes mobile voltage measurements more convenient and accurate. A.C. ranges are included in this modification since some generators, such as those manufactured by Leece Neville, have a.c. outputs.

First, subtract the scale to be changed (in this case 1.5) from the scale desired (15 volts, giving 13.5). Multiply this figure by the sensitivity of the basic movement of the meter. In the case of the Heathkit MM1, the sensitivity figure is 20,000 ohms/volt d.c. and 5000 ohms/volt a.c. Multiplication by these factors gives 270,000 for d.c. and 67,500 for a.c. These figures represent the resistance in ohms to be placed in series with one of the leads. It is desirable that these be 1-percent tolerance resistors.

Two methods can be used to insert the resistors in the proper circuit. The easiest and most economical method is to make two external probes, one for d.c. measurements and one for a.c. One end of the resistor is connected to a banana plug that will fit the 1.5-volt meter jack and the other end is connected to the probing wire or lead. A second method is to connect the resistors to a miniature 4-position rotary switch. This switch is mounted on the instrument in the space between the "ohms-adjusting" potentiometer and the —15-amp jack. The wiring diagram is shown in Fig. 3.

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Fig. 3 —Diagram of the meter circuit. All resistors are 1/2 watt.

Positions 1 and 4 switch out the resistors so that the meter reads normal. Position 2 allows measurement of 15 volts d.c. and position 3, 15 volts a.c. The resistor for the d.c. scale is a standard value but the 67,500-ohm a.c. unit is not. A combination of resistors can be connected in series to obtain the proper value.

— Maurice L. Sasson, AF.D., W2JAJ

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BUZZER OSCILLATOR

The buzzer oscillator shown in Fig. 4 can be used as a crystal tester, band-edge marker, or as a source of r.f./i.f. signal. The buzzer \( I_1 \) emits a damped radio-frequency wave modulated at audio frequency. A crystal \( Y_1 \) connected to the buzzer becomes shock excited at its fundamental frequency. If the output lead is connected to the receiver's antenna post, a swishing sound, along with sharply defined sidebands, will be heard. A dead or null spot will be found on the exact crystal frequency. The unit here is built in an enclosed box with switch \( S_1 \) mounted on the panel. The battery \( BT_1 \) is composed of several flashlight cells.

— Lonnie Thomas

REPAIRING SCREEN-TO-CONTROL-GRID SHORTS

If a tetrode becomes inoperative because of a short between screen-grid and control-grid, don't throw it away! Try repairing it by the following method. Charge a good husky electrolytic capacitor (50 to 100 \( \mu F \)) up to 200 or 300 volts. Discharge the capacitor across the tube pins connected to the shorted grids. The high current surge of the discharging capacitor may unlock the short and the tube will be as good as new. I have restored a v.h.f. tetrode four times by this method. It's still going strong, running 85 watts on 220 Me.

— Clarke Redfield, K2DIG

SUPERHET TRACKING MADE EASIER

The job of adjusting r.f., mixer and oscillator tuned circuits can become quite complicated in a superheterodyne receiver covering a wide frequency range. This is especially true if the process is attempted after the remaining receiver circuits have been wired. Mounting and unmounting parts, especially around band switches, in a cut-and-try process usually leads to an unsightly finished product.

The tracking job can be done easily if the constructor will first take the ganged tuning capacitor and wire it up breadboard fashion along with the tuned circuits of the r.f., mixer and oscillator. A temporary dial scale and pointer can be used for calibrating each tuned circuit. A grid-dip meter may be used for rough calibration or a modulated signal generator may be loosely coupled to the tuned circuit under test. Place a crystal diode in series with a pair of headphones and connect across the tuned circuit. When the circuit is tuned to the generator frequency, the tone will "peak up" in the headphones.

With the above method, test runs can be made, circuits adjusted, coils rewound, and trimming capacitors changed until proper tracking is obtained.

— William L. North, W4GEB

ANTENNA R.F. INDICATOR

Relative amount of r.f. energy at the antenna can be indicated by a fluorescent lamp taped to the antenna wire at a voltage loop. For a half-wave antenna, this point is at either end of the antenna. Of course, this scheme is only useful to those who can observe the lamp from the shack, although a system of mirrors could be set up for this purpose.

One word of caution: don't be surprised when neighbors report sighting a strange light — the fluorescent lamp can be observed for miles!

— R. H. Sweeney, W1PEQ

FINDING TUNED CIRCUIT VALUES

Tuned circuits in some equipment must be able to tune over specific frequency ranges. The question arises, what size coil and capacitor combination will be needed? Two simple formulas will answer this question. The first formula is:

\[
C = \frac{\Delta C}{f_2^2 - f_1^2} 
\]

where \( f_1 \) is the lowest frequency desired in Me., \( f_2 \) is the highest frequency desired in Me., \( \Delta C \) is the range of the variable capacitor in the circuit and \( C \) is the total circuit capacitance in \( \mu F \) at \( f_2 \).

The second formula is:

\[
L = \frac{25}{300} \sqrt{\frac{f_2^2 - f_1^2}{f_1^2}} 
\]

where \( L \) is the inductance of the coil in \( \mu H \), \( f \) is the highest frequency desired in Me., and \( C \) is the capacitance found from the first formula.

The above formulas will indicate how much coil inductance and how much capacitance are necessary in order to tune the desired range with a given variable capacitor. An example of putting the formulas to work: On hand is a J-fo-10-\( \mu F \). variable capacitor that is to be used in a 40-meter bandspread circuit. What value of coil will be needed? Substituting in the first formula:

\[
C = \frac{9}{7.3^2 - 53.3} = \frac{9}{53.3 - 1} = \frac{9}{52} = 0.17 \Omega
\]

Now to find the value of \( L \), we substitute in the second formula:

\[
L = \frac{225}{300} \left( \frac{7.3}{(53.3) (100)} \right) = 225 \left( \frac{7.3}{53.3} \right) (100) = 4.75 \mu H. 
\]

The value of \( C \) obtained by this method includes the capacitance that tubes and wiring contribute, so these should be subtracted from the calculated figure in selecting the shunt capacitor.

— Sol Davis, W3WPY

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DX-100 — SB-10 MODIFICATION

IN ORDER TO USE THE HEATHKIT SB-10 SINGLE SIDEBAND ADAPTER WITH THE HEATHKIT DX-X-100 TRANSMITTER, CERTAIN MODIFICATIONS OF THE LATTER ARE NECESSARY. THESE CHANGES ARE FULLY EXPLAINED IN THE SB-10 MANUAL. THE INSTRUCTIONS READ: “IF EXTENDED S.S.B. OPERATION IS CONTEMPLATED, IT IS SUGGESTED THAT THE MODULATOR AND THE SPEECH AMPLIFIER TUBES (1625, 12BY7 AND 12AX7) BE REMOVED TO REDUCE THE FILAMENT CURRENT DRAIN.”

Since 18 screws must be removed from the cabinet before the tubes can be removed, and since I wanted to be able to change from S.S.B. to A.M. with a minimum of effort, I installed a switch to make the change with a mere flick of the finger. In addition, this switch takes the heater voltage off the SB-10 tubes when the DX-X-100 is operated on A.M. THE CIRCUIT DIAGRAM FOR THE MODIFICATION IS SHOWN IN FIG. 5.

Install a double-pole double-throw toggle switch S1 just above the DX-X-100's AM-CW-SSB mode switch. (This mode switch was added to the DX-X-100 as part of the Heath MK-I modification kit which modifies the SX-100 and SX-100-B for use with the SB-10 adapter.) The switch is mounted to fit between the front panel and the filter capacitors which are located behind the panel. Be careful not to damage the filter capacitors when drilling the mounting hole for this switch. Mount a two-lug tie point near the 1625 socket toward the rear of the chassis, and a one-lug tie point near the front 1625 socket, using the existing screws for mounting.

Remove all leads from pin 1 of the rear 1625 except the one that goes to pin 1 of the front 1625. Now connect all the wires that were removed in the above step to a lug on the nearby two-terminal tie point (call this Lug 1), except for the lead that goes to pin 7 of the accessory socket. Connect the lead that goes to pin 7 of the accessory socket to the other lug of the two-terminal tie point (call this Lug 2). Now dress three wires along the side of the wiring harness and across the front of the chassis. Push them through the hole near the filter capacitors and up to the d.p.d.t. switch S1. Number the wires 1, 2, and 3 and connect them as follows: Wire number 1 to lug 1 of the two-terminal tie point and to the switch terminal marked “1” in the diagram. Number 2 wire goes from lug 2 of the tie point to switch terminal 2. Number 3 wire connects pin 1 of the rear 1625 modulator tube to switch terminal 3.

From pin 7 of the rear 1625 tube, disconnect the lead that goes to pin 4 of the 5763 r.f. section tube. Splice a length of wire to this lead and dress it around the front of the 1625 tube socket. Connect the lead to the single lug terminal tie point that was mounted near the socket. Now disconnect the black lead and the black and white striped lead from pin 7 of the front 1625 tube. Reconnect them to the above single lug terminal tie point. It may be necessary to add some length to the black lead though I was able to get enough slack to make the connection.

Place two leads along the wiring harness to the switch S1. Number the wires 4 and 5 and connect number 4 to the single lug terminal tie point and to switch terminal 4. Connect wire number 5 to pin 7 of the front 1625 tube and to switch terminal 5. Solder all the connections.

ETCHING METAL PANELS

DECAL LABELS ON RADIO EQUIPMENT OFTEN WEAR AND PEEL OFF QUICKLY, PARTICULARLY ON TEST EQUIPMENT SUBJECTED TO CONSTANT USE. ETCHED LABELS, ON THE OTHER HAND, PROVIDE PERMANENT IDENTIFICATION OF CONTROL KNOBS AND DIALS.

To etch a steel panel, pour hot paraffin over the area to be labeled. When cooled, letter the label into the paraffin with a sharp pointed instrument, scraping the metal clean to form the letters or numerals. Neat lettering can be insured by using a lettering guide from a stationary store. Remove any wax shavings with a fine brush and place a drop of hydrochloric or nitric acid on each letter. Several applications of acid may be necessary to obtain the desired depth. When etching has been completed, wash the panel with cold water and peel off the remaining wax. The etched characters can be filled with paint or nail polish.

The necessary acids can be obtained in small quantities at most drugstores, but are highly corrosive and should not be brought in contact with the skin. Containers should also be properly labeled and have tight plastic or rubber caps.

FRUITCAKE CHASSIS

FRUITCAKE mixes are sometimes sold in small thin-walled steel boxes. These containers make ideal cabinets or chassis for miniature equipment. I am using one for a control box in my mobile station and another to house a capacitor checker. These particular boxes measure 234 X 312 inches.

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Part I—How We Got Our Present Amateur Bands

BY A. L. BUDLONG,* W1BUD

For the amateur who desires to keep himself well informed, this series of articles is must reading. Part I, in this issue, sets forth briefly the facts, figures and dates in the history of amateur frequency assignments, a subject of vital interest to ARRL members as we enter upon the period of another world telecommunications conference. Part II, to follow in the next issue, will describe how an international conference does business and outline the preparations taken in the U. S. for the Geneva Conference, which starts August 17th.

To the average person, Geneva, Switzerland, is the place where a lot of pre-summit talk has been taking place recently by top diplomats of the major powers. For us amateurs, however, it is the 1959 location of that periodic nightmare known as an international radio conference, a place where the world’s “commercials” always triumph and the amateur always loses more frequencies. There is no question about losing frequencies because we now operate in certain narrow bands whereas once—as the fable goes—we had everything from 200 meters down, all for our very own.

These ideas are firmly implanted in many an amateur mind. Were we to say—and we do—that the international treaty under which we now operate affords us far more frequencies than we got at our first international allocations in 1927; that under international treaty we in the U. S. have more now, both below and above 25 Mc. (an arbitrary allocations dividing line) than ever before; that no U. S. law ever assigned amateurs all the territory from 200 meters down; and that neither any U. S. law nor international treaty so much as mentioned the word amateur until 1927 . . . were we to assert these are the facts, it would appear explanations are in order.

And indeed we think they are. Certainly it is true the average amateur has only a hazy idea of what we ever had, of how we got it, why FCC in assigning us frequencies is beholden to an international radio conference, why for that matter we have such affairs, how they do business and how the League goes about representing amateur radio, as it has at every conference beginning with the 1927 affair. (We didn’t get into the act at earlier conferences because the one previous to 1927 was held in 1912, before the League was organized.) What we propose to do here, therefore, is to give a brief factual account of amateur frequency assignments, both domestic and international, from the very first days, and to follow with a short description of the hows and whys of an international conference. This is being written in the belief that the information will be valuable to all amateurs and, because it is felt it would be more widely read now than at some time when interest in such subjects is not so high.

A History of Amateur Assignments

Why do we have to have international agreements on radio? Broadly speaking, there are three reasons:

1) Since stations of one nation are frequently in communication with stations of another nation, it is necessary to have agreements on such operating details as calling procedure, distress signals, call assignments, methods of collecting tolls on radiograms, etc., unless utter confusion is to be encountered when any two stations try to do business over the air.

2) Because it is possible to perform radio stations throughout a wide range of frequencies, it is necessary to agree in advance where the various services will locate themselves in the spectrum, so that stations will know where to find each other.

3) Since radio signals are not confined to the borders of the country in which they originate, international agreements on allocations to services are also necessary in order to prevent chaotic conditions on the air and hopeless interference between services.

The first two were probably the major considerations in the early radio conferences. The third was not so vital in the early days of radio but today is extremely important.

Pursuant to the international agreements, each nation, both as a matter of common sense and agreement, arranges its own domestic laws so

* Secretary and General Manager, ARRL.
that they conform to the international commitments. Obviously, it would be silly if the various nations, after carefully working out solutions to their problems, disregarded the remedies by permitting the stations within their borders to operate on some entirely different basis.

Now let us trace the course of all the international conferences and all our own national laws to see how the amateur got taken care of as the laws came along. We'll cover the international treaties first, and then cover our domestic (U. S.) radio laws set up under these international treaty provisions.

**International Regulation**

The very first international radio conference, though it doesn't really belong in this story, was held in 1903.

It was held in Berlin. It didn't say anything about wavelengths, operating procedure or anything of this sort and was held primarily for one reason: there was getting to be considerable trouble because of the fact that stations using Blotto Co.'s equipment would communicate only with other Blotto-equipped stations and would turn studiously deaf ears to calls from stations using Bliffsky or other gear. Such nonsense obviously had to be stopped and this first conference, participated in by nine nations (including the United States, which was to participate in all subsequent conferences) was called mainly for the purpose of putting an end to such shortsightedness.¹ A few clauses regarding charges for messages and priority of distress calls completed the brief document.

The next conference, resulting in the first actual treaty, was the one that really started things off. It was held in 1906.

Like the first, it took place in Berlin. Twenty-nine nations participated. Perhaps it would be well to say right now that the principal objective was the setting up of arrangements to deal with ship-to-shore work; that being the main thing radio was then used for. In fact, the only services defined in the treaty regulations were coastal stations and shipboard stations — a station, presumably, was either one or the other!

Judged by present standards, the conference resulted in a pretty simple treaty and an even simpler set of regulations to go along with it. However, it is of interest to us because it was here that we set the very first agreements of any kind on wavelength assignments. These agreements were exceedingly simple: coastal stations open to general public service had to be able to use both 500 and 600 meters; ship stations were to use 300 meters for a normal wavelength but could use others if they did not exceed 600 meters.

¹ This conference didn't settle the question, though, and it came up again at both the subsequent 1906 and 1912 affairs, at the latter of which it finally was eliminated as a problem.

small boats unable to "get up" to 300 meters were authorized to use "a shorter wavelength"; and finally — get this! — coastal stations, apart from their two special waves, could use any wavelength, so long as it was either below 600 meters or above 1600 meters. Had coastal stations in those days wished to use any of the territory represented by our present amateur bands, they were free to do it.

There was no mention of amateurs in the treaty and no provision for them except that if any nation had licensed amateurs at that time (none did, including our own United States) it presumably would have to see to it that they stayed below 600 or above 1800 meters.

In addition to these matters, the treaty and regulations specified three-letter calls, limited shipboard power, normally, to a kilowatt, outlined details of hours of service for coastal stations, the posting of "wireless" telegrams, rates, collection of charges, etc., specified the use of the International Morse code for radio work, designated SOS as a distress call and outlined some very rudimentary regs on methods of calling and working.

This second Berlin gathering also decided on the principle of holding similar conferences from time to time and, as a matter of fact, the next was held six years later in London, so we come to 1912.

Forty-three nations from all over the world participated in this London conference; our radio gatherings were beginning to amount to something! Not much was done to change the 1906 treaty and regulations but they were enlarged on somewhat. As before, general public-service stations had to be able to use 300 and 600 meters, but now they could also use 1800 meters. Ship stations were 300 and 600 meters. A curious addition to wavelength specifications was one prohibiting stations used exclusively for sending signals designed to determine the position of ships from using a higher wavelength than 150 meters. Here was the first "short-wave" assignment, as such, and it was to radio-bearing stations! However, this was by no means an exclusive assignment, because, just as in the 1906
treaty, any station could use any wavelength (except that the compass stations had to stay under 150) as long as it stayed under 600 or over 1000 meters.

Ship power was still limited, normally, to a kilowatt; additional power could be used if needed, however, for distances over 200 miles or under unusual circumstances. The Q signals came into being. Revisions and additions were made to other operating details but not a great deal of change shows up in this treaty in these matters as compared with the earlier one. Our old friends, the coastal stations and shipboard stations, were still the only defined services.

At this gathering it was agreed to hold the next conference in 1917, but the first World War and its aftermath upset things so badly that it was fifteen years before another radio conference took place.

1927

The 1927 conference was held at Washington. Nearly eighty nations participated; as of that time, this was the largest international gathering ever held on any subject and the first since the advent of "short waves."

1927

The delegates were confronted with a perfectly stupendous task because of the tremendous strides made in radio development since the previous gathering. All the old concepts of radio had been discarded and new theories evolved; new uses for radio had been found with a resulting terrific enlargement in the number of services; telephone had been developed and had given birth to the broadcasting industry; the short waves had found use. As may be imagined, the conference regulations were numerous and detailed, bearing little resemblance to those in the former documents.

Radio services had segregated themselves into dozens of different distinct classes by this time, so the services mentioned in the list of definitions were considerably more detailed. One of the definitions was that of "private experimental stations." There were two subheadings to this definition: the first explained that the definition included stations of the kind we now recognize as "experimental"; the second stated that the definition applied also to "a station used by an amateur." We had arrived. Here, for the first time, we find ourselves mentioned in an international radio document.

More than that, the radio spectrum — heretofore virtually open to everybody — was now split up into channels, from 10 kilocycles to 23,000 kilocycles, and the various services allotted certain specified channels or groups of channels for their use.2 And in this table, we amateurs were allocated the following bands: 1715-2000 kc., 3500-4000 kc., 7000-7300 kc., and 14,000-14,400 kc. Since the regular table of allocations did not go above 23,000 kc. and since we amateurs urged assignments still higher, special assignments were designated at 28-30 Mc. and 56-60 Mc. jointly for the use of the amateur and experimental services.

Licenses were required of all amateur operators and it was further stipulated that each such licensee would have to demonstrate ability not only to transmit the Continental code but to receive it — "by ear." The code speed required of licensees was left to each country to determine for itself, however.

Of course, the regulations also went into great detail on all other matters such as revision of the Q-signal list, calling procedure, rates, methods of collection, license requirements (commercial), etc., but we take it for granted that by now our readers are aware that each set of regulations in the international treaties include these matters and we will not refer to them further. From now on we will treat only those portions of the treaties that deal with amateurs and amateur radio.

Following the Washington Conference, came a five-year interval, and then the second of the really "modern" conferences in

1932

This was held in Madrid. Very little change was made in the previous treaty or its annexed regulations, except that the general allocations table was extended to 28 Mc. and the "as a guide" aspect was eliminated; thereafter countries agreed to make their assignments in accordance with the allocations table. Our Washington amateur frequency bands were continued intact. However, we had not been satisfied in the Washington regulations with having the definition of an amateur included only as part of a definition of the "private-experimental-station" class; at Madrid, therefore, we sought to have amateurs recognized as a separate and distinct class. The effort was successful and at Madrid, for the first time in an international treaty, we see the amateur service recognized strictly as such.

The next international meeting was in

1938

The location was Cairo, Egypt. By now, the increasing pressure on the high-frequency spec-
trum brought about by expansion of existing services and the introduction of new ones was creating serious problems in the allocations table. The spectrum between 3 and 25 Mc., once thought to be of virtually limitless extent, was full to overflowing — with more customers clamoring for admission every day. As might be expected, those countries having little interest in amateur radio regarded our amateur bands as legitimate areas for the spotting in of some of the overflow, and the aggregate initial proposals of the other countries (particularly those in Europe) for a revised allocation table cut heavily into all our bands. Only the unsurpassing stand of the U. S. delegation in our behalf, supported by our neighbors and sister republics in the Americas, saved all our previous bands for amateurs in this region — we in North and South America emerged without the loss of a kilocycle. Elsewhere, however, amateurs did not fare so well: in the European region, the 3.5-Mc. band was severed, and amateurs permitted only in the portions 3500-3635 kc. and 3685-3950 kc.; outside the American continents, too, amateurs no longer enjoyed exclusive rights to the entire 7-Mc. band, and both amateurs and broadcasting could be permitted to use the territory between 7200-7300 kc.; in Europe, the 5-meter band was reduced, at least in practical effect, to less than half its original width of 4 Mc. Spectrum assignments were extended to 200 Mc. A special appendix indicated a regional assignment table for the American continents and included exclusive amateur bands at 56-60 Mc., 112-118 Mc., and 224-230 Mc. Beyond 230 Mc, no amateur assignments were indicated, although assignments to other services (television, fixed and mobile) were made as high as 300 Mc.

Aside from these allocations matters, there were few other developments of even passing interest to amateurs, and all the other strictly amateur provisions were continued without change.

1947

The year of the Atlantic City conference, which produced the frequency assignments under which we are now operating. Like the 1927 conference, it had to tackle a host of brand-new allocations problems resulting from an incredible development of new applications of radio, particularly in the fields of radar, radio-navigation and a virtually entire new service — international aviation. Since, presumably, readers are familiar with our current operating assignments we will not be listed here. Changes from previous international amateur frequency privileges can be briefly summarized, however: we lost the “100-meter” band to radio-navigation, although retaining sharing privileges to an extent; we lost 50 kc. from the top of the 14 Mc. band; we lost 300 kc. from the top of the 28 Mc. band; we picked up a whole new band of 450 kc. at 21 Mc., went through some readjustment of our previous v.h.f. bands, and picked up all the bands we now have above 225 Mc. So far as the United States is concerned we retained the 3500-ke and 7000-ke bands intact, but further curtailment of amateur use of these bands in other parts of the world occurred; this applies particularly to the 7-Mc. band, where in Europe and Africa the only exclusive amateur assignment is 7000-7100 kc.

Again, it was only because of the solid support of the United States delegation, with assists from Canada and our sister American republics, that we came out with what we have here — actually a net increase in amateur frequencies both above and below 25 Mc., the most we have enjoyed under international treaty.

[to complete the Atlantic City story, it should be noted that the new or expanded service assignments below 25 Mc. came at the expense of the fixed service, primarily, (our 21 Mc. band is an example) which lost roughly 25% of its frequencies previously held in the 2-25 Mc. region. The gainers were chiefly the aeronautical and broadcast services. General assignments were carried up to 10,500 Mc.]

National Regulation

We have now shown, very briefly, what has happened from the early days up to the present time in terms of international regulation. During all this time, however, we were confronted with changing laws and regulations on amateur radio here in the United States under the terms of the United States laws, so let us go back now, see what those laws were and what kind of domestic treatment we got under them.

The outstanding thing about early radio law in this country is that it was an awfully long time before we got the first one!

There was no United States radio law in 1903 at the time of the first Berlin international conference already mentioned, nor was there one in 1906, at the time of the second Berlin affair. It might be thought that this country was obligated to have some sort of national law or regulations after the 1906 conference, in order to carry out the agreements made there to which the U. S. had been a party. The reason there wasn’t is that, although we had signed the treaty, we didn’t ratify it until six years later; there had been quite a lot of squabbling and disagreement about that treaty, anyway.

So we see the years dragging on through 1906, '07, '08, '09 — and still no U. S. law on radio.

This doesn’t mean that no law was needed; indeed, by the latter part of this period “wireless” was assuming considerable proportions in the daily life of the world. But with no laws here amateurs could operate with whatever call, wavelength and power they wished, subject to no regulations whatsoever — and that is precisely what they all did!

In 1910 a very brief law was passed requiring ships of a certain size to carry radio equipment, but it said nothing more than that and has no real bearing in the present discussion. The Act was subsequently modified slightly by another similar act in 1912 but that, also, is of no concern to us.

August 1959
Nevertheless, the year 1912 is highly significant from our standpoint, for in that year three things happened: first, our Senate finally ratified the 1906 Berlin agreement; second, we participated in the 1912 London Radio Conference and signed the resulting treaty (it was promptly ratified early in 1913); third, the United States wrote its very first radio legislation. This was the so-called 1912 Law, under which we were to operate for the next fifteen years.

Now, we want to direct particular attention to this law because this is the one of which it has been said that it granted amateurs all the territory from 200 meters down, for their own exclusive use. Did it? Let us examine that law and see.

To begin with general considerations, it may be said that the law required that henceforth all transmitting stations in the United States must be licensed. Authority to issue licenses was delegated to the Secretary of Commerce and Labor. There were sections calling for the use of a pure and sharp wave, etc., one requiring listeners to observe the secrecy of messages, provision for punishment of violation of the regulations or the transmission of false distress calls. No individual services were defined except our old familiar stand-bys from international treaties, the coastal stations and ship stations.

This is all fine, but what about wavelength assignments, and particularly that part of the law giving amateurs 200 meters and down? All right, here goes for the wavelength assignments: the 300-meter wavelength was specified for general public-service work, per the international agreements of 1906 and 1912. Furthermore, with one exception, all stations were authorized to use any wavelength they chose, provided they stayed below 600 or above 1600 meters — this again being simply a duplication of the international specification of the time. Now, some readers have by this time noticed that phrase "with one exception." Yes, that exception is the one that is supposed to have given hams everything from 200 meters down. We will quote that article, in full. Here it is:

**General Restrictions on Private Stations.**

**Fifteenth.** No private or commercial station not engaged in the transaction of bona fide commercial business by radio communication or in experimentation in connection with the development and manufacture of radio apparatus for commercial purposes shall use a transmitting wavelength exceeding two hundred meters, or a transformer input exceeding one kilowatt, except by special authority. Well, how about the regular commercial stations that were engaged in transacting business, or developing apparatus in that connection, they couldn't go above 200 meters.

Were amateurs the only ones so restricted? Not at all; as a matter of fact, amateurs are not even mentioned. Read the start of the quoted section; it will be seen that the restriction applies equally to private and commercial stations. If this section can be interpreted as granting amateurs "200 meters and down," it also grants certain classes of commercial stations precisely the same privilege. However, it is important to note that this time that "private station" and "amateur station" are not the same. As we have already pointed out, the section doesn't mention amateurs as such. To be sure, amateurs at that time were classified as "private stations" — but so were a number of other classes! School and training stations were "private stations." So were many of what we now think of as "experimental" stations. Stations set up by a firm to enable it to conduct its own business between its various branches were private stations. About this time, it becomes apparent that between the broad interpretation of "private station" and the inclusion of that "or commercial" the Fifteenth regulation was meant to apply to virtually every station, unless it was conducting commercial business (or developing apparatus in that connection). Correct! It was!

Nor is that all; we point again to the fact that the section says only that the specified types of station cannot go above 200 meters (or over 1 kw.) without special authority. Well, how about the regular commercial stations that were allowed to operate above 200 meters; could they also go below 200 if they wished? The answer is that they could. The authority is contained in the second regulation, which we quote:

**Second.** In addition to the normal sending wavelengths, all stations, except as provided hereinafter in these regulations, may use other sending wavelengths: Provided that they do not exceed 600 meters or that they do exceed 1000 meters . . . [there then follows some dope on use of pure and sharp wave].

The only "except as provided hereinafter" contained in the law was the Fifteenth section already quoted.

Let this, then, be said: the 1912 law, to the extent that it gave amateurs the territory from 200 meters down, assigned precisely the same privileges, by law, to every other class of station in the country.

Except for a period during World War I, when
all radio stations were closed down, this is the law which we operated under for fifteen years. Incidentally, since another part of this law stated that stations should specify their operating wavelengths in their applications, practically all amateurs gave "200 meters" as their operating wavelength, and then tried to edge up higher than that if they could get away with it! As a matter of interest, no amateur license issued in the United States ever stated that the licensee was entitled to use all the territory from 200 meters down.

Although not affecting any very large group of amateurs, special arrangements were effected during this time between the ARRL and the Department of Commerce whereby certain "above-200" wavelengths were made available to outstanding amateur relay stations.

We have said that the 1912 law was the only one we had until the Communications Act of 1927 was passed. Now, it is apparent that nothing in the 1912 law creates special bands for the various services (we have quoted all the 1912 law which applied to wavelength grants or limitations), yet it is a fact that, three years before the 1927 international conference, amateurs in the U. S. were operating in specific bands of frequencies in the short-wave spectrum.

How come?

All right — brace yourself, for we suspect this will be news to many — those bands were not assigned under law, they had no legal standing, and we had them solely on the basis of temporary and informal agreement with the other radio services of the United States.

Here's the story:

Following the 1912 law, nothing much happened to disturb the tranquility of two-hundred-meter operation until around 1923, when a small group of amateurs (and commercials, too, if we are to be truthful) began going to the wavelengths well below two hundred, to see if they were feasible for communicating purposes. As we now know, they most certainly were, but it took a transatlantic QSO to make the average ham believe it, at that time. An interesting sidelight here is that since all amateur stations at that time were required to specify their operating wavelengths, and since these were invariably of the order of 150, 175 or 200 meters, it was necessary for the first short-wavers to get special permission to operate on such wavelengths as 100, 90 and 60 meters — these not having been specified in the licenses!

At any rate, when the short waves began to demonstrate their worth around 1924, everybody in creation made a headlong rush for them. Remember: under the ancient 1912 law, still in effect at that time, every single service in the United States had equal rights with everyone else for the use of the short waves!

Now, keep a firm grip on everything up to this point while we backtrack a couple of years to 1922 to pick up some dope that is going to constitute part of our 1924 picture.

Around 1922 it was apparent to the then Sec-

(Continued on page 159)

(\textsuperscript{5}) Since the short waves "broke" several months before the conference, the ARRL had negotiated several special low-wave bands for amateurs, pending the decisions of the conference. The resulting conference agreements were considerable expansions over the space made available by these temporary assignments.
A frequently heard complaint is that c.w. contacts are tedious and boring. I am inclined to agree, even though I am an old die-hard devotee of the brass pump handle. But the code itself is not the villain.

Low code speed can be a major road block to the enjoyment of c.w. operating, but is by no means the only reason for tedious QSOs. Unless you can handle code at a speed above 25 or 80 words per minute, the use of operating short cuts is imperative if you are to say what you want to say in a reasonable amount of time. The average speed of beginner c.w. operators is considerably lower today than it was a good many years ago, with speeds of ten words per minute or less being very common. At such low speeds it can take forever to say something if you insist on spelling every word out to the last letter and on throwing in all the words and all the punctuation that you would employ in writing a theme for English class. Failure to use abbreviations and other operating short cuts can make an irritating session of what could have been a very pleasant QSO.

If you are just beginning in ham radio and your code copying ability has improved enough so you can tune around the amateur c.w. bands for a bit of copying practice, you probably have been puzzled sometimes by the fact that, while you're sure you copied correctly, the copy doesn't make sense! For example, what do you make of "VY TNX QSO OB" or "HR WX OCAST ES CLD TODA" or "MI FD NG FER DX BUT MI VERT FB"? These are verbatim transmissions copied at W6DTY during recent contacts on 40 meters. This stuff may be gobbledygook to you; but if you copied it, you did copy correctly and the senders were actually saying something. In the first case the man said, "Many thanks for the contact, old boy." The second collection of gunk states, "The weather here today is overcast and cold." The third gem was sent by a man talking about his antenna problems. He said, "My folded dipole is no good for working DX, but my vertical antenna gets out fine." These examples of ham c.w. lingo are somewhat extreme and are not necessarily typical, but they serve to illustrate the time-saving capacity of abbreviations. The translations are not literal, of course, but do represent the thoughts transferred by radiotelegraph from the sending operator to the receiving operator.

There is a great deal more to on-the-air c.w. radio operating than a mere knowledge of the International Morse Code. A major contributing factor to slow, tiresome contacts is the inability of a great many amateur operators to comprehend or use "Q" signals, abbreviations, and other operating short cuts.

If you wish to take the tedium out of your c.w. QSOs there are three operating short cuts you may employ: (1) Use "Q" signals wherever they apply; (2) Leave out all words which are not necessary to the sense of what you are saying; (3) Use the standard abbreviations for words most commonly transmitted during a QSO.

Q Signals

The international list of "Q" signals covers a lot of ground. The "Q" signals allow you to make a detailed statement with only three transmitted letters, or to ask a lengthy question with only four characters. For instance, rather than having to spell out the statement, "I am being interfered with," you merely send the letters "QRM." Instead of spelling out the question, "Shall I send faster?" you use the signal "QRQ?" The time-saving value of the "Q" signals should be obvious.

For the "Q" signals to be meaningful, they must be properly used. It is well worth while to memorize the statements and the questions connected with each of the "Q" signals ordinarily used in ham radio operating. The list can be found in any édition of The Radio Amateur's Handbook. In regard to the use of "Q" signals, don't overlook the question mark: it's important! Without the question mark the signal is a statement of fact or a direction as to procedure; when the question mark is added to the signal, the signal becomes a question, asking for information or for instructions as to procedure. A very common error on the amateur bands today is the use of the signal "QRZ" without the question mark. For example, suppose WA6XXY calls CQ and is answered by another station but, perhaps because of interference, doesn't get the call letters of the answering station. In order to indicate that he heard the calling station but did not copy the call letters, WA6XXY should make a brief transmission as follows: "QRZ? QRZ? DE WA6XXY K." The signal "QRZ?", with question mark, means, "Who is calling me?" It is commonplace to hear amateur operators employ this "Q" signal, for the purpose just described, without the question mark. This is patently nonsensical because just plain QRZ means, "You are being called by ......"

Cutting Down on Words

In most sentences certain words can be left
out completely without altering the meaning of the sentence. On phone this would make you sound like an idiot, but in code it sounds perfectly natural and shortens transmission time by an appreciable amount. The other day, during a c.w. contact, I copied, "I NOTICE THAT THE BAND IS VERY FUNNY TODAY." At ten words per minute this statement took some time to send. It could have been sent, "NOTICE BAND VERY FUNNY TODAY." The words I, THAT, THE, and IS could have been eliminated without detriment to the information being transmitted. Incidentally, one of the purposes of the "Q" signals, aside from the fact that they are internationally understood regardless of the language spoken by the operator, is to shorten transmission time by using only three letters to make a statement. The commonly heard ham expression, "MY QTH IS . . ." defeats the purpose of the "Q" signal. The signal QTH means, "My location is. . . ." The words MY and IS are already included in the "Q" signal. So, instead of eating up time by saying, "MY QTH IS POPOUNK CALIF," you need only send, "QTH POPOUNK CALIF."

Standard Abbreviations

Because there are a number of words and expressions which are very common in amateur c.w. operating, such words have been abbreviated to shorten transmission time. These abbreviations have come into use over a long period of years and, in most cases, are quite standard among operators the world over. Perhaps the best description of the art of abbreviating appeared in older editions of The Radio Amateur's Handbook. Let me quote the 1933 edition of the Handbook:

"In amateur work many of the most commonly used radio and ordinary English words are frequently abbreviated, either by certain generally recognized methods or, as often occurs, on the spur of the moment according to the ideas of the individual operator. Beginning amateurs are likely to be confused by these ham abbreviations at first, but will probably pick them up quickly enough in the case of the more or less standard ones, and get the general idea governing the construction of the unusual ones occasionally encountered.

"A method much used in short words is to give the first and last letters only, eliminating all the intermediate letters. Examples: Now, NW; Check, CK; Would, WD.

"Another method often used in short words employs phonetic spelling. Examples: Some, SUM; Says, SEZ; Good, GUD; Night, NITE.

"A third method uses consonants only, eliminating all vowels. Examples: Letter, LTR; received, RCD; Message, MSG.

"Replacing parts of a word with the letter "X" is a system occasionally used in abbreviating certain words. Examples: Transmitter, XMTR, or TX; Weather, WX; Distance, DX; Press, PX.

". . . we want to caution the beginner against making too great an effort to abbreviate or to scatter abbreviations wholesale throughout his radio conversation. A judicious use of certain of the short-cut words is permissible and saves time . . . the only legitimate object of abbreviations, of course. To abbreviate everything one sends, and to do so, in many cases to extremes, is merely ridiculous."

The list which follows includes most of the "standard" abbreviations heard on the amateur c.w. bonds today. Except in a few instances, procedure signals are not listed. It is hoped that this glossary of ham brass-pounding terminology will be of some considerable help to beginners and to many of the newly licensed novice or general class operators.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA</td>
<td>All after</td>
</tr>
<tr>
<td>AB</td>
<td>All Before</td>
</tr>
<tr>
<td>ABT</td>
<td>About</td>
</tr>
<tr>
<td>ADR</td>
<td>Address</td>
</tr>
<tr>
<td>AGN</td>
<td>Again</td>
</tr>
<tr>
<td>AMP</td>
<td>Ampere; Amplifier</td>
</tr>
<tr>
<td>AMT</td>
<td>Amount</td>
</tr>
<tr>
<td>ANI</td>
<td>Any</td>
</tr>
<tr>
<td>ANT</td>
<td>Antenna</td>
</tr>
<tr>
<td>BC1</td>
<td>Broadcast interference</td>
</tr>
<tr>
<td>BCL</td>
<td>Broadcast listener</td>
</tr>
<tr>
<td>BCNU</td>
<td>Be seeing you</td>
</tr>
<tr>
<td>RD</td>
<td>Bad</td>
</tr>
<tr>
<td>RIZ</td>
<td>Business</td>
</tr>
<tr>
<td>BK</td>
<td>Break; break me; break in</td>
</tr>
<tr>
<td>BKG</td>
<td>Breaking</td>
</tr>
<tr>
<td>BKN</td>
<td>Break-in</td>
</tr>
<tr>
<td>RN</td>
<td>Been; all between</td>
</tr>
<tr>
<td>BUG</td>
<td>Automatic key (formerly only a Vibroplex; now generally applied to any automatic key)</td>
</tr>
<tr>
<td>BUK</td>
<td>Book</td>
</tr>
<tr>
<td>B4</td>
<td>Before</td>
</tr>
<tr>
<td>C</td>
<td>Yes; that is correct</td>
</tr>
<tr>
<td>CANS</td>
<td>Headphones</td>
</tr>
<tr>
<td>CC</td>
<td>Crystal controlled</td>
</tr>
<tr>
<td>CFP</td>
<td>Confirm; I agree</td>
</tr>
<tr>
<td>CK</td>
<td>Check</td>
</tr>
<tr>
<td>CKT</td>
<td>Circuit</td>
</tr>
<tr>
<td>CL</td>
<td>I am closing my station: call</td>
</tr>
<tr>
<td>CLD</td>
<td>Called</td>
</tr>
<tr>
<td>CLG</td>
<td>Calling</td>
</tr>
<tr>
<td>CRD</td>
<td>Card</td>
</tr>
<tr>
<td>CU</td>
<td>See you</td>
</tr>
<tr>
<td>CUAGN</td>
<td>See you again</td>
</tr>
<tr>
<td>CUD</td>
<td>Could</td>
</tr>
<tr>
<td>CUL</td>
<td>See you later</td>
</tr>
<tr>
<td>CW</td>
<td>Continuous wave (commonly applied to telegraphic communications or equipment)</td>
</tr>
<tr>
<td>DA</td>
<td>Day</td>
</tr>
<tr>
<td>DLD</td>
<td>Delivered</td>
</tr>
<tr>
<td>DPE</td>
<td>Dope; data; information</td>
</tr>
<tr>
<td>DWN</td>
<td>Down</td>
</tr>
<tr>
<td>DX</td>
<td>Distance</td>
</tr>
<tr>
<td>ECO</td>
<td>Electron-coupled oscillator</td>
</tr>
<tr>
<td>ES</td>
<td>And (&amp;)</td>
</tr>
<tr>
<td>FB</td>
<td>Fine business; excellent; very good</td>
</tr>
<tr>
<td>FD</td>
<td>Folded dipole</td>
</tr>
<tr>
<td>FER</td>
<td>For</td>
</tr>
</tbody>
</table>

August 1959
FIST  Sending characteristics, using telegraph key (as in “gud fist,” “bum fist,” etc.)
FM  From
PHONE  Phone; telephone
FREQ  Frequency
GA  Go ahead; begin (or resume) sending
GB  Good by
GE  Good evening; good afternoon (use after 12 o’clock noon)
GG  Going
GM  Good morning
GN  Good night
GND  Ground
GUD  Good
HI  Indicates laughter; high
HPE  Hope
HR  Here
HRD  Heard
HVE  Have
HVG  Having
HW  How
HW?  What do you say?
INFO  Information
KW  Kilowatt
LID  Poor operator
LTR  Letter; later
LW  Long wire (antenna)
MANI  Many
MI  My
MIKE  Microphone
MILL  Typewriter
MILLS  Milliamperes
MJS  Miles
MOD  Modulator; modulation
MTRS  Meters
N  No; that is incorrect
ND  Nothing doing
NG  No good
NIL  Nothing; I have no traffic; no more here
NITE  Night
NM  Nothing more; no more
NR  Number, near
NW  Now; I will continue
OB  Old boy; official bulletin
OC  Old chap
OM  Old man
ONLI  Only
OPG  Operating
OPR  Operator
OSC  Oscillator
OT  Old timer (formerly meant “oscillation transformer” and “old top”)
OTC  Old timers’ club
P LS  Please
PSE  Please (preferred)
PWR  Power
PX  Press (news sent by radiotelegraph)
QRRR  Attention, emergency; distress (amateur radio “SOS”)
QST  Attention all radio amateurs
R  Receipt acknowledged; received all O.K.; are
RC D  Received (preferred)
RCVD  Received
RCVR  Receiver
RI  Radio inspector (F.C.C. official)
RIG  Radio transmitter (transmitter only; does not include receiver and/or antenna)
RITE  Right
RPT  Repeat; report
RST  Readability, signal strength, and tone
RX  Receiver
SA  Say
SED  Said
SEZ  Says
SIG  Signature (as on a message); signal
SIGS  Signals
SINE  Sign; personal identification, such as initials or nickname
SKED  Schedule
SRI  Sorry
SSB  Single sideband
STICK  Pencil
STN  Station
SUM  Some
SWL  Short wave listener
TFC  Traffic (relates to messages, or message handling)
TKS  Thanks
TMW  Tomorrow
TNG  Thing
TNX  Thanks
TODA  Today
TRUBLE  Trouble
TT  That
TU  Thank you
TV  Television
TVI  Television interference
TX  Transmitter
U  You
UR  Your
URS  Yours
VERT  Vertical (antenna)
VFO  Variable frequency oscillator
VV  Very
WA  Word after
WAT  What
WATS A?  What do you say
WB  Word before
WD  Word; would
WDS  Words
WID  With
WK  Work
W KD  Worked
WKG  Working
WL  Will; well
WUD  Would
WX  Weather
XM TR  Transformer
XTAL  Crystal
YF  Wife
YL  Young lady
YR  Year
YRS  Years
73  Best regards (already plural; never say 73s)
88  Love and kisses

62  QST for
California — The Santa Barbara ARC is sponsoring its hamfest on Sunday, August 23, at Tuckerton Grove in Santa Barbara. Bring your own lunch. Refreshments are available at the concession stand, and the club will serve free coffee. Two- and ten-meter transmitter hunts, games for the kids, and programs for ladies and men. For further information contact John W. Deeds, KG4KV, P. O. Box 273, Santa Barbara.

Indiana — The Tri-State Amateur Radio Society will hold its annual hamfest-picnic on August 30 at Eagles’ Picnic Grounds, Evansville. There will be games, contests, and prizes. Refreshments available on the ground. Mobiles can check in on 75, 10, or 6 meters. Advance registration is $2.00, or $2.50 at the gate. For further information write to the hamfest chairman, Dr. Thomas G. Westfall, W9BKQ, 2100 W. Franklin St., Evansville.

Iowa — The Iowa 75-Meter Phone Net picnic will be held at Inez Grove Park, Ames, on Sunday, August 19. Potluck dinner at 1300. Coffee will be furnished by the sponsors, the Ames Radio Association. No fee, but bring your share of the potluck. Mobiles monitor 3870 kc. Further information available from DennisARK, WENTJ, 1418 Douglas Ave., Ames.

North Carolina — The annual hamfest of the Shelby Radio Club will be held on Sunday, Sept. 6, at Brackett’s Cedar Park, 14 miles north of Shelby on highway #70. Southern fried chicken, iced tea, hush puppies with all the fixin’s, all you can eat. Entertainment and contests. Mobile talk-in on 3886 kc. For map and information contact Malcolm E. Spangler, K4KUT, Box 481, Shelby.

Ohio — The Green Valley Radio Club will hold its second annual “Dr. Lee De Forest Day” celebration, hamfest and dealer display on August 16 at the National Guard Armory, 11754 West Vine St., Alliance. Games, contests, prizes. Advance registration is $1.00, or $1.25 at the gate. For reservations contact Harry E. Powell, WS8XX, RDF #2, Alliance.

Ohio — The Warren Amateur Radio Association will hold its second annual picnic and hamfest at the enclosed shelter house, Packard Park, on Sunday, August 23. Bring your own lunch for a picnic at noon. There will be a swap and shop, ham auction, and entertainment. Registration is $1.50. Activities begin at 1100. Mobiles will be monitored on 29.6 Meters. Plenty of activities for the whole family, and everyone welcome. For further information contact Don Lovett, K5AT, 3600 Northwood Drive, Warren.

Pennsylvania — The Mount Airy V.H.F. Radio Club will hold its annual hamfest and family day on Sunday, August 9. (The rain date is Aug. 16). This will be held at the Fort Washington State Park, just off U. S. 303, near Houtou, Goshen. Free soda, Registration $1.00 per family. Mobiles monitored on 144.2 and 60.2 M meters.

Pennsylvania — The Pennsylvania Fone Net and the Eastern Pennsylvania CW Net will hold their annual hamfest on Sunday, August 30 at Hershey Park. This is a family affair. Bring your own picnic lunch, or purchase your eats at the park. Registration begins at 0800, and is $1.00 per call. There will be a meeting of 3RN. For information and registrations contact Edgar Naratil, W3BNR, 423 Lafayette Ave., Palmerton.

Pennsylvania — The fourth annual hamfest of the four York County amateur radio clubs (the Pen-Mar RC of Hanover, the Hilltop Transmitting Society of Red Lion, the York ARC of York, and the Keystone VHF club of York) will be held on August 29 at Atland’s Ranch, 10 miles west of York, rain or shine. Registration ($1.00 in advance or $1.25 at the gate, per ham) begins at 1000. Plenty of free parking adjacent to the picnic grounds. Picnic tables available. Free soda and games for all. Auction, Talk-in, and related activities on 145.62 Me., 20.62 Me., 28.5 Me., and 75 meters. Swimming available at a slight extra charge. For tickets write to John A. Zett, W3PLD, 2710 Grandview Ave., York.

Texas — The annual convention of the South Texas Emergency Net will be held at Kerrville August 28 through 30. For details contact Eugene A. Jank, W5EJT, 100 N. Winoton Lane, San Antonio 15.

Vermont — The annual net-together of VE2 and U.S. hams will be sponsored by the Burlington ARC on Sunday, August 9. This 8th annual international field day and Vermont hamfest will be held at Clarey’s Bayside, Malletts Bay, Colchester (2 miles north of Burlington). There will be a family picnic, batting, roller skating, water-skiing, Vermont CW and Fone net meetings, Green Mt. net meeting, and AREC meeting. There will be mobile treasure hunts on 2-, 6-, 10- and 75-meters. And a softball game. W1KOO will be on to talk mobiles in. There will be a rendezvous Saturday night at the field day site. For cabin and motel reservations, contact BARC, P. O. Box 38, Winooski. Bring your picnic basket and a registration fee of $1.00 (children under 10 are free).

Virginia — The annual hamfest of the Shenandoah Valley ARC will be held at the Winchester Armory in Winchester on Sunday, August 2. The program will be indoors, so come rain or shine. A banquet will be held on Saturday night. August 1, and a lunch will be served on Sunday. For further information write to the Shenandoah Valley ARC, P. O. Box 138, Winchester.

Harvey Board was elected treasurer of the Mira Costa High School Radio Club, whereupon the FCC issued him the call W6FEE.

Tired of making WAS the easy way? Try K4DRO’s scheme — he worked them in alphabetical order.

This June’s graduating class at Hamilton High School in Los Angeles had ten hams and ex-hams in it (K6BEP, K6DBR, K6KUG, K6QGD, K6ROC, W6WRY, W6CUB, W6GDY, ex-KN5RU and ex-KN5QGJ). — WH6EB0

K1GVD called K5BAG and discovered that the operator at the other end was W4GVD.

Here’s another console arrangement, this one at W2XXL. The layout and the equipment in use is pretty straightforward, and so there’s no need to go into details on that score. Perhaps just seeing some of these neat stations will influence you to clean up some of that haywire in your station!

August 1959
Amateur Radio Invades Television

Putting on a television show with amateur radio as the theme is a project that requires the time and effort of a great number of hams. The Delaware Valley boys did such an outstanding job, and enjoyed such success, that they would like to tell you about it — just in case you'd like to put on a TV show over your local station.

On Saturday afternoon, April 18, 1959, a little past two o'clock, television viewers in the Philadelphia area were the victims of TVI. From every set tuned to Philadelphia's Channel 10 came the voice of a ham operator calling CQ. It wasn't long before the viewers realized that this was a different kind of TVI. This was TV-Invasion.

What happened on this big day was the culmination of twelve weeks of planning and preparation by a selected committee representing some 23 amateur radio clubs in the Delaware Valley. This committee, headed by George Ryan, K2DEI, prepared a thirty-minute television program on amateur radio operation. It was geared for greatest appeal to the secondary school level, but was kept informative enough so that the general public could also appreciate the basic concepts of one of the world's greatest hobbies. The Production and Script Committee was a smaller group working within the larger committee, and this consisted of Dick Harris, K2MBT, Al Hamilton, W3GIF, and Florence Collins, W3DBN. These three worked in close coordination with the WCAIJ-TV producers of the "Big Blackboard" show, George Dessart and Warren Knight.

The Background

How the show came into being is the main story we have to tell. Last summer George, K2DEI and Dick, K2MBT were commissioned by the Board of Directors of the South Jersey Radio Association to work out some publicity for amateur radio in the Delaware Valley. After a brief consideration of local newspaper coverage, we decided to attempt even broader fields. The opportunity for one avenue we really hadn't hoped for occurred as a result of George's employment at one of the local radio stores. One of the Channel 6 engineers was a regular customer for spare parts at said shop, and during a conversation one day the suggestion was made that we attempt to present ham radio to the public via television ... the very same medium that causes so many Tennessee Valley Indian scalpaches! Whereupon, George and Dick got together and came up with an idea that resulted in a late night interview on Channel 6, featuring K2MBT with W2OGZ, Charlie Jenkins III, on camera answering questions, and George, K2DEI, manning the gear on the set and attempting to log everyone who called in once they found out what was going on. The result of that venture was so successful that we immediately began thinking of a return engagement.

It was this subject that dominated conversation over a strong cup of coffee later that same morning. W2KFC, Lee Miles, mentioned rather casually that there was a possibility we could get some exposure on Channel 10, the CBS station in Philadelphia. It seems a six-meter friend of his is a prominent member of the WCAIJ-TV engineering department. This is where our main story begins.
Getting the Ball Rolling

Lee contacted Ed Harper, K2TYW, and got a very positive reaction to the suggestion because Ed had seen our show on Channel Six and was impressed. In fact, he had already been thinking in terms of a spot on his station when Lee got hold of him. Consequently, Channel-10 producers George Dessart and Warren Wright were approached with the suggestion of an amateur radio presentation on one of their “Big Blackboard” shows. Apparently Ed is a convincing person, because it wasn’t long before word came that if we could come up with a suitable format they would be very pleased to let us present the hobby of amateur radio on the Big Blackboard in the near future.

Immediately, K2DEI and K2TYW got together on how to proceed. First of all, they decided that this venture should be colossal, and secondly that it should be the joint effort of all the radio clubs in the Delaware Valley who were willing to participate. K2DEI took charge of this as-yet-unformed committee, and called a mass meeting of club representatives. In all, 37 invitations went out and 23 amateurs responded. This first meeting was held in K2DEI’s front parlor, where about thirty of us crowded the windowsills and staircase. George swears that his house settled at least an inch and a half that night! Out of this group, a working “Committee of Nine” was appointed. They were: Jim Collins, W3DBL and his wife Florence, W3DBN; Al Hamilton, W3GJF; Edith Rosner, W3AUU; Ed Kushner, W3HKZ; Dick Harris, K2MBT; Bob Edelman, W3ZIE; Ed Mc Vaugh, W3LEM; and Sam Smith, K3GBA. K2TYW was appointed chief liaison between the committee and WCAU-TV. Also, since both K2TYW and W3HKZ were on the staff at WCAU, they served in the valuable capacity of technical advisors. Our ace in the hole was the fact that W3HKZ was shop steward for the television technicians at Channel 10, and both he and K2TYW were active members of the WCAU Ham Radio Club, consisting of some 45 members. So we had the full support of the engineering department! This helped a great deal.

Planning

Weekly meetings were held in one of the Channel-10 studios. One of the first jobs was to draw up a proposed format for the show. The three-man committee on Production and Script went to work on the ideas that had been discussed at the first meeting. As soon as the Committee of Nine approved the Production Committee’s proposal, a meeting was set up with the station producers. Apparently we overdid ourselves, because it didn’t take them very long to decide that we could do the job to their satisfaction, and according to their standards. They then committed themselves and us to Saturday, April 18, 1959. We were finally on our way! From here on in we had nothing but hard work ahead of us, and there could be no let-up until the show was off the air.

With the script and production agreed on, the next thing was to appoint a committee to manage the procurement of equipment and manpower. W3DBL headed this group and became a busy collector of ham gear for the next few weeks. One of the biggest breaks that came our way was an offer from Barker and Williamson Company to lend us the use of a complete B&W kilowatt linear station, with a 75A-4 and operator. The operator that went with the equipment was Harold Carr, W3JFI. K2DEI also offered the use of a new Globe Champ for the show.

The original time scheduled for the show was 8:00 A.M., but seasonal commitments during the month of April made it necessary for the station to change the program to 2:00 P.M., a much better time. However, the day the show went on the air another local TV station was broadasting a baseball game, so we probably lost a few potential viewers to our favorite All-American sport.

The “Big Blackboard” is a WCAU-TV Public Affairs Presentation. Its purpose is to expose secondary school pupils to the arts and sciences in an interesting manner, to spur them on toward a possible career or college education. It was felt that a presentation of the ham radio hobby in action would interest those who were potential electrical engineers or physicists. With this in mind, we were cautioned to develop our presentation toward young people in the hope that some would take up the hobby and develop interest toward college and a possible career in electronics.

The format of the “Big Blackboard” show calls for one person to act as the lecturer, or professor. In our case we were to have several persons on the set to demonstrate the equipment in action, but in order to tie the whole business into a single compact demonstration the committee de-
W3DBL mans the radio control transmitter and W3TUU makes final adjustments on his r.c. plane while the Zoomar lens catches the action from the studio door. In the background the Philmont mobile truck stands by for its turn on camera. Beyond this, an amateur mobile awaits its turn to demonstrate.

cided to draft one of its own members. As a result, K2MBT, because of his experience in broadcasting, was duly appointed narrator on the Big Blackboard on behalf of the Delaware Valley amateurs. Dick had always had a slight frustration to emote before the cameras, and here he would get the chance to do his stuff for a solid thirty minutes, with a very informal format.

One thing that soon became apparent was that there is a world of difference between sitting before a microphone in a quiet radio studio, and working in the glare of television's Klieg lights, with the goggle-eyed TV cameras following you everywhere you turn, not to mention the off-camera mob that goes with every production. But we couldn't have asked for a better gang of fellows to work with. Most of us had never even stepped inside a television studio before, but the crew made us feel right at home. We are all indebted to Bob Matthiessen, W2RUE, crew chief and video operator; the three cameramen, Bill Morris (K3CCX), Dick Kearney, and Bill Wagner; Pat Lynch, W2HVT, our audio man; Ray Wolfe, W3CEQ, our lighting man; and, of course, our two technical consultants, Ed Harper, K2TVW and Ed Kushner, W3HKZ.

Most of the time up to the day of the show was pretty much routine. Perhaps an exception to this was the important job assigned to Edith Rosner, W3AAU. Edie had to handle publicity for the show, and she did a really big job. She contacted the secondary schools of our major viewing area with prepared material to be posted on school bulletin boards. In addition, she saw to it that publicity was released to the newspapers of the area. Some of the local newspapers even developed the basic story about the show to include mention of one of their local hams who was in it. Ham clubs in the area also spread the word on the air during QSOs.

Final Preparations

By Friday night, April 17, all was in readiness except to erect antennas and install equipment in Studio 3. Everyone was sweating out possible interference to station equipment when the rigs were thrown on the air. Consequently all the Channel 10 staff were alerted when try-out time came. Three transmitters were tried: the six-meter Gonset Communicator, the Globe Champ on 40 meters, and the B&W kilowatt on 20-meter sideband. Everything was clean! We now had operating equipment for a real live demonstration. Everyone was in high spirits. We had feared that the use of live equipment might not work out and we were prepared to fake a few things for the sake of authenticity. This was not necessary.

The B&W kilowatt and the Globe Champ were on the air most of the night. The B&W station setup was intended to demonstrate the DX phase of hamming, so W3JFI set about to do just that all night. His log showed a very nice variety of countries, including a rare McMurdo Sound station in the Antarctic, and one in Asia Minor. As might be expected, when we finally went on the air Saturday afternoon, all that Harold could raise was a VE3!

By Saturday mid-morning, the studio was a buzz of activity. We had about ten sets in the studio, and all were to be used in the demonstration. Each one of these positions was busily engaged in setting up and tuning up, and around each was an interested group of onlookers. Some of the WCAU personnel stopped in for a quick look around and seemed interested in what was going on. All were quick to admit that never before had they seen such an amount of preparation for the "Big Blackboard."

Action, Caméra!

The Big Blackboard starts in a very formal manner with the lecturer in front of the class of students. Ours began well, and from all reports ran very smoothly to the end. Dick, K2BMT, as narrator, opened the show with a greeting and welcomed one and all into "The Wonderful World of Amateur Radio!" From here he took us on a brief tour back through the early history of radio communications. This phase made use of some clever artwork by Dick Shaw, K2KCI. After a very few minutes of introductory material, the viewers were taken on a tour of typical ham stations. First was the typical ham in a garage. This set was operated by Ray Cherrill, W3HQO, a television serviceman, talking to Edith Rosner,

(Continued on page 148)
ELECTION NOTICE

To All Full Members of The American Radio Relay League Residing in the Atlantic, Canadian, Dakota, Delta, Great Lakes, Midwest, Pacific and Southeastern Divisions:

An election is about to be held in each of the above-mentioned divisions to choose both a director and a vice-director for the 1959-1961 term. These elections constitute an important part of the machinery of self-government of ARRL. They provide the constitutional opportunity for members to put the direction of their association in the hands of representatives of their own choosing. The election procedures are specified in the By-Laws. A copy of the Articles of Association and By-Laws will be mailed to any member upon request.

Nomination is by petition, which must reach the Headquarters by noon of September 21. Nominating petitions are hereby solicited. Ten or more Full Members of the League residing in any one of the above-named divisions may join in nominating any eligible Full Member residing in that division as a candidate for director therefrom, or as a candidate for vice-director therefrom. No person may simultaneously be a candidate for both offices; if petitions are received naming the same candidate for both offices, his nomination will be deemed invalid. Inasmuch as all the powers of the director are transferred to the vice-director in the event of the director's resignation or death or inability to perform his duties, it is of great importance to name a candidate for vice-director as it is for director. The following form for nomination is suggested:

Executive Committee
The American Radio Relay League
West Hartford 7, Conn.

We, the undersigned Full Members of the ARRL residing in the... Division, hereby nominate... as a candidate for director; and we also nominate... as a candidate for vice-director; from this division for the 1959-1961 term. (Signatures and addresses)

The signatures must be Full Members in good standing. The nominee must be a Full Member and the holder of an amateur license, and must have been a member of the League for a continuous term of at least four years at the time of his election. No person is eligible who is commercially engaged in the manufacture, sale or rental of radio apparatus capable of being used in radio communications, or is commercially engaged in the publication of radio literature intended in whole or in part for consumption by radio amateurs.

All such petitions must be filed at the headquarters office of the League in West Hartford, Conn., by noon EDT of the 21st day of September, 1959. There is no limit to the number of petitions that may be filed on behalf of a given candidate, but no member shall append his signature to more than one petition for the office of director and one petition for the office of vice-director. To be valid, a petition must have the signature of at least ten Full Members in good standing; that is, ten or more Full Members must join in executing a single document; a candidate is not nominated by one petition bearing six valid signatures and another bearing four. Petitioners are urged to have an ample number of signatures, since nominators are occasionally found not to be Full Members in good standing. It is not necessary that a petition name candidates both for director and for vice-director but members are urged to interest themselves equally in the two offices.

League members are classified as Full Members and Associate Members. Only those possessing Full Membership may nominate candidates or stand as candidates; members holding Associate Membership are not eligible to either function.

Voting by ballots mailed to each Full Member will take place between October 1 and November 20. It is expected that if on September 21 only one eligible candidate has been nominated, he will be declared elected.

Present directors and vice-directors for these divisions are:


Full Members are urged to take the initiative and to file nominating petitions immediately.

For the Board of Directors:
L. H. RUDLOFF
Secretary

EXTRA CLASS STATUS

We publish below a Notice of Inquiry issued by the Federal Communications Commission, discussed in this month's Editorial page.

FEDERAL COMMUNICATIONS COMMISSION

In the Matter of

Extra Class Amateur Radio Licenses, etc., etc., under Part 12 of the Commission's Rules.

NOTICE OF INQUIRY

1. Notice is hereby given of a Notice of Inquiry in the above-entitled matter.

2. On January 28, 1959, the Commission issued a Memorandum Opinion and Order denying a petition submitted by George H. Goldstone, 1921 National Bank Building, Detroit 26, Michigan, which requested amendment of Sections 12.23, 12.56, and 12.131 of Part 12 of the Commission's Rules. The petitioner's purpose was to give some prestige to holders of Extra Class Amateur Radio operator licenses by granting them certain additional privileges.

3. To effectuate this purpose, Mr. Goldstone proposed the following changes:

A. Divide the present Extra Class into two groups: Extra Radiotelegraph licenses and Extra Radotelephone licenses.

(Continued on page 144)

August 1959
They've done it again!

We could save some space here if we asked you to turn to page 62 of September, 1959, QST, and change a few numbers in the famous story told there. It was one of the outstanding amateur radio stories of modern times, and we tell it again, with 222 substituted wherever 144 appeared in the original as the principal change. Yes, as indicated by our cover, the Pacific Ocean from Southern California to the Hawaiian Islands has been spanned on 220 Mc! The names, calls, locations, power levels, mode of operation and the propagation medium are the same. Only the band and date are different.

On June 18, after months of preparation, Ralph Thomas, KH6UK, began tests on 222 Mc., with John Chambers, V6NLZ, listening. Making contact nightly on 14 Mc. c.w., as in the 144-Mc. tests of 1957, KH6UK would change over to 222 Mc., keying his 1-kw. rig automatically while W6NLZ listened. This procedure was followed for nine months before the first breakthrough on 144 Mc., but success on 220 came on the fifth night of the tests.

John had seen the inversion layer clearly up against the mountains back of Santa Monica Bay, as he drove up the winding road to his 110-foot elevation atop the Palos Verdes escarpment the night of June 22. This was the tip-off for the 144-Mc. contact, and it worked again on 220. When Tommy changed over to 222 Mc., shortly after 1930 he was heard almost at once. There were to be some agonizing moments before it could be made a two-way QSO, however. Signals came through erratically at first, and conditions were not too good on 14 Mc., so that all told it took some 45 minutes for W6NLZ to get the information through to KH6UK that he was being heard. Even after this was done a two-way on 220 eluded their grasp until 2130 PST.

During this two-hour period the signals on 222 Mc. were in and out, peaking up well, but dropping out completely at times. After 2130 things steadied down, and soon the QSO was going in almost routine fashion. W6NLZ reports that KH6UK reached S9 peaks, and much of the time for the last hour of the QSO the signal was quite steady. Using a converted KWS-1, running 750 watts input, W6NLZ went over to s.s.b. at one time and his signal was copied solid at Kahuku. KH6UK had no means of applying modulation, so there was no voice two-way. The QSO lasted until about 2220 PST.

Equipment used in this work was put together as a cooperative venture on the part of the principals and several other v.h.f. men. KH6UK ran a kilowatt to a pair of 4CX300As, feeding an array of 4 long Yagis stacked with 2-wavelength spacing in both dimensions. His converter was built by W6BAZ, and ahead of it was a parametric amplifier by W6AJF. This last item is described in our lead article this month. W6NLZ used the much-converted KWS-1 that serves him so well on both 50 and 144 Mc., enabling him to use either s.s.b. voice or c.w. on 222 Mc. His antenna was a pair of 11-element Yagis a mere 20 feet above ground. The converter was by Tapetone — and, incidentally, John won it in Tapetone's contest, results of which were announced in April QST. He also has a parametric amplifier, but was not using it at the time. The frequency at both ends was 222 Mc. This is used in preference to the customary low end spot, in order to avoid various forms of QRM prevalent in the Los Angeles area.

As with their success on 144 Mc., KH6UK and W6NLZ have done something unique in the annals of v.h.f. communication. There is no other record of v.h.f. propagation of a tropospheric nature over anything like this distance, and no known use of frequencies even as high as 144 Mc., let alone 222 Mc., over distances of more than 1700 miles. Another notable page has been...
Sporadic-E DX on 144 Mc.

Not since June 10, 1951, had there been anything like it. On that date, the 2-meter band opened between Northern Texas and Southern California. Dozens of contacts were made by canted W6s and W6s, and the 1400-mile record that stood until 1957 was set. There have been a few scattered instances of sporadic-E skip on 144 Mc, since, but they have been so short as to provide almost no opportunity for DX contacts.

This year, sporadic-E season started off with a bang. There were more openings, stronger signals, shorter skip and more double-hop propagation than in any year for some time. Then along came the night of June 17. Observers on 50 Mc, noted something hot, W4LTU, Springfield, Va., heard a station in Ankeny, Iowa, working another in Southern Illinois, under 250 miles. Knowing that theory indicates that a skip of 235 miles on 50 Mc, means that the m.u.f., should reach 144 or higher, Walt was in there trying. He heard DX on 50, but he still felt uncertain. So he had been able to work into the Denver area. VE5AQG, near Toronto, heard double and single hop all through the evening. Reg worked 7 Southern California stations on 50 Mc, between 1858 and 1917 EST, and he observed that there was some extremely short skip in the same area noted by W4LTU.

On 144 Mc, W2ORI, Lockport, N. Y., saw evidence of QRM on all TV channels through 7, and logged some DX on the go, band around 100 Mc. At 2100 EST John heard W5YYO, Fritch, Texas, near Amarillo, coming through weakly on 144 Mc. The two made contact at 2145, with 80 signals, and John heard several other DX signals not completely identified. W5YYO worked VE6s AE2 ELA DAA AQG and W2ORI. W5SFW, Amarillo, had only a folded dipole for 144 Mc, and that flat on the roof, but he still heard VE2ELA VE3AQG VE3DIR and W2ORI, all about 1350 miles distant. Phil also spread the news on 50 Mc as rapidly as possible, and had his calls on 6 were responsible for some of the VE6s being on the job on 2. He heard the same short skip near the mid-point of the path as was reported by other observers. Other reports we have to date: VE3DIR worked W5YYO and heard W3SFW. W3SFW, Amarillo, worked VE2ELA VE3AQG and heard VE3DIR and W2ORI.

Not only was this one of the longest and best 144-Mc. sporadic-E skip openings on record, but it also reached into the highest latitude yet recorded for 144-Mc. E6 in this hemisphere. Probably the farthest north work previously by this mode was when W8WXY, Manshold, Ohio, worked VE5YV, for what was then the 2-meter record, 1200 miles. One more contact, all 144-Mc. E6, DX reported until this year was below the Mason-Dixon Line.

Notice that we qualified these statements with "in this hemisphere." The principal reason for this was that on June 15 there was sporadic-E skip on 144 Mc, in Europe. EI2W, near Dublin, tells us that his K1DB, Naples, Italy, heard in Northern Ireland and throughout England. 1SUS, Rome, also heard, though not so widely. Both stations worked into the English Midlands, and 1KDB was heard over distances up to 1500 miles. Also included in this note from EI2W was the information that Harry worked into Copenhagen, Denmark, 500 miles, at 0500 GMT June 14. This was a tropospheric contact, and it is the first on 144 Mc. between Ireland and Denmark.

One more report is on file here that looks like sporadic-E skip. We can't be too sure of this one, for it does not fit the E6 pattern as well as the others. At 1745 EST June 11, W1LMZ, Concord, Mass., heard W5HOT, Greenville, Ill., working W5EL, near Miami, Fla., in adjacent states.
An outstanding 220-Mc. station of the Los Angeles area is K6GTF, Arlington. Bill has worked W7EE, Parker, Ariz., a 240-mile mountainous path.

with interested parties, and he urges stations north of Florida to aim his way and watch his frequency. He and CE1ZZ (144.9 Me.) call CQ nearly every night from 2005 EST on, using cw and phone, and F5LNL, Paris, France, CO2YV worked K6GTF and W4PWI: Key West, W4EFL, Homestead, W4RW W4FPL W4XL K4PMP and W4N4L, Miami, and W4GJO, Sarasota.

Mysterious sounds on 144 Mc. reported by W8JG, Hub- hard, Ohio; noise tick, about 1 per second, with some misses, heard by stations as widely separated as W8GCS, Warren, Ohio, and W3RUE, Pittsburgh, Pa. It was heard between 2100 and 2300 EST May 19. There was a slight peak in level with beams W8W. Any more on this?

Though much of the country had the worst possible conditions for the June V.h.f. Party, parts of the South and Middle West had wonderful tropospheric propagation. This came close to the end of the Party, and ran over into the following morning, as witness this list worked by W4TLV, Demopolis, Ala., beginning at 2212 CST: W8BTG W8OTIP and W9FY, Lincoln, W8MAY, Passaic City, N.J., W8N1, Pleasant Hill, Okla., W8OZK, Winfield, W81AJ, Kansas City, Kan., K9CTH, Duane, W9P2, Ponca City, W9HXX, Watonga, and W9NC, Blackwell, Okla. Barry thinks that the W9BTG and W9OZK contacts may have been the first on 144 Mc. between Alabama and Nebraska and Kansas.

220 and Up

For several years W2AO, Brooklyn, N. Y., was hammed in the use of his favorite band, 220 Mc., by a peculiar kind of interference. It sounded just like receiver noise, but it was tunable. It idled out weak signals in the first few hundred kilocycles of the 220-Mc. band, which in the Northeast means all weak signals. The noise came in on the antenna, but no sharp bearing could be obtained for it.

Every visiting ham, including your conductor, was given a chance to solve Marv's problem, but all failed. What kind of noise could be tunable, and yet not respond normally to rotation of the beam? W2AO tried everything he could think of, including calling FCC, but he got nowhere for a long time. Finally he got FCC action, and after some considerable effort the culprit was located. Cover the next paragraph and try to guess yours.

When the source of the interference was found, it was so obvious that everyone who had been baffled by the evidence was ready to kick himself for not having solved it on the first try. The noisemaker was a super-regenerative detector-naturally. What else? And it was in a door-opening device. Don't ask us why it had to be poked on the low end of the 220-Mc. band, but it was. It was so broad on Marv's beam because it was almost below it.

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<th>50 Mc. WAS</th>
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<tbody>
<tr>
<td>1 W2JBJ</td>
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<tr>
<td>2 W8RJ</td>
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<td>3 W8CI</td>
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<td>4 W54JG</td>
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<td>13 W90D9</td>
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<td>14 W5329</td>
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<td>15 W5320</td>
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19 W30JU 21 K6EDX 22 W5QMP 23 W5CMH 25 W50Q 27 LU30CA 20 W30JU 21 K6EDX 22 W5QMP 23 W5CMH 25 W50Q 27 LU30CA

VEXCN 45 KE1G 20 Z5RJ 26 SM8CH 20 K7JUV 44 RE4B 20 L1DC 26 EE1F 42 SM7Z 29 Z5RJ 26 VQ6CL 18 K64Q 39 SM8AN 29 OT2C 26 J4ARO 18 E94V 37 SM8BT 22 L3E7 21 JA5S 17 VE9H 41 CO2Z 27 LB8GA 20 JA1AHU 16
2-METER STANDINGS

<table>
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<tr>
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<td>W2BWJ</td>
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<td>146.000</td>
<td>W2BWC</td>
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*With the Clubs and Notes*

The Midwest V.H.F. Club of the Chicago area announced its V.H.F. Man-of-the-Year Award at the National ARRL Convention at Galveston, Texas, June 19-21. The award is given each year to the v.h.f. man or men who have contributed most by the advancement of the v.h.f. cause, in the opinion of the judges. The 1959 award was given jointly to Walter J. Bain, W4ULT, and Ross Bateman, W4AO. Primary factor in this choice was their series of successful "New Thresholds" V.H.F. and U.L.F. Receptions," in QST. W4ULT was also cited for his fine work in promoting meteor-watcher communication on 144 Mc., and W4AO for his moon-reflection experiments on 144 Mc. in conjunction with W4GJK. Both are long-time v.h.f. enthusiasts of the highest caliber.


The Keystone V.H.F. Club of York, Pa., announces a Hildersbaum Award, available to anyone who works 12 of their members on two or more v.h.f. bands. Endorsement stickers are provided for 50, 144, 220, 430 and 1215 Mc. and up. More information from W3KHIC, Awards Secretary.

Six-meter activity is maintained at a high level in the Dallas area through the efforts of the 6-Meter Club of Dallas. KS3BQ writes that at a recent club session an engraved plaque was presented to Gene and Mina Hahn, W5HOD and W5HOI, who are now moving to Amarillo. They were cited for outstanding service to the v.h.f. cause in their jobs as Net Director and Social Director, respectively.

**OES Notes**

**KIHU,** Farmington, Conn. — Heard XE1GE on 50 Mc. at 1645 EST June 2, when no other DX was coming through. Ham TV station nearing completion.

August 1959
SIDEBANDERS in SKIRTS

By Dorothy Strauber, K2MGE

Single sideband operation is very similar to marriage in that, once you have gotten into either, you want your friends to follow your example! That, probably, is why one gal is convincing another to join the ever-growing group of YLs who now operate s.s.b. About three years ago when I first started operating s.s.b., there were only a few regulars, Nita, W0ZTH; Helen, W8SPU; Lenore, W6NAZ; Mary, W1CEW; and Helen, W1PTT. We tried to hold a YL s.s.b. net every Wednesday, but because of the wide divergence in district, this proved unsatisfactory. So we had to content ourselves with as frequent individual contacts as possible. Because of the nature of s.s.b. with its voice control, ease of break-in and ability to get through where other modes of communication could not, it was quite easy to contact our "pioneer" gal sidebanders. And we enjoyed many roundtables with the gals reigning as "mistresses of ceremonies" — a condition which still exists today. Because we're still rather scarce on s.s.b., listen to a gal calling "CQ" and see how quickly a roundtable gets started.

Sideband, to its many devotees, is infinitely more enjoyable than other modes of communication because, despite even the recent crowding, the QRM is never as bad nor as objectionable as it is on a.m. or c.w. The absence of carrier heterodyne is a blessing to the ears; the narrowness of the sideband signal enables you to move up as little as one or two kcs. if there is interference from a neighboring station; and, most important, if you can't be copied with ease on the upper sideband, you can always switch to the lower sideband.

Another aspect of sideband that appeals to the gals is the simplicity of working DX stations, and not only working them once for a new country, but being able to chat with them time and time again as an old friend. I have held regular schedules with Jane, OQ5IE, in the Belgian Congo for about nine months, during which time K2TEX of New York City shunned her OM's (W2CMM) hobby for twenty-five years until the day sideband equipment came into the Binger household. Now one of the most active of the YL sidebanders, "Kitty" has worked more than 70 countries within a few short months. Thanks to single sideband operation, Kitty says, she uncovered the fascination of amateur radio for herself.
DX fishing is a daily pastime of well-known OQ5IE, Jane Hiernaux of Stanleyville in the Belgian Congo. Jane was probably the first YL to go on a s.s.b. DXpedition when she made a recent trip to Uganda, VQ5 land, for some sideband operating from a new locale.

which time we have chatted with each other every Wednesday for at least two hours at a time with neither one of us missing a word that the other has said. For those who like to chase DX let them be impressed by the example of Meredith, W6WNE, who recently received her license. In the short space of six months she worked DXCC on single sideband!

I had mentioned earlier the small group of YLs who formed the nucleus of “sidebanders in skirts.” They, of course, have been joined by many times their original number. K9EBA, Gus, who has set himself a goal of YLCC on s.s.b., has already worked 88 gals. To be sure, this is just a small percentage of the more than 4,000 girls who are licensed, but the number keeps growing every day. Probably the expense of changing over from present to sideband equipment is the major factor thus far in limiting the number of YLs on s.s.b. Also it is possible that unfamiliarity with tuning s.s.b. has contributed somewhat to the small percentage. If the latter is the case, may I point out that you can tune s.s.b. with most any receiver. Simply turn the knob to the c.w. position, turn the b.f.o. one and a half ke. to the left for upper sideband (which is used on 10, 15, and 20 meters) or to the right for lower sideband (in use on 40 and 75 meters). With a little sensitive adjustment, this should simplify the tuning process and enable the gals to listen in and enjoy amateur radio in its finest form.

Some of the YLs I have heard most frequently on s.s.b. are W1ZXT, Jo; W2LHK, Aileen; K2TEX, Kitty; WA2AVB, Charlotte; W2SAP, Shirley; W3CUL, Mae; W3GEN, Andrea; W3IOQ, Else; K4IRV, Rinnie; K1IRL, Inez; W4BIL, Fran; K4DNL, Olivia; K1ZWW, Jo; K5QZC, Priscilla; K5SPD, Mary; W5BJU, Harriet; KS5IZ, “Al”; K5IKF, Gil; W6NAZ, Lenore; W6WNE, Meredith; K7EYL, Sally; W8SPU, Helen; K8IGG, Anne; W8FJU, Mary; K9MET, Grace; K0OBF, Corn and W9ZTH/9, Nita. My apologies to the many other gals on single sideband who have not been included; I operate mainly on 20 meters where some of the districts are not heard due to skip conditions, and I've not had the opportunity to bandhop and meet the gals on the other frequencies.

Single sideband may be new but it has proved its worth as a superior means of communication over and over again. It has been said “never underestimate the power of a woman”. We feel that if you gals listen to sideband, you won’t let the OM rest until there is a change of equipment and you join us. And what a hearty welcome you’ll get! See you on s.s.b.!

WAC-YL Note

After August 15, applications for the Worked All Continents YL certificate issued by the Young Ladies Radio League should be mailed to custodian Barbara Houston, K0LYV, General Delivery, Richardson, Texas.

K8IGG, Anne Allen of Ypsilanti, Michigan, uses a 20A, Thunderbolt final, Drake receiver, and 36-element beam, giving her one of the most powerful signals on s.s.b. Anne is the XYL of W8JAU.

Coming YL Get-Togethers

YLRL Convention

Dates for the third international convention of the Young Ladies Radio League have been set — June 17, 18, and 19, 1960! The Women Radio Operators of New England will serve as hostesses, with Onie Woodward, WIZEN, and Millie Decena, W18VN, as co-chairmen. The convention will be held somewhere in the Boston, Mass. area. Details given here as they develop.

ARRL New England Division Convention

New England’s big ham event, Labor Day weekend, Sept. 5 and 6, will be held at the air-conditioned Hotel Statler Hilton in downtown Hartford. For YLs, in addition to the usual convention attractions, there will be a fashion-show luncheon in the glamorous hotel Terrace Room, a Sunday morning “brunch,” and a meeting of the Women Radio Operators of New England. For XYLs there will be
A special suite of rooms set aside as ladies headquarters will afford comfortable lounging and leisurely ragchewing. See page 10 in this issue for registration information.

Kudos

Some of the information which appeared on page 93 under "Traffic Topics" in the June issue bears repeating in this column. In summarizing the record of 1958 BPL traffic handlers, two YLs figured so prominently that it is with pride we point again, on this page, to their inspiring contributions to ham radio.

For the third straight year Georgianna Mezey, W2KEB, has been "traffic champ". Georgie's staggering record reads 478 BPL points for 1958, 345 for 1957, and 282 for 1956. (See article reference above for explanation of BPL points.)

Mae Burke, W2CUL, placed second in BPL totals with 302 points. Mae has the distinction of having made BPL 14 times in 12 months by virtue of making it twice from her Florida location, in addition to making it every month from her home QTH in Morton, Pa. In 1957 Mae received the Fifth Edison Radio Amateur Award in recognition of her outstanding work in traffic handling.

Another YL on the list of the top ten BPLers for 1958 is Bertha Villits, W0LGG, who placed eighth with 164 points.

In an "all time" (post-war) list of the top 25 BPL members W3CUL had better than a two-to-one lead over the OM who placed second — W3CUL, 3170 points; W4PL, 1770 points. W2KEB is sixth with 1376 points. Other YLs recorded among the top twenty-five are W2MJA, Peggy Coulter, and W2RUF, Clara Reiger.

Leis and lots of orchids to our top YL traffic handlers for their enormous, unselfish devotion to public service through amateur radio. We can only wonder how they do it.

New Certificate

The Women Radio Operators of New England YL club offers a new certificate for confirmed contact with six WRONE members. Three of the New England states must be represented in the six contacts. All contacts must be made after May 1, 1959 on any band, and contacts must not be made during a WRONE net. QSL cards should be mailed to custodian Isabel Bunney, K1EAV, 47 Pine St., North Billerica, Mass., accompanied by a self-addressed envelope with sufficient postage to cover their return and 10¢ to cover cost of mailing the certificate. Contacts must be made from one location, with the exception of Maritime Mobile stations. MMs need only work the specified number of contacts, as Rule 1 states, while maritime mobile. A sticker will be issued for contact with WRONE members in the three states not listed initially on the certificate.

Floridora YL

If you have contacted any of the Floridora girls of Florida, you have probably seen their novel "buttons-and-bows" stamp. The Floridoras have put an added touch of femininity into their hamming by using the stamp on QSL cards, club certificates, on three inch ID buttons to be worn at hamfests, and on skirt material. Contact ten Floridoras for your copy of the attractive club certificate.

New York YL

Howard S. Bradley of Hamilton, New York, is a man who obviously has a way with women. W2QHH's technique and persistence have earned him the novel distinction of being the first OM to confirm contact with 1000 YLs. When he recently qualified for YLCC/1000, Howie added still another honor to a collection of awards and certificates which is probably the greatest in all hamdom. As W3VLD states in his Ham Register, W2QHH is "one of the most certificated hams if not THE most certificated in the world." See the May-June issue of YLRL Harmonies for a feature story on the man who will be glad to talk to a few thousand more YLs anytime.
CONDUCTED BY ROD NEWKIRK,* W9BRD

How's DX?

Complications and confusion encountered in the pursuit of primary QSO-certifications (QSLs) are a never-ending conversation-piece among the DX fraternity. Witness, for example, the steady expansion of "Where" chatter in these monthly DX reviews. "Bill and Jim got their QSLs from ST8YL, but I didn't — and I worked her first." Woe! But that's the way the cookie sometimes comes apart.

It's not surprising that similar difficulties show up in collecting secondary certifications — "awards". Here's a typical expression of distress received some time ago from W2BUJ:

... I was forewarned about the delay involved in obtaining [a certain certification] but I was not aware that correspondence on the subject might be ignored entirely. I am "burned up" because I now find that W3MDE has had a similar experience concerning refusal of credit for one of his cards. He responded by submitting one of his two T2PG QSLs.

No answer to this. Further inquiry resulted in the sponsor's statement that the additional card was never received, so he sent a second T2PG card. After some eighteen months the certificate finally arrived, but no T2PG card was returned. Two more years have passed and still no word on the T2 QSLs. Now I seem to be in for a similar deal. Can anything be done?

This is tricky caveat emptor stuff partially treated in our December 1956 "How's" commentary. The cluttered realm of non-ARRL communication certifications is an interesting source of colorful shack wallpaper but it's a field frequently fraught with frustration. Applicants for such diplomas necessarily subject themselves to the administrative capability of sponsoring groups or societies. Add to this formidable variable the risky vagaries of overseas mail.

"Can anything be done?" Well, prior to filing for a given certification, much exasperation might be avoided by consulting with someone who has recently done the same. Experiences of others can properly encourage or discourage you as the case may be.

We follow a somewhat doleful theme with another thought for your midsummer meditations. It's the probable degenerative effect that a decreasing sunspot count will have on future DXpeditionary activity. ZL3DX, for example, ran into mediocre propagation conditions on his recent operational tour of rare Pacific areas. Late reports from a few European and African DXers indicate similar radiational unpleasantries.

Fingers crossed for the impending Seychelles sortie of WOA1W and VQ4ERR!

Much of the incentive for costly week-end junkets to remote points will be lost when chances of blank log pages loom large. But do we underestimate scientific progress toward enhancing ionospheric refractivity? In time to come our most ambitious DXpeditions may shrewdly synchronize their activations with operations of the Argus and Smokepuff type. Crazy, man.

What:

A general skittishness and some jarring facades color our DX propagation picture for the summer of 1959. Rarity multipath openings on 14 and 21 Me. bewilder the beam bunch, while at the 28- and 35-Me. extremes of our long-haul spectrum we see the holes borne separated from the men. Taking the broad view, however, conditions remain darned good, especially in the opinion of those who can recall the ionospheric famine of 1952-'54. So reports from the "How's" team indicate a continuing high level of activity and proportionate results.

20 phone perks up as the 10- and 15-meter puddles become summer shallows. BVIUSC (11,160) 14 GMT, CN28E, CR2s 6AK 9AH* (303) 10, GT2Ah AY 23, E9A9Z, EL35A, ET2USP* (317) 22, FBCP (180) 6, FQKAE (126) 5, FY7Z* (345) 23, H45s AM KBR, HIFs H2B 2Y 2Y, FK6AI of San Andres, HILXK (150) 13, H9E2Z, H12AB*, KAI 2AA 2DS 2DY 26Y 24A 2BC, KB8BH, KQ4USG, KG9s 44A 4, 4AL 6AY 6AKA, FJ6BV, KM6BJ* (270), KG6CA* (360) 10-11, KX6s AP RT EA, KX6NA (285) 10-11, LX1DV, L22RKA, MP4s RBA* (380) 23, DAE, O440G* (310), OD5s AB (158) 4, AU CA, OK6CAV* (300) 19, SPS 4GZ 5H1 5ST, NUKA (150) 10, W8YBT, TGs 7CB 9US, TEIT25, UALs 88TU 8DX 83E 6SU 6QS/6QI STHW, VKs 9AA (177) 14, 9AD* (309) 10-11, WY8 BUCC* (310) 11 of Mackenzie. VPs 8DH 2KR S8R* (310) 4, 8RN 8DC, VQs 2GW 2, 5PB* (309) 19-20, VRCC (175) 9-10, V58 6AE (175) 14, 9AH* (225) 3, 4WQGM/KS4, XE8JD, XNR8AL (123) 13, YO7s CV CY, YUYL* (330) 20, Z6s 1AH 2A, ZG4s CS 2, GT, 4X4s AS IF, 5As 2CY STY, 9G1BG* (368) 0-1, 9Ks AM* (304) 21, AZ (180) 3-4, 9M2s LG (188) 15 and UA (150) 14 are designated workable by 14-Me. A3 investigators W2s CV7* (GRC (185 worked), HJM*, W1HU, K1FEA, K6LAE, K2IK, K0GIR, CQ1BJ, K12TG) (14 (30 worked/confirmed on phone), VEs 1PQ and 3E1L. Asterisks, as usual, represent single-sideband action.

*4822 West Bertrans Ave., Chicago 41, Ill.
OTG/6 TEA (80/43), K5s HFT QJA TER, VV6KG, K6-LAE wonders if anyone else has claim to a

15 Novice frequencies find the crows clinging to many an item that would go well in any General's log. We hear from KW6 3GTP (12/17), 3HWT 80 MF UMC, and SINGAL who has a machine with the communication complexity of a sailing ship. 28K 8G 8TG 8JE, C55A (58/14) 8JE, DMs 2ADC 2AEH (58/14) 8JE, K5s DCL EFI IFJ IIK, K3s DPO, K4s DRO IGD 1C3 c.w. bears up admirably with W1CTW (157 on 21

10 phone sweats toward the north-south propagation path but periodic east-west openings still eddy 28-Mc. regulars. KIEF FY2s 2GBC SQR (115/14) 8JE, COZK and EL4A traded audio with G9s 26C 7BD7 7TK, ZBIFA (9) 23-0, ZC4s CS JC, ZDs 2GUP 2HHT 20, 2VPF 14, 2AGK 3KQN, DUs 1DR (82) 14, 1MFH 1RT1 6IV 7SV, 9AM (82) 4, CT2BO (15), CX6AD (50), DMs 2ADL 2AGB

40 s.w.‘s immediate DX future seems bright, indeed. This year sees the liveliest 7-Mc. summer in a long time. The rainfall churns this for W1YIS, K9I1LW, K4IVG, K10ID, K5s JFT QYA TER, W6KG, K6LAE. KIEF FY2s 2GBC SQR (115/14) 8JE, COZK and EL4A traded audio with G9s 26C 7BD7 7TK, ZBIFA (9) 23-0, ZC4s CS JC, ZDs 2GUP 2HHT 20, 2VPF 14, 2AGK 3KQN, DUs 1DR (82) 14, 1MFH 1RT1 6IV 7SV, 9AM (82) 4, CT2BO (15), CX6AD (50), DMs 2ADL 2AGB
Real cool, cats. Our QTH of the Month is South Orkneys Base "H", Falkland Islands Dependencies Survey, currently the quarters of VP8DT. You can credit W9WHM for tombunting you with this lovely hot-midsummer-night’s dream.
cent of all this is just not true. At the moment I have cards for seven such countries waiting to go off. Since first be-
ing an amateur in 1924 I have always sent cards for all QSOs but now this resolution has been made: Unless I get a card, no card will be forthcoming from me. I cannot afford unnecessary expense now that I am retired from professional life."

KRDQ, a relative newcomer to DX ranks, finds IRCs no panacea for slow QSL returns. John would like to work 10 metric tons of QSOs per month. He has found a way to obviate the need for certified proof of QSO when filing for secondary certifications. Any ideas? Until the right scheme comes along, K2YV recommends WR4AW's DX Stamp Service (p. 76, April QST). "It surely works!"

Concerning his QSL labors on behalf of VP2KJ, W8MX8 writes, "I'm using the usual set-up, i.e., for Stateside contracts post immediate replies, foreign applications with IRCs enclosed are answered by air mail, and all others go through the QSL bureau. Never having operated 15 phone, KSKAV's receipt of an OQRS4S confirmation leads him to suspect that his call has been pirated. Serveys lays it to poor phonetic-identification by someone who could dearly use that QSL. V01H1 should be flipping F9AVT switches right about now. "All cards received will be QSL'd and should go to my home address." K5LAE recommends profuse use of fresh-off-the-press U.S. commemorative stamps on your outgoing QSL-sending mail. Good idea, for it's an odds-on reposition that stamp collectors lurk in the family circles of most rare-DX ops.

K5JVF fears that those holding their breaths for 7-Mc. HH2HB cards will never make it. And we'll never make it if we don't get right down to QTH cases, like so:

BVIUSG (see preceding text)
BVIUSG, Navy 803, FPO, San Francisco, Calif.
C6BAG (via CE3BIL)
CPSJF, P.O. Box 507, Orulu, Bolivia
CEJL, Box 1166, Cochabamba, Bolivia
DL4KL, E. L. Bowes, APO 109, New York, N. Y.
DL9HX, E. Glaser, Wolfsraatbroer 29, Augsburg 10, W. Germany.
DK9AVN, H. Adler, Box 37, Straubing 1, D.D.R.
DU1MPH, Fred Salas, Box 3440, Alancila, P. I.
E190D, via W2KUW
K69DG (via URE)
K7JBP, B. J. Bryant, 1015 KJQG, USA MESC, APO 843, New York, N. Y.

PB8A XX ZZ (via F8BBG)
ex-F8BBG (via FZ8QW)
F8BBX, Challome, Box 6080, Dakar, F. W. A.
FK8AW (via WZC7N)
FP8MP (via W2GQW)
FO8AP (via K5QDQ)
F84FWD, Box 806, Brussuale, Brux., F. R. A.
F84ZD, Box 59, Tampoon, Reunion Island
H15ASD, D. A. Heron, Bogdani UT-24, Bl-I, Budapest 3, Hungary
H15JLI, P.O. Box 691, Quita, Ecuador
H15CBO, P.O. Box 55, Cuenca, Ecuador
H15AIMY (via H15AIM)
K6CGO (via K5QDQ)
K670B (via preceding text)
KL7LA, Bill Hunter, Box 488, Nome, Alaska
ex-K670F (via W7LQ0)
K67GUS, VU3-WPD, Navy 8387, FPO, San Francisco, Calif.
ex-LA5SQ/P (via LA5SQ)
LA5PI (via W8AQ8)
PAB3R, D. Vermeulen, P.O. Box 19, Best, Netherlands
P8AC (via VE3HBD)
P8N4L, P. Terran, Box 1455, Curitiba, Brasil
T61F666, 33rd ACWRON H-3, APO 81, New York, N. Y.
T81PZ (via K8DQ1)
UR2BU, Karl Kellenem, Obslant 691, Tartu, Estonia S.S.R.
V01FQ (via VP2G)
V02AR, Hood St., St. Johns, Antigua
V02GAK (via VP2GW)
V05RO (via VESMR)
V06JW (via K6LFFY)
V09EP (via V779BD8)
VO4PM, W. F. Smith, Box 513, Nairobi, Kenya
er-V52JIF (to G3WILP)
er-V581PB, M. Fonder, RA8 FET, Labuan, No. Bornp
V580S, G. Scott, Soans College, Bruneil Town, Brunei via Singapore
V91RMM (via W3KVQ)
VX3PB, G. Villalobos, Box 44, Reynosa, Texas, Mexico
XZ2AD, U. Ha Hoon, Inaya Rl., Rangoon, Burma
Y1JPE (via K6QOR)
VX7N (via W2CTN)
Y33WP, P. Fabrice, Box 81, Maribor, Yugoslavia
Y53AEB, 800, Box 1069, Sanabia Granada, Caracas, Ven:
Y53AFR, J. Rotellier, P.O. Box 2299, Caracas, Venezuela
Z53USA, H. H. Wiesler, FASHION (Spec) 201, Navy 210, Box 1, FPO, New York City
ZD6NJ, c/o R. Wilder, Box 576, Salisbury, So. Rhodesia
ZD9AK (via 8A11)
Z89US (via K66XX0)
ZS6AQA, S. Shapero, c/o W. G. Ley, Castle House, Jour-
gett St., Johannesbrau, Tvl., So. Afr.
ger-4S37GR (to G3WILP)
9G1BM, B. A. WillibrOard, P.O. Box 177, Accra, Ghana
9G1CZ, N. Semmens, Box 138, Dunkwa, Ghana
9N1AA, H. R. King Mahendra, Royal Palace, Katmandu, Nepal
9N1AR, H. R. King Mahendra, Palace, Katmandu, Nepal
All hall W9 F6 W98 TS. BK1, W2a AM6, CPH, HMI 331, JBL, K0UGY, W68 AXZ Q9B, GRB, W1JIT, K4TEA, W5JPC, K5JEF, W6 176 KPH, PoS CUF LAD, W74 M1, KAWH, W6X KX NOH, R1W1H, HKB6XU, OK1JJX, L. White, A. Hanks, Inflight (La.) DX Club, DX Club of St. Louis, Japan DX Radio Club, New York News Radio Club, Northern California DX Club, NZART, Southern California DX Congress, WIA, West Gulf DX Club and Willamette Valley DX Club for enabling us to assemble the preceding directory. Have you helped your listener lately?

Whence:

Asia—More on this Nepal thing from W1CJ via W1LYQ; Hla Majesty, King Mahendra of Nepal, intends to hit the air waves as 9N1AA at any time now with a Pace-maker and Thunderbolt on 10-, 15-, and 20-meter sideband. W1CJ's outfit, Advanced Enf. Company of Washington, a subsidiary of Cook Electric, Chicago, is installing a communications system in that country. Fine amateurish work at the ham level.

Ceylon jottings thanks to W2CDP and 4S7FJ: YL 4S7YL, Neat and solid sender with the breadboard model in the new look" comes courtesy W9YSX. Compare that with the "new look" that ZD7SA QSL cause. VF5FJ (ex-CH8QO) also must take another bow for many hours of labor contributed to the ZD7SA QSL cause.
ZP5CF now shoots for the 250-country mark with his 90-watt 807 rig, NC-173 and beams on 14, 21 and 28 Mc. Fred's wife, ZP5ET, also knows her DX onions. (Photo via W5ICQ)

Eurasian DXpeditionary objectives...

"For the record," writes OK1JX to W1WPO, "JT1AB, a Czech in Ulan Bator, inherited all of JT1AA's gear. Another station over there, JT1KAA, is a club affair working mainly on 7 and 3.5 Mc. without much DX possibilities. For would-be JT1KCB (W7QON) advises, "To obtain an Okinawa call it is required to hold a Stateside license and comply with necessary security regulations and installation requirements for the area in which the gear will be located..."

Through K66AE, BV1EUB emphasizes that third-party traffic on amateur bands in his area is taboo. MARS does a booming business, though, on adjacent channels.

K6G6OR discloses, "YA1PB came on with a.m. and then..." W6LJH bears he is the first Six to nab the Shizuoka A-2 certification.

"FA2ZD doing the administrative favors for this one...K9ACCH, at Dayton Dec. 28, APD 241, New York, N. Y., often scans the 20-meter phone band from his post in Turkey where he reports receipt of hooty signals from Wa 19CG on 14 Mhz. 28 Mc. and 4PVB..."

W9VCH, formerly of K4AS, is off to Japan again and expects to become a KA2 with c.w. and sideband, a KWM-1 on 14, 21 and 28 Mc. and then..." W61JH bears he is the first Six to nab the Shizuoka A-2 certification.

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The ham rig in Belgian African territories. I also hope to be ZD9AK's first long-path California QSO from Gough Is. " EA8CF tells W3QIR he's off to Spain for a year or two, and then..."

K6FK and VE3DMU chorus ZS6IF's plans for ZS7 ZS8 and S5. "EA9DG joined the Rio de Oro parade, while curious EAAD95 radiates on 14 Mc. from Ruanda-Urundi and the eastern part of the Belgian Congo at the beginning of Beptember," conveys OK1JX (W5PPT) to VE3DMU. I already have six mountain QSOs on 20 c.w. around 1300-1400 GMT, complains about tail-enders who start QRMing right after he establishes contact with some other station. He likes to chat and he threatens to blacklist mid-QSU breakers-in. Also, when he calls "CQ NO USA/JO" he really means it. It's factual; modern competitive pressures notwithstanding, the normal right of competitive DX types to work anyone as long as they please, has never been abrogated..."

North Borneo note from K16BXU: "VS1KB, a principal operator at RAF dhubber VE1GUZ, departs for ZG5 to work the small Tasmanian islands.

VE6BC, who will operate 144, 24, 28, 30 Mc. and 40 Mc. all bands, expects to work Dx hunters by the score..."

Africa—An apparent reshuffling in licensing procedures and requirements closed off most Einetria and Ethiopia amateur operation in late May, EFA 20S and 3X4 were exceptions..." K16A finds DX conditions quite good at Roberts Field. "Only a few days of dead bands and two rig breakdowns. In my first nine weeks as K16A I've 90/50 on 1263 QSOs. Also have three continents on 20 meters..."
Pan-Pacific Boy Scout Jamboree in Auckland this auring. ZL6GE will be an ARRL PTA member. W6GK GB MK QM MT of TB and VA rolled the ball from 3.5 through 50 Me., e.g., a.m., s.s.b. and radiotelephone. ZL6GS scheduled a nine-month holiday in Rarotonga commencing in June. CR10AAA's DX activity remains negligible because of illnesses and a heavy bread-and-butter routine.

Europe — WASM-seekers will be heartened at news via KZ3US. From 2230 GMT, the 16th of this month, to 2400 on the 17th, British stations will be on for DX trading. CQ-WK and indicating their lan (country) locations with appended suffixes. KZ3US claimed the second WASM diploma award to a U.S. Two and a half years ago, it was announced that the collection of Russian stations at 300 or so . . .

This month will see the 3rd Columbus Marathon Test setting a new world record for cross-country running. From 0001 GMT, August 2nd to 2359, October 12th. The object is for non-DXers to collect five contacts and vice versa on phone and c.w. So far as W7FJ is concerned, RSF's or RS's can be swapped with each 1st but once over this period, and one's final score is simply the grand total of contacts made. Further details on participation and a description of awards available, address inquiry to Associazione Radioteleonica Italiana, Genoa Section, Casella Postale 346, Genoa, Italy, attention H1MT. . . .

After his successful LSX6/P venture, DL7LP in WFRG and W8DIK in WI7D are favored with a flock of contest-type QSOs are in prospect. DXCC-seekers "will be heartened at news via W8KX. 20, 16 and 10 meters using c.w., a.m. and s.s.b. If conditions are favorable a flock of contest-type QSOs are in prospect. For further details on W8KX's QSOs, contact the QST colleague W1QON reports her brother-in-law, K2QXG clinched the second WASM certificate. W1QON indicates their lan (county) locations with appended suffixes. K2QXG was heard on 0001 GMT, August 2nd to 2359, October 12th. The object is for non-DXers to collect five contacts and vice versa on phone and c.w. So far as W7FJ is concerned, RSF's or RS's can be swapped with each 1st but once over this period, and one's final score is simply the grand total of contacts made. Further details on participation and a description of awards available, address inquiry to Associazione Radioteleonica Italiana, Genoa Section, Casella Postale 346, Genoa, Italy, attention H1MT. . . .

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W6GK GB MK QM MT of TB and VA rolled the ball from 3.5 through 50 Me., e.g., a.m., s.s.b. and radiotelephone. ZL6GS scheduled a nine-month holiday in Rarotonga commencing in June. CR10AAA's DX activity remains negligible because of illnesses and a heavy bread-and-butter routine.

Europe — WASM-seekers will be heartened at news via KZ3US. From 2230 GMT, the 16th of this month, to 2400 on the 17th, British stations will be on for DX trading. CQ-WK and indicating their lan (country) locations with appended suffixes. KZ3US claimed the second WASM diploma award to a U.S. Two and a half years ago, it was announced that the collection of Russian stations at 300 or so . . .

This month will see the 3rd Columbus Marathon Test setting a new world record for cross-country running. From 0001 GMT, August 2nd to 2359, October 12th. The object is for non-DXers to collect five contacts and vice versa on phone and c.w. So far as W7FJ is concerned, RSF's or RS's can be swapped with each 1st but once over this period, and one's final score is simply the grand total of contacts made. Further details on participation and a description of awards available, address inquiry to Associazione Radioteleonica Italiana, Genoa Section, Casella Postale 346, Genoa, Italy, attention H1MT. . . .

After his successful LSX6/P venture, DL7LP in WFRG and W8DIK in WI7D are favored with a flock of contest-type QSOs are in prospect. DXCC-seekers "will be heartened at news via W8KX. 20, 16 and 10 meters using c.w., a.m. and s.s.b. If conditions are favorable a flock of contest-type QSOs are in prospect. For further details on W8KX's QSOs, contact the QST colleague W1QON reports her brother-in-law, K2QXG clinched the second WASM certificate. W1QON indicates their lan (county) locations with appended suffixes. K2QXG was heard on 0001 GMT, August 2nd to 2359, October 12th. The object is for non-DXers to collect five contacts and vice versa on phone and c.w. So far as W7FJ is concerned, RSF's or RS's can be swapped with each 1st but once over this period, and one's final score is simply the grand total of contacts made. Further details on participation and a description of awards available, address inquiry to Associazione Radioteleonica Italiana, Genoa Section, Casella Postale 346, Genoa, Italy, attention H1MT. . . .

The object is for non-DXers to collect five contacts and vice versa on phone and c.w. So far as W7FJ is concerned, RSF's or RS's can be swapped with each 1st but once over this period, and one's final score is simply the grand total of contacts made. Further details on participation and a description of awards available, address inquiry to Associazione Radioteleonica Italiana, Genoa Section, Casella Postale 346, Genoa, Italy, attention H1MT. . . .

W6GK GB MK QM MT of TB and VA rolled the ball from 3.5 through 50 Me., e.g., a.m., s.s.b. and radiotelephone. ZL6GS scheduled a nine-month holiday in Rarotonga commencing in June. CR10AAA's DX activity remains negligible because of illnesses and a heavy bread-and-butter routine.
Here are the final standings of Montreal Amateur Radio Club's 1958 VE/W Contest held last September 27 and 28.

The top score came from north of the border, as VE2NX keyed the University of Toronto's VE3UOT to 132,108 points by virtue of 581 QSOs in 57 ARRL Sections. Other Dominion high-pointers: VE2IN 109,440, VE3QO 108,632, VE4SX 96,615, VE3AJU 96,564, VE3BXP 95,844, VE3BOH 81,324, VE3DDU 66,750, VE3DIH 63,600, VE3AXX 50,500.

Sacramento Valley's K6SXA paced U.S. entrants with 123,906 points. Other U.S. leaders were: KH4LP 93,429, W9NII 87,236, KO4LY 76,100, W9DYG 75,359, W5LCG 75,053, W9PZT 73,590, K2MWK 71,641, K0QIC 64,080, KH1TA 64,335.

The following tabulation was prepared by the MARC Contest Committee. The figure after the call is the final score. The amateur heading each ARRL Section listing earns a certificate.

**Maritime**

<table>
<thead>
<tr>
<th>Call</th>
<th>Score</th>
</tr>
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<tbody>
<tr>
<td>VE1ADH</td>
<td>63,600</td>
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<tr>
<td>VE1BEK</td>
<td>12,861</td>
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<tr>
<td>VE2NY</td>
<td>24,918</td>
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<tr>
<td>VE3J</td>
<td>10,779</td>
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<td>VE3H1</td>
<td>31,812</td>
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<td>VE3ZI</td>
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<td>VE3DB</td>
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<td>VE3AA</td>
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<td>VE3H3</td>
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**Quebec**

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<tr>
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<td>VE3EGG</td>
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<tr>
<td>VE3CEJ</td>
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<tr>
<td>VE3HPC</td>
<td>7,980</td>
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<tr>
<td>VE3DU</td>
<td>1985</td>
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<tr>
<td>VE3HRL</td>
<td>3186</td>
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<tr>
<td>VE3EL</td>
<td>893</td>
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<td>VE3AI</td>
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<tr>
<td>VE3H1</td>
<td>9094</td>
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<tr>
<td>VE3QC</td>
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**Manitoba**

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<td>VE4LJ</td>
<td>52,212</td>
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<td>VE4EJ</td>
<td>10,995</td>
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**Saskatchewan**

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<tr>
<td>VE5H1</td>
<td>39,904</td>
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<td>VE5QG</td>
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**Alberta**

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<tbody>
<tr>
<td>VE6H</td>
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<td>VE6T</td>
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<td>VE6Y</td>
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<tr>
<td>VE6H1</td>
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**British Columbia**

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<td>VE7EH</td>
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<td>VE7D</td>
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<td>VE7ACP</td>
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**Yukon/ N.W.T.**

<table>
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<tbody>
<tr>
<td>VE8TO</td>
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<td>VE8EJ</td>
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<td>VE8SI</td>
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**Indians**

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<td>W8CMB</td>
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<td>W8UAV</td>
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<tr>
<td>W8APH</td>
<td>32,499</td>
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<tr>
<td>K2HNT</td>
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<tr>
<td>W8AOE</td>
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<td>W8AQ</td>
<td>17,966</td>
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<tr>
<td>W8HT</td>
<td>15,920</td>
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<tr>
<td>W8FF</td>
<td>8303</td>
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1 Labrador winner. 2 VE2NI, New.

**Non-competing:** VE2GI, VE3CL, VE3UJ, W8IK, W8IF, W8EFM, K3CAN, K3APS.

**VE/W Contest—1958 Results**

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<td>K3BPQ</td>
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**Mad. Del. D.C.**

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<tr>
<td>W3KLA</td>
<td>50,782</td>
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<td>W3QG</td>
<td>32,608</td>
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<tr>
<td>W3IW</td>
<td>43,320</td>
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<tr>
<td>W3MSR</td>
<td>22,743</td>
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<tr>
<td>W3KCT</td>
<td>17,870</td>
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<tr>
<td>K3CQ</td>
<td>10,792</td>
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<td>K3CW</td>
<td>7,749</td>
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**S.N.J.**

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<tr>
<td>W3EXB</td>
<td>14,173</td>
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<tr>
<td>W3QDY</td>
<td>29,860</td>
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<td>W3CAP</td>
<td>3930</td>
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<td>K2HNR</td>
<td>10,981</td>
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**W.V.A.**

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<tbody>
<tr>
<td>VE3CWF</td>
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**Penn.**

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<td>W3NCF</td>
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<td>W3KCN</td>
<td>18,744</td>
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<td>W3FY</td>
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**W.V.Y.**

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<td>VE3MKW</td>
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<td>W3UHY</td>
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<td>W3USJ</td>
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<td>W3MES</td>
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<td>W3EWM</td>
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<td>W3TV</td>
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<tr>
<td>K2KCI</td>
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<td>W3PH</td>
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<td>K2MK</td>
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<td>K2UNR</td>
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<td>W3ASW</td>
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<td>K2CCF</td>
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<td>W3PW</td>
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**Illinois**

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<tr>
<td>W9NII</td>
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<tr>
<td>K9BLY</td>
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<td>W9PHT</td>
<td>76,562</td>
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<tr>
<td>W9PXR</td>
<td>63,814</td>
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<tr>
<td>W9LNOQ</td>
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<tr>
<td>K9IND</td>
<td>48,521</td>
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<tr>
<td>W9YGG</td>
<td>38,410</td>
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<tr>
<td>W9UL</td>
<td>33,190</td>
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<tr>
<td>W9LE</td>
<td>11,783</td>
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<tr>
<td>W9HIH</td>
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<td>K9AK</td>
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<td>W9DQ</td>
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<td>W9DQ</td>
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<td>K9DCF</td>
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<td>K9MIH</td>
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**E.N.Y.**

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<td>K2EJU</td>
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<td>K2PIC</td>
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<td>W2CIM</td>
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<td>K2EN</td>
<td>13,549</td>
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<td>W2TER</td>
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**N.Y.C.-L.I.**

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<td>W2QG</td>
<td>20,213</td>
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<td>K2QZ/6</td>
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<td>K2QX</td>
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<td>W2UIN</td>
<td>10,180</td>
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<td>K2AOV</td>
<td>2002</td>
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<td>K2EIQ</td>
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**W.V.Y.**

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<td>W8YX</td>
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<td>W8ZDF</td>
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<td>K9KW</td>
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<td>K9AF</td>
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<td>K9URG</td>
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<td>K9UI</td>
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<td>K9KBW</td>
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<td>K9HICX</td>
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**Wisconsin**

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<td>K9ALP</td>
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<td>W9RKP</td>
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<td>K2UOT</td>
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<td>W9CDD</td>
<td>47,650</td>
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<tr>
<td>W9CBE</td>
<td>22,600</td>
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(Continued on page 149)

August 1959 81
Editor, QST:

Occasionally in conversation with fellow amateurs or in letters published in our QST I note the expression "I am discontinuing my subscription to QST." What my fellow amateurs are really saying is that "I am withdrawing from our amateur organization," QST is our own magazine published by ourselves affiliated together as the ARRL and is a fine benefit of our membership and certainly in itself is worth more than the annual costs. ARRL is you and I and all of the other affiliated amateurs and we control our organization through the use of our nominating and balloting rights and privileges. Our ARRL is operated by and for all of us amateurs and those unaffiliated amateurs may well consider the benefits to us, daily, in our varied ham interests as we are competently represented in our activities by an efficient staff. In their own selfish interests all amateurs should band together and affiliate in our ARRL for the protection, promotion and benefit of our ham-activities. Participation in the organized activities of local radio clubs is also most desirable. The more who are members the greater the benefit to us and as a group. Our ARRL is not a commercial organization interested in profits as such but is a non-profit service organization to the amateur.

— James L. Fitzgerald, Jr., K40JlE

'TNX
K40BJ, Airbarson Two Midway Detachment Navy 3080 W.P.O. San Francisco, California

Editor, QST:

I would like to express my sincerest gratitude to all amateurs the world over . . . to the wonderful guys who have stayed up late, gotten up early, missed their own appointments so that we here on Midway can talk to our loved ones . . . to all those who magically made QRM disappear where there wasn't a "hole" to be found.

You can't realize how very much it means to us. Not just here, but on Kwaj, Guam, Okie, and Adak just to name a few. During the war everyone knew the boys were away on all those little rocks in the Pacific. Now that the war is over, not many realize that there are still men keeping these stations in wartime readiness, thousands of us separated from those we love, usually for more than a year.

Even with the wonderful recreation, life here is at best boring. The major morale booster is that "ham shuck." You should see the joy and happiness it brings a man when he can talk to "Mom," or perhaps his wife or sweetheart. I just can't describe it. I can just say, "thank you all ever so much for all of us." . . .

— George H. Morton, W4HUP

TEN KW. AND CHOICE BANDS
5980 Leeland Road East Petersburg, Pa.
Editor, QST:

The article "Russia's Electronic 'Iron Curtain' " was excellent. And this article brings up a number of points I think the League should pursue.

First, the ham bands represent a band of frequencies set aside for the use of the individual public. Any individual in the past, now, and we hope in the future, is free to use these bands by the simple expedient of taking an FCC exam- ination to prove their competence in radio laws, theory, techniques, and operation. As such, the ham bands represent the property of 170 million potential licensees — not just the 170,000 that some would have others believe. What other service can claim this number of potential operators? And because of this fact the width of the ham bands should be increased — not decreased.

Second, since the ham bands are available to the individual public, these bands should be choice bands, i.e., they should allow the best communication, distance and quality-wise, for the least investment.

Third, since interference is now evident on our present bands, it is desirable that our peak input power limitations be raised — at least on the 80- and 10-meter bands — to something at least in the order of ten kilowatts. This would appear reasonable considering today's equipment, techniques, practices, and the general rise in the technical level of the average amateur.

I'd be interested in hearing what others have to say.

— Fred Hammerand, WASUR

AN OMEM?

3721 Nineteenth Street, North Arlington, Virginia
Editor, QST:

. . . The other afternoon I attended the AFCEA convention at the Sheraton-Park hotel in Washington. In the lobby the Navy had set up a handsome and imposing ham station with two complete positions.

There wasn't a key in sight. Is this perhaps relevant?

— John A. Morrey, W4HEL

COMMON COURTESY

301 West Second Street Roswell, New Mexico
Editor, QST:

I want to harp a little on a subject that is a big gripe with all in the so-called "rare" western states who work on 50 Mc. — the nuisance of having midwesterners pile up on us when we try to work through them for a needed double-hop contact.

For example I need Delaware and Vermont for 50-Mc. WAS. If I call "CQ Delaware" anywhere from 25 to 50 Ws, W9s and W0s will pile on my frequency and start calling me. What chance have I to pick out a Delaware station who might be calling, if I have to listen to all of those who are not even in the so-called "rare" states. Common courtesy should forbid the answering of directional CQs by stations in other areas; at the very least, these fellows could give the caller a minute or so to look for the state or area he mentioned.

Whether he has five, 25, or 45 states worked seems to me to be a minor point. What's worse, I hear them breaking into the conversation with his neighbors — "Hey, I just found out I need Delaware and Vermont for my DX!"

— Ed G. Delan, K7A1W

(Continued on page 150)
RACES Frequencies Extended. Do you follow W1AW radio bulletins? If so, you will have heard in early June (by OBS 705) that FCC amended the amateur rules, effective July first to make certain additional non-exclusive frequencies available for the Radio Amateur Civil Emergency Service. For just what frequencies are earmarked for RACES uses consult the full listing of RACES frequencies in the latest-revised operating booklet or License Manual. The subject is covered also in Happenings, this QST. We mention this matter to forestall some questions from readers hearing RACES groups or scheduled tests in the 7103-7125 kc. (new) or other expanded or new band segments; there are some 6 kc. ones in 7, 14 and 21 Me. The text of the docket (Feb. QST) gives more details but we suggest that amateurs not completely familiar with the purpose, background and operation of this amateur service, note the editorial discussion, page 9, April ‘59 QST. The earmarking of these additional frequencies for RACES, after certain limitations in the earlier pattern became apparent, should enable those amateurs supporting RACES plans to do a better job in the event of need. RACES operators seek your understanding of their work. Also, your local AREC and RACES groups invite your enlistment in the challenging subject of planning and self-training to do useful public service things with our amateur communication.

What's for Novice and Technician Licensees? A current letter to the writer recognizes the popular appeal for new licensees in so many working for their ARRL CP certifications. We present to you below a current letter to the writer recognizing the popular appeal for new licensees in so many working for their ARRL CP certifications. These start as low as 10 w.p.m. and there are practice transmissions still slower. Also expressed was the fun in acquiring RCC (Rag Chewer's Club) accreditation and the pleasure as each card arrives piling up the evidence to use for a Worked All States ARRL (WAS) award. You can go places with all these just as soon as on the air with that precious first FCC ticket! But the letter concluded, posing the question, “What more now to work for??!”

Of course our advice, if you aim to get the most there is from amateur radio, is to keep headed toward that General Class amateur ticket, at all costs. One must first develop some know-how and his code, so he has the finest tools to go after every communication goal the book has to offer. Without the privilege of working all bands you are missing a lot. As for what-to-work-for, there are ample goals. If you don't believe us, order up a copy of W3RP's Directory of Certificates and Awards ($2 postpaid, in U.S.A. and Canada from Bill Clark, S Frances Ave., Harrisburg, Penna.). This gives rules for some 200 or more certificates.1 There is a certificate for about every kind of thing amateur ingenuity can dream up, from working five members of the Jayhawk club, or six members of a net to working 100 different cities in Japan.

OES Appointment Open to Novice and Techs. Eligibility for SCM appointments in many categories is properly deferred until operators have won their full scale amateur privileges. However, the Official Experimental Station post

1 Numerous listings are also given in the QST articles: Operating Achievement Awards, July ‘57 QST, and More Awards, Sept. ‘58 QST.
is one in the reach of both the Novice and the Technician Class operator. It gives recognition to the member who holds appointment and also furthers v.h.f. ARRL organization. You have to be a worker in a band or bands at 50 Mc or above and show consistent operating interest.

**Expanded Emphasis in OES Work.** With some pride the League notes steady increases in the number of OES. We recorded an 11% increase in '57 with a 14.4% further growth just last year. The operating booklet lists special objectives (for OES). These include monthly reports on results and propagation, the adherence to high operating ethics and equipment techniques, and a dedication to developing communications systems. In connection with this latter ARRL proposes that OES receive more credit for organized communications services, if and as rendered. We find OES already good supporters of the growing number of v.h.f. nets. From this point we want our numbers and service, including Public Service, to continue to increase to the credit of OES and Amateur Radio.

The current updating of Operating an Amateur Radio, including Public Service, to continue to increase. We find OES already good supporters of the growing number of v.h.f. nets. From this point we want our numbers and service, including Public Service, to continue to increase to the credit of OES and Amateur Radio.

**The Amateur Radio Pace, Hobby or Mania?** To get the most from one's Amateur Radio and yet to remain balanced is the essence of one of the points of our Amateur's Code! John Turner, W9GDI, in The Oscillator, of the Tri-Town Radio Amateurs Club, states the case neatly in a recent bulletin and we think a good many hams will agree. . . . He says:

"Since the war amateur radio, like everything else, has suffered the speed-up. Hams don't have time to learn much theory or construction. They get a license and drop into the nearest radio supply house for the latest gear. Some of these places will even include instruction in what switch to throw! Once the station is assembled, the high pressure operating starts. Don't make friends, don't rag chew, just rack up countries, points in SS, or whatever your ambition is, and don't worry about operating ethics. . . . Every other phase of our lives gets more and more regimented. Must our hobby suffer this same fate? It's my curse to have been bitten by the DX bug. New countries have been terribly important. Lately, however, I find that I can tune across a DX band, listening to the boys exchange RST's and move to 50 meters to chew the rag! When the day dawns that I can hear a new one, and still move to 80, then, I know that I'll have the mania cured, the monkey off my back, and we fun will be back in ham radio for me."

**FIELD DAY NOTE**

The Communications Dept. is on the lookout for action-packed 1959 Field Day photos. Got yours in yet? High claimed scores coming up in October QST.

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**W1AW OPERATING NOTE**

The complete summer schedule of the ARRL Headquarters station appears on page 40 of last month's QST. See that issue for information on when to visit W1AW, have a QSO, or copy the various bulletin transmissions that are made daily on phone and c.w.

**NATIONAL RTTY CALLING AND WORKING FREQUENCIES**

3620 kc. 7140 kc.

**CODE PROFICIENCY PROGRAM**

Twice each month special transmissions are made to enable you to qualify for the ARRL Code Proficiency Certificate. The next qualifying run from W1AW will be made Aug. 21 at 2130 Eastern Daylight Time. Identical texts will be sent simultaneously by automatic transmitters on 3555, 7080, 14,100, 21,075, 28,080, 50,900 and 115,000 kc. The next qualifying run from W6GWP only will be transmitted Aug 5 at 2100 PDT on 3555 and 7129 kc.

Any person can apply. Neither ARRL membership nor an amateur license is required. Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the six speeds transmitted, 10 through 35 w.p.m., you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m. you may try later for endorsement stickers.

Code-practice transmissions are made from W1AW each evening at 2130 EDT. Approximately 10 minutes' practice is given at each speed. Reference to texts used on several of the transmissions are given below. These make it possible to check your copy. For practice purposes, the order of words in each line of QST text sometimes is reversed. To improve your list, hook up your own key and audio oscillator and attempt to send in step with W1AW.

**FIELD DAY NOTE**

The Communications Dept. is on the lookout for action-packed 1959 Field Day photos. Got yours in yet? High claimed scores coming up in October QST.
With the AREC

We have just completed a statistical survey of AREC reporting records for the year 1958. Why so late? Well, can we help it if ECs don’t send in their reports in time? We used to spend a lot of money sending out reminder cards, but now we have a computer system to help us. Of course, we can’t hope for anything constant from year to year, and by statistical standards for 25 years, and as such it is the natural implementimg

not good. The AREC has been our emergency organization

AREC, but the apparent decline in RACES participation is

elementary, there is more antagonism, and fewer ECs

signed up in RACES also seems to have decreased about

why we cannot attain a 50 percent figure or better.

approach, but we see no reason why an EC can’t

ourself for the nation a service. So keep after it. Don’t let

It languish.

The above data are estimates based on reports received

from 368 ECs, about 20 percent of the total. This percentage of

return on our annual questionnaire seems to remain fairly

constant from year to year, and by statistical standards may be considered a fairly good return. But we’re not satisfied with it, of course we can’t hope for anything approaching 100 percent, but we see no reason why an EC can’t take the trouble to send in a questionnaire just once a year to help make our estimates more accurate; we see no reason why we cannot attain a 50 percent figure or better.

In 1958, there were 10 sections from which EC reports were received. Eight reports (out of 376) contained no data

usable in the analysis. The section having the most ECs is Eastern Mass., with 108. This section also submitted the greatest number of EC annual reports (111) and the highest percentage. Kentucky ranked highest in this respect, 10 of its 11 ECs submitting reports (90.9%). Eastern Florida deserves special mention for an outstanding reporting record among sections with 25 or more ECs, 21 of its 51 ECs reporting (41.2%).

As we have often said, reporting isn’t everything, and the statistical base is not always the actual best. But you’ll be surprised how often the statistics bear out actual performance. Besides, they’re all we have to go on. We think one of the big reasons ECs don’t report is that they feel they have nothing to report, and quite often this puts the burden back on you, the AREC member. If you accept this burden, and give your EC something to talk about, he’ll be more ready to make his reports. Then, maybe, we can reach that 50 percent figure. Shall we have a go at it, fellows?

While monitoring 50.4 Me. on May 7, KD2PM heard KQGGN calling “CQ emergency.” Answering the call, he was informed that the caller was mobile on the Harbor Freeway in Los Angeles and had come upon an accident in which there appeared to be an injury. No police were about, and traffic was blocked for some distance. KD2PM, setting out information from KQGGN, called the Highway Patrol and gave them all the details, whenceupon necessary equipment was immediately dispatched to the scene. — KD2PM via WDQ/FR.

Close cooperation and quick thinking on the part of three amateurs brought aid to a victim of a hit-and-run driver on the northbound N. Y. Expressway on May 18. K2LTE was driving home when he was flagged down by a man who told him that someone was lying in the road, severely cut and bleeding. K2LTE sent out a QRRR, which was heard by KDPPH, but contact was difficult so K2LTE relayed the message. Police were notified and an ambulance was dispatched to the scene within minutes.

Still another highway accident, this one in Middle Village, N. Y., was reported by KD2VBI on May 27, when a car was hit and a man and girl were injured. KD2VBI immediately gave them all the details, whenceupon necessary equipment was immediately dispatched to the scene. — KD2PM via WDQ/FR.

Four inches of rain fell in Cleveland, Ohio, on June 1, washing out sewers, roads, business establishments, homes, and precipitating a communications emergency. The American Red Cross called out the Mayhew Amateur Radio Club under the leadership of W5OKE. Using six meter gear, a base station was set up at the World Red Cross Headquarters under K5DQG. Other stations were established at University Circle (K8NNA) and at Shaker Heights City Hall (K5EXL and K8SBM). Mobile units searched for flood victims and brought aid to those in need of food, clothing, shelter and medical attention. Mobiles participating were W5s OKE NMY, K8s J1D JIQ GQL and NYZ. This was the first time the Mayhewans were called out by Red Cross, and they performed splendidly. — KD2PM via WDQ/FR.

An earthquake off Sillurian altered the Hawaiian island of Kauai to possible tidal wave activity on May 4. Three amateurs were linked with the territory-wide e.d. net and were ready to handle any emergency. Club members arrived at the Red Cross Headquarters under K5DQG. Other stations were established at University Circle (K8NNA) and at Shaker Heights City Hall (K5EXL and K8SBM). Mobile units searched for flood victims and brought aid to those in need of food, clothing, shelter and medical attention. Mobiles participating were W5s OKE NMY, K8s J1D JIQ GQL and NYZ. This was the first time the Mayhewans were called out by Red Cross, and they performed splendidly. — KD2PM via WDQ/FR.

A surprise alert by the Red Cross on May 4 in St. Clair County, Mich., found the amateur contingent ready. The problem was a make-believe tornado. WS6FWQ received the envelope containing instructions and immediately got in touch with W5QG, the EC, then put the Red Cross amateur radio station on the air. Members of the corps were called by landline and radio, and within a short time a mobile was speeding toward the scene of the mock disaster. Other mobiles took up strategic positions to relay messages. Within a short time the county AREC had seven fixed stations and six mobiles organized and operating. The

August 1959

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alert was termed a success by the chapter chairman. —

Cuyahoga County, Ohio, AREC, reports two April activities. The first was a full scale dress rehearsal of the AREC's "Severe Weather Warning System" on April 1. A total of 69 amateurs participated through eight separate networks covering 24 different communities. In spite of deliberate efforts to disrupt the project with simulated power failures shutting down key stations, the exercise was very successful.

The second activity was participation in a parade to celebrate the arrival of the first foreign vessel in Cleveland through the newly-opened St. Lawrence Seaway. A hand-carried unit was used on the dock as the boat came in, keeping the waiting parade informed as to the progress of the welcoming committee and coordinating the entire effort.

Three mobiles worked in the parade itself, furnishing communications for the officials. The entire operation was carried out under the greatest difficulties in a cold rain driven by a 60-m.p.h. gale. Five amateurs took part.— W8ABI, EC Cuyahoga County, Ohio.

— The Mt. Pleasant (Mich.) Amateur Radio Club conducted an emergency communications drill on April 23. The simulated disaster was a tornado which struck the northwest section of the city, knocking out public utilities and communications. Twenty-two members participated, with portable units at c.d. headquarters, the hospital, Red Cross headquarters and other strategic locations, in addition to mobiles. Said the Red Cross disaster chairman: "With the assistance of the Mt. Pleasant Amateur Radio Club, this area could conceivably be cut off from communications with the outside."

On April 28 and April 30, 23 amateur stations located at Veterans Hospitals throughout the nation conducted test schedules with each other, at the request of the U.S. Veterans Administration, "to test amateur radio facilities" between various Veterans Hospitals to work out a setup for use in case of disaster. Schedules were kept on 75, 30 and 20 meter phone, frequency band used depending on the distance to be covered. Most of these stations are equipped with emergency powered equipment, some self-owned, some government-owned. The test schedules were, generally speaking, successful, furnishing data from which a regular communications network could be set up.— K8BWI.

Twenty-three NEC reports were filed for April, representing 7110 AREC members in those sections. This is two lower than the 25 received for April of last year, but a slight increase in number of AREC members reported. Kansas NEC reported for the first time this year. Other sections reporting were: Ohio, N.W. Colo., W. Calif., San Joaquin Valley, N. Mex., E. Fla., E. Bay, W. N. Y., Mich., W. Va., Ala., Wyo., Wis., S. Texas, Vt., Santa Clara Valley, Maritime, Mo., Minn.

RACES News

Effective July 1, we have some new RACES frequencies. This is in accordance with FCC Docket 12719, responsive to an original proposal by the U.S. Civil Defense Amateur Radio Alliance. The new segments will give RACES some much-needed additional segments of the amateur bands on 20, 20, 20 and 15 meters. The provisions in detail are quite complicated and we urge all concerned to read carefuly the proposals detailed starting on page 164, February 1959 QST. The adopted language was not changed in FCC's finalization of this amendment.

In effect, and without going into the restrictions and provisos affecting the new segments, RACES now has operating privileges in the following segments, in addition to those previously available: 3510-3550 kc., 3555-3590 kc., 3605-3645 kc., 3650-3690 kc., 3705-3745 kc., 3750-3795 kc., 14047-14053 kc., 14220-14230 kc., 21047-21053 kc. and 21420-21430 kc.

Note that the new segments encompass the ARRL National Calling and Emergency Frequencies on 40 phone and c.w., on 20 phone and c.w., and on 15 c.w. Note also that the greatest expansion has been made on the c.w. bands, as befitting the long-range characteristics of these bands and their expected use for point-to-point circuits.

At a ceremony in the Communications Room of the Louisiana State Civil Defense Agency on June 10, W5CZ (left) was presented with a special Certificate of Appreciation by C. D. Director Major General R. F. Hufft (right) for outstanding work in organizing and equipping the statewide mobile c.d. network on 147.3 Mc.

There was much misunderstanding concerning the purpose of this proposal when it first came out, and many of the comments expressing opposition were based on the supposition that these frequencies would be exclusively RACES. Not so. Regular amateur radio has lost nothing. RACES has gained something. The total result is a gain for the amateur service. We hope all you RACES people will plan to make maximum use of these new segments as soon as possible.

Many of you will remember that during Operation Alert on April 17-18 we sent out a bulletin to FCCs requesting that amateurs report the results of the CONELRAD test direct to OCDM in Battle Creek, Mich. — and we enclosed cards for this purpose. The request was late in reaching us, but we crammed it into the OPAL bulletin which was already late in hitting the mails, and as a result the whole thing arrived anywhere from a day to a week late at its destination.

Despite this, OCDM reports that over 800 cards reporting CONELRAD results were received from amateurs (we had estimated they would receive between 400 and 500) and that they were assisting materially in evaluating the test on a national level. They expressed amazement that we could produce such results on such short notice. We're a little amazed ourselves. Thanks for your cooperation, fellows. It was a good showing.

Milwaukee news: The Southeastern Wisconsin Two-Meter Emergency Net, covering the Milwaukee Metropolitan Target Area, has not missed a session since it started in 1946. The net operates both on RACES frequency of 144.65 Mc, and its regular net frequency of 145.655 Mc. An average of 25 stations report in each Monday night, and a link with the Chicago Watch Dog net is maintained on two meters.

At the June meeting of the AREC in Milwaukee, W9GHR gave a talk on portable two-meter loops useful to work with low-power v.d. two-meter portable units. W9TQ lectured on and demonstrated the principles of RTTY.

A successful drill of the Lakeshore Emergency Net was conducted on May 18, with W9TQT of the Milwaukee C.D. Control Center as NCS. The drill was held on 29.5 Mc, at 1930, W9YD monitored from a critical receiving location and later gave a complete report on signal strengths of stations in the Milwaukee area. Inasmuch as the band was "open" to skip, some QRM was experienced from distant stations.— K9KJT.

Operation Alert in the Canal Zone took place on May 20, with the new c.d. radio section in control. Communication between the main control center at Balboa Heights and alternate control in Coco Solo was on 40 meters, local communication on 10 meters. Conditions made it possible for 10-meter signals to be read consistently at distances up to 60 miles. All amateurs reported promptly and were ready for instructions immediately after the all clear sounded. The operation assumed that the Atlantic area of the Canal Zone was completely devastated. Mobile units of the Pacific Sector were dispatched to the Atlantic Sector and took part.
in the completion of the operation. — K2ZRV, SCM Canal Zone.

Area 7 of Indiana C.D. has recently acquired 21 mobile units from surplus. The units were originally operated on 34 Mc, and will be converted to six meters. Within the area, Vermillion County now has two base units. Parke County has a base and five mobiles, and Vigo County has a base for its trailer and several mobiles. It has been decided to write an Area RACES Plan instead of individual counties planning. Thus, amateurs in counties where there is no active c.d. can qualify for RACES. A c.d. not on six meters is also being brought to provide practice in c.d. traffic handling. Area 7 of Indiana RACES expects, slowly but surely, to be one of the best organized in the state.

W9IHO

On May 14, Washetonaw County (Knick) made a test run evacuating school children from four eastern townships. Altogether, 296 pupils were involved. Five convoys were formed, with a radio car in each convoy, and mobile units were asked to make five reports going and coming to and from the evacuation area. All reports were received except from 5, which was late. Fifteen amateurs were involved in this exercise.

ELECTION NOTICE

(To all ARRL members residing in the Section listed below.)

You are hereby notified that an election for Section Communications Manager is about to be held in your respective Section. The notice supersedes notices previously issued.

Nominating petitions are solicited. The signatures of five or more ARRL full members of the Section concerned, in good standing, are required on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must have been a licensed amateur for at least two years and similarly a full member of the League for at least one continuous year immediately prior to his nomination.

Petitions must be in West Hartford, Conn., on or before noon on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given herewith.

The complete name, address, and station call of the candidate should be included with the petition. It is advisable that eight or ten full-member signatures be obtained, since on checking names against Headquarters files, it is discoverable that eight or ten full-member signatures are required. Petitions may be found invalid by reason of expiring membership status, etc.

The following nomination form is suggested. (Signers will please add city and street addresses to facilitate checking membership.)

Communications Manager, ARRL.

[place and date]
38 La Salle Road, West Hartford, Conn.

We, the undersigned full members of the ............... Division, hereby nominate ............... as candidate the Section Communications Manager for this Section for the next two-year term of office.

Elections will take place immediately after the closing dates specified for receipt of nominating petitions. The ballots mailed from Headquarters to full members will list in alphabetical sequence the names of eligible candidates. You are urged to take the initiative and file nominating petitions immediately. This is your opportunity to put the man of your choice in office.

— F. B. Hardycy, Communications Manager

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Albany Oct. 10, 1959 Clarke A. Simms, Jr.
Western Oct. 10, 1959 Frank M. Butler, Jr.
Western Florida Oct. 10, 1959 Frank M. Butler, Jr.
Illinois Oct. 10, 1959 Edmond A. Metzger

"In Canadian Sections nominating petitions for Section Managers must be addressed to Canadian Director Alex Reid, 109 Loanan Ave., Sarnia, Ont. Petitions must be filed with him on or before the closing dates named.

ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed by members in the following Sections, completing their election in accordance with regular League policy, each term of office starting on the date given.

British Columbia Peter M. McIntyre, VE3JT Apr. 10, 1959


On the New York City and Long Island Section of the Hudson Division, Mr. Harry J. Dannaids, W2UYK, and Mr. George C. Cook, Jr., W20BU, were nominated. Mr. Dannals received 554 votes and Mr. Cook received 438 votes. Mr. Dannals' term of office began July 5, 1959.

NDW-K6USN SCHEDULES

Tape-sent transmissions can be heard from the Naval Reserve Radio School, Twelfth Naval District, at San Francisco, on the following schedules:

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NDW-K6USN submits the above information courtesy of KMIC Don Johnson, USNR, and says the practice is mostly plain language text, its purpose to assist not only new men but all amateurs in becoming faster, better operators.

TRAFFIC TOPICS

The Traffic Session at the National ARRL Convention in Galveston, Texas, in June, was an after-thought. It seems apparent that the convention committee never gave it a thought, or else didn't think it would attract enough interest to be worth while. At it turned out, we had one (a Traffic Session, that is), for which a small microphone-aided addendum was stuck into the regular printed convention program. How many showed up? Oh, 25 or 30 out of a total of 1500, or so. It was a good meeting, and we all enjoyed ourselves; but with a little more advance planning and publicity it could have been a lot bigger.

We’re not blaming the convention committee. If anybody is to blame, it is ourselves. We’re inclined to be a little too quiet, too passive, in our specialty. A lot of us, we suspect, don’t attend conventions because if we do, who’s going to handle the traffic? So it bites us with no particular surprise, even though with some dismay, when we do go to a convention and find no traffic meeting scheduled — or one running concurrently with six other popular amateur operating activity specialties.

We have been to some conventions which have had real rip-snorting traffic sessions. Most of these were the result of an active traffic man on the convention committee, who had energetic, or else didn't think it would attract enough interest to be worth while. At it turned out, we had one (a Traffic Session, that is), for which a small microphone-aided addendum was stuck into the regular printed convention program. How many showed up? Oh, 25 or 30 out of a total of 1500, or so. It was a good meeting, and we all enjoyed ourselves; but with a little more advance planning and publicity it could have been a lot bigger.

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is not only desirable, but also that it will be popular. And it tent locally attended. As a result, the activities planned will fit fair — usually sponsored, locally run, and to a great extent locally attended. As a result, the activities planned will have to find some way of indicating to the committee that this is not only desirable, but also that it will be popular. And it must be popular unless we traffic men are on hand to make it so.

So, at the risk of depleting some of our traffic nets at convention times, we urge all and sundry to attend conventions and, at those conventions, attend the traffic meetings. Make those traffic meetings overflow into standing room. Whether the convention is national, divisional or state, if conventions and, at those conventions, attend the traffic meeting.

August 1 is the effective date for net re-registration. Use Lime telephonic.
To make the most of your TCC schedule, you'll need to keep your NCS report prompt. We mention it here, because we want the NCS to see it, too. When you get this issue of QST, it's your signal to get your NCS report to your net manager pronto, so he can whump up his report and slip it right off.

Can do? All nets whose July reports don't get here by August 10th will be left out of October QST, but we'll list those in the November issue provided the reports have a received-date stamp not later than Aug. 15. Let's see how good a showing we can make.

May reports:

**Net**

<table>
<thead>
<tr>
<th>Sessions</th>
<th>Traffic Rate</th>
<th>Average Representation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAN</td>
<td>29</td>
<td>1510 .725 37.7 98.3</td>
</tr>
<tr>
<td>CAN</td>
<td>31</td>
<td>1577 .617 27.4 96.8</td>
</tr>
<tr>
<td>W6</td>
<td>31</td>
<td>1655 .784 53.1 100.0</td>
</tr>
<tr>
<td>1RN</td>
<td>31</td>
<td>1996 .388 16.1 87.1</td>
</tr>
<tr>
<td>2RN</td>
<td>62</td>
<td>479 .371 7.7 99.4</td>
</tr>
<tr>
<td>3RN</td>
<td>62</td>
<td>384 .266 6.2 91.1</td>
</tr>
<tr>
<td>4RN</td>
<td>62</td>
<td>1091 .411 16.4 88.0</td>
</tr>
<tr>
<td>RN6</td>
<td>62</td>
<td>1387 .466 22.1 93.2</td>
</tr>
<tr>
<td>RN7</td>
<td>62</td>
<td>888 .378 14.2 83.3</td>
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<tr>
<td>8RN</td>
<td>62</td>
<td>2511 .454 14.2 80.5</td>
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<tr>
<td>RNS</td>
<td>56</td>
<td>5179 .149 14.3 87.5</td>
</tr>
<tr>
<td>TEN</td>
<td>62</td>
<td>701 .450 11.3 61.7</td>
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<tr>
<td>ECN</td>
<td>17</td>
<td>16 .135 2.0 70.6</td>
</tr>
<tr>
<td>TWC</td>
<td>30</td>
<td>405 .276 13.4 72.9</td>
</tr>
<tr>
<td>TWC Central</td>
<td></td>
<td>680 .278 6.5 100.0</td>
</tr>
</tbody>
</table>

**TCC Eastern** 84 342

**TCC Pacific** 115 1300

**Summary** 1751 26229 PAN 10.7 PAN

**Record** 1496 18192 .909 22.1 100.0

1 Region Net representation based on one session per night. Others are based on two or more sessions.

2 Section reports netting: NNJ (N.J.); GBN (Ga.); CN & CPN (Conn.); Iowa 75 Phone; SCN (So. Calif.); MDD (Md.-Del.-D. C.); Beech Hl (Utah); TCC (Towa); W8SN (Wis.); SDN, S. Dak.; 75 Phone, S. Dak. 40 Phone; QKS (Kans.); Key KPN, KPN, KYN, MKPN (Ks.); Gator FMTN, TPTN, FITN, NWPN (Fla.); QON (Ont.-Que.); WPN (W. Va.); MPN, GGP, GGP, MGP, MPH (Mich.). MN Vary: AENO, AENO, AENO, AENO Morning, AENT, ADNB (Ala.); BCN (B. C.); QMN (2 Mibch. wts.).

T3 The TCC Central reports, for example, to the manager. The report is used to help the manager ascertain the status of his amateur in his area. When a report is due, the manager can check to see if the report has been received by the TCC Central.
SOUTHERN NEW JERSEY—SCM, Herbert C. Brooks, KB2G—SEC: W2YRW, RMs: W2BZJ, WH2HW, W2HP, W2VQ, W2BU, W2LX, W2TQ, W2GK, W2TV, W2TVT, W2LU, W2JH, W2LUW, W2TVT, W2WZ. These certificates were issued to K2JSJ, K2JCJ, K2YVY and K2-OMW. These certificates were issued in recognition of consistent QNIs. K2BSN, Burlington, advises that W2-FVY is a new local, W2GRG, Merchantville, is enjoying his retirement. W2ZI, Trenton, attended the Commanugh Valley Amateur Club Annual Banquet and received the "Grand OM Award," W2BEI. Audubon, is heard nightly on N.JN, K2SUL, Sewell, Gloucester Co. EC, is building his station. K2VRF, a new OSC, has put his station on Armed Forces Day, which was sponsored by the U.S. Navy and had no trouble copv'ing the ship. W2JG report the makeup of the first 2000 stations. K2KFR, Atlantic Co. EC. Again we compliment W2-DRX, N.JN Manager, for a fine net bulletin loaded with information and news. K2QHR, the B&ORR Club's Field Day chairman was K2PJD, assisted by W2TUR. The club rode classes are conducted by K2YVY and W2YVY. A very fine report was received from K2RRQ, Atlantic Co. EC. W2QFZ, the J.H.U.'s club dinner and met K0BTV, ex-W3LSX. BVL reports made BPL in May. K2QKM us KC Orleans; K2ISO. EC Wyoming; K2- CKW, K2MBD and K2SOL. Please contact them for further information.

MARYLAND-DELAVRE-DISTRICT OF CO- LUMBIA—SCM, Arthur W. Hummer, W3EQK—Asst. SCM; Ray DeCorcella, 3DQZ, SEC: PKC. ECS: Prince George County, CVE; Washington, D.C., ECP; Garrett County, FKN; St. Mary's Co., VPK; Harford County, FVK; Baltimore County, JME; Baltimore City, MAZ; Washington County, OX; Westminster Community College, KJP; Cecil County, MWZ; Calvert County, WG. Maryland has 23 counties and listed above are ECS for only 10. How about some more City, MAZ: Washington County, OX; Prince George County, CVE; St. Mary's Co., VPK; Baltimore County, JME; Baltimore City, MAZ; Washington County, OX; Westminster Community College, KJP; Cecil County, MWZ; Calvert County, WG.

PENNSYLVANIA—SCM, Allen R. Breiner, W3JGQ—SEC: DUL, RM: AXA, PAM: TEJ. The PFN meets nightly Mon, through Fri, at 1900 on 3550 kc. The EPA meets every night at 1800 EST on 3510 kc. AXA still is looking for stations in the Lebec- nei-s. CUL is routing overseus traffie 3 times daily.

Wright-Dayton and attended the Hamvention at Ormond Reach, Fia, AYS recently went to Dayton while there. UYJ still is working on the Mowhawk alignment. PRL snagged some 8V's on 10-meter s. The Keytone ARC is 3Q00 kc. TUe EPA meets nightly Mon. through Fri. at 1800 EST ou lowering will sponsor the third Pennsylvania QSO Party. Reports from that area are home made and the oscilloscope, and perhaps a system of liaison can be arranged. The grand picnic of all Pennsylvania nets will be held Aug. 23.

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East at 1900, 1PN on 3980 kc, at 1600. K2SIL and K2SSX are invited to participate in League activities. K2SSX 2. (Apr.) K2JGU 126. K200K 4. K2BNS, Burlington, advises that W2-FFV is a new local, W2GRG, Merchantville, is enjoying his retirement. W2ZI, Trenton, attended the Commanugh Valley Amateur Club Annual Banquet and received the "Grand OM Award," W2BEI. Audubon, is heard nightly on N.JN, K2SUL, Sewell, Gloucester Co. EC, is building his station. K2VRF, a new OSC, has put his station on Armed Forces Day, which was sponsored by the U.S. Navy and had no trouble copv'ing the ship. W2JG report the makeup of the first 2000 stations. K2KFR, Atlantic Co. EC. W2QFZ, the J.H.U.'s club dinner and met K0BTV, ex-W3LSX. BVL reports made BPL in May. K2QKM us KC Orleans; K2ISO. EC Wyoming; K2-CKW, K2MBD and K2SOL. Please contact them for further information.

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HATS OFF TO HAM CLUBS

One of the most pleasant events of the year for midwestern radio amateurs is the annual Hamfesters Picnic, sponsored by the Hamfesters Radio Club of Chicago, Ill. This year it will be held on August 9th in Santa Fe Park.

It is the midwest's largest single gathering. More than 3,000 amateurs are expected to participate.

We note with special interest that the 1959 celebration will mark the Silver Anniversary of the Hamfesters Club. It's an occasion, we think, that deserves a review of the principles and objectives that have made ham clubs the world over about as worthwhile a group activity as any we know.

In this country alone, there are thousands of local ham clubs that meet regularly, and enthusiastically, for friendly discussion of the many interesting facets of our favorite hobby.

But far beyond mere discussion, most ham clubs perform continuous and important services, not for amateur radio alone but for their entire community.

Guest speakers are invited regularly to talk on technical topics, such as antenna design, operating techniques, or unusual circuitry. Every amateur can learn more about his hobby from such talks.

Frequently, the only source of public information on amateur radio is the local ham club. Through its efforts, the local community is kept informed on the many services that are performed by their neighbors.

Clubs frequently sponsor code and theory classes that are the stepping stones for a great many to obtain amateur radio licenses.

And, of course, in times of national emergency or disaster the ham club itself in many cases becomes the focal point of a priceless community service.

Twenty-five years ago, a handful of Chicago radio amateurs met to organize Hamfesters Radio Club, Inc. Today, its more than 250 members continue to build on the same solid foundation of objectives set forth in the Hamfesters by-laws in 1934:

1. To promote personal acquaintance and friendly relations among its members.
2. To promote greater knowledge of radio among its members.
3. To take general interest in all problems and matters concerning amateur radio involving any of its members, and to take such action as may be deemed advisable in the premises.

Simple, powerful and fundamental principles like these — through ham clubs the world over — are the heart and soul of amateur radio.

— Travis Marshall, K9EBE, Hallicrafters
— Jordan Kaplan, W9QKE, President
Chicago Area Radio Club Council

W9AC for Hallicrafters
More than one-half kilowatt of power and operating convenience!

VIKING "FIVE HUNDRED" TRANSMITTER

Rated 600 watts CW input...500 watts phone and SSB (P.E.P. with auxiliary SSB exciter)— instant bandswitching 80 through 10 meters! Compact RF unit designed for desk-top operation — power supply/modulator unit may be placed in any convenient location. All exciter stages ganged to VFO tuning. High gain push-to-talk audio system. Operates by crystal control or highly stable, built-in VFO. Class C 4-400A final amplifier provides plate circuit efficiencies in excess of 70% with unequalled broadcast-type high level amplitude modulation. Wide range pi-network output circuit with silver-plated final tank coil will load virtually any antenna system. Low level audio clipping—effectively TVI suppressed and filtered. Complete with tubes, less crystals.

Cat. No. Amateur Net
240-500-1 Kit ........................................... $749.50
240-500-2 Wired ........................................... $949.50
you’ll get more with a **Viking**

**"CHALLENGER"**—70 watts AM input 80 through 6, 120 watts CW input 80 thru 10—85 watts on 6. With tubes.
Cat. No. Amateur Net 240-182-1 Kit $114.75 240-182-2 Wired $154.75

Cat. No. Amateur Net 240-161-1 Kit $229.50 240-161-2 Wired $239.50

**"VALIANT"**—Instant bandswitching 160 through 10. 275 watts input CW and SSB (Viking with aux. exciter) 200 watts phone. With tubes.
Cat. No. Amateur Net 240-104-1 Kit $349.50 240-104-2 Wired $399.50

**"KILOWATT" AMPLIFIER**—This exciting unit is the only power amplifier available which will deliver full 2000 watts SSB* input and 1000 watts CW and AM! Continuous coverage 3.5 to 30 mc. Excitation requirements: 30 watts RF and 10 watts audio for AM; 10 watts peak for SSB.
Cat. No. Amateur Net 240-1000 Wired and Tested $1595.00 251-101-1 Matching desk top, back and 3 drawer pedestal $132.00

*The FCC permits a maximum of one kilowatt average power input for the amateur service. In SSB operation under normal conditions this results in peak envelope power inputs of 2000 watts or more depending upon individual voice characteristics.

**"THUNDERBOLT" AMPLIFIER**—Rated 2000 watts P.E.P. input SSB; 1000 watts CW; 900 watts AM linear! Continuous coverage 3.5 to 30 mc. May be driven by "Ranger", or other unit of comparable output. With tubes.
Cat. No. Amateur Net 240-352-1 Kit $244.50 240-352-2 Wired $389.50

3 feature-packed amplifiers!

**"COURIER" AMPLIFIER**—Class "B" linear rated 500 watts P.E.P. input with aux. SSB exciter—200 watts CW and 200 watts AM! Continuous coverage 3.5 to 30 mc. Drive requirements: 5 to 35 watts. With tubes.
Cat. No. Amateur Net 240-352-1 Kit $244.50 240-352-2 Wired $289.50

**New Catalog**

Yes, dollar-for-dollar and feature-for-feature you’ll get more of everything in a Viking transmitter... that’s why Viking transmitters outsell all others! Write for your free Viking Amateur Catalog and you’ll soon see why your best transmitter buy is a Viking.

**E. F. JOHNSON CO.**
2815 SECOND AVENUE S. E. • WASECA, MINNESOTA

**FIRST CHOICE AMONG THE NATION’S AMATEURS**

93
BUILD YOUR OWN HEATHKIT

HEATHKIT HAM GEAR

PROVEN, "ON THE AIR" PERFORMANCE

"SENeca" VHF HAM TRANSMITTER KIT
Beautifully styled and a top performer of highest quality throughout. The "Seneca" is a completely self-contained 6 and 2 meter transmitter featuring a built-in VFO for both 6 and 2 meters, and 4 switch-selected crystal positions, 2 power supplies, 5 radio frequency stages, and 2 dual-triode audio stages. Panel controls allow VFO or crystal control, phone or CW operation on both amateur bands. An auxiliary socket provides for remote operation of antenna relay and remote control of the transmitter such as with the Heathkit VX-1 Voice Control. Features up to 120 watts input on phone and 140 watts on CW in the 6 meter band. Ratings slightly reduced in the 2 meter band. Ideal for ham operators wishing to extend transmission into the VHF region. Shpg. Wt. 56 lbs.

HEATHKIT VHF-1 $159.95

DX-20 CW TRANSMITTER KIT
Designed exclusively for CW work, the DX-20 provides the novice as well as the advanced-class CW operator with a low cost transmitter featuring high operating efficiency. Single-knob bandswitching covers 80, 40, 20, 15 and 10 meters using crystals or an external VFO. Pi network output circuit matches antenna impedances between 50 and 1,000 ohms. Employs a single 6DQ6A tube in the final amplifier stage for 50 watts. A 6CL6 serves as the crystal oscillator. The heavy duty power supply uses a heavy duty 5U4GB rectifier and top-quality "potted" transformer for long service life. Easy-to-read panel meter indicates final grid or plate current selected by the panel switch. Complete RF shielding to minimize TVI interference. Easy-to-build with complete instructions provided. Shpg. Wt. 19 lbs.

HEATHKIT DX-20 $35.95

HEATH COMPANY Benton Harbor, Michigan a subsidiary of Daysstrom, Inc.
"CHEYENNE" MOBILE HAM TRANSMITTER KIT
All the fun and excitement... plus the convenience of mobile operation are yours in the all-new Heathkit "Cheyenne" transmitter. The neat, compact, and efficient circuitry provides you with high power capability in mobile operation, with low battery drain using carrier controlled modulation. All necessary power is supplied by the model MP-1 described below. Covers 80, 40, 20, 15 and 10 meters with up to 90 watts input on phone. Features built-in VFO, modulator, 4 RF stages, with a 6L46 final amplifier and pi network (coaxial) output coupling. High quality components are used for long service life and reliable operation, along with rugged chassis construction to withstand mobile vibrations and shock. Thoughtful circuit layout provides for ease of assembly with complete instructions and detailed pictorial diagrams to insure success. A spotting switch is also provided. A specially designed ceramic microphone is included to insure effective modulation with plenty of "punch". Plan now to enjoy the fun of mobile operation by building this superb transmitter. Shpg. Wt. 19 lbs.

"COMANCHE" MOBILE HAM RECEIVER KIT
Everything you could ask for in modern design mobile gear is provided in the "Comanche"... handsome styling, rugged construction, top quality components... and, best of all, a price you can afford. The "Comanche" is an 8-tube superheterodyne ham band receiver operating AM, CW and SSB on the 80, 40, 20, 15 and 10 meter amateur bands. A 3 mc crystal lattice-type IF filter permits the receiver to use single conversion without image interference, and at the same time creates a steep sided 3 kc flat top IF bandpass characteristic comparable to mechanical type filters. The neat, compact and easy-to-assemble circuitry features outstanding sensitivity, stability and selectivity on all bands. Circuit includes an RF stage, converter, 2 IF stages, 2 detectors, noise limiter, 2 audio stages and a voltage regulator. Sensitivity is better than 1 microvolt on all bands and signal-to-noise ratio is better than 10 db down at 1 microvolt input. One of the finest investments you can make in mobile gear. Shpg. Wt. 19 lbs.

MOBILE SPEAKER KIT
A matching companion speaker for the "Comanche" mobile receiver. Housed in a rugged steel case with brackets provided for easy installation on fire wall or under dashboard, etc. Uses 5 PM speaker with 8 ohm voice coil. Measures 5" H. x 5" W. x 2 1/4" D. Shpg. Wt. 4 lbs.

HEATHKIT MP-1
$44.95

MOBILE POWER SUPPLY KIT
This heavy duty transistor power supply furnishes all the power required to operate both the MT-1 Transmitter and MR-1 Receiver. It features two 2N442 transistors in a 400 cycle switching circuit, supplying a full 120 watts of DC power. Under intermittent operation it will deliver up to 150 watts. Kit contains everything required for complete installation, including 12' of heavy battery cable, tap-in studs for battery posts, power plug and 15' of connecting cable. Chassis size is 9 1/4" L. x 4 3/4" W. x 2" H. Operates from 12-14 volt battery source. Circuit continuity provided by self-contained relay which allows push-to-talk mobile operation. Shpg. Wt. 8 lbs.

HEATHKIT MT-1
$99.95

HEATHKIT MR-1
$199.95

HEATHKIT AK-7
$5.95

HEATHKIT AK-6
$9.95

MOBILE BASE MOUNT KIT
The AK-6 Base Mount is designed to hold both transmitter and receiver conveniently at driver's side. Universal mounting bracket has adjustable legs to fit most automobiles. Shpg. Wt. 5 lbs.

POWER METER KIT
This handy unit picks up energy from your mobile antenna and indicates when your transmitter is tuned for maximum output. A variable sensitivity control is provided. Features a strong magnet on a swivel-mount for holding it on a car dashboard or other suitable spot. Has its own antenna or may be connected to existing antenna. Sensitive 200 ua meter. Shpg. Wt. 2 lbs.

HEATHKIT PM-2
$12.95
"APACHE" HAM TRANSMITTER KIT

The many features and modern styling of the "Apache" will provide you with just about everything you could ask for in transmitting facilities. Emphasizing high quality the "Apache" operates with a 150 watt phone input and 180 watt CW input. In addition to CW and phone operation, built-in switch selected circuitry provides for single-sideband transmission using the SB-10 External adapter. The newly designed, compact and stable VFO provides low drift frequency control necessary for SSB transmission. A slide rule type illuminated rotating VFO dial with full gear drive vernier tuning provides ample bandspread and precise frequency settings. The bandswitch allows quick selection of the amateur bands on 80, 40, 20, 15 and 10 meters. This unit also has adjustable low-level speech clipping and a low distortion modulator stage employing two of the new 6CA7/EL34 tubes in push-pull class AB operation. Time sequence keying is provided for "chirpless" break-in CW operation. The final amplifier is completely shielded for TVI protection and neutralized for greater stability. A cooling fan is also provided. The formed one-piece cabinet with convenient access hatch provides accessibility to tubes and crystal sockets. Die-cast aluminum knobs and control panel escutcheons add to the attractive styling of the transmitter. Pi network output coupling matches antenna impedances between 50 and 72 ohms. A "spotting" push button enables the operator to "zero beat" an incoming frequency without putting the transmitter on the air. Equip your ham shack now for top transmitting enjoyment with this outstanding unit. Shpg. Wt. 110 lbs. Shipped motor freight unless otherwise specified.

HEATHKIT SB-10
$89.95

SINGLE SIDEBAND ADAPTER KIT

Designed as a compatible plug-in adapter unit for the TX-1 "Apache" transmitter, this unit lets you operate on SSB at a minimum of cost, yet does not affect the normal AM and CW functions of the transmitter. By making a few simple circuit modifications, the DX-100 and DX-100-B transmitters can be used, utilizing all existing RF circuitry. Extremely easy to operate and tune, the adapter employs the phasing method for generating a single-sideband signal, thus allowing operation entirely on fundamental frequencies. The critical audio phase shift network is supplied completely preassembled and wired in a sealed plug-in unit. Produces either a USB, LSB or DSB signal, with or without carrier insertion. Covers 80, 40, 20, 15 and 10 meter bands. An easy-to-read panel meter indicates power output to aid in tuning. A built-in electronic voice control with anti-trip circuit is also provided. 10 watts PEP output. Unwanted sideband suppression is in excess of 30 db and carrier suppression is in excess of 40 db. An EL84/6BQ5 tube is used for linear RF output. Shpg. Wt. 12 lbs.

MODIFICATION KIT: Modifies DX-100 and DX-100-B for use with the SB-10 Adapter, Model MK-1. Shpg. Wt. 1 lb. $8.95.

ALL-BAND RECEIVER KIT

A fine receiver for the beginning ham or short wave listener, designed for high circuit efficiency and easy construction. Covers 550 kc to 30 mc in four bands clearly marked on a slide-rule dial. Transformer operated power supply. Features include: bandswitch, bandspread tuning, phone-standby-CW switch, phone jack, antenna trimmer, noise eliminator, RF gain control and AF control. Shpg. Wt. 12 lbs.

CABINET: Opt. extra. No. 91-15A. Shpg. Wt. 5 lbs. $4.95.

"Q" MULTIPLIER KIT

Useful on crowded phone and CW bands, this kit adds selectivity and signal rejection to your receiver. Use it with any AM receiver having an IF frequency between 450 and 460 kc that is not AC-DC type. Provides an effective "Q" of approximately 4,000 for extremely sharp "peak" or "null". The QF-1 is powered from the receiver with which it is used. Shpg. Wt. 3 lbs.
OF DISTINCTIVE QUALITY

ACCESSORY SPEAKER KIT
Handsome design and color styled to match the "Mohawk" receiver. This heavy-duty 8" speaker with 4.7 ounce magnet provides excellent tone quality. Housed in attractive 3/4" plywood cabinet with perforated metal grille. Speaker impedance is 8 ohms. Shpg. Wt. 7 lbs.

HEATHKIT AK-5 $9.95

"MOHAWK" HAM RECEIVER KIT
Stylistically designed to match the "Apache" transmitter, the "Mohawk" ham band receiver provides all the functions required for clear, rock-steady reception. Designed especially for ham band operation, this 15-tube receiver features double conversion with IF's at 1682 kc and 50 kc, and covers all the amateur frequencies from 160 through 10 meters on 7 bands with an extra band calibrated to cover 6 and 2 meters using a converter. Specially designed for single sideband reception with crystal-controlled oscillators for upper and lower sideband selection. A completely preassembled wired and aligned front end coil bandswitch assembly assures ease of construction and top performance of the finished unit. Other features include 5 selectivity positions from 5 kc to 500 CPS, bridge T-notch filter for excellent heterodyne rejection, and a built-in 100 kc crystal calibrator. The set provides a 10 db signal-to-noise ratio at less than 1 microvolt input. Each ham band is separately calibrated on a rotating slide rule dial to provide clear frequency settings with more than ample bandspread. Front panel features S-meter, separate RF, IF and AF gain controls, T-notch tuning, T-notch depth, ANL, AVC, BFO, Bandswitch tuning, antenna trimmer, calibrate set, calibrate on, CW-SSB-AM, receive-standby, upper-lower sideband, selectivity, phone jack and illuminated gear-driven vernier slide rule tuning dial. Attractively styled with die-cast aluminum control knobs and escutcheons. No external alignment equipment is required for precise calibration of the "Mohawk". All adjustments are easily accomplished using the unique method described in the manual. An outstanding buy in a communications receiver. Shpg. Wt. 66 lbs. Shipped motor freight unless otherwise specified.

HEATHKIT AM-2 $15.95

REFLECTED POWER METER KIT
The AM-2 measures forward and reflected power or standing wave ratio. Handles a peak power of well over 1 kilowatt of energy and covers 160 through 6 meters. Input and output impedance provided for 50 or 75 ohm lines. No external power required for operation. Use it also to match impedances between excitors or RF sources and grounded grid amplifiers. Shpg. Wt. 3 lbs.

HEATHKIT RX-1 $274.95

BALUN COIL KIT
Match unbalanced coaxial lines, found on most modern transmitters, to balanced lines of either 75 or 300 ohms impedance with this handy transmitter accessory. Capable of handling power input up to 200 watts, the B-1 may be used with transmitters and receivers covering 80 through 10 meters. No adjustment required. Shpg. Wt. 4 lbs.

HEATHKIT B-1 $8.95

ELECTRONIC VOICE CONTROL KIT
Eliminate hand switching with this convenient kit. Switch from receiver to transmitter by merely talking into your microphone. Sensitivity controls allow adjustment to all conditions. Power supply is built-in and terminal strip on the rear of the chassis accommodates receiver and speaker connections and also a 117 volt antenna relay. Shpg. Wt. 5 lbs.

HEATHKIT VX-1 $23.95

VFO KIT
Far below the cost of crystals to obtain the same frequency coverage this variable frequency oscillator covers 160, 80, 40, 20, 15 and 10 meters with three basic oscillator frequencies. Providing better than 10 volt average RF output on fundamentals, the VF-1 is capable of driving the most modern transmitters. Requires only 250 volts 15G or 15 to 20 ma, and 6.3 VAC at 0.15 a. Illuminated dial reads direct. Shpg. Wt. 7 lbs.

HEATHKIT VF-1 $19.50

HEATHKIT VX-1 $23.95

HEATHKIT RX-1 $274.95

HEATHKIT B-1 $8.95

HEATHKIT VX-1 $23.95

HEATHKIT VF-1 $19.50
Save 1/2 or more... with Heathkits

HEATHKIT DX-100-B $189.50
HEATHKIT DX-40 $64.95

DX-100-B PHONE AND CW TRANSMITTER KIT
A long standing favorite in the Heathkit line, the DX-100-B combines modern styling and circuit ingenuity to bring you an exceptionally fine transmitter at an economical price. Panel controls allow VFO or crystal control, phone or CW operation on all amateur bands up to 30 mc. The rugged one-piece formed cabinet features a convenient top-access hatch for changing crystals and making other adjustments. The chassis is punched to accept sideband adapter modifications. Featured are a built-in VFO, modulator, and power supply, complete shielding to minimize TVI, and a pi network output circuit for complete operating convenience. Features a built-in VFO, modulator, and power supply, complete shielding to minimize TVI, and a pi network output circuit for complete operating convenience. A pair of 6146 tubes in parallel are employed in the output stage modulated by a pair of 1550s. Shipping weight 107 lbs. Shipped motor freight unless otherwise specified.

DX-40 PHONE AND CW TRANSMITTER KIT
An outstanding buy in its power class the DX-40 provides both phone and CW operation on 80, 40, 20, 15 and 10 meters. A single 6146 tube is used in the final amplifier stage to provide full 75 watt plate power input on CW or controlled carrier modulation peaks up to 60 watts for phone operation. Modulator and power supplies are built in and single-knob band-switching is combined with the pi network output circuit for complete operating convenience. A 4-position switch selects any of the three crystals or jacks for external VFO. Power for the VFO is available on the rear apron of the chassis. Easy-to-follow step-by-step instructions let assembly proceed smoothly from start to finish even for an individual who has never built electronic equipment before. Shipping weight 25 lbs.

Free Send now for latest Heathkit Catalog describing in detail over 100 easy-to-assemble kits for the Hi-Fi fan, radio ham, boat owner and technician.
For emergency, mobile or home-station use...

A UNIVERSAL VIBRATOR POWER SUPPLY*

In this and any other vibrator circuit, you'll get more efficient operation when you use long-life, sure-starting Mallory vibrators. Both X₁ and X₂ in the above circuit are Mallory vibrators... a 6-volt Mallory 4501 for the former, and a 12-volt Mallory G-4501 for the latter. The product of 30 years' experience and intensive research, Mallory vibrators are the outstanding choice of discriminating original equipment manufacturers, radio amateurs and top service technicians.

Your distributor will give you prompt and helpful service in choosing the components you need.

MALLORY—For outstanding all-around performance...

RMC Discaps®... for C₁ hash-filter capacitors, disk ceramic. They're available in the file-card five pack.

FP Capacitors... for C₄ and C₅ ripple filter capacitors... FP's are the original 85°C capacitors.

GEMS... for C₁ buffer capacitor, tubular plastic... give outstanding service, in easy-to-use dispenser.

*Registered Trademark of Radio Materials Company, a Division of P. R. Mallory & Co. Inc.

IS K6INI THE WORLD'S CHAMPION DX OPERATOR?

Judge for yourself! Read his letter and count the DX he has worked—with only 65 watts and a $16.95 Gotham V-80 Vertical Antenna.

2405 Bowditch, Berkeley 4, California
January 31, 1959

GOTHAM
1805 Purdy Avenue
Miami Beach 39, Florida

Gentlemen:
I just thought I would drop you a line and let you know how pleased I am with your V-80 vertical antenna. I have been using it for almost two years now, and am positively amazed at its performance with my QRP 65 watts input! Let me show you what I mean:

I have worked over 100 countries and have received very fine reports from many DX stations, including 599 reports from every continent except Europe (589)!! I have also worked enough stations for my WAC, WAS, WAJAD and ADXC awards, and I am in the process of working for several other awards. And all with this GOTHAM V-80 vertical antenna!

Frankly, I fail to see how anyone could ask for better performance with such low power, limited space and a limited budget. In my opinion, the V-80 beats them all in its class.

I am enclosing a list of DX countries I have worked to give you an idea of what I have been talking about.

Wishing you the best for 1959, I am

Sincerely yours,
Thomas G. Gobbert, K6INI (Ex-TI2TG)

List of 105 countries/stations worked with 65 watts and a V-80 vertical

<table>
<thead>
<tr>
<th>Country</th>
<th>Callsign</th>
</tr>
</thead>
<tbody>
<tr>
<td>BV1US</td>
<td>KG4AI</td>
</tr>
<tr>
<td>CE3DZ</td>
<td>KG6FEA</td>
</tr>
<tr>
<td>ZL5AA</td>
<td>KH6U</td>
</tr>
<tr>
<td>CO2WD</td>
<td>K17BUZ</td>
</tr>
<tr>
<td>CN28K</td>
<td>KM6AX</td>
</tr>
<tr>
<td>CN98B</td>
<td>KP4AFC</td>
</tr>
<tr>
<td>CR9AH</td>
<td>KP6AL</td>
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<tr>
<td>CT1CB</td>
<td>KR6BF</td>
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<td>CX2FD</td>
<td>KS4AZ</td>
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<tr>
<td>DL1FL</td>
<td>K44AA</td>
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<tr>
<td>DU7SV</td>
<td>KW6CA</td>
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<tr>
<td>EA1FD</td>
<td>KX5AF</td>
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<td>EM4N</td>
<td>LZ3CS</td>
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<tr>
<td>FB2Q</td>
<td>L43SG</td>
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<tr>
<td>F88Z</td>
<td>LU2DFC</td>
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<tr>
<td>FG7XE</td>
<td>LZ1K5P</td>
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<tr>
<td>FK8AL</td>
<td>OA44AU</td>
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<tr>
<td>FM7WT</td>
<td>O89EJ</td>
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<tr>
<td>FO8AD</td>
<td>O82IM</td>
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<tr>
<td>G33DO</td>
<td>OK1FF</td>
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<tr>
<td>GC8BO</td>
<td>ON4AY</td>
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<tr>
<td>GE3WUI</td>
<td>KG1AX</td>
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<td>GM3JGB</td>
<td>OZ3KK</td>
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<tr>
<td>GW3LNN</td>
<td>PA8FAB</td>
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<tr>
<td>HASK8B</td>
<td>PJ5AA</td>
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<tr>
<td>HCC4UN</td>
<td>PJ2HE</td>
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<tr>
<td>HCBULX</td>
<td>PY26W</td>
</tr>
<tr>
<td>HE9LAC</td>
<td>PY8NE</td>
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<tr>
<td>HP110O</td>
<td>SMEAG8B</td>
</tr>
<tr>
<td>IMVM</td>
<td>SP8BY</td>
</tr>
<tr>
<td>JA1ANG</td>
<td>T2LUA</td>
</tr>
<tr>
<td>JZ8HA</td>
<td>U1A1U</td>
</tr>
<tr>
<td>W1AW</td>
<td>U1A8K8</td>
</tr>
<tr>
<td>KB6BJ</td>
<td>U1G2AB</td>
</tr>
<tr>
<td>KC4AF</td>
<td>VE80J</td>
</tr>
</tbody>
</table>

FACTS ON THE GOTHAM V-80 VERTICAL

- If K6INI can do it, so can you.
- Absolutely no guyung needed.
- Radials not required.
- Only a few square inches of space needed.
- Four metal mounting straps furnished.
- Special B & W loading coil furnished.
- Every vertical is complete, ready for use.
- Mount it at any convenient height.
- No relays, traps, or gadgets used.
- Accepted design—in use for many years.
- Many thousands in use the world over.
- Simple assembly, quick installation.
- Withstands 75 mph wind-storms.
- Non-corrosive aluminum used exclusively.
- Omnidirectional radiation.
- Multi-band, V80 works 80, 40, 20, 15, 10, 6.
- Ideal for novices, but will handle a Kw.
- Will work with any receiver and xmitter.
- Overall height 23 feet.
- An effective modern antenna, with amazing performance. Your best bet for a lifetime antenna at an economical price.

73,
GOTHAM
AN APPEAL TO INTELLIGENCE

A product that is consistently advertised in QST month after month, year after year, has to be good. Over 10,000 GOTHAM antennas have been purchased by QST readers. Even the “price-is-no-object” customers choose GOTHAM antennas on the basis of performance and value. Select your needs from this list of 50 antennas:

**Airmail Order Today — We Ship Tomorrow**

GOTHAM Dept. QST
1805 PURDY AVE., MIAMI BEACH, FLA.

Enclosed find check or money-order for

### TWO BANDER BEAMS

A full half-wave element is used on each band. No coils, traps, baluns, or stubs are used. No calculations or machining required. Everything comes ready for easy assembly and use. Proven Gotham Value!

<table>
<thead>
<tr>
<th>Beam</th>
<th>6-10</th>
<th>10-15</th>
<th>10-20</th>
<th>15-20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std. 3-El Gamma match</td>
<td>12.95</td>
<td>29.95</td>
<td>36.95</td>
<td>38.95</td>
</tr>
<tr>
<td>Deluxe 3-El Gamma match</td>
<td>21.95</td>
<td>34.95</td>
<td>39.95</td>
<td>42.95</td>
</tr>
<tr>
<td>Std. 4-El Gamma match</td>
<td>16.95</td>
<td>36.95</td>
<td>39.95</td>
<td>42.95</td>
</tr>
<tr>
<td>Deluxe 4-El Gamma match</td>
<td>25.95</td>
<td>39.95</td>
<td>42.95</td>
<td>45.95</td>
</tr>
</tbody>
</table>

### TRIBANDER

Do not confuse these full-size Tribander beams with so-called midgets. The Tribander has individually fed (52 or 72 ohm coax) elements and is not frequency sensitive, nor does it have baluns, coils, traps, or other devices intended to take the place of aluminum tubing. The way to work multi-band and get gain is to use a Gotham Tribander Beam.

<table>
<thead>
<tr>
<th>Beam</th>
<th>6-10-15</th>
<th>10-15-20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std. 3-El Gamma match</td>
<td>$39.95</td>
<td>$49.95</td>
</tr>
</tbody>
</table>

### 6 METER BEAMS

Gotham makes only two different six-meter beams, a six-element job and a twelve-element job. They are both Yagi beams, with all the elements in line on a twelve foot boom.

<table>
<thead>
<tr>
<th>Beam</th>
<th>12-El</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std. 6-Element</td>
<td>9.95</td>
</tr>
<tr>
<td>Deluxe 6-Element</td>
<td>16.95</td>
</tr>
</tbody>
</table>

### 15 METER BEAMS

Fifteen meters is the “sleeper” band. Don’t be surprised if you put out a quick, quiet CQ and get a contact halfway around the world. Working the world with low power is a common occurrence on fifteen meters when you have a Gotham beam.

<table>
<thead>
<tr>
<th>Beam</th>
<th>Std. 2-El Gamma match</th>
<th>T match</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>19.95</td>
<td>22.95</td>
</tr>
<tr>
<td>Deluxe 2-El Gamma match</td>
<td>29.95</td>
<td>32.95</td>
</tr>
<tr>
<td>Std. 3-El Gamma match</td>
<td>26.95</td>
<td>29.95</td>
</tr>
<tr>
<td>Deluxe 3-El Gamma match</td>
<td>36.95</td>
<td>39.95</td>
</tr>
</tbody>
</table>

### 20 METER BEAMS

A beam is a necessity on twenty meters, to battle the QRM and to give your signal the added punch it needs to over-ride the high power boys. Hundreds and hundreds of twenty meter beams, working year after year, prove that there is no better value than a Gotham twenty meter beam.

<table>
<thead>
<tr>
<th>Beam</th>
<th>Std. 2-El Gamma match</th>
<th>T match</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>21.95</td>
<td>24.95</td>
</tr>
<tr>
<td>Deluxe 2-El Gamma match</td>
<td>31.95</td>
<td>34.95</td>
</tr>
<tr>
<td>Std. 3-El Gamma match</td>
<td>34.95</td>
<td>37.95</td>
</tr>
<tr>
<td>Deluxe 3-El Gamma match</td>
<td>46.95</td>
<td>49.95</td>
</tr>
</tbody>
</table>

(Note: Gamma-match beams use 52 or 72 ohm coax. T-match beams use 300 ohm line.)

### ALL-BAND VERTICAL ANTENNAS

You could work the whole world, and get fantastic reports, with a Gotham vertical and only 55 watts, like VP1SD.

You could work tremendous skip and DX, and be surprised at the way your Gotham vertical brings them in, as R. E. C. of Washington, D. C., found out.

You could have a simple, easy-to-install-and-operate vertical antenna, and switch from band to band, as thousands of Gotham customers have done.

<table>
<thead>
<tr>
<th>Beam</th>
<th>V40 vertical for 40, 20, 15, 10, 6 meters.</th>
<th>$14.95</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beam</td>
<td>V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters.</td>
<td>$16.95</td>
</tr>
<tr>
<td>Beam</td>
<td>V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters.</td>
<td>$18.95</td>
</tr>
</tbody>
</table>

**HOW TO ORDER.** Send check or money order directly to Gotham. Immediate shipment by Railway Express, charges collect. Foreign orders accepted.

### FREE! FREE! FREE!

Valuable catalog of 50 different antennas, with specifications and characteristics. Gives bands and frequencies covered, element information, size of elements, boom lengths, power and desired gain figures, weight, feed line used, polarization, and other valuable information. Send card today!

Name: ____________________________  Address: ____________________________  City: ____________________________  State: ____________________________
Station Activities

(Continued from page 99)

AGC, EC Schuyler Co. Endorses: W2FE as O0, K2BBJ as OPS. Lancaster hams have formed a club called "The Radios" with K2RML, pres.; W2VBBP, sec.-treas. W2RBB, dir. W2RSL, tech, adm. W2COB topped W.N.Y. in the Jan. CD Party; he also received a 15-meter beam antenna and W2BRP supplied the muscle power. K2KGN has built a new 6-meter converter. More than 600 attended the HARA Hamfest. W2JBC was general chairman, with K2RRT, cor. of K2RTQ, and K2RTM in charge of prizes. W2UJS won first place in the code-receiving contest using a pencil at 40 w.p.m. K2RNY was record at 35 w.p.m. W2KZB and W2RBB acted as judges. Another fine "ham family day," sponsored by the Radio Club, was attended by 150. W2XKAI, the station at Cornell ARC, made aPLX 145. K2XBB is the cause of "Engineers Day." New officers are K2QGG, pres.; K2DEM, vice-pres.; Barb, secy.; Lester, ex- K2WTT, treas. New-elected officers of the Aurora ARC are K2QLE, pres.; K2QQX, vice-pres.; K2DAK, secy.; K2ZOB, treas. W2QEP reports that the boys in Plattsburgh have organized a club and are planning their 24 members. Traffic: (May) K2SIL 710, K2SSX 434, W2EBZ 257, W2RFA 38, K2UYP 80, K2BBP 116, W2XCM 114, K2BPA 73, W2PYP 74, K2UZJ 73, K2GWN 69, K2RTN 66, K2AOQ 62, W2OE 57, K2QDT 83, W2FEB 46, W2- PQA 35, K2EQB 35, K2WTB 35, K2KU 27, K2SF 24, K2KP 11, K2BFC 9, K2DVE 6, K2QWM 4, W2PYI 7, K2BC 5, K2QCI 4, K2MMW 3, W2RRT 3, K2CST 2, (Apr.) K2AOQ 49, K2WYW 42, W2BLO 9, K2HQB 6.

WESTERN PENNSYLVANIA—SCM, Anthony J. Mrucza, W2JNN—SEC; OMA, K2MG, GEO, NUG and LAX, PAMS: AER. The WPA Traffic Net meets Mon. through Fri. at 1900 EST on 3585 kc. The Penna. Fone Net meets Mon. through Fri. at 1900 EST on 3585 kc. A new one is OFC—LAR. The Cumberland Valley ARC held a very successful Old Timers Nite May 9. The evening was dedicated to the contestants who participated in the past activity. 225 Ed Rosier, won the Old Timers trophy. Others who traveled to the event were 4QWY, 4SU, 3OE, YA, UA, BRC, K2W, NUG, and UX, members of the school in New Jersey. K2CLX has been busy putting up antennas. New officers of the Westmont Hilltop ARC are IWT, pres.; KBZ, vice-pres.; and K2AFI, secy. ZW2Z won the Communicator III at the Breeze Shooters Hamfest. K2QOD writes that the Menomonee ARC now has a membership of 40. Steel City ARC reports via Kilo Watt Harmonies that club meetings are now held the 3rd Tue. of the month at 1830 EST. The club station was very active in the April V.H.F. Contest; U2HUM has the photography bug. ZW2Z has a Klystron on the air. W2PM reports the formation of the Fortnight Hilltop Club in the area. SCM is in contact with the following officers: LWW, pres.; UVD, vice-pres.; K2- CM, secy.-treas.; K2CH, vice-pres.; K2CH, secy.; K2BBB, treasurer. Breeze Shooters Hamfest at North Park was a huge success. Word from AWU, who is stationed at the Air Force Base, Bluffville, Ark., is that he is operating K2FFJ on 75 and 160. The HAB held its meeting at the General Telephone Company's Building and took in a tour of the place; a new sweep was held June 6 at Cornell in the area of WAQ and ZPB, who are moving out of the State; LSS has obtained a DX-40 rig to be used at the Boy Scout Camp. The Eta RC reports via the Observer that among the visitors at the Dayton Hamvention were CTN, HWU, K4Y, RM1, TOC, U2HUM, K2WBB and K3DCC. TOC has accepted an appointment as Code Counselor for the Boy Scouts; TVW has been under the weather. SIJ has 59 countries confirmed on 80- meter e.w. K2JXN is recuperating from the measles. Congratulations to HIB, LQS, UL, UVG, and UZB on the fine showing in the February Frequency Measuring Test. LQS had an average of 186 912 kc., and U2HUM 173 568. Congratulations to the members of the Western Penns. Net at 3515 kc. Mon. through Sat. at 1800 EST. The St. Louis gang is busy making final arrangements for the combined Central and Midwest ARC Convention to be held Aug. 23 and 24 at the Chase Hotel, St. Louis. Advance programs and announcements have been re-

(Continued on page 104)
MODEL TA-33 — Three-element beam rated to full KW. 8 db. forward gain; 25 db. front-to-back. 1.1/1 SWR. Max. element length 28'. Boom length 14'. Turning radius 15'. Shipping weight 50 lbs.
Net Each . . . . . . $99.75

MODEL TA-32 — Two-element beam rated to full KW. 5.5 db. forward gain; 20 db. front-to-back. 1.1/1 SWR. Max. element length 28'. Boom length 7'. Turning radius 14'. Shipping weight 32 lbs.
Net Each . . . . . . $69.50

MODEL TA-33 Jr. — Three-element beam rated to 300W. 8 db. forward gain; 25 db. front-to-back. 1.5/1 SWR. Max. element length 26'. Boom length 12'. Turning radius 14'. Shipping weight 28 lbs.
Net Each . . . . . . $69.50

MODEL TA-32 Jr. — Two-element beam rated to 300W. 5.5 db. forward gain; 20 db. front-to-back. 1.5/1 SWR. Max. element length 26'. Boom length 6'. Turning radius 13'. Shipping weight 22 lbs.
Net Each . . . . . . $49.50

MODEL V-3—10-15-20M Vertical rated to full KW. Electrical quarter wave on each band. Requires only short radials. 11'6" from base to tip. Complete with baseplate, guy line, necessary hardware. Shipping weight 8 lbs.
Net Each . . . . . . $22.95

MODEL V-3 Jr. — Same as V-3 but rated only to 300W. Overall height 11'9". Shipping weight 6 lbs.
Net Each . . . . . . $17.95

MODEL V-4-6 — Vertical with switching full height. 40-45-50-60M. Complete with insulator, flyer, hardware, matching coil — for 7A operation of V-4 and V-5. Shipping weight 30 lbs.
Net Each . . . . . . $37.50

TRAPMOBILE
10-15-20M MOBILE ANTENNA

MODEL MA-3 — 10, 15, 20 meter Mobile version of the famed TRAPMASTER. Stainless steel whip sections. Fits standard mounts. Length 7'8". Shipping weight 8 lbs.
Net Each . . . . . . $19.95

MODEL A-255 — 10-25-50M Vertical 25'5". Net...
received and they should please all segments of the ama-
meeting. K9AMD, of the same club, installed a new
in charge, visited the Chicago Fire Department un
meters, The Ottawa cd. unit, with CD Director YOK
mission to set up iiis gear there. The Northwestmi
ec-juipinent. KOACH is in Turkey and hopes to get per-
SAQ and KN9SAT. K9PPX and K9A1YQ bave reeeived
(5-meter net working a t. 5.26 Me. un Thurs, at 2000
uld and new triends at the Stan'ed Rock Hamt'est.
annual picnic and the boys came from several states to
Springheld. The Midwest Traffic net also handied 166
uthers in the gang. CSW reports that the North Cen-
 Directors* Meeting. TEC is back on the air on 2
upproved hy the League us an atïiliated cluii. John
the Albany Park Amateur Radio Club are K9s, EGJ,
active ou the sideband net, ( Hticers of the new Hancock
2000 daily and RFN 0800 .Sun, on 3656 kc. ; QIN (slow
VAY. Net skeds IFN (a.m. ) 0800 daily and 1800 M-F
BDG, HRJ, MEK and UXK. RMs; DGA, TT and
The summer weather, vacations and outdoor aetivities
renew friendships. Trahie reports are low this nionth.
expectedly, Trahie reports as 179; KOGT.T., for ÏNIO 6-Meter Net,
reports traffic as 64 and TT reports RFN traffic as 57.
reports as 307; QEN, reported by VAY. as 261; MEK
in with a 15-mpter dipole and QTD is rebuilding his
more crystals that can be polished to this frequency.
and W-DEL urwords. Net reports: BDG reports IFN
5; K9PM 5, W9GA 5. TEC, the new full immediate
6; TDG 24, SOT 24, K9TSQ 24, K9NKF 23, W9SQR 23.
W9USQ 23, K9HMD 22. QXl 48, high 7, low 2. average 4.4: QTC
ments 11 sessions. QXl 48, high 7, low 0. average 1.83. The Bo. Dak.
informai trahie 90, high 12, low 0, average 2.5; informai
8CT 2; QNI 314, high 22, low 8, avergae 19.2; formai
reports 36 sessions; K0BQR 4. KUDUR 3. K0BMQ 6,
(Lincoln) arc counting the »ess. A part of the States
K0JLA
Manon, pussed away recently, K0JLW is nuw working
iour closeness has been from several states to
new friendships, Trahie reports are low this month.
The summer weather, vacations and outdoor aetivities
renew friendships. Trahie reports are low this nionth.
expectedly, Trahie reports as 179; KOGT.T., for ÏNIO 6-Meter Net,
reports traffic as 64 and TT reports RFN traffic as 57.
reports as 307; QEN, reported by VAY. as 261; MEK
in with a 15-mpter dipole and QTD is rebuilding his
more crystals that can be polished to this frequency.
and W-DEL urwords. Net reports: BDG reports IFN
5; K9PM 5, W9GA 5. TEC, the new full immediate
6; TDG 24, SOT 24, K9TSQ 24, K9NKF 23, W9SQR 23.
W9USQ 23, K9HMD 22. QXl 48, high 7, low 2. average 4.4: QTC
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Manon, pussed away recently, K0JLW is nuw working
iour closeness has been from several states to
new friendships, Trahie reports are low this month.

DAKOTA DIVISION

WISCONSIN—SCM, George Wohla, W8KQB—SEC:
YQL, PAML: RNP, GFL and K0HQQ, RSL 3; SA4,
K9AQQ and K0ELT. HDZ has taken over as EC for
Forand du La Roche Hamfest, K9ESF. K9ESF is
congratulated on his good work since 1935, HTQ has
a new Viking kW. The first trial run of the Brown
Country Tower. New advantages for the radio club
IKY, LID, KRMQ and DOL, acting as mobile spotter,
K9MXU is new in Tenn Rivers. CO is on with a new
Bo. Dak. phone net on 3845 kc. New hams: K9ACX and
W9VY. traffic as 261; MEK
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Manon, pussed away recently, K0JLW is nuw working
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new friendships, Trahie reports are low this month.

DAKOTA DIVISION

NORTH DAKOTA—SCM, Harold A. Wengel,
W3CYS—ASST., K8ADK—CSM; Gerald F. Lee, 
W2KY. SA4: SCM assistant: FKE and VAY. SCM as
to 125, 82. WUFAVV 55, KHISP 55, W9-
(Wauka tiwDA DXX. D'O 520, KNOGUll 232, W9USR
(Continued on page 106)
Feature packed...
Value packed...

FIXED STATION
Communicator

Complete, ready-to-operate station...
transmitter, receiver, power supply...
all in one small cabinet. Just connect
antenna and AC power... operate!

This is truly value-packed equipment,
eliminates cost of extra cabinets and
chassis for several individual units. Also
—transmitter, receiver and associated
equipment are designed to work to-
gether at full effectiveness. You save
money...you get better operating,
integrated equipment, a
"packaged station."

Two complete-station models: 10 meter,
covering 28-29.7 mcs and 6 meter,
covering 50-54 mcs. Both ten and six meter
models are identical in general characteristics and appearance.

Transmitter power input is 40-50 watts • Final amplifier uses 6146 tube, has pi network output •
Highly stable, calibrated VFO or optional crystal control. VFO has spotting switch to aid tuning •
Receivers are selective, sensitive • Adjustable squelch • Noise limiter • “S” meter • Panel mounted
speaker • Heavy-duty 115V AC power supply.

G-28, 10 meter, #3204 ... 299.50
G-50, 6 meter, #3221 ... 319.50

GONSET Division of Young Spring & Wire Corporation
801 SOUTH MAIN ST., BURBANK, CALIFORNIA
take your choice!

HQ-100
True Hammarlund quality at low cost! General coverage, 540 KCS to 30.0 MCS. 10-tube superheterodyne with automatic noise limiter. Electrical bandspread. Q-multiplier.
Optional Telechron clock-timer $10

HQ-110
A true amateur receiver at a low price! Dual conversion. 6, 10, 15, 20, 40, 80 and 160 meter ham bands. Crystal calibrator. Q-multiplier. Separate linear detector for SSB and CW. Separate BFO.
Optional Telechron clock-timer $10

HQ-145
Brand-new general-coverage receiver! 540 KCS to 30.0 MCS. Dual conversion. Adjustable 60 db slot filter. Crystal filter. 11-tube superheterodyne with automatic noise limiter.
Optional Telechron clock-timer $10
Optional plug-in 100 KCS calibrator $15.95

HQ-170
Optional Telechron clock-timer $10

HQ-160

Established 1910

HammArLund
MANUFACTURING COMPANY, INC.
460 West 34th Street, New York 1, N.Y.

In Canada: White Radio, Ltd., 41 West Ave., N. Hamilton, Ont.
rest of the country? The Council would like to have our constructive ideas on this matter. Toledo’s Ham Shack Gossip names as its Hams of the Month the teen-agers of the area. You young folks should read the requirements for becoming an A-1 Operator. Follow these rules and you’ll be a credit to amateur radio. YER was winner in the Toledo V.H.F. Club’s first hidden stunt hunter of the year. Columbus ARA’s QST says tell us your story; section of the CARA held what is claimed to be the first amateur radio club meeting to be held over amateur TV, the members getting together in the homes of the amateur TV stations, who in turn showed members at each station to the other station and conducted the meeting; the code and theory class still has 46 students; HAM has a new Tribunter; new mobiles under 6 meters are HUL, UHZ and KSHJR; JSU has a new tower and beam. The Green Valley RC of Alliance will hold its second Annual Lee Deforest Day Celebration Hamnet Aug. 18 at the National Guard Armory; 1175 West Vine St, TBT presented LJI with a new jr. operator. K2PS had a mild heart attack, K3BPY has the Collins 8 line, KRMHJ now has an f.m. 8-meter mobile rig. K1IST has taken over editorship of Tusco RC’s The Beam from STR. KNSOLJ is a new ham. Greater Cincinnati ARA’s The Mike and Key tells us the club members were shown the Bell color film “Cushioned Goddess.” KSCAQ and his XYL were hospitalized after an auto accident. KALDD received his General Class ticket at the tender age of nine. Our Great Lakes Director, your SEC and SCM attended the Springfield ARA’s Annual Banquet and saw attend Ed Sligh in Akron. We then drove to the Dayton Hamvention where over 2300 were registered, 945 attending the banquet. After the banquet, the Ohio Council of Amateur Radio Club’s cups were presented, one to the Ohio Valley ARA for the highest score in 1968’s Field Day, another to the Dayton ARA for winning this year’s Ohio Intrastate Contest and the Hamvention cup to the outstanding amateur in a five-state area. ZOF, the Master of Ceremonies, introduced the key-note speaker, Lt. Gen. F. H. Griswold, K6DWC, whose subject was “Strategic Air Command and the Amateur.” K3X went to see a movie featuring Slim Pickens. A ham from Sidney showing a picture of Vinnie Emerich, 14 years old, who won the Collins 8-line transmitter and receiver. KSHJR received a WAC certificate. The Buckeye Net (BN) will hold its third annual picnic Sat., Aug. 8, starting at 1000 EST at Mt. Vernon. I think I would be nice if the boys in the Ohio Phone Net would join us, making it an all-Ohio traffic nets picnic. Those who made BPL in May were DAE and UPH. Traffic: (May) W8TJPH 1045, DAE 402, QMT 65, J2G 34, J2V 87, AL 76, GKB 64, RXX 47, KSHJR 43, CTQ 38, W8YGR 38, KSHGT 30, WABE 21, KSHUP 21, WALT 21, SYD 16, K3DDG 15, W3JE 15, K8KHS 13, W8FFK 10, W8TJPH 10, W8WYS 10, K8IBH 8, W8HPP 7, KSHJR 6, W8HJZ 6, LMB 6, K8KBS 4, MII 3, MII 3, W8STF 2, (Apr.) W8XIO 6.

HUDSON DIVISION

EASTERN NEW YORK—SEC: SCM, George W. Tracy, W2FEU, Sec.: W2KGC, R.M. W2PFX, P.A.M.: W2JBD, and W2NOC, Section nets: W2XNO on 3095 kc. at 1300, W2WON on 3093 kc. at 1300, W2PFX on 3096 kc. at 1300, W2KIS on 3099 kc. at 1300, K8XPH on 3098 kc. at 1300, and W2WON on 3096 kc. at 1300, ENY (electronic) on 29000 kc. (Thurs.) and 14356 kc. (Fri.); NYSPTEN on 3716 kc. Sat. at 1300. Endorsements: W2PFX and K2UTV as ORS. Welcome to Pelham Memorial H.S. Club as a new ARRL affiliate. Sorry to report the passing of K2AE, the “clean” of local amateurs at 92 years of age. We’ll miss the great “purple pajamas,” a colleague of Nikola Tesla in the early days of radio. Congrats to K2UTV on making BPL again. New Generals are W8YGR and K2RM, K2ZDV, W2CZC, has moved to Massachussets. The NYSPTEN Picnic will be held at Taughannock State Park Aug. 22. K2CVG reports 20 states on the netters. The Lakeland H.S. (NYSPTEN) has added a Field Day contest with a generator during the Boy Scout Summer Camporee. K2ICH received a Worked All Ohio Award from the JFO. New leaders: The Yonkers Club: K2BIG, pres.; K2TV, vice-pres.; K2ZIN, and W2DDE, secretaries. 1UCD, from ARRL is the club’s speaker in May on the generator connection. K2ICH has a new Viking 500 and K2MBU a Comanche. K2BFE has a new 15-meter beam. The new president of the Schenectady Club is W2FEU. The Albany Club held an outing at Schroonda Reserve owned by K25TN, Utter County is active in RACES. The R.P.I. Club had a Labor Day George party sponsored by W2CZC and W2CZD. Among those working with State Officials to promote call letter plates are W2CZC, W2TIP, and W2CZD. Twenty-five members of K2RM and K2SHB, attended the W2KIS 175 Club picnic at K8MHJ’s. K2CBU 175, K8KIK 102, W25T 60, W2CZC 58, W2K8C 22, W3ARK 17, W25BS 11, W8TWT 10, W2WTE 9, W2MYC 7, W2BVB 6, W2DDB 4, K2CVD 2, W2AALO 1.

(Continued on page 110)
Hams Everywhere Depend on QUALITY International Crystals and Components and GET 'EM FAST!

**FO-11 100 KC OSCILLATOR**
- Kit with tube and crystal $12.95
- Wired and tested $15.95
- 100 KC crystal only $8.50
- for use with FMV-1 10 KC multivibrator
- Shipping Weight 2 lbs.

**FMV-1 MULTIVIBRATOR**
- for use with FO-11 100 KC oscillator
- Kit, less tube $5.95
- Wired, with tube $8.95
- Shipping Weight 2 lbs.

**STP-50 6 METER TRANSMITTER**
- Kit, less tubes & crystal $21.50
- Kit, with tubes less crystal $26.50
- Wired, with tubes but less crystal $32.50
- Crystal, FA-5 12MC $4.00
- Shipping Weight 5 lbs.

**STP-10 10 WATT MODULATOR**
- Designed specially for International's STP-50 transmitter.
- Kit, less tubes $22.75
- Kit, with tubes $25.25
- Wired and tested, with tubes $30.50
- Shipping weight 3 lbs.

**ONE-DAY SERVICE ON CRYSTALS**
- for Amateur or Commercial use!
- See catalog for crystal prices.

**FCV-1 6 METER CONVERTER**
- Kit with crystal less tubes $10.95
- Wired with tubes and crystal $15.95
- Shipping Weight 2 lbs.

**FCV-2 CONVERTER**
- Model 50, 6 Meters
- Model 144, 2 Meters
- Kit with crystal less tubes $12.95
- Wired with crystal and tubes $17.95
- Shipping Weight 2 lbs.

**STP-100 100 WATT MODULATOR**
- Designed specially for International's STP-50 transmitter.
- Kit, less tubes $21.50
- Kit, with tubes $26.50
- Wired, with tubes but less crystal $32.50
- Crystal, FA-5 12MC $4.00
- Shipping Weight 5 lbs.

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**ONE-DAY SERVICE ON CRYSTALS**
- for Amateur or Commercial use!
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NEW...
CAMBION® Catalog Lists Components for "COMPLETE DESIGN"

Here's the handy 16-page CAMBION Catalog that makes component selection for complete jobs faster and easier than ever before! Includes everything from battery holders and binding posts to thumb screws and tube clamps. Covers in detail the wide variety of CAMBION standard and insulated terminals; coil forms and coils; jacks and plugs; panel hardware; and many, many other CAMBION Components. Also lists those versatile, low-cost CAMBION Kits: choke, coil, and coil form kits; standard and insulated terminal kits.

Whether you're working with conventional or printed circuits, building a permanent or temporary rig, you'll do a faster, more efficient job using this new reference. Yours without charge if you ask for it now.

NEW YORK CITY AND LONG ISLAND—Harry J. Dannais, W5TUK-SEC; W2ADO, RN1; W2YFT, PAM; W3UGF, V.H.F. PAM; K2EQH, Section nets: N.Y.L. 3600 kc. nightly at 1500 EDT on Sat. in 1915 EDT; N.Y.C.-LI. 3500 kc. Most through Nat. from 1730 to 1830 EDT; N.Y.C.-LI. AREC, 3900 kc. Sun., at 1930 EDT; N.Y.C.-LI. W.I.F. Traffic Net, 145.5 kc. Tue. through Sun., at 2000 EDT; BPL cards were recently mailed by W2KB and K2QBB, the latter on origination plus deliveries. At the suggestion of W2LQK, our new QSL cards are listed for your information: Manhattan, K2YV: Bronx, W2DUP; Staten Island, W2VKF; Brooklyn, K2TKE; Queens, W2LG; Nassau, W2FI; and Suffolk, W2AKA, AREC and RACES questions may be addressed to any of the aforementioned men for their respective areas. All our section nets continue their efforts every month—four Urnes. This is the 25th year on it. K2YV, an ORS for four months, has made 170 contacts in 8 hours in the C.W. CD Party; sending up a wire fence! Who needs antennas? K2TPU received his CTC-15 at 800 and added A1Qsma for a new state on 5 meters. K2YDR has a new Johnson 6N2 working and added Nebraska for his 30th state on 50 Mc. A new Ranger has been completed at K2YU to assist his DXCC 164/165 record. Joe needs only a JTA1 QSO to complete W4Z, K2BMI, and W2AGJ assisted in an emergency involving a trailing accident on the Interboro Parkway. K2VHI relayed information on the 6-Meter LI. Essentials Net to W2AWC, who contacted the police and relatives of the persons involved in the accident. This timely work received the new paper circulation. W2AFE added a new power Tri-Band beam. W2LQK installed a new G-666 and his Viking move to a new Pontiac. The Queens 10-meter ARC performed a valuable public service by monitoring in the American Legion Parade with modules W2LAC, W2LGK, W2WIF, W2MHU, and W2M2U; fixed stations W2AMI and W2JTO; and K2LWN with his mobile-module. The latter station provided the parade chairman with direct contact with all parade units. The Bronx HS of Science ARC elected K2KQH, sec.; K2KRM, asst. sec.; K2KJW, asst. sec.; K2LWS, ex-officio; W2LJT, and his Viking II and HQ-150 have helped tremendously on N1F. A new teen-age net is being organized on 40-meter phone by K2KJX and W2BVU. K2DID built an Apache and companion s.s.b. exciter. K2MID added a 10-meter mobile rig to his new car. W2KNA moved to Bayport. New officers of the Bayside ARC are K2WOT, pres.; K2HDR, vice-pres.; K2YU, sec.; W2THU, trans.; and K2UL. K2KJX installed a TA-33 Jr. K2HTD is working on a keyer for RTTY. WV2BDV put K2UBW needs KL7 for WAS. 'W2PTS has finished his modulator. All he has to do now is to get it working. W2BY5V is working on a layer for RTTY. W2BDV put... (Continued on page 118)
Traveling companions to thousands of cars...

Gonset Converters, operating in conjunction with your existing BC auto radio, offers you excellent mobile reception...simple, rapid installation...best, dollar-for-dollar value.

Super-12 Converter

Sparkling, modern version of a famous Super-6 predecessor. Operates directly from 12 volt DC, requires no high voltage source, is well suited for use with new "hybrid" auto BC receivers that operate directly from 12 volt battery systems. Unit is compact, easily installed, blends perfectly with modern car interiors.

Sensitivity and stability are excellent. Converter provides coverage of 5 amateur bands, 10, 15-20, 40 and 75 meters. Also covers 11 meter Citizens Band. Has 19 and 49 meter coverage for casual listening to international SW broadcasts.

Model 3261...69.50

6 Meter Converter

Another fine converter, gives mobile reception over the frequency range 49 to 54 mcs. Requires no high voltage supply, connects directly to 12 volt battery system. May be used with standard car radios. Small in size...installed readily.

Has sensitive RF stage for weak-signal reception, is highly stable, has low frequency drift. Triple conversion (including mixer in auto radio) gives maximum image rejection.

Also includes built-in, effective noise clipper which may be connected to any auto set having tubes up to the second detector stage. Entirely independent of converter proper.

Model 3275...69.50

On highways and byways throughout the world...Gonset Converters...traveling companions to thousands of cars!
NEW VOM-20 Miniature MULTITESTER

ONLY $33.90

Complete with Batteries

- EXCEPTIONAL ACCURACY...
- Sensitivity: 20,000 ohms per volt for dc, and
  15,000 ohms per volt for ac.
- 3 BIG SCALES...
- (1) for dc voltages and current (2) for ac voltages and (3) for ohms.
- RANGES...
  - Up to 1500 ac, dc; 500 dcma; megehms.

SEE YOUR DISTRIBUTOR
OR WRITE DIRECT FOR DATA SHEETS

HEADQUARTERS FOR MINIATURE COMPONENTS

international instruments inc.
® P.O. BOX 2954, NEW HAVEN 15, CONN.

1" and 1½" METERS

SPECIFIED WHERE ACCURACY AND DEPENDABILITY COUNT

MODEL 100

1" Round Meters: 90° scale arc, 0.760° scale length. Also supplied as VU and DB and Meters with external accessory attached. Many special cases available.

1½" Round and Square Meters: 50° scale arc, 1.322° scale length. Model 153 (square) Meter meets Mil-M-3823 requirements. Model 163 (square) Meter tested satisfactorily to Mil-M-10304 (Sig. C.).

SEE YOUR DISTRIBUTOR
OR WRITE DIRECT FOR DATA SHEETS

MIDWEST DIVISION

IOWA—SCM, Russell B. Marquis, WB8DOR—The TCLC held its annual party May 23 in Cedar Rapids with an attendance of 23. K0RLB was elected new net manager and GQX was elected asst. manager and reporter. K0MLL has added the TCLC newsletter. The 75-Meter Phone Net will hold its annual picnic in Ames Aug. 17. GXP received an OPS appointment. Renewals: VTA as O8S and ZMU as PC. The Sioux City ARC received the RACES go-ahead from the FCC. K05O is Radio Officer for Sioux City. The Great Lakes Radio Club held a picnic at Rutland. The Rain Anointments played host to a picnic at Baird with 80 present. The Atlantic group held a picnic for Southwest Iowa hunis. VTQ made WAZ. The Post Dodge 8-Meter Net now has 10 members, PAN is leaving for a 2-month cruise in the Far East. K0CX and K0HBA visited IBD. HDB visited the 81U Radio Club at Iowa City. The SCM is becoming active again in traffic after an enforced absence. K0IBJ, of Albany, is now K0TOO. The Sioux City ARC has purchased another station to house portable gear. GQO now has a 100-watt d.s.b. mobile rig. KFB and DWD are back on the 75-Meter Phone Net after a long absence. Traffic: (May) G0G 1241, LCX 801, 80C1S 524, W8SCA 105, V0F 78, K0RJ 67, W8NGS 65, K0AEJ 50, W8QX 48, O8P 43, O8A 38, W8KBC 30, W8KGC 25, W8RGA 21, PJ9 19, FDM 15, K0HIC 14, K0AQ 12, 101. 10, N0YXW 7, V0A 7, K0KEX 7, W0U7 7, ADR 6, K0DPT 6, J0M 6, W0PFA 6, K0QKH 4, K0X 4, W0WQZ 2, K0QAI 1. (Apr.) W8A1T 2.

KANSAS—SCM, Raymond E. Baker, W8WNC—RCF, Asst. SEC: K07A, VPL: PAN; HAM; RM QGQ is enjoying a well-earned vacation in 6-land visiting his son. K0NX will act as RM during his vacation. A.M.A. meeting is beginning in June. Traffic: (May) G0G 1241, LCX 801, 80C1S 524, W8SCA 105, V0F 78, K0RJ 67, W8NGS 65, K0AEJ 50, W8QX 48, O8P 43, O8A 38, W8KBC 30, W8KGC 25, W8RGA 21, PJ9 19, FDM 15, K0HIC 14, K0AQ 12, 101, N0YXW 7, V0A 6, K0KEX 7, W0U7 7, ADR 6, K0DPT 6, J0M 6, W0PFA 6, K0QKH 4, K0X 4, W0WQZ 2, K0QAI 1. (Apr.) W8A1T 2.

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112
For Hams who TRAVEL . . . live in APARTMENTS

the New MOSLEY

Tote-Tenna

for 10-15-20

works GOOD anywhere!

here's why:

TOTE TENNA is a full electrical ½ wavelength on each of the 3 bands and is voltage fed through a frequency-sensitive tunable L network. This makes it possible to tune out reactance and achieve near-unity match under almost every conceivable condition of installation. High in the air—or near the ground . . . TOTE TENNA will put your signal out!

Superb engineering and craftsmanship make the TOTE TENNA a perfect traveling companion to the finest in portable/mobile rigs. Rated to 300 watts (AM), TOTE TENNA is also ideal as a “fixed station” antenna for low and medium power operation.

TOTE TENNA radiator opens to 14' . . . packs into space just 4½" x 8" x 36". Truly portable! Sturdy window mount is quickly, easily installed without tools. Weather seal keeps out wind or rain so you can "ham" in comfort—anytime!

Radiator sections, of durable 61ST6 aluminum, are ingeniously connected by an interior spring and nylon cord arrangement that permits rapid and accurate assembly. No ground or radials are needed. You're on the air in minutes with TOTE TENNA!

MODEL TT-31, TOTE TENNA with Tuning Unit, Coax Line & Window Mount. Amateur Net, $80.00

MODEL TT-31-A, Deluxe Carrying Case.

Amateur Net, $27.45

MODEL RI-6, *SWR Bridge. Amateur Net, $47.65

MODEL TT-31-X, TOTE TENNA complete with all accessories listed above. Amateur Net, $149.50

*(Because TOTE TENNA is designed to be tuned for peak performance in varying locations, this can be best accomplished by tuning for lowest SWR. The MOSLEY Model RI-6 is a superior quality instrument featuring a side indicator meter and intended for continuous service at power ratings from 10 watts to 1 Kw. For 52 ohm line.)

Mosley Electronics, Inc.

8622 St. Charles Rock Road • St. Louis 14, Mo.
Now, from CDR

New, Low-Cost TRANSISTORIZED Power Supply

Here's the transistorized power supply you've been waiting for... quality-built to a new standard in "total-package" design by the company you know you can trust! It's yours for only $60, amateur net.

The Model 12TP12 converts a 12.6 VDC nominal input to an output of 500 VDC at 240 MA (120 W). Highly efficient and quiet, this compact (5 1/2" x 4 1/4" x 3") mobile power supply weighs only 1 1/4 pounds. In stock now at your C-D-R distributor. See him today, or write for full details to The Radiart Corporation, HAM Dept., Indianapolis, Indiana.

C-D-R also makes the famous HAM-M Rotor

114
THE REVOLUTIONARY NEW
CENTRAL ELECTRONICS 100V
EXCITER-TRANSMITTER
BROADBANDED! ONLY
ONE TUNING CONTROL
THE VFO ITSELF.

CENTRAL ELECTRONICS, THE PIONEER OF AMATEUR SSB IS PROUD TO BRING YOU THE FINAL RESULT OF THREE YEARS OF THE KIND OF PATIENT ENGINEERING, TESTING AND IMPROVING THAT MAKES FOR A SUPERIOR PIECE OF ELECTRONIC GEAR.

MANY OF THE TRIED AND TRUE PRINCIPLES AND FEATURES OF THE ORIGINAL MULTIPHASE EXCITERS HAVE BEEN RETAINED IN THE NEW 100V, ALTHOUGH IN VASTLY IMPROVED FORM. THE USE OF PATENTED BROADBAND CIRCUITRY THROUGHOUT PRACTICALLY ELIMINATES "COCK-PIT" TROUBLE.

REGARDLESS OF YOUR PREFERRED MODE OF OPERATION, IT'S ALL IN THE 100V. SSB, DSB, AM, PM, CW and FSK . . . AND ALL AT THE FLIP OF ONE SWITCH. ALTHOUGH THE 100V WILL PROBABLY FIND ITS GREATEST USE AS A SINGLE SIDEBAND SUPPRESSED CARRIER EXCITER-TRANSMITTER . . . NO ONE HAS BEEN "LEFT OUT IN THE COLD" IN ITS DESIGN. THIS IS THE KIND OF A RIG THAT HAMS DREAM ABOUT!

CHECK AND COMPARE THESE FEATURES

STABILITY: The new patented two tube permeability tuned VFO circuit is exceedingly stable and is immune to the effects of line voltages and tube aging. Built like a battleship, it is tuned by a husky precision lead screw assembly running in ball bearings. This is a VFO to end all VFO's.

FREQUENCY COVERAGE: 80 METERS - 3.5 to 4.5 Mc. 40 METERS - 6.5 to 7.5 Mc. 20 METERS - 13.5 to 14.5 Mc. 15 METERS - 20.5 to 21.5 Mc. 10 METERS - 27.7 to 29.7 Mc. A spare X position provides for the installation of broad-band coils for 160 meters, MARS, etc. OR any 1 Mc. portion of the spectrum between 1.5 Mc. and 25.5 Mc. OR any 2 Mc. portion of the spectrum between 25.5 Mc. and 29.7 Mc. YOU DON'T SETTLE FOR HALF A LOAF OF FREQUENCY COVERAGE WHEN YOU HAVE A 100V!

THE TUNING DIAL: Band scales in the large slide rule window change with the band switch and are calibrated at each 100 KC point. Frequency is read directly in 1 KC increments on the circular KC dial without any computation whatever. Approx. 12 feet of bandspread on each band. A smooth running two-speed tuning knob allows fast tuning at 100 KC per turn and slow tuning at 750 CYCLES per turn. Calibration accuracy is 250 cycles between any two 50 KC points.

METERING: Reads POWER INPUT (0-200 watts) RF AMPS OUTPUT, AC LINE VOLTAGE and CARRIER SUPPRESSION IN DB DOWN TO 70 DB.

MONITORING: A 2" scope provides an instantaneous visual check on non-linearity resulting from improper loading. Also indicates proper setting of carrier injection for 100% AM modulation. Scope presents a sharp trapezoid pattern.

OTHER INDICATORS: Below the meter a neon indicator provides a check on the operation of the NEW AUDIO LIMITER CIRCUIT. Below the scope a second neon indicator starts operating if you have the antenna or load mis-matched.

MULTIPHASE 100V complete........................................Amateur net $695.00

Orders entered prior to June 1, 1959 will be shipped at the original price of $595.00

COMING UP! MORE SUPERIOR GEAR FROM C.E. THE 55B PIONEER

A NEW COMPANION RECEIVER: Which will TRANSCIENCE THE 100V or separate the two VFO's at the flip of a switch. The 100V has the interlock control sockets.

A NEW 2500L BROADBAND LINEAR AMPLIFIER. Big brother to the famous 600L.

A NEW HETERODYNE CONVERTER: To cover all of the 2 and 6 meter bands with the 100V. Interlock control sockets are in the 100V.

SORRY, INFORMATION AND DELIVERY DATES ON THESE NEW ITEMS NOT YET AVAILABLE.

NEW AUDIO FILTER-LIMITER: The new filter is composed entirely of R-C components, yet has the steep side response and rejection characteristics of a four toroid tuned filter but without the usual harsh, ringing effects. Bandpass is 200 to 2700 cycles. This filter precedes the phase shift system and will maintain 50 DB SUPPRESSION OF THE UNWANTED SIDEBAND. The new audio limiter maintains audio drive to the balanced modulator WITHIN 1 DB REGARDLESS OF HOW HARD THE MIKE IS HIT. IT'S IMPOSSIBLE TO OVERDRIVE THE 100V BALANCED MODULATOR.

Inverse feedback circuits allow 10 DB OF CLIPPING with negligible distortion.

NEW PS-2 AUDIO PHASE SHIFT NETWORK: A twelve cross-over point network is composed of heat-cycled components having 1% accuracy. Even changing the balanced modulator tubes has no effect on its main tuning 50 DB OR BETTER suppression.

POWER OUTPUT: The husky, ultra-linear type 6550 tubes in the final of the 100V will deliver 100 WATTS OF SINGLE TONE POWER, EVEN ON TEN METERS! AND WITHOUT GRID CURRENT FLOW. Two tone third order distortion products are down in excess of 40 DB. A new POWER OUTPUT CONTROL eliminates the need for power dividers when driving AB1 or AB2 lines, since power output is continuously variable from 10 watts to full output.

SET AND FORGET CONTROLS: These seldom used controls are all located behind the flip down magnetic doors on the front.

GENERAL CIRCUITRY: Crystal controlled master SSB generation is at 8 MC, VFO injection is 5 to 6 MC. Crystal controlled heterodyne oscillators operate into mixer stages for various bands. This system, originally developed by C.E. is today the standard of the industry. Blocked grid keying of mixers and final amplifier provides perfect CW and PHONE BREAK-IN.

PHYSICAL DATA: Panel is standard 19" width by 834" high. Finish is smooth grey. Attractive heavy duty rounded corner cabinet is 15" deep, finished in grey wrinkle and has a latch type access lid. Shipping weight approx. 90 lbs.

WRITE FOR LITERATURE ON THE COMPLETE MULTIPHASE LINE

MULTIPHASE EQUIPMENT
1247 W. Belmont Ave. Chicago 13, Illinois
A subsidiary of Zenith Radio Corp.
**NEW 60-FT. 4-BAND ANTENNA**

Hi-power design. 4 bands in 60 ft. over all. Will handle 2 KW of well over-modulated AM carrier.

<table>
<thead>
<tr>
<th>Band</th>
<th>Screwed Posts</th>
<th>4-band</th>
<th>4 band</th>
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<td>40M-C</td>
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<td>40M-A</td>
<td>4 band kw antenna</td>
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**FIVE-BAND ANTENNAS**

<table>
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<th>Band</th>
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<th>5-band</th>
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<tr>
<td>HCF-5</td>
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<td>phone coils 5BC-C CW coils</td>
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<td>phone 5BA-C CW antennas</td>
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All antennas have

- 88 ft. KW twinleads
- heavy-duty insulators
- copperweld wire

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**G4ZU BEAMS**

"DX men from all countries, load this completely new precision G4ZU Beam. 52 ohm coax feed direct to transmitter. NO TRAPS TO SET OR COILS TO BURN OUT. Each beam preset for maximum operation. NO ADJUSTMENTS and rated to the full KW. G4ZU has the only beam improvement to be granted both U.S. and English patents. This dream beam your ticket to DX UNLIMITED. In the U.S. only at $79.50 and available now.

---

**MASTERCYCLE**

Chicago, Illinois

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**EASTERN MASSACHUSETTS**

- SCM: Frank L. Baker, jr., W1ALP—New appointments: EUT Swampscott as EC, SHU11 as AO. Appointments endorsed: QVQ, Sector 16B as EC; G6, Sector 16A as AO. WNP Concord, HLT, Stow, VVI Area 1 R.O. as EC; KIAGS as OBS: GUC as AO, NBY is moving to Chelmsford. New calls in Callbook are: GMW, KIAG, GMW11. The Cape Cod and Islands ARA held its annual picnic at "Confusion Manor," KIGP9 has 30 watts now, The Framingham Club held their annual dinner with a lot of new equipment there. MIX received a W-Del certificate, AUQ is working all the time. KIHU is busy with the RFR is building a kw. rig, HIC finally worked out of New England on 6 meters into Indiana. The Great Bay Radio Asso. had a change of officers. MIX received a WNH and WFRC certificates, MEG was named operator of the month in MAAR. KIGXG is on several bands in Illinois. KTJ spoke at the QRA, the South Shore Club met. KIZP is only. SHU11 is moving to MIT. and works at WCOF nights. K1003/3/1 is at Air Base, Officers of the Wiltz City Radio Club are KNN12KZ, pres.; KNN12K, secy.; KNN12A, treas.; KED12FD, chf eng. The Hams Clarence School has a station on the air and is using the cell of Mr. Perilli, the instructor. New officers of the 70 Club Radio are RCA, pres.; JPS, vp's.; HHH, secy.; INX, treas. MNK is the new Pres. After leaving for a couple months, DAQ12A has been working you day and night. Beverly is the new Pres., the 75 Club Radio Club in Muldrow, OK, is operating 75 Club, SV19, pres.; HEC, secy.; HEC, treas.; HTU, IEE; and FFC, directors; KIDNS, public relations. The club meets the 1st and 2nd Wed. of each month at 27 N. Hi. Ave. They have a KTJ says they have received some Genets for c.d. work, FJ1 and K5GHP have net certificates for the Eastern Mass. C.W. Net, OFK, a new net, is on 2 meters in the U.S. only at 1600 kc. and 750 watts.
MORE THAN CITIZENS' RADIO ... a complete, fully engineered "industrial-type" transceiver!

VIKING Messenger

Anyone can operate...no code to learn...no examination necessary...license issued by the FCC on request!

- Complete Class "D" (27 Megacycle) Citizens' Band coverage—your choice of 5 channels at the flip of a switch!
- Meets all FCC requirements
- Maximum legal power
- Push-to-talk microphone!

"More than just 2-way Citizens' Radio equipment"—the Viking Messenger is the very finest personal communications equipment available in the field! Designed for reliability and easy installation in your home, business location, car, truck, or boat. Excellent receiver sensitivity and selectivity. Built-in Squelch, Automatic Volume Control, and Automatic Noise Limiter. Compact, modern styling—only 53/8" high, 7" wide, and 113/8" deep. Complete with tubes, microphone, and crystals for one channel. 3 models available: 115 Volts AC; 6 Volts DC and 115 Volts AC; or 12 Volts DC and 115 Volts AC.

Manufacturers of the world's most widely used personal communications transmitters

Write for FREE color brochure with specifications and complete information on antennas and accessories!
The New ELENCO COMMANDER

4 KW P.E.P.
Grounded Grid
LINEAR AMPLIFIER

- 6000 Volt power supply for high efficiency
- Hipersel transformers for compactness
- Easy to drive. No wasted exciter power
- High-low power switch for tuning and quick power change
- Double interlocked for absolute safety

Although designed to commercial specifications, the Elenco Commander operates with excellent efficiency at the legal amateur power limit of 1 kw average d.c. input. Working well within its rating, the amplifier gives superior performance on five amateur bands, 10 through 80 meters.

ELENCO "POWER GAINER"
Audio Compression Amplifier
4 Times Power Gain.
Prevent Overmodulation
AM-SSB-DSB

only $39.50

New factory-to-consumer sales plan (direct sales only) includes trade-ins, time payments, money-back guarantee.

WRITE FOR DETAILS

ELECTRONIC ENGINEERING CO.
Wabash
Indiana
Manufacturers of Commercial & Amateur SSB Equipment

Hamfun, The West Mass section includes Worcester, Franklin, Hampshire, Hampden and Berkshire Counties. All other counties are in the Eastern Mass section. Your SCM is assuming duties at League Headquarters, thereby creating a vacancy for the SCM position. The election notice in "Operating News" Traffic: TRAFFIC 80, DCL 78, BUR 77, DXS 74, ZUP 27, QKC 28, AGM 19, OK 8, KICGN Y.

NEW HAMPSHIRE—SCM, Robert H. Wright, WIRYNH—SEC: RXU, RXA; KIBCS and KICGLF, PAM: FIAQ, V.I.F., PAM: TA. The GSPN meets at 1000 Mon. through Fri., and at 0000 Sun., on 3842 kc. The SCM (c.w.) meets nightly at 1330 on 3605 kc. The Northeast V.I.F. Net convenes nightly on 145.8 kc. The N.H. RACES Net meets Sat. at 1330 on 2953 and 53.350 kc. Please note the earlier meeting time of the SCM. The New Hampshire has lost another oldtimer in the passing of TIP of Northwood. The GSPN picnic held May 24 was well attended despite the cold weather with about 60 members and their families showing up. It was held at Lake Stow Park in Gilford on the shore of Lake Winnipesaukee. The Manchester Radio Club plans to be having to sponsor a N.H. Hamfest next year. A revised rotate a certificate of merit for perfect c.w. and a copy of the Armed Forces Day Message. Welcome to new hams KNILAS, Louise French, of Merrimack, PIZ and VAU are both employed at the Sprague Electric plant in Conover, and RAH is employed at Aerotronics Associates in Hopkington. MIPD and VIFC are equipped with 1952 TTY, TTY 2. KBCS, KIBCS 624, CIF 51, MHC 128, WIFR 70, QGC 59, BRK 17, KICBOO 16, WIVIF 15, ACD 12, KIDDS 10, WICU 2. (Apr.) WIRKA 16.

RHODE ISLAND—SCM, Mrs. June R. Burckett, WIIYX—SEC: PAZ, PAM: KCS and YRC, RM: IBHI, WGB. WGB is the new president of the IRA. Other officers elected at this club's annual election on June 1 are: KICGH, vice-pres.; KICMB, secy.; and POP, treas. At a recent election of officers at the WIRH, MUL was elected pres.; NOB, vice-pres.; KICMB, secy.-treas.; and SUL, act. mgr. VBR is a new member of MARS. HBN reports that a new member of the WIRD, KICMB, has put the VHF club on its list of amateur circles.

Vermont—SCM, Harry A. Thomas, jr., WIVSA—SEC: KCS, RM: KICMB, PAM: YZV, Ast. PAM: KICMB, PAM: KICMB. Frequencies used in Vermont: 48, 3360, phone 3955. VTN meets Mon.-Sat., at 1330 (c.w.), VTPH Sun., at 0000 (phone), VGMB Mon.-Sat., at 1330 (phone), VTPH Sun., at 0000 (phone), KICMB, Manchester, and KICMB, Newport. The following Vermont amateurs were seen at the New Hampshire 3rd Annual Convention: KICMB, Manchester, and KICMB, Newport. It was previously reported that the WIRD, W1DRC, would be given to the members of the VHF club on their installations in each of the five Rhode Island counties on or after Jan. 1, 195. This date is in error and should be Jan. 1, 195. Traffic: (May) WISU 555, LQ 50, TXL 37, TR 28, 5Y 10, BBK 17, WED 12, KICMB 10. (Apr.) WIRHA 16.

VERMONT—SCM, Harry A. Thomas, jr., WIVSA—SEC: KCS, RM: KICMB, PAM: YZV, Ast. PAM: KICMB. Frequencies used in Vermont: 48, 3360, phone 3955. VTN meets Mon.-Sat., at 1330 (c.w.), VTPH Sun., at 0000 (phone), VGMB Mon.-Sat., at 1330 (phone), VTPH Sun., at 0000 (phone), KICMB, Manchester, and KICMB, Newport. The following Vermont amateurs were seen at the New Hampshire 3rd Annual Convention: KICMB, Manchester, and KICMB, Newport. It was previously reported that the WIRD, W1DRC, would be given to the members of the VHF club on their installations in each of the five Rhode Island counties on or after Jan. 1, 195. This date is in error and should be Jan. 1, 195. Traffic: (May) WISU 555, LQ 50, TXL 37, TR 28, 5Y 10, BBK 17, WED 12, KICMB 10. (Apr.) WIRHA 16.

NORTHERN DIVISION

IDAHO—SCM, Mrs. Helen M. Maitlis, W7XXW—SEC: K8B, RM: KICMB, PAM: YZV, Ast. PAM: KICMB. Frequencies used in Idaho: 48, 3360, phone 3955. VTN meets Mon.-Sat., at 1330 (c.w.), VTPH Sun., at 0000 (phone), VGMB Mon.-Sat., at 1330 (phone), VTPH Sun., at 0000 (phone), KICMB, Manchester, and KICMB, Newport. The following Vermont amateurs were seen at the New Hampshire 3rd Annual Convention: KICMB, Manchester, and KICMB, Newport. It was previously reported that the WIRD, W1DRC, would be given to the members of the VHF club on their installations in each of the five Rhode Island counties on or after Jan. 1, 195. This date is in error and should be Jan. 1, 195. Traffic: (May) WISU 555, LQ 50, TXL 37, TR 28, 5Y 10, BBK 17, WED 12, KICMB 10. (Apr.) WIRHA 16.

(Continued on page 129)
"WORLD'S FINEST" AND MOST PRACTICAL 3-BAND SYSTEM

"CHRISTMAS TREE"

"THE STANDARD OF COMPARISON"

2" O.D. x .134 Wall x 16 ft. Diamond "E" 1025 Mech. Steel Mast — $30.00

10 Meter 3 Element — Model 10M-314 — $96.00

15 Meter 3 Element — Model 15M-318 — $130.00

20 Meter 3 Element — Model 20M-326B — $215.00

"Balun" fed
Optimum design, 10, 15 and 20, for no compromise 3-band performance!

"Beamed-Power"
"Balanced-Pattern"

By far the most powerful and practical 3-element "Tri-band" System... guaranteeing no compromise, 3-band performance, and reliability — rain or shine! "Balun" fed and optimum antenna design assures... maximum gain, and impedance bandwidth, plus pattern symmetry with minimum TVI, BCI and harmonic radiation qualities—not possible with so-called "Tri-banders." Install Telrex "Tri-band — Christmas-Tree" for "top-man-on-the-frequency" results!

Lower Cost "Tri-band" Systems Available

Antennas Since 1921

"Balun" fed and optimum antenna design assures... maximum gain, and impedance bandwidth, plus pattern symmetry with minimum TVI, BCI and harmonic radiation qualities—not possible with so-called "Tri-banders." Install Telrex "Tri-band — Christmas-Tree" for "top-man-on-the-frequency" results!
BURGESS BATTERY COMPANY
FREIGHT, N.
Niagara Falls, Canada

ORGANS & ELECTRONICS
Box 117, Lockport, Ill.

MONTANA—SCM, Vernon L. Phillips, W7NPY/W7X.
RNPS; KUH; KGL, MDN, TAC, TAC.
M-W-F at 1900 on 3910 kc. RSPS tests T-T-S at 1900
3350 kc. FLT was honored as the outstanding
standard of Montana and received an Honorary Degree of Science
Degree. ZQG and TIO have a new baby girl. There were
110 registered at the Central Montana Hamfest at Lewistown.
KTHX was won a G9EB, KTAZ and YHS.
PBL of YHS passed the Amateur Extra Class exam. New calls:
KTHXK at Culee Bank KTEGL, KTEQW.
KTEGY at Florence; KTIEJ at Livingston; KTICM
and KTICN at West Yellowstone; and KTHL at Cor
ville. KTHQ moved from Havre to Billings. FLT
moved from Idaho to Eureka, WAW moved from Billings
to Denver. YNE moved from Billings to Worland, W2L.
The Electric Craft Radio Club made the ARRl Affiliated Club Honor Roll.
KTHQ has a new Heathkit Chevenne Mobile and is
working near Dillon. Traffic: W7THF 111, K7WZ 62, DV7 12, AWD 4, BVO 4, W7NPY 4.
OREGON—SCM, Hubert R. McNally, W7JDX—
KTHQ reports meetings of AREC twice per month on
20. It KEPO is working out well now with his DX-40
after some trouble. The Southern Oregon Radio Club
furnished communications for the Memorial Day Boat
on the Rogue River. KEN, DXQ, CPY, CME, AH, DEM.
DJQ, YUV, KUS, KZU, KACB, KN4V7C and
KTVU/T took part. STG still is making flying trips to
Portland. KTVXZ is a new ORS. TH is the stand
BYU group was active during the recent National Alert.
Those working were GLZ, KY, OZL, GZB, NGW and
KAC. The Oregon ORS gang increased during May
32, BDU and KTCML calling the big totals. ZB is
about to lose his 80-meter antenna because of highway
work. The Portland v.h.f. group was out during the
recent earthquake test and made another good showing.
About fifteen 6-meter mobiles responded in 30 minutes.
NEN has a new Windom beam, a brand-new
BRP transmitter. A new report was received from
KTDUS. ZJL has moved from Roseburg to Forest
Grove. A good report was received from (K77ZJ). The
SC, UQ, continues to report progress in AREC mem-
bership and activity and definite plans have made for the
proposed AREC net on 3234 kc. JOJNN is going along in great style, with good check-ins and
traffic reports for May. The Chacckamas County gang
furnished communications for an evacuation exercise dur-
During the recent Alert KTEPO, GNC and UQ led the
traffic reports. K7ZK 44, KACM 61, W7ADJ 62.
RTN 119. ZOF 83, GLZ 36, KTVXZ 12, W7TAM 21,
DIC 31, OMO 21, LT 17, DEM 14, KTEPO 10, W7FZHI
4. 12DI 4.
WASHINGTON—SCM, Robert B. Thurston, W7PGY—
RC: PCT, RM; AIR, PAM: BPA and PGY. Washing-
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WARRTS, 2590 kc., 1500 Mon. through Sat.; WSN, 3700
kc., 2000 PST Mon. through Sat.; KACB, 4111 kc.
JLQ, KACB, 3700 kc. on SSB. KTHQ is a new ORS.
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DIC 31, OMO 21, LT 17, DEM 14, KTEPO 10, W7FZHI
4. 12DI 4.
Leaders in the Design and Manufacturing of Communication Antennas & Equipment

MULTI-BAND ANTENNA COILS
New Plug-in type coils, designed to operate with std. 3' base and 5' whip.

- Rigidly tested & engineered—found to have a "Q" of 525
- Operates into a 50-ohm cable
- Positive contact—noise-free, trouble-free operation
- Weather sealed—factory pre-tuned

YOUR CHOICE EACH $14.95

NO. 999 10-15-20-40-75
NO. SSB-156 40 & 75 M.

BUMPER MOUNTS

- Adjustable to any bumper
- No holes to drill

CITIZEN BAND ANTENNA
26.960-27.225 MC
- YSWR under 1.5:1 at resonance
- Complete with 5' RG 58/U Cable, Swivel-type antenna base for flat or packed roof installation.
- 8P-27 $12.95

SWIVEL-BODY MOUNT

- Smaller version of Master Mobile Mount
- Can be mounted in any position
- Adjustable swivel for all positions
- Overall length 10½"
- Brass, water proof phenolic insulator

- $19.95

MARINE LAYDOWN MOUNT

- Can be mounted in any position
- Adjustable swivel for all positions
- Overall length 10½"
- Brass, water proof phenolic insulator

- $19.95

All products are for Universal Use-Mobile, Home, Marine, C.A.P., Civil Defense, Emergency, etc.

NEW! SLIM-JIM ALL-BAND BASE LOADING ANTENNA COIL
FOR 10, 11, 16, 20, 40, 80 METERS
SIZE ¾" X 16"
NO. 10140

Positive action, just slide whip in or out to loading point and lock nut into position.

$17.95

MASTER-MAGIC WAND
New easy-to-install, single band, top-loaded plastic covered fiberglass antenna provides maximum performance at the most useful radiation frequencies.

- 10 Met.- 5 Ft. L. $8.95
- 11 Met.- 5 Ft. L. $8.95
- 11 Met.-35 In. L. $8.95
- 10 Met.-45 In. L. $8.95
- 13 Met.- 5 Ft. L. $8.95
- 20 Met.- 5 Ft. L. $8.95
- 40 Met.- 6 Ft. L. $9.95
- 80 Met.- 6 Ft. L. $9.95

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PACIFIC DIVISION

HAIWAI—SCM. Samuel H. Lawel, KH6AED—The Pacific Division Convention, to be held in Honolulu Aug. 15-16, is sponsored by the Honolulu Amateur Radio Club. A visit to Wake Island revealed the following KE7BE all within a radius of two city blocks: CB, 300, CM, CP, CQ, CS, CU, CV, CX, and Nears W1WC, K1WBC, and K1WCGA is Net Control Station of the Pacific Net. This traffic net meets night-time at OTOO on 14,240 Mc. K1W0CE has moved to Guam, still with the P.A., KG6AUM, EC for Manu, reports 16 full and 14 supporting members at the AARC, KH6LJ. 1st back on the active list. KH6DHI reports into the NTSC nightly and will accept local traffic for the mainland. KH6RT is op on s.s.b. and will try to contact KH6DHI. Traffic: (May) KH6AFJ 294, (Mar.) KH6DHI 174, KH6RT 81, (Feb.) KH6DHI 169, KH6RT 60.

NEVADA—SCM. Charles L. Rhine, W7KJU—New officers of the NARA are PC, tnc.; UYV, vice-pres.; K7DEF, sec.-treas.; K7AGZ, sat. at arms.; MAH, dir. MAH was on from ML Davidson for the V.H.F. Contest. SRM has installed Gooset Communicators in all Reno hospitals as a tie-in with the e.d. for disaster work and is now busy training operators for restricted radio phone license. VUT vistsed at the NVAR at the NVAR and heard an interesting report by IVIL on FPR. He has a new full now—parallel 4-ESSA. IVIL visited the Arizona group at the Whitehorse meeting. JCW graduated from high school and now is in the Army. KT6A has push-pull 813's in the final. BFM is attending summer summer school and hopes to graduate to General Class soon. The NVN meets on 3660 kc. at 1001 P.D.T now. We still need better coverage in some spots. Traffic: (May) WA6CLT, WA6EF, W6JF, W6K0P, W7KBO, W7KOS.

SANTA CLARA VALLEY—SCM. W. Conlev Smith, K6DX—Asst. SCM: Frank J. Parier, W6VMY. SEC: W6HAY, PAM; W6ZLO, K6DXP, W64LP and K6XSI. W6HUV and W6WTH gave a fine talk on the ARRRL-Iggy Propagation Research Project before the Monterey Bay RC on May 30. It was a very well received talk and are happy to welcome Mason to the section during his sojourn at Stanford where he is continuing the project. At the same meeting W6NBR gave a brief rundown of the Board Meeting. The San Mateo RC Hamfest was held June 7 with a big turnout estimated at 400 plus XYL and jr. operators. There was a unique and interesting display of old-time gear. W6PBC has completed an "all-band receiver" (28 Mc. and higher.) W6GIE repainted the communications trailer inside and out and added new operating positions. W6DEF still has to install the trailer in the new Hambler station wagon. K6ZU missed making BPT for the first time in over two years. Bob passes NCN traffic with K6DVM via RTTY Wednesday nights. W6WYF reports FB RTTY contacts with CE3AG, ex-W6Q, W6CQ, W6RETS was temporarily cut out and replaced by a new rig, W6WST. Traffic: Squins all within a radius of two city blocks: CB (2.5, 15-16), is sponsored by the Honolulu Amateur Radio Club.

EAST BAY—SCM. B. W. Southwell, W60WJ—Asst. SCM: Mary Gywne, W6PR, SEC: K7DIQ, RC: W6JGW, W6ZGF, W6IUV, K6EDN and K6JXN. W6CAN has returned as the K6DQ. Thanks for an FB job. Warwick W6JGK is the new SEC. His QTH is 210 Cicholle Hill Ranch Road, Walnut Creek, Calif. K6JGK is QRL, a new QTH. K6QIC is stationed at Treasure Island Electronics School. His new 3rd band is 39 feet up and he also has a new NC-300. K6OSO is rebuilding the Berkeley QMerea has a picnic meeting. K6Z1Z is QRL. NCN traffic. K6DVM is on RTTY traffic. K6DKZU. n.r.i. experimental. New officers of the Skyriders are W6KBE, vice.; W64C, sec.; W66CN, correspondence.; the YXL of W6QEP, treas. W6KAP is on 21-Mc., phone. K6ZBL copied the Armed Forces Day message on K6TY. K6JIT worked W7CQY on 40, with a ground plane and 25 watts and has a new 50-Mc. beam. Their EME saw a demonstration of microwave equipment and cross polarization. The Donmarinos ARRL held the CYCRC. K6ZlZY is on all bands with a DX-35 and 450 Mc. phone. W6WBFQ is a new Novice in Hayward, The HARC has a new 4.5 kw., IJ, V.A., 90-watt, portable generator. The MDARC was active on Field Day with 250 mc. and a Silent Key. K7KPO received his CP-15 award. K6EDN has just gotten Donn DSH-100. W6RTT is a new Novice in the MDARC. The W6EIQ family is a new correspondent. W6WEP is going mobile. W6JWZ is mobile on all

(Continued on page 184)
Transistor Power Supplies* and Components

**D SERIES (Standard)**
Continuous operation at 30 watts. Selective taps at 200, 250 and 300 volts; intermediate voltage at 1/2 selective taps. Both voltages can be drawn simultaneously if total power does not exceed continuous ratings. Positive or negative ground operation. Input and output filtering included except for intermediate tap.
Size: 4¾" x 3¼" x 1¾" Wt.: 10 oz. 6- or 12-V Input: $39.95 24-V Input: $61.95

**DA SERIES**
Continuous operation at 45 watts. 450 volts and 225 volts simultaneous if total power does not exceed continuous ratings. Intermittent duty to 90 watts, 450 volts at 150 MA; 225 volts at 60 MA (5 min., 20 min. off). Positive or negative ground operation. Input (primary voltage) filtering; partial high voltage filtering provided.
Size: 4¾" x 3¼" x 1¾" Wt.: 14 oz 12-V Input: $57.50 24-V Input: $79.50

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**Toroid Transformers for Transistor Power Supply Application**

**H SERIES**

- H-6-450-1: Input: 6-VDC. Output: 450-VAC center tapped...450 and 225 VDC from bridge rectifier...45 watts.
- H-14-450-12: Input: 12-14-VDC. Output: 450-VAC center tapped...450 and 225-VDC from bridge rectifier...55 watts.
- H-6-100-1: Input: 6-VDC. Output: Voltage doubler configuration. Secondary tapped for either 100, 125 or 150-VAC. DC Output: 200, 250 or 300-V at 100 MA.
- H-12-100-1: Input: 12-14-VDC. Output: Voltage doubler configuration. Secondary tapped for either 100, 125 or 150-VAC. DC Output: 200, 250 or 300-V at 125 MA.
- H-24-100-1: Input: 24-28-VDC. Output: Voltage doubler configuration. Secondary tapped for either 100, 125 or 150-VAC. DC Output: 200, 250 or 300-V at 150 MA.

Without Encapsulation (2 ozs.). 1-10 units: $14.00 ea. With Encapsulation (3 ozs.). 1-10 units: $18.50 ea.

**HD SERIES — 2000 CPS**

- HD-14-25-300-2-D: Input: 12-14-VDC. Output: Voltage doubler configuration. Secondary tapped for either 225 or 300-VAC. DC Output: 450 or 600-V at 200 MA.
- HD-28-25-300-2-D: Input: 24-28-VDC. Output: Voltage doubler configuration. Secondary tapped for either 225 or 300-VAC. DC Output: 450 or 600-V at 200 MA.


**HDS SERIES — 2000 CPS**

- HDS-14-25-300-3-D: Input: 12-14-VDC. Output: Voltage doubler configuration. Secondary tapped for either 225 or 300-VAC. DC Output: 450 or 600-V at 300 MA.
- HDS-28-25-300-3-D: Input: 24-28-VDC. Output: Voltage doubler configuration. Secondary tapped for either 225 or 300-VAC. DC Output: 450 or 600-V at 300 MA.


**400 CYCLE SERIES**

- 14-115-1.5-400: Input: 12-14-VDC. Output: 115-V at 1.5 amp.
- 24-115-1.5-400: Input: 24-28-VDC. Output: 115-V at 1.5 amp.

Dim: 3" dia. x 1" thick. Without Encapsulation (12 ozs.). With Encapsulation (16 ozs.). Per Unit: $76.00.

**Matched Pair HD Transistors:**
- 12-14-V operation—$11.00 per pr.
- 24-28-V operation—$21.00 per pr.

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Club challenged Columbia for the “Corn Cob” Field Day Trophy; PAM K4IE held a meeting of NCSs and alternates of the S.C. Field Day Group to go over operating procedures; SEC K4JPE spoke on the value of ARCE; ZH1 on RACES. ARK and G0Y on ARRL rules and the forthcoming WC0C. NCS K4IJE nationally has received his long-deferred net certificate. ZH1’s EC appointment has been renewed, VPN is back from Newfoundland. K4AVU has his Conditional Class license. K4KAVU and Net Manager GAT are recommended for their 1st issue of S.C.-C., H. Net News. S.C. handled 71 formal messages in May. The Charleston Hamfest will be held Aug. 2, Pawleys Island Sept. 12-14, and Rock Hill Oct. 2. The Greer and Greenville ARCs are newly affiliated with ARRL. The Ridge Radio Society and Greer ARC are planning a ham fest this fall. Traffic: (May) K4K4T 279, W4KC 218, K4IJE 162, W4YC 70, W4MK 58, K4US 44, W4J 32, CHD 53, K4MV 43, W4QQV 23, K4L1N 19, W4QCC 19, K4KJE 9, W4CNZ 8, (Apr.) K4IYI 6.

VIRGINIA—SCM, John Carl Morgan, W4RX—VPN meets on 3880 kc. at 1900; W4RX—VPN (slow net) on 3680 kc. 1830 M-F; VR on 3680 kc. at 1900 daily, all EST. VPN is successfully supporting the summer cold-drums for the first time. K4MV has been appointed Sec for Virginia succeeding PAK, who found it necessary to resign. Our sincere thanks to Hake for his fine job. We know you’ll give VPN your support. LB reports he’s pulling the main switch for two years while on duty in London. Dick will be missed on VPN. KXU is QRD Turkey; K4VE, of Quantico’s PFC is now in Japan and peripatetic CVO still is all over the map. The college and high school crowds are more active in the parade from studies. Congrats to K4BRO, valedictorian of his high school class, and to KN4KZK, who won a big scholarship in Agriculture in his Prog. Again that ham radio and good school work can be completely compatible. Welcome to K4MIE, now 4GWP in the Virginia-Allen. GCP is modeling in DC-3. SST, bent. K4MP used one week of vacation to assemble the new DX-100B. RA4TA made 28 QSOs on the first 2 nights with the new HTTY rig. OOL, the labelled Be Vicky, hit the air and thereby QROs by about 900 per cent. K4KMK made General, worked his first DX and now has the rig on for nets. K4AVU snagged 25 new contacts in May. A card from the Willimantic Conn. Jaycees reports ORT has won the W-Conn. C.W. Award. Their work was truly spectacular. The Richmond ARl Day Round-up which even produced BZE on phone! CNX now has 80-meter WAC confirmed. The Roanoke Hamfest was a winner, too. Complaints about the SCM control box were to tie with CHK as winner of the left-foot sending contest. Traffic: (May) W4PFC 1037, QDY 453, SHI 99, K4K4T 279, W4KC 218, OQS 250, LJR 128, WH4P 118, WH4A 94, WH4X 71, WH4ZU 57, PRO M. OOL 43, K4IJE 33, WH4G 29, BEZ 28, K4MP 26, W4RX 23, W4MGL 14, LJR 11, K4AVU 10, HHT 9, V4K 7, WH4WB 4, K4CK 3, WH4Q 2, WH4D 2, DX 3, WH4A 1, DX 1, WH4C 3, DX 1, WH4Q 2, DX 1, WH4D 2, DX 1. (Apr.) WH4E 3, WH4ZU 2, WH4A 1, DX 1, WH4Q 2, DX 1.

WEST VIRGINIA— SCM, Albert El. LUx, W8PQQ—VPN meets on 3880 kc. at 1900; W8PQQ—VPN (slow net) on 3680 kc. 1830 M-F; VIP on 3680 kc. at 1900 daily, all EST. VPN is successfully surviving the summer cold-drums. West Virginia hams- for the W. Va. Award. He ’s doing a lot of carpentry, Traffic: (May) W4PFC 1037, QDY 453, SHI 99, K4KMK 25, K4AVU 10, HHT 9, V4K 7, WH4WB 4, K4CK 3, WH4Q 2, DX 1, WH4D 2, DX 1. (Apr.) WH4E 3, WH4ZU 2, WH4A 1, DX 1, WH4Q 2, DX 1, WH4D 2, DX 1. (May) K4K4T 279, W4KC 218, K4KMK 25, K4AVU 10, HHT 9, V4K 7, WH4WB 4, K4CK 3, WH4Q 2, DX 1, WH4D 2, DX 1. (Apr.) WH4E 3, WH4ZU 2, WH4A 1, DX 1, WH4Q 2, DX 1, WH4D 2, DX 1.

ROCKY MOUNTAIN DIVISION

COLORADO— SCM, Carl L. Smith, W8BWJ—SEC; NIT, PAMs: CXW and JJH, RM: W4EDK and K4ED. Our RM’s have been two of the busiest men in Colorado. Much effort is being put into the organization of the Colorado VHF Society and their use of the DX-100B. The EVERGREEN hams are now operating this rig. We have a number of special events planned for the coming months. The Arizona/Colorado VHF Convention will be held in Flagstaff, Ariz., Aug. 10-12. The ARRL VHF Conference will be held in Denver, Aug. 31. Details will be announced in future issues of this magazine. The Denver 6-meter recorder and a monthly paper is published to provide news and comments for the net. The Denver 6-meter group provides communications for the Porsche Club (Continued on page 138)
FAMOUS ‘PICTURE-BOOK’ COURSES

BASICS OF DIGITAL COMPUTERS by John S. Murphy. #216, 3 vols., soft covers, $7.50; #183H, Cloth Bound, $8.50.

BASIC PULSES by J. Gottlieb, P.E. #216, soft cover, $3.50.

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BASIC ELECTRICAL POWER DISTRIBUTION by Anthony J. Genovese, P.E. #216, Stiff cover, $4.80 per set.

PHOTOTUBES (volume 33 in the Electronic Technology Series) edited by Alexander Schre, Ph.D. This penetrating

study into the field of photo tubes deals with the subject both from the physics of photoelectricity and from the
electronics of practical tubes and circuits. Special

attention is given to such diverse topics as the laws of

photoelectricity, radiation spectrum, intensity—wave-

length relationships, curves of quantum theory, structure of

phototubes, ratings and applications. At all times theoreti-
cal information is balanced by practical information pro-

viding the reader with a comprehensive understanding of
the field of photoelectricity, phototube devices and applica-
tions used in this field. #216-33, $1.80.

BUILDING THE AMATEUR RADIO STATION by Julius Bereits, W2PIF. If you want to buy the equipment for an

amateur radio station, or build one, you will find this

volume indispensable. This book is the next step for the

beginner amateur radio enthusiast who has earned his

operating license. A guide for construction of the begin-
ner’s transmitter and receiver. Also includes instructions for
receiver and transmitter on-the-air operation. #221, $2.50.

FUNDAMENTALS OF NUCLEAR ENERGY AND POWER

REACTORS by Henry Jacobowitz. After presenting basic

concepts in atomic and nuclear physics essential to under-
standing the operation of nuclear reactors, the book dis-
cusses the construction, principles of operation, cost and

power output of specific plants. Experimental reactors

and the forerunners of the units now under construction are
covered. #218, $5.95.

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RIDER SOUND-N-SIGHT CODE COURSE

A report from the Monmouth Message, April 30, 1959.
‘Fort Monmouth—Student officers of the Radio Officer
MOC Course, section 3210, have made exceptional pro-
gress . . . mastering Morse Code instructions utilizing the Rider
‘Sound-N-Sight’ method . . . students have progressed much
faster than all previous classes.”

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... Advanced SSB Performance”
10% down
325-1 TRANSMITTER ($59.00)

“Surpassing in Performance
... Simplified in Operation”
10% down
755-1 RECEIVER ($49.50)

Hill Climb through BTO, TH, CIJ and MYF. This
group also is active in e.d. drills, AGU has moved to
Pueblo as pastor of Bethel Methodist Church. The PARA
Newsletter reports the last impression of the last impression,
KRDND and his XYL with harmonies 1 through 10
making T-shirts numbered according to age and wear-
ing KRDND on their hats. Other tradesmen in Los
Angeles, and the new QTH of GGY and TYB is Carls-
bad. N. Mex. All who knew him were saddened to hear of
the passing of GGY. OES, OBS, OBS, OBS and OBS are
available. Most needed are Official Bulletin Stations. All interested operators on 40 or 75
meters are urged to apply. Please send copy of your bulletin to the SCM for news items.
Please get your reports in the SCM for each month.

KA1H—SCM. Thomas H. Miller, WTOWH—Aost.,
and ERO have been awarded net certificaties on the Bee-
chive Net, bringing the total to 25 the number that have
been issued. The net has only 26 members on the roll. VE9
has a new trap vertical antenna and a new SX-100 re-
ceiver, CKD and WWII have new TXs that have been
arranged. FSC took a trip to Glen Canyon Dam and
stopped to see GGY at Bryce Canyon and BNZ in Rich-
field and met EXY. another Net. Lakeam in To-
rab, KZL is in Sun Valley, Idaho, for a summer job.
K7CLS is using plate modulation on his DX-40 and is
now working on a differential keying for it. K7CUI
graduated as valedictorian from Jiaush High School. JBY
received a PAN certificate for outstanding service as a
representative to the area net from the regional net. Traffic:
W3BQD 335, OXN 112, VE9 12, QOT 9, K7AUM 8, CMS 4.

NEW MEXICO—SCM, Allan 8. Hargess, K5DAA—
The NMPY meets Mon. at 0700 MST and Thurs.
Thurs. at 1800 MST on 3500 kc. The Breakfast Club
meets Mon., through Sat. at 0630 MST on 3500 kc. The New
Mexico, Bays Pounders Net meets Mon., Wed., and Fri. at 2000 MST on 7100 kc. The TWIN meets Mon.
through Sat. at 1600 MST on 7100 kc. Please support your
nets. Our new FR is ZHN, POI is the near e.d.
director in Farmington, replacing CIN. K5IPA. Portales is
very active in setting up for RACES Base in the comp-
unity. New calls in Portales are K5UUV, KNSUY
and KNSVU. Radio Officer ZU will go to Portales in
the near future to help get the RACES off to a flying
start. CA, of Albuquerque, is in the hospital now. All
SKY left for an airplane trip. New calls in Carlsbad are
W7VB, GGY, and K5VUI. The Annual Hamfest in Car-
lsbad will be held Aug. 23. Make your plans now to
attend. Traffic: (May) K5WSP 3588, W7OAJ/2 310, W7DWB 355, ZHN 100, K5KAI 107, DAA 25, IPK 25,
GYYA 14, W5GD 8, HJF 6, K5DAA 5, PAT 4, RIT 3, WWPP 4, K5QVI 2. (Apr.) W7DWB 358, W7OAJ/2 300, K5KAI 100, PRH 14.

WYOMING—SCM. L61, D. Driscoll, WAMU
SEC: CQL. The Pony Express Net meets Sun. at 0530
MST on 3500 kc. The Wyoming Jackpole Net meets
Mon. through Fri. at 1200 MST on 3500 kc. for traffic.
The YO Net is a v.w. net on Mon., Wed. and Fri. at 1800
MST on 3500 kc. The YO Net has adjourned for the sum-
mmer months and will reconvene Labor Day Eve.

YOTA YOUTH ORGANIZATION NET.

NEW MEXICO—SCM, Allan 8. Hargess, K5DAA—
The NMPY meets Mon. at 0700 MST and Thurs.
Thurs. at 1800 MST on 3500 kc. The Breakfast Club
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Mexico, Bays Pounders Net meets Mon., Wed., and Fri. at 2000 MST on 7100 kc. The TWIN meets Mon.
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and KNSVU. Radio Officer ZU will go to Portales in
the near future to help get the RACES off to a flying
start. CA, of Albuquerque, is in the hospital now. All
SKY left for an airplane trip. New calls in Carlsbad are
W7VB, GGY, and K5VUI. The Annual Hamfest in Carls-
bad will be held Aug. 23. Make your plans now to
attend. Traffic: (May) K5WSP 3588, W7OAJ/2 310, W7DWB 355, ZHN 100, K5KAI 107, DAA 25, IPK 25,
GYYA 14, W5GD 8, HJF 6, K5DAA 5, PAT 4, RIT 3, WWPP 4, K5QVI 2. (Apr.) W7DWB 358, W7OAJ/2 300, K5KAI 100, PRH 14.

WYOMING—SCM. L61, D. Driscoll, WAMU
SEC: CQL. The Pony Express Net meets Sun. at 0530
MST on 3500 kc. The Wyoming Jackpole Net meets
Mon. through Fri. at 1200 MST on 3500 kc. for traffic.
The YO Net is a v.w. net on Mon., Wed. and Fri. at 1800
MST on 3500 kc. The YO Net has adjourned for the sum-
mmer months and will reconvene Labor Day Eve.

YOTA YOUTH ORGANIZATION NET.

ALABAMA—SCM, Clarke A. Simms, jr., WHKKE—
SEC: WJX, PAM: DOG and KBGTO. RM: K7L. It is
my pleasure to announce the appointment of two new
ECs. W7W will be EC for Mobile County and AZX re-
turns as EC for Montgomery. W7W makes back to BTO, now G7YW, and also GYY, whose old call is unknown.
WJX is very proud of a new receiver and TGD is
now working on a differential keying for it. K7CUI
graduated as valedictorian from Juab High School. JBY
received a PAN certificate for outstanding service as a
representative to the area net from the regional net. Traffic:
W3BQD 335, OXN 112, VE9 12, QOT 9, K7AUM 8, CMS 4.

SOUTHWESTERN DIVISION

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representative to the area net from the regional net. Traffic:
W3BQD 335, OXN 112, VE9 12, QOT 9, K7AUM 8, CMS 4.

(Continued on page 130)
Here are four tubes for linear amplifier service—higher power output at lower plate voltages with minimum distortion. The PL-6549 and its zero-suppressor-voltage version, the PL-177A, are for 50- to 200-watt peak output service. The PL-172, a 1000-watt type, features the exclusive Penta vane-type suppressor grid which makes possible extra efficiency and linearity. The new PL-175, a 400-watt tube, also has the vane-type suppressor grid, and gives 25 to 30 per cent more output in Class AB1 linear amplifiers than tetrodes with similar ratings.

### RATINGS

<table>
<thead>
<tr>
<th>Type</th>
<th>FILAMENT Voltage (Volts)</th>
<th>Current (Amps)</th>
<th>Max. Plate Dissipation (Watts)</th>
<th>USEFUL OUTPUT* CLASS AB1 LINEAR AMPLIFIER Plate voltage in volts</th>
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<tbody>
<tr>
<td>PL-6549</td>
<td>6.0</td>
<td>3.3</td>
<td>75</td>
<td>1000: 96W 140W 210W 2500: 470W 605W 710W 3000: — — — — — —</td>
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<tr>
<td>PL-177A</td>
<td>6.0</td>
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<td>75</td>
<td>1000: 96W 140W 210W 2500: 470W 605W 710W 3000: — — — — — —</td>
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<td>PL-175</td>
<td>5.0</td>
<td>14.5</td>
<td>400</td>
<td>1000: — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — —</td>
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<tr>
<td>PL-172</td>
<td>6.0</td>
<td>7.8</td>
<td>1000</td>
<td>1000: 1020W 1280W 1540W 2500: — — — — — — — — — — — — — — — — — — — — — — — — — — — — — — —</td>
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*Actual power output delivered to load from typical amplifier.

ASK FOR A FREE COPY of "Transmitting Tubes for Linear Amplifier Service." This nine-page bulletin discusses linear amplifier tube requirements in detail. Graphs, characteristic curves, oscillograph linearity patterns and data show why Penta's exclusive beam pentode designs outperform four-element tubes.

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**GRID DIP METER #110**

**KIT $29.95**

**WIRED $49.95**

**Continuous coverage 400kc - 250Mc; 500ua meter.**

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**Includes complete set of coils for full band coverage.**

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**RF Signal Generator #324**

**150kc-435mc**

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**WIRED $119.95**

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<table>
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<th>Name</th>
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<th>Zone</th>
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**EMERGENCY WORK?**


**EASTERN FLORIDA—SCM, John F. Porter, W4KZ—SEC: IYT, RM: K4SH, PAMs: TA5 and RA2. New officers of the Manatee ARC are K4IA, pres.; FGK, vice-pres.; EJN act. mgr.; K4BY, secy.-treas. The Indian River ARC held its Annual Beach Picnic May 18 with a good turnout. A new ham at K2Z is KN4ATN. K40YR and K2XO both have Viking KWS on the air now. K4DRO received his A1 Operator certificature. Toma also won the Florida color Rim who has been assigned a new SX-101 and Trihander. The Florida YL Novice Net is progressing very nicely and meets on Thurs. 7:30. New members are encouraged to contact KN4ANR, P.O. Box 358, Hovey-in-the-Heights, The Lake ARA furnished communications for the Watermelon Festival Parade at Leesburg May 22. This is a fine way to receive good publicity for the hams of our State. The newly-formed Hollywood ARC has selected 6 meters as the band best suited for its emergency net. The club offers code practicing sessions on 6 meters Mon. and Wed. nights at 1530 EST. W4D has a new HQ-70. The Orlando gang furnished part of the much-needed communications for the Outboard Marathon Race from Sanford to Jacksonville and return. This is another good public service that the hams can be proud of. Follows, don't forget to send in any news of this type, along with pictures if possible. We are now in the middle of the hurricane season and may be called on to provide emergency communication before the season ends. Keep on the alert and check your gear. Traffic: (Miami) K4HDR 486, SJH 25 LCP 210, LEB 206, W4LMT 125, K4KDN 183, BY 74, ODS 60, K4L 59, W4ITT 56, K4QXH 48, K4H 42, K4N 29, K4VU 19, W4DUG 15, K4M1B 18, MITU 7, SER 3, W4DNS 7, FFF 9, K4Q9Q 6, MTP 7, BU 3, J5G 3, AHW 4. (Apr.) K4KDN 98.

**FLORIDA—SCM, W. G. Butler, Jr., W4KRH—SEC: PQW, RAS: AXP and BVE, Perry: K446PTG, FXT and GHD are new hams. KOP reports that the H.S. Radio Club and used for emergency power. Tallahassee: The Leon HI's Club's new officers are K4PYU, pres.; K4NICO, vice-pres.; and G4FZ, secy.-treas. The Nov. Novice Net is being held at the new Leon County EC. Port St. Joe: A club has been formed, with K4ZGFP, pres.; MXN, vice-pres.; and W4BSG, secy.-treas. A TVI committee also has been formed, with WNP and CCA. Panama City: K4IDQ is on back after locating a new receiver. Fort Walton: The Eglin AFB held an FB picnic and shrimp boil on the beach at 5MMA's QTH. A mobile club, nicknamed the "Whizwampers," has been formed, with ZLY, W4Q and K4HR as officers. Pensacola: K4V4D has a new SX-101, PAA HYL and 5ODC are active on 15 meters, SPP has been transferred and will be missed by many friends. OOW has modified the club Challenger rig with a new band beam has been installed at the NAS Club by K4HLYL and K4UKG. The club h as a new SX-101. The P4FZC and the NAS Club had a joint Field Day. W4AHI Radio is running code and theory classes for beginners. Mary W. Fin. hams were seen at the Mobile Hamfest. H4V won the hidden transmitter hunt, RIV17 was the elusive hidden bunny. Traffic: (May) W4BYE 75, K4PYVU 42, DDB 14, W4AGA 4. (Apr.) K4PYVU 24.

**GEORGIA—SCM, William F. Kennedy, W4CFJ—SEC: PMJ, PAMs: LXE and ACEH, RM: DBY, GY5 meets on 3995 kr. at 1500 EST on Tue. and Thurs., 0800 on Sun., GSN Mon. through Sun. at 1300 EST on 3595 kr., ADO at NC: the 75-Meter Mobile Phone Net each Sun. at 1330 EST on 3995 kr., MV at NC: Atl. Ten Meter Phone Net each Sun. at 2200 EST on 29.6 Mc, K4DC at NC: GTAN Sat. at 1000 EST on 7200 kr., GPVR on Thurs. at 0800 EST on 7200 kr. K4CYY at NC: GAN on 7105 kr. at 1500 EST Mon. through Fri., BMI on 2020 kr. at 2200 EST on 7200 kr. and FFF 9. The Mobile Hamfest was held on 40 and 20 meters. Georgia Penches were presented and took away many prizes. ZD, our Southeastern Division Director, gave his rundown on what took place at the Board Meeting in May. Georgia’s SEC, who has been ill for some time, was present, and we were happy to see him. New officers of the Columbus Radio Club are K4SBL, pres.; YTO, vice-pres.; W4XG, secy.; K4VGT, treas.; K4JLS act. mgr. K4HAM has been busier than ever this month. In May 17 the Augusta Radio Club had a wonderful hamfest. President K44AM and his officers went out to show everyone a fine time, and he has been in Georgia to listen for him on 40 and 20 meters. K4LEM is inactive. AQ5, the Georgia Tech station, has a new SX-101 rig built by W4KXY. K4DEM, W4QMG is building up a pair of 4X-150As for 220 Mc. CFJ is looking for some late EX or TV-199 tubes. Also a circuit of a Radiola Model 20, K4QMO and K4POW

(Continued on page 135)
Eye-appealing Radiotelegraph Key Tie Clip that telegraphs your hobby to every fellow amateur. Attractively styled, it serves as a point of distinction. It's a natural addition to any Ham's fashion accessories. You will really be keyed in with this RCA Tie Clip.

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are now hams in Cleveland, Ga. The Dalton, Ga., Club's new officers are K4STI, pres.; K4ZFO, vice pres.; K4YHE, secy.-treas.; K4NFF-AN, net, manager, K4NDCV, advisor. Those on committees are GQT-3TJ and HHO. CFJ and K4CZK are proud grandparents. K4LVE is taking a course in ECT. K4VBC will be portable again by Rockhill, S. C. The new officers, all of whom are familiar names, are K4BAI, 101; LVE 72; YFIC 66; HJZ 56; BYD 50; PFA 21; VCM 6; W4FJW 3. (Mar.) W4DDY 440.

WEST INDIES—SCM, W6PB, secy.-treas. KP4DJ—SEC: AAA. The Antilles Weather Net started twice-daily net sessions June 1 at 7 a.m. and 5:30 p.m. on 7245 kc. with K4VBA as NCO, Twenty CWS, VP6N, FG7E, FM7E, plus several K4P stations, reported at the first session. The P.R. Amateur Emergency Net on 3625 kc. at 7 p.m. Wed., will shift to 7245 kc. after roll call to pick up additional 40-meter-only stations at approximately 7:30 p.m. 7245 kc. is now the day frequency of the P.R. Amateur Emergency Net. W4DDY is now K4P and was rewarded with an HT-32 and Triband beam. AAA is off until he finishes the new air-conditioned concrete radio shack. W4P/AM received his General Class license and will operate a Globo King 500-A at Colegio San Jose. K4VBA has a new plate transformer in the Globe King, a new DowKey t.r., switch, and is awaiting a DBB-100. AOF/LQD received a Mohawk receiver kit. The U.P.R. Radio Club station FAE has a new Valient transmitter on all bands. AHI is preaching with a new key, as is ACQ, who just bought a new Vibroplex. AOH and K4B are new net stations on 3925/7245 kc. from Ponce. N6L/ N6MTX reported to the P.R. Net on 7245 kc. His son is awaiting his Novice call. JAI has a new Tapetone Skywatcher receiver for 6 meters, a 2-meter converter and a Gunson 2-meter base antenna. C8 sends greetings from Rio de Janeiro via JM. Ponce hams are reassembling their radio club. ANQ and LC are two new modules heard on 49 meters. LC is using a Bandy 200-watt transmitter in the trunk. RD added an HT-32 to his KWS-I and Viking II, FZ is driving a GG 4-250 to a kW, on which, using a Viking I driver, SQ is listening to the traffic. Traffic: K4WT 79.

CANAL ZONE—SCM, Ralph E. Harrow, K7RJW—RV and his family will be vacationing in the United States from June 7 to Aug. 30. During this time WA will act as SCM. The Crossroads Amateur Radio Club's new home is progressing very nicely and with the addition of the new civil defense equipment will be heard on the airways with the call PA. The members were on all bands during the Field Day period. Traffic: K4LVE 191; K4VHC 107; VP6C 72; VHC 69; HJZ 55; BYD 52; KH4T 51; W4AM 48; VC7 47; OJ 43; HH 43; W4DDY 42; PHA 40; RR 39; VF 37; CD 3; DH 3; EL 3; LV 3.

SOUTHWESTERN DIVISION

LOS ANGELES—SCM, Albert F. Hall, jr., W6JQB—SEC: W6LIP, BM; W6BHH and K4HRL, PAM: W6ORS. The following stations earned BPL this month: W6ZSB, K4MCA, W6WPF, K4LVR, K4HRL, W6OYH and W6BHH, Congrats, fellows! It is good to welcome W6WPF back to the traffic gang. K6LVR now is handling liaison with the Pacific Net on 20 meters. W6BHH is going fishing in Oregon and Washington! Congrats to K6QQD on receiving a Public Service Award! W6KAR has a Mosley beam on Mt. Hamilton. His feet! K4QVP will be operating mobile from the Kansas City Area. K6TPL still is knocking off Pacific DX on 20 meters. W6ARR is starting a new Committee. W4AM reports fine attendance viewers! day at the shock. K6OVY there is handling TCC skeds. K6VIZ is working the Pacific Islands. W6RES is travelling around the State and visiting hams. The Intra-County Net on 430 kc. will be of the air for the summer and expects to start in the fall. K6GLS got FVYTP for a new country. W6OYH reports much QRM from school exams! K6EA is back hanging the traffic nets again! W6UFJ made CP-20 and RCO awards. K4COP reports that K6OJM will receive a special award for any 6-meter contact. W6OYH has a 5-watter going on 430 kc. and is experimenting with antennas. The Santa Fe Railway Employees Radio Club officers are K4COK, pres.; K4NJA, vice-pres.; W6BHH, secy.-treas. Support your section nets: Phone, SoCal Net at 504 Met. at 1730 PDT daily; c.w., Southern California Net on 3600 kc. at 1530 PDT daily. Traffic: (May) W6JQB 2283; K4MCA 2242; W6WPF 1166; K6LVR 1141; K4HRL 1092; W6AM 992; K4LVE 290; K6WLF 289; W6BHH 286; K6QAR 170; K4OJ 167; K4JUL 164, K4KZM 123, W6ASKS 89; K4GCC 66; K6TPL 58; K6QQD 55; K4GCS 53; W6WGF 51; W6QY 24; W6MY 12; W6QDB 11; W6MT 10; W6WEK 10; K4LVE 10; W6WGF 9; W6JQB 7; W6JKB 5, W6JQB 4; W6WGF 3, W6JQB 2; (May) K4COK 1; K6OJ 1; W6QDB 1; W6MT 1; W6JQB 1; W6WGF 1.

ARIZONA—SCM, Cameron A. Allen, W7OIF—SEC: W7IFS, PAM. C8N, 3000 kc. The North Arizona Hamband held at Whitehorse Lake, D3G has done sideband, (Continued on page 154)
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90 days open account or 10% down, 20 months or more. We finance at a low 6%. Payment within 90 days cancels all interest. Compare terms and prove to yourself that you save money at Henry. Write today to start your 90-day open account.

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It's a fact—100% modulation on most ham rigs is a "sometimes thing". Uncontrolled, instantaneous audio peaks can ruin an otherwise clean signal. THERE'S A SIMPLE SOLUTION—Install a P & H compressor-amplifier in the mike line of any AM, SSB, DSB or PM transmitter—Adjust audio gain for full 100% modulation and forget it. TALK POWER IS UP—FLATTOPPING IS GONE. The net result is the CLEANEST, MOST POTENT AUDIO your rig is capable of. Single knob control. Works on AVC principle—like broadcast compressors. TWO MODELS: The AFC-1 (3x3x5") requires an external power source and has a built-in 90-3300 cycle band pass audio filter . . . sells for only $32.95. The AFC-2 (5x5x7") has a built-in power supply, a switch controlled (Broad-Medium-Sharp) cycle band pass audio filter . . . sells for only $54.95. Also available the AFC-2CW, a sharp filter model for CW reception or mike input on filter exciters. If you are interested in what either of these "Little Grey Boxes" can do for your phone signal . . . Or what smooth, instantaneous, non-blasting phone and CW reception you can get from that older model receiver with a P & H compressor in the speaker line . . . See your dealer, or drop a card to DEPT. R-l 1.

K7DHL is working the 13th Regional Net and KQ4I the Mission Trail Net to the KQ and bringing traffic to the Colorado State Net. How about some reports on what you are doing so that I will have something to write about? All it takes is a post card the first of each month. UDI has moved into his new home. Traffic: WTYAT 126, OIF 5.

SAN DIEGO—SCM, Don Stanfield, W6RLU—Our Division Director, W6MIL, spoke at the Newport Amatuer Radio Society in June. W6KVB has a new Trinidad beam up and is operating with a new SX-101A. K6TH is the new General Class licensee in the Newport group. K6BTO can now operate on all amateur bands from 160 meters to 50 M. K6KXs has now an HT-23A and sports a 25-28A on all bands. WAWYK has a traffic count of 2563 to lead the section. K6ZCR, in Fullston, has made it 2541 for the last month. His traffic went in May 2531, of which 44 were originated and 73 delivered. She also is an AO as well as an ORS. The June meeting of the San Diego DX Club was held at the home of W6MIF. WA6BRUX went to Alaska with a local YMCA group from San Diego. The Helix Club enjoyed a ladies' night dinner in June and then a tour of local radio and TV station KFSD. K6BPI was disrupted for a time when he sat down to operate one evening and his chair went through the floor in the shock and is active again. We are sorry to report that W6JUT, long-time AO, enthusiast in San Diego, was hospitalized for surgery. With summer now in full swing, please remember to supply your SCM with news for this column. Traffic: W6LBK 2563, W6EOT 588, K6KCR 251, W6KVB 4.

SANTA BARBARA—SCM, Robert A. Henke, K6CVR—The Oxnard and Paso Robles Clubs held special meet- ings for the purpose of presenting a lecture by M. J. Southworth, W6YVF, on the "ARRL Project". He showed slides and gave an informative talk along with them. W6YVF's QRS appointment has been renewed for another year. K6CVR is keeping busy handling with meteor scatter and reflection. There should be many interesting static-free net sessions from his experiments. W6QOX, K6GHI and K6KCL did a very good job of handling about 150 pieces of traffic for the Ranchero Teletype. The chairman was well pleased at the way that other hams cooperated in helping their traffic, K6KCL, chairman of the YL Convention in Santa Bar- bara, reports that a total of 80 YLs were present and enjoyed themselves very much. Traffic: W6FFY 4.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. L. Harbin, W5WNG

—SCM, C. C. Pool, K5NO. SEC: K5AEK, PAMS: BBO and W5Q RM; ACR: A reminder to net managers: Now is the time to get all the information together to report your nets Aug. 1 is the beginning date for net registrations so get the information together and send it in. Speaking of reg, I think the net managers and net control should pay a bit more attention to frequency. Try to get everyone to zero on net control frequency whether it be the exact net frequency or not. By doing this all stations will be on one frequency and not scattered over 5 or 10 K. As you all know, our main talking point for a net is that 40 or more stations will be operating on one net frequency. There should be more effort made in using only one net frequency. Try to get everyone to zero on net control frequency whether it be the exact net frequency or not. By doing this all stations will be on one frequency and not scattered over 5 or 10 K and then a tour of local radio and TV station KFSD. K6BPI was disrupted for a time when he sat down to operate one evening and his chair went through the floor in the shock and is active again. We are sorry to report that W6JUT, long-time AO, enthusiast in San Diego, was hospitalized for surgery. With summer now in full swing, please remember to supply your SCM with news for this column. Traffic: W6LBK 2563, W6EOT 588, K6KCR 251, W6KVB 4.

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—SCM, C. C. Pool, K5NO. SEC: K5AEK, PAMS: BBO and W5Q RM; ACR: A reminder to net managers: Now is the time to get all the information together to report your nets Aug. 1 is the beginning date for net registrations so get the information together and send it in. Speaking of reg, I think the net managers and net control should pay a bit more attention to frequency. Try to get everyone to zero on net control frequency whether it be the exact net frequency or not. By doing this all stations will be on one frequency and not scattered over 5 or 10 K. As you all know, our main talking point for a net is that 40 or more stations will be operating on one net frequency. There should be more effort made in using only one net frequency. Try to get everyone to zero on net control frequency whether it be the exact net frequency or not. By doing this all stations will be on one frequency and not scattered over 5 or 10 K as well as an ORS. The June meeting of the San Diego DX Club was held at the home of W6MIF. WA6BRUX went to Alaska with a local YMCA group from San Diego. The Helix Club enjoyed a ladies' night dinner in June and then a tour of local radio and TV station KFSD. K6BPI was disrupted for a time when he sat down to operate one evening and his chair went through the floor in the shock and is active again. We are sorry to report that W6JUT, long-time AO, enthusiast in San Diego, was hospitalized for surgery. With summer now in full swing, please remember to supply your SCM with news for this column. Traffic: W6LBK 2563, W6EOT 588, K6KCR 251, W6KVB 4.
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**Hallicrafters SX-101A**
Covers 60, 40, 20, 15 & 10 meter bands plus a 2 & 6 meter con-
version band. Large slide rule dial. Illuminated dial. Functions with A. V. C. or Pre-
cial 10 mc position for WWV. 
New product detector.
Amateur Net... $399.50

**Versatile Miniature Transformer**
Same as used in W2EL SSB Rig—March 1956 QST. Three sets of CT windings for a com-
bination of impedances: 600 ohms, 5200 ohms, 22000 ohms. 
(Where using centertaps the im-
pedance are quartered. The ideal transformer for a SSB trans-
mitters. Other uses: in-
tersstage, transistors, high im-
pedance choke, line to grid or plate, etc. Size only 2 h. x 3/4" w. 3/4" d. New and fully shielded.
Amateur Net, ea. $1.39
3 for $3.49 10 for $10.75

**Central Electronics 100V Exciter-Transmitter**
NO TUNING (except VFO), uses famous CE BROADBAND system, PRECISION LINEAR VFO—1 kc calibration. Single knob bandwidth 80 thru 10
SSB—DSB—AM—PM—CW
and FSK. RF output adjustable
10 to 100 watts FSK. Meter reads
Watts Input, Amps Output and
Carrier Suppression. 20" RF scope. Speech level & load mis-
match indicators. Audio filter—
Inverse feedback—50 db Carri-
er and Sideband Suppression.
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**Sub-Miniature 0-200 Microampere Meter**
A high quality instrument made by inter-
national Instrument Co. (Model 100). Only 1" in diam. Ideal for limited space applications
& transistorized circuits. A natural for transistorized grid dip oscillator as described in June ’56 QST.
Amateur Net $3.95 ea. 2 for $7.50
2" round 0-500 microamperes. Bakelite case. Made by
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Amateur Net $2.95 ea. 2 for $5.50
Weston 2" 0-4 amp RF meter Model 507. A giveaway at
$2.95 ea. 2 for $5.50
1/16" square (ruggedized) 0-100 microamps.
$3.95 each 2 for $7.00

**New Stanco Filter Choke**
4 by 250 ma. case filter choke, weight 8 lbs.
Regular Price $6.96
Special Price $1.95

**“Wonder Bar” 10 Meter Antenna**
As featured in Nov. 1956 QST. Complete with 6 & W
3013 Miniductor. Only 7 ft. long for 10 meters. Wt. 5 lbs.
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Rated output: 625 V, DC at 225 ma. High efficiency, compact.
New, recent military production. 5" diameter. 20" long. Wt. 18 lbs. Price......$11.95

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No. 1—NOVICE CODE COURSE. You get and keep 10 recordings (alphabets through 8 W.P.M.) Includes typical FCC type code exams. Free instruction book on learning how to send and receive code the simplest, fastest way; plus charts to check your receiving accuracy; plus an album; all for the low price of only: 45 r.p.m. $5.35 33t/Q r.p.m. $4.95 78 r.p.m. $6.95

No. 2—SENIOR CODE COURSE. You get and keep every-thing in the Novice Course except that you get 12 recordings (alphabets through 18 W.P.M.) plus typical FCC type code exams for General class. Also includes 12 commercial telegraph discs: 45 r.p.m. $10.50 33t/Q r.p.m. $9.50 78 r.p.m. $11.50

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No. 4—COMPLET AMATEUR AND ITH THEORY COURSE. A complete, simplified home study course tackling radio covering the Novice, Technician, Conditional and General classes— all under one cover— with the help of interesting tests, a few of typical FCC type questions to prepare you for license exams. No technical background required. You also get FREE, a guide to setting up your own ham station. All for the amazing low, low price of:

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CANADIAN DIVISION

ONTARIO—SCM, Richard W. Roberts, VE3NG—TX was involved in a rather serious accident with his boat and has been unable to be on the air. His sister, Lila, is now operating from his ham shack for a few hours each day. K5SVC is on the air with a DX-60. Our hat is off to K5MBK for making HPL and helping K5USA to make HPL also. OKlahoma’s K5FPJ is off to Texas to give his FB contributions to the League and to ham radio in general. Traffic: (May) KUSTA 14, MRK 260, CAY 410, LOM 382, STE 175, NBX 4, TDK 2, W2DFJ 3, INC 32, JTW 20, WMAQ 20, MGK 21, K5WJ 16, W1XXM 14, PNG 14, K5ELG 15, W3WAF 11, K2CA 9, KON 8, BNQ 7, W6V 5, V4V 4, K5JQ 3. (Apr) W5W 12, J5M 1.

AND COMMERCIAL BROADCASTS EASILY

NOW... Pass FCC Amateur and Commercial Exams EASILY

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APPROVED, SIMPLE, FAST, HOME STUDY
75 cents, 34t/Q r.p.m. Unbreakable Phonograph Record & Easy-To-Understand Books Has Helped Thousands Pass Commercial and Amateur Code Exams, Amateur Theory Exams, for FCC License!

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No. 1—NOVICE CODE COURSE. You get and keep 10 recordings (alphabets through 8 W.P.M.) Includes typical FCC type code exams. Free instruction book on learning how to send and receive code the simplest, fastest way; plus charts to check your receiving accuracy; plus an album; all for the low price of only: 45 r.p.m. $5.35 33t/Q r.p.m. $4.95 78 r.p.m. $6.95

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DXCC, UFO, was elected to Tau Beta Pi, honorary engineering scholastic society at the U. of Colo. The Boulder Amateur and Maxon Airfield Clubs hosted their annual Fall Day, KNSVCA is on the air with a DX-60. Our hat is off to K5MBK for making HPL and helping K5USA to make HPL also. OKlahoma’s K5FPJ is off to Texas to give his FB contributions to the League and to ham radio in general. Traffic: (May) KUSTA 14, MRK 260, CAY 410, LOM 382, STE 175, NBX 4, TDK 2, W2DFJ 3, INC 32, JTW 20, WMAQ 20, MGK 21, K5WJ 16, W1XXM 14, PNG 14, K5ELG 15, W3WAF 11, K2CA 9, KON 8, BNQ 7, W6V 5, V4V 4, K5JQ 3. (Apr) W5W 12, J5M 1.
LIMITED TIME OFFER FROM RADIO SHACK!

BONUS TRADES

NEW GSB-100 SSB TRANSMITTER

- A complete SSB transmitter or exciter for higher powered linear amplifier!
- Operates on SSB with selectable sidebands AM, PM, or CW!

Matchless power at this price! 100-watt P.E.P. power input. Transmits both sidebands when on AM. Voice-operated control system. Quick band change in 80, 40, 20, 15 and 10 meters. Pi-network output! Order No. 45DX522

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$47.95 down, $24 monthly

Sh. Wt. 67 lbs.

NEW GSB-101 LINEAR AMPLIFIER

- More watts-per-dollar!
- 80, 40, 20, 15 and 10 Meter Coverage!
- Pi-network output—matches 30-200 Ohms!

More features for the money! Built-in DC-operated antenna relay for quiet operation. Four 811A tubes; two 866A rectifiers. 1000 watts P.E.P. Grounded grid principle utilizes full driving power in output. Only 60-70 watts driving power needed. Order No. 45DX523

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NEW 6 METER FIXED STATION COMMUNICATOR

- Transmitter, receiver, power supply all-in-1!
- Husky 40-50 watt transmitter!
- Sensitive, selective communications type receiver!

One of the best values you'll ever see in a complete station "package"! Pi-network output. VFO spotting. Adjustable squelch, efficient noise limiter. Compact 7½” x 12½” x 13”.

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$319.50

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Order No. 45DX246 Sh. Wt. 35 lbs.

SAVE $1155 on GONSET CARBON MIKE!

Radio Shack special purchase! Sale $79.50

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For all Gonset communicators or any unit using carbon microphone. Push-to-talk button, kink-proof coil cord, etc. Order No. 911101 Sh. Wt. 2 lbs.

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24 to 36 jumbo pages month after month for a full year crammed with savings on ham radio, hi-fi, etc.

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1960 Complete Guide to Electronic Buying

Over 250 profusely illustrated pages, size 8½” x 11”, with authoritative articles, plus complete catalog on ham radio, hi-fi, etc. Issued in September.

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□ Send Bargain Bulletins FREE for 12 months
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Over 250 profusely illustrated pages, size 8½” x 11”, with authoritative articles, plus complete catalog on ham radio, hi-fi, etc. Issued in September.
Use this Model 504C multi-band frequency multiplier as a low power transmitter or driver for high powered amplifier.

The tuned 807 final stage provides 25 watts power output on 80-40-20-15 or 10 meter bands. Frequency control derived from an external crystal oscillator or VFO between 3500 and 4000 kc. Filament and D.C. plate voltage from external power supply.

Whether you are a novice or an experienced operator building for the future you will find this an excellent basic unit. It can drive a KW final, and SSB operation using the B&W 51SB is easily accomplished. See the Model 504C at your dealer or write B&W for information.

**Frequency Multiplier**

**Driver Transmitter**

**Model 504C**

Price: $60.00

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**DOW-KEY**

**Silent COAXIAL RELAY**

GUARANTEED FREE OF HUM OR CHATTER

**DKC-GE**

Power consumption, AC models approx. 1 watts. DC models approx. 5 watts. VSWR at 150 mc 1.1 and 1.2 at 300 mc. Coil voltages: AC 6, 12, 24, 115, 230; DC 6, 12, 23, 18, 110, 220. Special coil voltages available.

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**DOW-KEY CO. INC.**

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**Parametric Amplifiers**

(Continued from page 16)

best average reception over 144 to 144.2 Mc. The signal generator was connected into one jack at 144.1 Mc. with outputs up to 100,000 microvolts available. The usual 2-meter receiver was disconnected and an APR-1 receiver tuning 300 to 1000 Mc. was substituted. By using another signal generator in the 450-Mc. range, the input to the APR-1 receiver could be found by the substitution method. At the pump frequency of 482 Mc. the output across 50 ohms measured 80,000 microvolts or 80 millivolts. A high-Q 144-Mc. circuit between the antenna and the parametric amplifier is indicated for reducing radiation from this source.

The unwanted output at the two idler frequencies, 626 and 338 Mc., was in direct proportion to the signal input at 144 Mc. It measured 5000 microvolts for a 10,000-microvolt input, 500 for 1000, and 50 for 100, at the lower idler frequency of 338 Mc. At the upper frequency of 626 Mc. the outputs were 2000, 200 and 20 microvolts, respectively. Since the parametric amplifier would probably only be used on signals of 1 microvolt or less, the outputs at 338 and 626 would be less than 1 microvolt — not enough

(Continued on page 140)
You’re “On the Move”... with the Hy-Gain Trap Traveller

MOBILE PORTABLE DIPOLE BEAM

★ Automatic 10, 15 and 20 meter operation with ENTIRE WHIP OPERATIVE on all three bands for MAXIMUM EFFICIENCY.

★ Unique three band frequency selective circuits select proper amount of inductance for high efficiency CENTER LOADED whip operation on 15 and 20 meters. Loading coil is automatically shorted out for full sized quarter wave whip operation on 10 meters.

★ Coil is high Q air wound of No. 14 copper wire on ribbed high impact styron form. Entire assembly is enclosed in completely weatherproof, air tight plastic cover. Air foil design, only 1½” wide and 4½” high. Handles up to 3000 watts power.

★ May be used with any standard 3’ base section and 5’ whip, or Hy-Gain’s new telescoping base and whip assembly. Telescopes down to only 29” for easy garaging. Especially designed high pressure knurled knobs maintain perfect mechanical and electrical contact in telescoping sections when whip is fully extended.

★ Designed for 52 ohm Coax, SWR less than 2:1 on all bands.

AUTOMATIC LOADING COIL
NO. T-3

Trap Traveller mobile automatic three band loading coil Model No. T-3. May be used with any standard three foot base and 5’ whip or with Hy-Gain telescoping base section and top whip assembly. Air foil design only 1½” wide by 4½” high.

Trap Traveller Telescoping Base Section

Hy-Gain telescoping base section and top whip assembly, Model TBW: fits all standard mobile mounts. 5’ top whip, when used with Trap Traveller coil telescopes from 8’ 4½” down to 3’. Positive grip, knurled knob connections.

Portable MICRO-DIPOLE KIT

Trap Traveller Dipole Kit requires two 3-band loading coils and makes into M I D G E T high efficiency dipole for 10, 15 & 20M. Mounts anywhere; matches 52 ohm coax; low SWR, all three bands. 16 ft. overall when extended. Sections collapse to 3 ft. for easy carrying. Complete with all hardware (less the two loading coils). Wt.: Only 2½ lbs. Model TDK: $9.95. Complete Dipole with loading coils $29.95.

Universal Mounting Bracket

Uniquely adjustable screw driven clamp mechanism with 2’ mast for mounting the Trap Traveller Dipole or Beam almost anywhere. Adjustable through a 90 degree arc from vertical to horizontal. Wt.: Only 2½ lbs. Model UB: $9.75.

CONVENIENT PLASTIC CARRY BAG

Attractive and convenient plastic carrying bag with full-length zipper holds either Dipole or Beam when collapsed. Plenty of space for Trap Traveller coils and Mounting Bracket in addition. Model TCB: $8.95.

PORTABLE MICRO-BEAM KIT

Trap Traveller Beam Kit requires four 3-band loading coils and makes into world’s first miniature 3-element, 3-band portable beam, 16 ft. overall when extended, boom 6 ft. long. Collapses into 3 ft. package for easy transportation. All elements, boom, aluminum. All hardware included (less the four loading coils). Wt.: Only 9 lbs. Model TBU: $19.95. Complete Beam with loading coils $79.95.

Portable MICRO-BEAM KIT

for 10, 15 & 20 Meters

8’ 4½” Extended for Maximum Efficiency

Telescopes Down to Only 29” for Self-Storing and Easy Garaging

$14.95

$15.00

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TECHNICIAN—NOVICE—GENERAL
or Special Freq. 500 KC. to 160 MC.

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1.6 to 80 mc, with plug-in coils. For Phone & CW, Novices, General, CAP, Mobile, Complete with 8 x 1 x 8 cabinet, tubes, 40 meter coils & crystal. Wt. 20 lbs. $79.95
80, 20, 10 meter coils $2.91 per head. 160 meter coils $1.60.
MODEL 242 FOR 5 METERS OR 2 METERS — 45 WATTS INPUT — 6146 FINAL. Complete with mobile connections. AC, power supply, tubes, 800 xW tube input. Use 8 mc.
rate of 15 V, 900 kHz, Switching list matches S2 — 80 ohm
antennas. Same cab. as 240. $89.95

TECHNICIANS? The 6 meter 242 is your ideal transmitter, designed especially for 6 meters. Check these features: 55 to 50 watts input. Three 8 F stages with 6146 high efficiency straight through final. 100% phase modulation with pull modulation. High capacity double tuned circuits for maximum TVI suppression.

VFO $49.95

Send full amount or $25 with order — balance C.O.D.

LETTEINE RADIO MFG. CO.
62 Berkeley St.
ValleV Stream, N. Y.

How's DX?
(Continued from page 80)

Vice-President W3NW, now past the 250-mark, finds new ones so hard to find that he's getting sizable once more on 40 and 80. In line to W7DIT, K17DR does this summer's propagation conditions in Alaska. He's hoping for the usual August pick-up but the issue is in some doubt. Weather there is something beyond the heumm, too.

"VP2KJ operates single-sideband with a KWM-1 on 15 meters, establishes W8MXX, generally evenings between 21, 300 and 23,440 kc. Bob RG2WD, enjoys his Barbados retirement with 50 sideband watts, a Mohawk receiver, rotators and a ground plane..."

LEAFLET of the city of Puebla, Mexico, offers a "Fifth of May" DX certification to DXers throughout the world. Yanks can earn same by submitting proof of contacts with two Pueblan XEs on two bands, QSOs to date after the last of this year. For the finer points check with XE117F at the club address. "2 Puebla, Pue., Mexico, Maysday!" RU2YJ refers to direct mail, for UA0ON: W3AXT yeas for the current whereabouts of HS8W, X84A and SU12AI; and W8LMP will settle for a tracer on operator W3 of SV8W in 1958..."

Calif. DX Club's score points out that next year will mark W7JPS's silver anniversary as ARRL QSL manager for our sixth call area... VERON has V5E 2JC and 3ABE anticipating a 11-Me. St. Pierre stand later this month..."

W8LAIU relieves W5GK BUH and NW at the editorial helm of the West Gulf DX Club's DX Bulletin, one of the swiftest periodicals in its fold... XE1A AAT BI and CW, prime movers in XE1B matters, hope to provide more Revilla Gionos c.w., a.m., s.s.b. and radiotelegraph QSOs from Socorro in time to come... Check with W5JIN for details on Ohio Valley Award, a neat certification available to those who submit proof of necessary QSOs with OV1A members. Thirty-five points will qualify you at three points per 80-meter QSO, two points for 40, and one point on 14, 21 and 28 meters. "How's" lost a long-time contributor to band and is a wonderful specimen of the art when W62Z, ex-W1VW, joined Silent Keys in early May. After some 40,000 QSOs since 1927, the QSLs of W62Z will grace many a hamshack wall for years to come.

Ten Years Ago in "How's DX?" — Our August 1939 prologue argues for wider utilization of our lower frequencies for serious DX work... Eighty-meter activity reaches its midsummer low point but HS2UI and Y81B2 are in fine form, W4BBR to the 61-country mark on 3.5 Mc. On 40 we find FK3AB, G19DUB, KJOAP, K4AA and W6GOI/K... Rewarding diligent efforts in Mexico, KMO is good for AC4s RF YN, EK3s DO GW, F58AB, H2EBC, KCOs EA WA, MD2G, PK1DA, Mauritian's VK1AT, originating W6s, W1M/RS, K1AIK/RS, V8, ZD9AA, Mike manipulators manage M4-Me. A3 delights like EK1MD, IIL1BJ, MD2AC, MF2AA, PK2SS, VK1SI—VR1, W2ZLW, W373JL, W2ES and W2SF..."

Divers developments on the DX front: NY4s become KG1s with discourting suddenness... FFBAB of 1939s 15 fame is said to be set to initiate some ham activity in Madagascar... Israel's joining the ARRL DXCC Countries List causes some commotion because of border technicalities... Leaves bedevils the boss with eerie QRM... Pictures of H48A, Swiss DXCCers H2M, J BX and FE button up the offering.
NOW HEAR THIS! UNCLEDAVE IS NOW A HEATH AUTHORIZED DEALER! GET
"HEATHKITS"...BY FAR YOUR BEST INVESTMENT! PAY LESS...GET MORE!

Used Eqpt.

receivers

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<thead>
<tr>
<th>Model</th>
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<tr>
<td>Hallicrafters S32A</td>
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transmitters

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<tr>
<td>Johnson KW Amplifier</td>
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odd items

- Hand Carbon Mikes, dot...$10.00
- RG8U coax cable, per 100 ft...$10.50
- RG8U/ru coax cable, per 100 ft...$10.75
- RG59U coax cable, per 100 ft...$7.95
- RG59U coax cable, per 100 ft...$7.95
- RG59U coax cable, per 100 ft...$7.95
- RG59U coax cable, per 100 ft...$7.95
- 72 ohm KW twinlead, per 100 ft...$4.95
- Condensers, 25, 50, 75mfd...$0.69
- Butterfly condensers...$0.99
- Ceramic insulators, 1" to 3"...$0.29 - $0.69
- Clarostat controls, 800,000 ohm...$0.19

Citizen's Band Eqpt.

(11 meter)

We have all the name brands in Class D, (11 meter) such as — Morrow—
Elmac—Vocaline—Goniset—and Globo...as well as a full line of mobile
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The World above 50 Mc.
(Continued from page 71)

KAZSQ, Roswell, N. J. — Making OBS transmissions on
50 Mc. daily at 1430, beam NE.

W4FYR, Ft. Lauderdale, Fla. — Have heard 50-Mc.
signals on several occasions recently when there was no
evidence of sporadic-E skip on 28 Mc.

K4KWW, Chatham, Va. — Simple ground-grid r.f.
amplifier (schematic in Fig. 1) will make big improvement
in converters or receivers that are low in gain at 50 Mc.

Fig. 1—Schematic diagram of the ground-grid r.f.
amplifier for 50 Mc. used by K4KWW. Tube may be
417A, 6L4, 6AM4 or any similar v.h.f. triode.

L1—11 turns No. 28 close-wound on %-inch iron-slug form.
L2—3 turns wound over B-plus end of L1.
RFC—Solenoid v.h.f. choke (Ohmite Z-50).

Parts were assembled on flat aluminum plate, with no
shielding, but no trouble was encountered with oscillation.
Adjust L1 and C1 for best signal-to-noise ratio. Tube used
here was 417A, but any small high-Gm triode will work well.

W4KJ, Jacksonville, Fla. — Increased interest in 50-
Mc. ionospheric scatter makes possible many QSOs without
prearranged schedules. Following stations worked during May
by this medium: W2YVY K2RGG K2ABY GE2RX W3YNM
K3SIT W3ASD W3OMG W4LTU.

Built 13-element Yagi for 220 Mc. When using pierced
boom for mounting elements the boom diameter bas appreci-
able effect on element length at this frequency.

K6EB, Palisades Park, N. J. — Still looking for long-
distance skeds on 144 Mc. Would be glad to hear from
anyone having good equipment and antennas, for e.w.
skeds.

W7AKR, Ojai, Cal. — San Diego now has repeater on
Monument Peak northeast of city. Input is 147.18, output
145.38 Mc.

W6QYM, Sherman Oaks, Cal. — Transmitter hunts
gaining in popularity. Beams universally used on 144 Mc.
proximity detection methods on 50. Need for greater echo
drive in these events is obvious.

W6WXX, La Mesa, Cal. — Very short skip on 50 Mc.
June 10. Heard all call areas except W1, with stations
as close as Reno coming in well. Cued XE2WC, Tijuana,
and got him on, with resulting tremendous pileup of
northern W7s.

W7MAY, Reno, Nev. — Sporadic-E skip observed 8 days
in May. All call areas heard. Completed 15-element long
Yagi for 144 Mc. Hope to work Bay area on 144 Mc. as has
been done regularly on 50.

More Sporadic-E DX on 144 Mc. ! Observing very short
skip on 50 Mc. near the midpoint of the path to Florida,
W2SPW, Amarillo, Texas, cued W4GO, Sarasota, on 50
Mc. at 1430 EST, May 28. Changing to 144 Mc., W2SPW
was heard at once, S7, and a two-way on 144 Mc. followed
immediately. W4GO reports that W2SPW peaked over
90. The path remained open for about 15 minutes.

Later that same day, W4GO worked JH2W, Port-au-
Prince, Haiti on 50 Mc. It was the latter’s first 50-Mc.
QSO, and probably the first JH-W on 50 Mc.

On July 4 at 1615 EST, W8CHT, Rochester, Mich.,
noticed very short skip on 50 Mc. He, W9, Louis stations working
Indiana) so he went to 144 Mc. At 1645 he heard W2SPW
working VE3ABW and later VE3HJ, W4LTU, Springfield,
W, heard W5EC, Denver, on 144 Mc. 1705 to 1715 EST, a
distance of 1220 miles.
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**Happenings**

(Continued from page 67)

B. Award a "Radio Pioneer Certificate" to amateurs licensed prior to April 6, 1917, in lieu of issuing them Extra Class licenses, but with all the privileges of the present Extra Class.

C. Change the permissible maximum power input of amateur stations by generally speaking, reducing the limit for all classes of licenses of amateur stations except those holders of Extra Class licenses (either Radiotelegraph or Radiotelephone) or "Radio Pioneer Certificates" who would be permitted a maximum power input of 1000 watts.

4. It is unnecessary to reprint here the reasons set forth in the aforementioned Memorandum Opinion and Order (see Mimec 67735), for finding this proposal to be neither feasible nor in the public interest. However, while denying that petition, the Commission did concur with its objective: to restore a degree of prestige to the Extra Class. It was stated: "Therefore, the Commission proposes to issue a Notice of Inquiry to explore the possibilities of restoring meaning and prestige to the Extra Class license. In this manner interested parties will be able to file comments containing alternative proposals which might accomplish the purpose desired both by the petitioner here and by the Commission." It is noted that this statement speaks of "alternative proposals" and the Commission wishes to emphasize that the aim of this Notice of Inquiry is to receive possible solutions from interested parties which have not already been examined and found unacceptable by the Commission.

5. Any interested person may file a written statement or brief setting forth his views on this matter on or before September 15, 1959. If, as a result of this Notice of Inquiry, the Commission should subsequently initiate a Notice of Proposed Rule Making adequate opportunity will be afforded interested parties to file comments on any such proposal.

6. Pursuant to the provisions of Section 1.51 of the Commission's Rules, an original and fourteen copies of all statements, briefs, or comments filed shall be furnished the Commission.

**RACES EXPANSION**

As mentioned briefly in this department last month, FCC has expanded, effective July 1, 1959, the frequency segments available for use by the Radio Amateur Civil Emergency Service. In its order the Commission noted a misunderstanding on the part of at least some of the individual amateurs who filed comments in the belief that the FCC proposal would withdraw such segments from normal amateur operation; the Commission took pains to point out that no frequencies were being excluded from normal amateur operation (see also page 9, April QST). The complete list of RACES frequencies which are now in effect appears on page 166 of February QST; we tabulate herewith only those which are newly available to RACES as of July 1:

For use by all RACES stations in emergency areas when required to make initial contact with military units, also for communications with military stations on matters requiring coordination: 3510-3516 ke., 3516-3550 ke., 3984-3990 ke., 7097-7103 ke., 7103-7125 ke., 7245-7255 ke., 14047-14053 ke., 14220-14230 ke., 21047-21053 ke., and 21077-21083 ke.

In the event of actual civil defense emergency, segments from normal amateur operation; except for used by all RACES stations in continental U. S. only, with e.w. and f.s.k., and voice emission also when the segment is part of an amateur band where emission is authorized amateurs: 3510-3516 ke., 3516-3550 ke., 3984-3990 ke., 7097-7103 ke., 7103-7125 ke., 7245-7255 ke., 14047-14053 ke., 14220-14230 ke., 21047-21053 ke., and 21077-21083 ke.

In the event of actual civil defense emergency, segments marked with an asterisk are available only during the initial 30 days of such emergency unless otherwise ordered.

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22 ft. to 100 ft.

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VE/W Results

(Continued from page 81)

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K8AHI. . . . . 39,955
K8CPY. . . . . 29,770
W6BJY. . . . . 11,900
W6CLZ. . . . . 618

K6OHC. . . . . 64,080
W6PHF. . . . . 24,518
W6CQI. . . . . 12,640
W6GKJ. . . . . 16,245

S. P.
K6GPH. . . . . 83,031
W6LWL. . . . . 28,685
W6YOM. . . . . 3772

S. C.
K6MXA. . . . . 103,806
K6KFT. . . . . 4874
W6DWJ. . . . . 3249

New Jersy
K6HJ. . . . . 17,328
K6KRM. . . . . 12,688

Conn.
W1EY. . . . . 38,988
W1W. . . . . 34,602
W1WY. . . . . 32,490
W1SAD. . . . . 18,844
W1FJ. . . . . 15,555
W1DX. . . . . 13,285
W1HM. . . . . 12,776
W1JH. . . . . 12,123
W1R. . . . . 10,017
W1W. . . . . 8,707
W1H. . . . . 6,560
W1W. . . . . 4,383

W1EY. . . . . 26,766
W1MB. . . . . 20,914
W1KRM. . . . . 19,787

N. H.
W1FZ. . . . . 26,967
W1CUL. . . . . 17,707

R. I.
W1KJ. . . . . 17,219
W1K. . . . . 15,102
W1R. . . . . 10,017
W3ZBD/1. . . . . 7148

Vt.
W1Q. . . . . 26,309
W1P. . . . . 14,227
K1DY. . . . . 9,750
W1NL. . . . . 6,510

W1KJ. . . . . 26,766
K1ZMM. . . . . 19,814
K1ADR. . . . . 17,409

W1FZ. . . . . 26,967
W1CUL. . . . . 17,707

W1KJ. . . . . 26,766
K1ZMM. . . . . 19,814
K1ADR. . . . . 17,409

K6XK. . . . . 5523
K6ML. . . . . 2924

K7CDX. . . . . 11,047
K7AHI. . . . . 9,007

K7MK. . . . . 21,600
K6M. . . . . 10,108
K7R. . . . . 10,108
K8ML. . . . . 9,007

K6K. . . . . 36,551
K6I. . . . . 12,123
W4SKC. . . . . 10,606
W4SKC. . . . . 10,606
W4SKC. . . . . 10,606

W4KAC. . . . . 6031
K4HPR. . . . . 5977
W4PS. . . . . 3812
K4SAV. . . . . 3315
W4WOG. . . . . 2874

K6XK. . . . . 26,766
K7CDX. . . . . 11,047
K7AHI. . . . . 9,007

W4VPD. . . . . 42,454
K4LDR. . . . . 38,988
K4KOD. . . . . 15,415
K4HGC. . . . . 8,614
K4HOR. . . . . 1,414

W4VEY. . . . . 57,020
W4LDD. . . . . 15,162
W4US. . . . . 13,848
K4ZK. . . . . 7,118

W4WOM. . . . . 45,735
W4NKR. . . . . 31,190
W4SKC. . . . . 24,320
K6KU. . . . . 10,108
K6TZZ. . . . . 3239
K6GC. . . . . 4914
K6KAL. . . . . 1332
K6BEP. . . . . 3880
W4UGC. . . . . 1,190
K6FUK. . . . . 1,190

(Continued on page 148)
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Amateur Radio Invades

(Continued from page 146)

W3AAU, at her home just outside Philadelphia. Another typical set-up was perhaps a slight exaggeration, but showed Florence Collins, W3DBN, using a "Gooney-Box" in the kitchen while doing her ironing, talking to her husband who was mobile. The outside camera caught hubby in the car, and some very clever switching let the viewers watch and hear both sides of the transmissions. Florence stole the show with a parting remark to hubby to hurry home, "and don't forget a quart of milk!"

We next showed the DX operator's shack and were treated to a sideband chat with an amateur in Canada. Wes Sammis, W2YRW, manned our traffic set-up, and since a traffic net is a hard thing to come by in the middle of the afternoon, we taped one in advance and used the sound on the air, while Wes faked a bit, and did a good job. Woody Haldeman, W3PST, the Philadelphia County Civil Defense Radio Officer, and ARRL's George Hart, W1NJM, shared the next spot in discussing briefly the ham's part in emergency work. The outside camera again caught some action in the form of the Philmont Club's mobile unit wheeling into position. Ray Wilkins, K3BRL, manned the shop set, where we depicted an experimenting ham. Ray gave us some fast talk on sweep generators, but convinced everyone that a ham is also important, as a technician.

John Severn, W3ZSJ, came equipped with a tape recorder and a tape of some satellite reception to demonstrate the activities of amateurs in the field of satellite tracking. Frank Sandorra, W3TUU, brought along some of his radio-controlled aircraft and was caught in action by the ever-busy outdoor cameraman.

The entire presentation was necessarily very brief and perhaps seemed a little sketchy, but in half an hour one cannot possibly cover everything about ham radio and do it complete justice. Our only hope was that we interested some in our hobby. Also, it was our desire that the uninformed be better informed, and thereby become more tolerant of the neighborhood ham. It was with this thought in mind that we purposely selected adult operators to appear on camera, so that the general picture of a ham operator would be one of maturity.

There are those who say that K2MBT did a
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- No Baluns Or Matching Networks
- SWR — Less Than 1.2 To 1
- From 3 dB To 15 dB Gain Over Vertical Whip When Working
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- STACKED MOBILIER
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DUAL HALO $17.45

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It told me how other hams have seen the
opportunities in the booming business of
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From it I learned that it's a natural field for hams—on either
a full-time or part-time basis. So now I have my own mobile-
radio maintenance business—and my family is mighty glad I
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very smooth job as narrator, and that his ad lib presentation was a credit to ham radio. But Dick himself will tell anyone who asks that until the whole thing was over, radio experience or not, he was one nervous boy!!

**Well Worth the Effort**

What about the results of our efforts? We had spent about twelve weeks preparing for thirty minutes on the air. The total of man-hours that went into the preparation has never been fully determined. The station seemed very pleased. They have received a good mail response from the show, and their telephone switchboard was jammed for the better part of an hour after the show with compliments and thanks for a really worthwhile production. Later information comes to us that from as far away as Europe congratulations have come in for the effort we put forth. So all in all we feel that the job was well worth the effort we all put in. Amateur radio needs to be put before the public now more than ever, so we heartily encourage those in other areas to do the same as we did here in the Philadelphia area.

The public needs to know more about the Wonderful World of Ham Radio — truly one of the world's most perfect hobbies!

**Correspondence**

(Continued from page 86)

not make a go of it, until I flatly announced that I intended to answer no midwestern calls. After that I had to work through snide remarks, insults and deliberate efforts at QRM for another 20 minutes before we were finally able to complete the contact. Similarly, on the rare occasions when I can try short-skip contacts with Arizona and adjacent states I have trouble with Californians and Texans, even though these states are easy to work from my location. We "rare-state" operators work hard at filling requests for contacts with other states. I work stations at the rate of 30 to 40 an hour when conditions are right. QSL cards go out by the hundreds, giving me a postage bill that would stagger many hams, and it doesn't leave much time for friendly ragchews. I enjoy this popularity most of the time and will do my best to work anyone who needs New Mexico: all I ask is common courtesy and consideration.

— Frank Green, K1QQL

**HOW'S THAT?**

5911 Chester Avenue
Philadelphia 43, Pennsylvania

Editor, QST:

Please tell me — what means "fixed portable" we hear so much on 10 meters?

John P. Stowe, W3JQE

**Geneva — 1959**

(Continued from page 59)

the Secretary of Commerce had been given no authority whatsoever to enforce any wavelength assignments other than those set forth in the law itself. When the short waves first opened up, every service in the country — Government, commercial and amateur — could operate anywhere it wanted to in the short-wave territory, and did, with increasingly chaotic results. The 1924 conference represented an attempt to solve an otherwise impossible situation by means of mutual agreements to be voluntarily respected by all services until the law could come along and catch
COGENT REASONS WHY YOU SHOULD USE THE NEW DELUXE
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up. Everybody was perfectly aware that the "regulations" resulting from these agreements were not binding, but everyone knew also that some sort of order was essential in order to continue operating at all.

In many respects, this 1924 Hoover Conference was a modern international radio gathering on a small scale. Every domestic service was present, pushing for all the short-wave territory it could get. The "shorts" were so brand-new that nobody had a clear idea of which waves were good for what; for that reason, everyone was out to get all that could be got, from one end of the scale to the other. Without going into detail (details in past QSTs for those interested) we may say that the outcome of the 1924 meeting was amateur bands as follows: 1500-2000 kc., 3500-4000 kc., 7000-8000 kc., 14,000-16,000 kc., 56,000-64,000 kc.

It was recommended that the Supervisor of Radio decide whether one license would permit the use of all these bands or whether multiple licenses would be necessary (it was later agreed that one would do the trick). Incidentally, it will be noticed that we were embarked on the idea of maintaining a harmonic relationship, so far as possible. The omission of any ten-meter assignment in the table, however, is accidental; there was no assignment. The reason for this is that the Hoover series did not extend as far as the ten-meter territory. The 5-meter assignment was incorporated by special request solely because of the fact that a small group of experimenters wished to work there; the same reason applies to a subsequent 400-401-Mc. assignment for beam experiments, made shortly after the conference by the Department of Commerce at the special request of ARRL.

Other bands were assigned to the various other services which wanted space in the spectrum and which, remember, were just as much entitled to it as we were.

Since the 1925 conference did nothing to alter this general set-up we will skip over it and say that during 1924, '25, and '26 we here in the U. S. operated in the 1924 bands. By mutual agreement, of course.

In the meantime, Congress was being bombarded with requests and entreaties for a new law but was still doing nothing about it. How long this might have gone on no one knew had it not been that in 1926 the so-called "breakdown of the law" came about when a broadcast station which didn't like its assignment on the mutual-agreement basis made a test case resulting in a court opinion denying the Secretary of Commerce the authority to compel stations to observe any specified wavelength assignments (outside the very broad limits previously mentioned in the basic law). Overnight, all the existing "regulations" which specified definite wavelength assignments were rendered inoperative. Any other service that wanted to could have started to operate in "our" bands, for instance. It was a tense moment! Would all the radio stations in the
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The function of the ARRL QSL Bureau system is to facilitate delivery to amateurs in the United States, its possessions, and Canada of those QSL cards which arrive from amateur stations in other parts of the world. All you have to do is send your QSL manager (see list below) a stamped self-addressed envelope about 4 1/2 by 9 1/2 inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner.

W1, K1 — G. L. DeGrenier, WIGKK, 109 Gallup St., North Adams, Mass.
W2, K2 — North Jersey DX Ass’n, Box 55, Arlington, N. J.
W3, K3 — Jesse Biehlerman, W3KT, P.O. Box 400, Balas-Cynwyd, Pa.
W4, K4 — Thomas M. Moss, W4HYW, Box 644, Municipal Airport Branch, Atlanta, Ga.
W5, K5 — Brad A. Beard, W5ADZ, P.O. Box 25172, Houston 5, Texas.
W6, K6 — Horace R. Groer, W6TI, 414 Fairmount Avenue, Oakland, Calif.
W7, K7 — Salem Amateur Radio Club, P.O. Box 61, Salem, Oregon.
W8, K8 — Walter E. Alasgrave, W8NGW, 1245 E. 187th St., Cleveland 10, Ohio.
W9, K9 — J. F. Oberz, W9DSO, 2001 Gordon Drive, Flossmoor, Ill.
W9, K9 — Alva A. Smith, W9DMA, 238 East Main St., Caledonia, Minn.
VE1 — L. J. Fodor, VE1FQ, P.O. Box 903, Halifax, N. S.
VE2 — George C. Goodo, VE2YA, 138 Lakeview Ave., Pointe Claire, Montreal 33, Que.
VE3 — Leslie A. Whetham, VE3QZ, 32 Sylvia Crescent, Hamilton, Ont.
VE4 — Len Cuff, VE4LC, 286 Rutland St., St. James, Man.
VE5 — Fred Ward, VE5OP, 990 Connaught Ave., Moose Jaw, Sask.
VE6 — B. R. Savage, VE6KO, 835 10th St., North Lethbridge, Alta.
VE7 — H. R. Hough, VE7IR, 1681 Freeman Rd., Victoria, B. C.
VE8 — J. A. E. Williams, VE8JW, P.O. Box 314, Whitehorse, Y. T.
VO1 — Ernest Ash, VO1AA, P.O. Box 8, St. John’s, Newf.
VO2 — Douglas B. Ritcey, Dept. of Transport, Goose Bay, Labrador.
KP4A — W. E. Mayer, KP4KD, Box 1061, San Juan, P. R.
KH6 — Andy H. Fuchikami, KH6BA, 2548 Nanaimo Dr., Honolulu, T. H.
KL7 — K7CP, 310—16th Ave., Anchorage, Alaska.
KZ3 — Catherine Hayes, KZ3KA, Box 407, Balboa, C. Z.

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**N. E. Division Convention**

*Continued from page 10*

Sunday afternoon.

The entire facilities of the beautiful new Statler-Hilton Hotel will be devoted to the convention. Parking space will be plentiful, and a special late checkout time will be provided for convention guests. Charter bus service and guided tours of ARRL Headquarters and the Maxim Memorial Station, W1AW, throughout Saturday.

Outstanding speakers have been engaged for the technical programs and general sessions. ARRL will be represented by President Dosland, W0TSN, and several members of the Headquarters staff. Banquet toastmaster: George Bailey, W2KH, former League President, and long-time leader in amateur affairs. Special facilities and program for the ladies. Gala Saturday-night party, with dancing to the famous Landerman Orchestra.

Hotel and convention registration forms were mailed to New England ARRL members during July. These should be returned as soon as possible. Amateurs from other areas are cordially invited, but advance registration is recommended. Write Harold E. Flagg, W1RVZ, 80 Cedar Ridge Drive, Glastonbury, Conn. Prices: Admission and banquet — $8.50. Admission only — $4.00. At door: Admission only — $4.50. Banquet, if available, $5.50.

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General purpose attenuator for exciters up to 150w input. Suitable to attenuate drive between many excitors and condenser microphone. 200-450 ohms. Can be connected between input and output connectors. Tap switch to select any of three attenuation positions or straight through.

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60w CW, 55w AM input on both 6 & 2 M. Single control bandswitching, 4-stage RF section allowing straight through operation. Grounding and TVI-suppression. RF stages metered. Provisions for mobile use. 85-72 ohm cross output. New doub-band final tank circuit eliminates switching. Variable antenna loading control. Reserve power socket on rear chassis for accessory use.

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34-109 receiver, new; $150; Heath N-3 scope, new; $37.50; SR-100 carrier (was modified; $75; needs minor adjustment as is); 2-304TL, new, $10; others each. Command transmitters, receivers, The Parson, box 768, Hartland, Ky.


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WANTED: GFR-90 and GSB-1. May also consider another first DX receiver, that has a two meter communicator, as a crank-up传到from local source. Joseph Marshall, Jr., 22 Chase Drive, Northport, L. I., N. Y.

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FOR Sale: Collins receiver 75A-3 with spkr, 10"; transmitter, new, $355; Harvey-Wells RS-8A receiver, almost new, $60.00; 2-304TL transceiver, $2.50. Inquiries invited. 1017 East 62nd, Cedar Rapids, lowa.

FOR Sale: Collins receiver 75A-3 with speaker, control board and controls. As new, $125.00 postpaid. J. M. Wettengel, W9STR, 3031 N. Monitor Ave., Chicago 34, 111.


LAMBERT TV2, 200 watt amplifier, regulator and rectifier, new, $155; Harvey-Wells RS-8A receiver, almost new, $60.00; 2-304TL receiver, instex box and 10 meter crystal converter, $76; 115Vac normally open 1000W 115V 60 cycle control, ideal for remote switching of power supplies. Also Heathkit 30 amp power supply, $45. Each. Linear Electronics, Inc., 109 Hammond St., Watertown, Mass.

WANTED: 5i6E-1 AC power supply for KW1-L J. Pritchard, 230 Beverly St., Titusville, Fla.

FOR Sale: Collins receiver 75A-3 with speaker, $125.00. RTN-111 a.p., $10; Heathkit 9A-SC, $25.00; 9A-SC, $50.00. Collins Radio Co., 15 Five St., Blue Point, L. I., N. Y.

WANTED: New Anzacope Model s2, please your wavelength, can be used on SSB or AM, $40; Model 26 teletype printer, excellent shape; $250; Model F8A teletype converter, converted to 455 Ke. $40. Paul Blum, W2KCR, 101 Kristin Road, North Syracuse, N. Y. All from F.o.b. Syracuse.

FOR sale: Collins SVE-2 excellent $310; SX-71, includes CQ meter, $230; Heathkit SK-3, $420. W9ZMF, 1030 Northland, Minneapolis, Minn.

TRADE: 721 Restoration co, 270 mile with Weaver KV scope, slugs, carrying case, plus Standard Flimsy King, 22 car. automatic pistol, with double loaded cylinder. I'm going to trade both for DX-100, Viking 11, SSB/ex or good receiver K9CPR. Dan Yarno, 830 First Ave., C., Lowvont, New Mexico. K9KZ, $300, I can part with it. 103rd Ave., 19th St., N. Okla. City, OK 73107. latest. I'll answer. Might trade. Will ship F.o.b. K4LVH/7, 168 Bennett St., New Haven, Conn.

BASL 6b, 6b turreted, TY-3 suppressed, $165; 4353-51 mechanical filter, new, $40, 1481; NBFM adapter, $10, W8HAD, Seattle, Wash.

**WANTED:** inexpensive Ham gear receiver, transmitter, etc. Fixed or mobile, but condition not important, must be cheap, commercial gear only. Ship to K0JLD, 2805 Waburton, Santa Clara, Calif. If you have a Ham gear receiver or a Ham gear transmitter you immediately, please help me get a start. Please state price.

**SELL:** SX-100 w/speaker, $225; Heath power meter, $17; Heath VFO, $375; KWM-50, $23; Communicator II, $12; $175. Will deliver within 50 miles. Write for details.

**PERFECT, unmarked DX-100, $170; HX-100, $185:** will take small all-band rer in trade. 2500 volt 2 amp. per watt supply. Complete. No trades.

**ssel:** Complete 100 watt 150 and GQZ power supply, modulator, Heathkit DX-2200, $75; KWM-50, GQZ, DX-2200, Commander 6, to 50 James power supply. GQZ 60V mod. converter, Heathkit DX-2200, $75; GQZ input transformer, $25; Volta trans., $20; Heathkit AA-20, $25; $185. Want: 8 K filter for 73AD, WD8DSV, Box 87, Webster, Mass.

**SELL:** Complete 100 watt 150. r.f. GQZ power supply, modulator, Heathkit DX-2200, $75; GQZ, DX-2200, Commander 6, to 50 James power supply. GQZ 60V mod. converter, Heathkit DX-2200, $75; GQZ input transformer, $25; Volta trans., $20; Heathkit AA-20, $25; $185. Want: 8 K filter for 73AD, WD8DSV, Box 87, Webster, Mass.

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Selling: Viking Adventurer with home brew 30 watt modulator $155, early cond, $300. Takes W6Z, 3531 Main St., Huntington, Mass.

FOR SALE: Collins KWM-1, 12V-DC and 110V-AC supplies, mobile mounting trap and mast; Master Flex stainless steel heavy duty couplers. Master Flex 9000L. Mobile Matrix Model 505 makes only five months old, excellent condition. Will sell complete, $100. R. L. Terrel, 640 South Kensington, La Grange, Ill.

FOR SALE: Johnson Parakennel, new cond, $250. Major H. W. Organ, 1327 Mineola Ave., Mineola, L. I., N. Y.


FOR SALE: DX-100 $150; RME 4300 $149; DX-71, $125; all in excellent condition. Price to cover all. John Mansheim, W0JCS, Fort Madison, Iowa.

FOR SALE: Matchbox BUl Rotunno, 1325 Mount Jackson Rd., New Castle, Delaware.

FOR SALE: Super selective T.F. amplifier for NC-500 as described in QST for Sep. 1957: parts for KVV and power supply; many other items. Write for details. Ed Armas, W2VOD, 11 Acorn Drive, East Northport, L. I., N. Y.

FOR SALE: Complete matchbox wanted. Westm, WA8X, 2611 N. 12th St., Seattle, Wash.

FOR SALE: Globe Scout 680, $80; Knight VFO, $25; both one year old. Used very little, Aramburu, Vl63, 57 Meeting Lane, Hicksville, L. I., N. Y. Tel. WELLS 4-1525.

SKIL: Lakos'ibre l'basemasr II with all-band VFO. $230; SX-96, Silver Spring, Md.

BELL: Latest model 75À3 with 800, 3000 Kc filters, io Kc calibrâ^

WANTKD: KWM-1 D.C. pwr supp. type 516R-1-12. R. Yeager

SWR bridge with meter, HC10 BSB converter, new. $110. Harry Webb. 125 Ocean Ave., 1455 Wilson, Chicago 40, Ill.

HQ-140-X receiver, like new, w speaker. Best offer over $175. R. Ranger, new, very latest, factory wired. Best offer over $200; BCott Jones. KOGTG, Senator, Nebraska.

BWAP: Telescope, 6 inçïi refleetor, 54 in. F.L., f9, ht aecuracy, with power supply, $45; Reathkit grid dipper, $12. Donald Horn.


FOR Saie: Portable mïil, $20; Garrard record-changer, G-E car-

FOR Sale: SX-99, wtUi speaker, $120; DX-35, $45; CC-5-50 con-

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FOR SALE: Heavy duty microwave tower, never used, consisting of 15' to 20' sections, hardware, mounting latches, etc. Dania, W2JQG, 54 Charles st., Clifton. N. J. Please write.

SILLS: Klenan 500 watt final: use as linear, complete with tubes, $80. Bohm 6L6G; Central Electronics 10-A eup, anti-tune, $90. 20 coils, $20; Electro-Voice 810 X212 oat and stand, $80. Gals: Consul set; components for $20. 400 watt linear, $50; Bud 39 in. rack, $150. 100 Kc oat, $30.00; two $15.00, $4. All plus post. J. Morgan. KB9UCC, 5621 Nework St., M. W., Apt. 101, Washington, D. C.

SILLS: Used S-53-A receiver, like new, recently overhauled. First SALE: Viglking II, push-to-talk DKI mike and stand; VFO, Matchbox supply and headphone VOX and AT for good tape recorder. W5RYK.

WANTED: 148-7591 for $2.40 at the door. Contact: Mr. Harry Hinderou, K1JHE, 619 Lindsay Rd., Carmel, Penn.

GRABIN: 148-7591 for $2.40 at the door. Contact: Mr. Harry Hinderou, K1JHE, 619 Lindsay Rd., Carmel, Penn.

WANTED: antenna counter tubes 14876, Bob Wilson. W5JHL, 1412 Brookland Dr., Dayton 6, Ohio.

SELLING Out: KWM-1 serial 40715. 5150-1 supply, FT20 mike. Vibroplex Lightning bug, all purchased new and used only a few hours. Offers wanted. K5VJ4, 10324 Vista La Cruz, La Mesa, Calif.

KWM-1 Serial number 337 with AC power supply. $695 E.O.U., W1UGF, 159 North St., Wethersfield, Conn. 

REGENCY ATR-1 converter, $65. Hallaerfiers 4X-106 6-meter reer, $45. B. J. Keyes. Mexico, Ind.

CONN E-21, 6 meter Communicator, used 2 hours only; in original carton for shipment, $195. A. L. Lawrence, 43-94 97th Pl., Corona, N. Y.


THUNDERBOLT with attenuator for $125; Gonset super six with 6 volt clipper, $30; 6 volt 100 amp. alternator, complete, $20; 2000 volt 1 amp. power supply components. Terms: Need; 2 meter Gonset K77A3, Hunker Hill, Ill.

HOST Offer: Station of WSTCK, deceased. NC-300 vs. sprk; Viking 11 w/Mod. 122 VFO; DO-101 mike on pt stand; BC-221A; Heathkit 22 valve VFO. Newer Model. AM-32. Stephon 268 carto. $65. W2RRS. GDO; Precision EV-20 VTVM and HP's probe; Trimm 2000 Ohm potentiometer. $1.98; 9 volt battery. $1.75. W9YK.

FOR Sale: KWVM-1 series 1087 Serial No. 100; S100, $5; 2 meter VFO; 6 meter VFO for sale in or near vicinity (lack cartons for shipment). Mrs. Robert Bessee, 507 Walker, Warren, Ohio.

WANTED: Collins KWS-1 and 75A-4: both in perfect condition. O. J. Mills, 1263 Grant Ave., Bronx 6, N. Y.

FOR RECEPTION: ATR-1 converter, $75. Hailaerfiers 4X-106 6-meter reer, $45. B. J. Keyes, Mexico, Ind.

FOR Sale: Collins 75A4 with 3.1 Kc filter and speaker. In perfect cond. Hillyard, 124 L. J. Gammill, Box 283, Plaquen River, Md. Phone Great Mills 1194.


FOR Sale: DX-40, $60; Knight VFO, $30. Ralph Pincus, WA2AWH. 1200 Grant Ave., Bronx 6, N. Y.


WANTED: RM6 VHF-152. Ken Goodwin. Best View, Quaker Hill Rd.

FOR Sale: NG-100, no speaker. $35; Lettuce Mod. 210, $50; 4th order in gut cond. Local deal only and Edisto xmr. $20. K2DDD, 2245-64th st., Brooklyn 4, N. Y.

WANTED: HME VHF-152. Ken Goodwin. Best View, Quaker Hill, Conn.

SELLING Out: Viking Jupiter, push-to-talk 10671 mike and stand; VFO. Matchbox supply and headphone VOX and AT for good tape recorder. W5RYK.


WANTED: Technical manuals and tube test data bulletin for use with tube tester 1-177 and adapter, MX-945-1. KNSNSJ, J. WU-CH, 1971 Upper Terrace, Kendall 17, Ohio.

HCA 1682, in 4x condex. $2.25; Viking I VFO, push-to-talk, $10. K2JJH, 188 Davy St., Shreveport, La., by Louis M. Gregory. W5FLZ, 3025 Old Moorsport Rd.

SELLING Out: KWM-1 serial number 337 with AC power supply. $695 E.O.U., W1UGF, 159 North St., Wethersfield, Conn. 

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TONE MODULATOR FOR GRID DIP METER

The Millen "Designed for Application" No. 90751 Tone Modulator is a small package, containing a transistor audio oscillator and a mercury battery, which plugs into the phone jack of a Grid Dip Meter to modulate the signal at approximately 800 cycles for applications requiring a modulated signal. Modulator is automatically turned on when plugged into a Grid Dip Meter jack.

In addition to its prime use in modulating a Grid Dip Meter, the No. 90751 may be used in other ways. The Tone Modulator has sufficient power output to drive a pair of headphones without amplification. Therefore it may be keyed for code practice or it may be plugged into the mike jack of a phone transmitter to provide a tone for modulation checks and for modulated C.W. emission. Dimensions: only 4 x 1 7/8 x 1 1/2 in. Weight: 4 1/4 oz.
BILL WILKINSON, W1HA—former sonar field engineer—is now a division staff engineer with Raytheon's Government Services Division. One of Bill's present assignments is with the most comprehensive underwater sonar system yet devised—Raytheon's AN/BQQ-1 for the Navy.

Even in the Navy, submarine duty is experienced by a select few. Bill Wilkinson, W1HA, and a special crew of Raytheon field engineers belong to this exclusive club and find the experience interesting and stimulating.

Bill—who points out that Raytheon field engineering experience has been a valuable asset in his career—is now a division staff engineer with overall responsibilities for sonar field engineering. Many Raytheon executives have been appointed to their present positions from field engineering assignments.

In addition to the sonar program, there are Raytheon field engineering opportunities in missiles, fire control, ground and bombing radar, radar countermeasures. To qualify, you should have field experience in one or more of these fields—and preferably an EE degree.

Benefits: attractive salary, assistance in relocating, insurance, educational programs. You'll join a friendly group and a long list of hams around the world.

Please contact R. E. Guittarr for details.
ALLIED ham kit value

**knight-kit** MODEL G-30
A PRODUCT OF ALLIED RADIO

**GRID DIP METER KIT**
ONLY
$22.95
$2.30 down

Gives You Most for Your Money
- 1.5 to 300 mc continuous coverage
- Variable hairline for accuracy
- Minimum control readjustment
- Molded socket for long-life service

Helps keep your rig in peak operating condition. Measures resonance of RF circuits; also serves as absorption wave meter, oscillating detector, etc. Has highest frequency range in its price class, all the way out to 300 mc (continuous overlapping coverage in 6 ranges). Has variable hairline for top accuracy; hairline is printed on easily adjustable separate cursor, for precise calibration. Unique construction brings nearly constant oscillation across entire board. Easy, one-hand operation; fast-reading scales colored to match coils (color code printed on case identifies right coil instantly); blackface meter is easy to read — has quick response movement. Easy to assemble. Quality parts throughout. Case is sturdy satin-finish aluminum. All coils included in clear plastic box. Shpg. wt., 3 lbs. Order yours now.

Y-721. Grid Dip Meter Kit, only $22.95

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**knight-kit** R-100

**COMMUNICATIONS RECEIVER KIT**
Unexcelled Amateur Receiver Value

ONLY
$104.50

$10.45 down

This incomparable receiver kit is truly worthy of the advanced Ham. It has all the features, selectivity and sensitivity of high-priced commercial units to meet the highest standards of Amateur performance. Yet, for all its advanced design, it's a marvel of easy assembly, made possible by exclusive plug-in bandswitch and printed circuits. Here is true Amateur kit superiority (see highlights at right) at tremendous savings. Includes tubes, all parts, handsome metal cabinet (10 x 10 x 16") and step-by-step instruction manual. (Less phones, speaker and S-meter.) Shpg. wt., 30 lbs.

Y-726. Amateur Receiver Kit, only ........... $104.50
Y-727. S-Meter Kit for above, only .......... 10.75
Y-728. 4" Matching Speaker, only ........... 7.50
Y-256. 100 KC Crystal Calibrator Kit, only.... 10.95

OUTSTANDING FEATURES
- Better than 1.5 µv sensitivity on all SW bands
- Printed circuit bandswitch—exclusive feature
- Printed circuitry used throughout
- Tunes 540 kc to 30 mc in 4 bands
- Selectivity from 300 cps to 4.5 kc
- Bandspread on all Amateur bands
- Built-in Q-Multiplier
- Vernier dials—no strings used
- Minimum drift; volt. reg. B applied to HF osc.
- Constant-running HF oscillator
- Exalted BFO Injection for SSB
- Heavy-gauge steel chassis

BUY ON ALLIED'S EASY TERMS

ORDER FROM ALLIED RADIO
100 N. WESTERN AVE., CHICAGO 80, ILL.
OUR 39TH YEAR

168
NEW front pane! SSB selector with exclusive, new "IF SHIFT" for instant sideband choice...eliminates retuning or detuning.

NEW "Q" Multiplier provides razor-sharp rejection notch (more than 60 db deep). May be tuned continuously across entire receiver passband. Separate notch frequency and notch depth controls.

NEW 5-position IF selector provides sharp, SSB-1, SSB-2, medium and broad selectivity. .5 Kc, 2 Kc, 4 Kc and 8 Kc bandwidths provide optimum selectivity for SSB, CW, phone, phone net and VHF plus sideband selection.

NEW dual noise limiters. Separate automatic noise limiters for AM. Separate double-ended manual limiter for CW and SSB.

NEW tone switch provides for attenuation of highs, lows, or both for maximum readability.

NEW exclusive WWV converter provision. No interference with dial calibration or frequency coverage. Accessory calibrator provides one microvolt sensitivity on 10 mc WWV frequency.

NEW hi-speed, 40-1 tuning dial with logging scale.

NEW fine tuning vernier dial drive provides super-precision for CW and SSB tuning.

ADDITIONAL FEATURES:

Only $44.99 down*  
Suggested cash price: $449.00  
(slightly higher west of the Rockies)  
(and outside the U.S.A.)

*Most National Distributors Offer Budget Terms and Trade-In Allowances.

National
NATIONAL COMPANY, INC., MALDEN 48, MASS.
...uses RCA-811-A’s and RCA-866-A’s

Capable of delivering a single-sideband signal that carries the authority of real POWER, Gonset’s new GSB-101 Linear Amplifier has what it takes to do the job. Four RCA-811-A’s in a parallel, cathode-drive circuit “look” into the pi-network output. And 2 RCA-866-A rectifiers in the power supply handle the dc load.

Why RCA-811-A’s? (1) They’re high-pervenance design—take full power input at moderate plate voltage. (2) They’re high-mu—permit class B SSB service in cathode-drive circuit with low bias.

Why RCA-866-A’s? (1) They’re conservatively rated. (2) They have high peak-emission capability.

RCA-811-A’s and 866-A’s—and all RCA Power and Rectifier Tubes—are available at RCA Industrial Tube Distributors everywhere.

For the name of your nearest RCA Industrial Tube Distributor, call Western Union by phone and ask for Operator 25.